CHAPTER 5. CIRCULAR FLOW MODELS

The behavior of a macroeconomic system is determined by the interactions of a great many actors and institutions. The first step in studying an economy is to simplify the picture somewhat by defining a few fundamental components of an economy. The following description is general but directed toward the United States.

PRIVATE MARKETS The decisions of households and businesses ("the private sector") are expressed primarily through market exchanges operating according to the laws of supply and demand. A "market" describes all the parts that go into the process of buying and selling a commodity. We will be concerned with four macro markets.

1. The Product Market (PrM) refers to all the factories and stores in which goods and services are produced and exchanged.
2. The Credit Market (CrM) concentrates on the process of transferring money from lenders to borrowers; the credit market refers to all financial institutions: banks, credit unions, savings and loans, and the stock and bond markets.
3. The Labor Market (LaM) describes the process of offering and hiring labor services. This market can describe the general issue of how a nation's output is divided as income among wages, rent, interest and profit.
4. The Foreign Exchange Market (FxM) is where dollars are traded for the currencies of other countries. This exchange of currencies is crucial to the whole process of international trade and investment.

PUBLIC POLICIES The government influences the economy through two main avenues:
1. Fiscal policy is the use of government spending and taxes to influence the economy. The Treasury is the government organization in charge of fiscal policy.
2. Monetary policy describes the actions of the Federal Reserve controlling the supply of money in the economy.

CIRCULAR FLOW DIAGRAMS Circular flow diagrams are useful for summarizing the principle components of an economy and displaying how they interact. Almost every economics textbook includes a circular flow diagram of some sort. This section will construct several versions of the circular flow model that are roughly similar to those found in other texts, but which differ in detail.

THE BASIC CIRCULARITY. THE PRODUCT MARKET: Income & Expenditures
The basic circularity in an economy, which will be included in every circular flow diagram, involves the earning and spending of income. This is the basic circularity of an economy in which: Income ⇒ Spending ⇒ Income …
The accompanying circular flow diagram depicts the simplest possible model of an economy. Pay attention to the direction of the arrows. Start at the lower left of the diagram. The household-business sector (H/B) has income of Y. In this simple model all of that income is spent on current goods and services, as consumption (C). X stands for "expenditures " and denotes total spending. In this simple case all
Income is spent on consumption. The left side of the diagram shows that all spending is paid to the private sector as income. This income is then spent on purchasing more production, which becomes income, and so on.

Macro versus microeconomics.
Even with this very simple model we can see a profound fact of macroeconomics that distinguishes the economy as a whole from an individual (microeconomic) household. The simplest picture of a household’s finances would look like this:

```
Income → Household → Spending
```

In both the micro and the macro case one can imagine that spending is heavily influenced by income, that increases of income will lead to increases of spending.
Income ↑ ⇒ Spending ↑ is likely to be true whether one is thinking of a single household or to the economy as a whole.

But in the macro case we also get:
Spending ↑ ⇒ Income↑. If we, as a whole, begin to spend more, then we, as a whole, will get more income. Taken as a whole, our spending is our income.
This is not true in the micro case. If an individual household spends more, this will not cause that household’s income to rise.
This means that, while we can sometimes learn about macroeconomic behavior by comparing the economy to an individual household, we can also be mislead by the comparison.

THE TWO VIEWS
Much of this class will be structured around a comparison of two ways of looking at an economy. We can enumerate some of the basic characteristics of these two view-points. Each of the views (which we could also describe as theories or models) will be represented by a variation of the circular flow diagram - one by the Open Model, the other by the Closed Model.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>OPEN</th>
<th>CLOSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Perspective</td>
<td>short</td>
<td>long</td>
</tr>
<tr>
<td>Unemployment</td>
<td>high</td>
<td>low</td>
</tr>
<tr>
<td>Politics</td>
<td>“liberal” -- favoring gov’t</td>
<td>“conservative” -- opposing gov’t</td>
</tr>
<tr>
<td>Theory Name</td>
<td>Keynesian</td>
<td>monetarist</td>
</tr>
</tbody>
</table>
CIRCULAR FLOW DIAGRAMS

A. Every Circular Flow Diagram will have the essential macro circularity -- that income (Y) becomes spending (X), which becomes income to be spent again, and so on.

B. THE BASIC MODEL. *Every* model used will include, *at least*, Savings and Investment, in addition to C, X, Y. The simplest (Basic) version of the two models will therefore be:

**OPEN MODEL**

\[
\text{PrM} \xrightarrow{\text{X}} \text{Injections = I} \xrightarrow{\text{C}} \text{Leakages = S} \xrightarrow{\text{Y}} \text{H/B}
\]

**CLOSED MODEL**

\[
\text{PrM} \xrightarrow{\text{X}} \text{Injections = I} \xrightarrow{\text{C}} \text{Leakages = S} \xrightarrow{\text{Y}} \text{H/B}
\]

C. To these can be added, as needed for a specific problem:

1. **The Treasury.** Add Gov't. Purchases (G), (net) Taxes (T) and the Budget Balance (B).

2. **The Foreign Sector.** Add Exports (E), Imports (F) to the models. Add Foreign Capital Flows (K) in the Closed Model.

3. **The Treasury and the Foreign Sector** to get **The Full Model.**

4. **Money.** These diagrams start with some version of the Closed Model and add:

   a. **the Money Supply.** This requires adding a box for Fed - the Federal Reserve - and an arrow ΔMS between the Fed and the Credit Market to show the Federal Reserve changing the economy's money supply.

   b. **Money Demand.** This requires adding a box for Cash - to show the economy's demand for money - and an arrow ΔMD between CASH and the Credit Market to show changes of the economy's money demand.

   c. both Money Supply and Money Demand.
THE OPEN MODEL.

We will now get more realistic and more complicated by introducing more elements of the economy and displaying them on the diagram. We classify the economic flow variables into three categories.

1. **Domestic consumption**: (C) the purchases of US-produced consumer goods. Domestic consumption is the part of income that is immediately recycled back to the Product Market as Spending and returned to the Household/Business sector as Income.

2. **Leakages**: the part of income that does not directly return to the Product Market as spending. There are three leakages: Savings, Taxes, and Imports. Total leakages are the sum of these three. \((\text{Leakages} = S + T + F)\).

3. **Injections**: the part of spending that does not arise directly out of current income. There are three injections: Investment, Government Purchases and Exports. Total injections are the sum of these three types of spending. \((\text{Injections} = I + G + E)\).

The Open Model can be summarized by equations.

1. **Uses of Income**
   \[ Y = C + F + S + T \quad \text{Y = C + Leakages} \]

2. **Types of Spending**
   \[ X = C + E + I + G \quad \text{X = C + Injections} \]

3. **The Treasury**
   \[ B = T - G \quad \text{T = G + B} \]

THE CLOSED MODEL

A second view of the economy is shown by a *Closed Model* circular flow diagram. This model stresses the connectedness of the monetary flows. We can use this model to more completely define some of the elements of the circular flow, and to introduce the markets for credit and foreign exchange.

The Credit Market: Savings & Investment

Generally, not all current income is immediately spent on currently produced output by those who earn that income. Some income is saved \((S)\) and offered as lending in the credit market \((\text{CrM})\). These funds are borrowed and spent as investment \((I)\) by those in the economy who desire to spend more money than they themselves currently have available. Typically we will think of those borrowers as businesses buying capital (i.e. investing). The accompanying figure adds The Credit Market, savings and investment, to the circular flow.
Compare this treatment of saving to that of the open model which saw saving as a leakage -- something that disappears from the economy. The closed model stresses the fact that saving is not lost to the economy, it is merely rechanneled by way of the credit market. Income that is saved is actually spent, just by someone different than the person who initially earned the income.

*************** AN ASIDE: The meanings of C and I.

The symbols C and I may each be interpreted in two slightly different ways. One way is to define Consumption and Investment according to *who does the spending*: Consumption is spending by households; Investment is the spending by Businesses (on new capital). These are the official definitions, used in National Income Accounting (NIA).

The other way to define C and I are according to *where did the money come from?* We can define C as "spending out of current income" and I as "spending out of credit." These definitions better fit the circular flow (CF) diagram. Spending is classified according to the source of funds, whether current income or credit. The main differences between the two methods of classifying spending are: 1) the purchases of consumer durable goods, which are largely financed by credit, would fall under C in the NIA method and under I in the CF method, 2) reinvested corporate profits, which consists of businesses spending out of their current income, would fall under I in the NIA system but under C in the CF method.

<table>
<thead>
<tr>
<th>DEFINITIONS</th>
<th>DIFFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>I</td>
</tr>
<tr>
<td>National Income Accounting</td>
<td>Spending by households</td>
</tr>
<tr>
<td>Circular Flow Models</td>
<td>Spending out of current income</td>
</tr>
</tbody>
</table>

*************** END OF ASIDE

The Treasury And Fiscal Policy:
Government Purchases, Transfer Payments, Taxes & the Budget Balance.

The Treasury (TRSY) is the government agency that takes care of the government’s revenues and spending. Roughly speaking the Treasury is the government’s accountant. The US Congress is in charge of creating the government’s budget. That is the document that lays out what the government will spend and tax each year. The decisions as to what the government will tax and spend are known as fiscal policy.
The elements of fiscal policy are:

1. **Government purchases** of goods and services (G). This is shown on the diagram as money flowing from the Treasury to the Product Market to buy goods and services.

2. **Taxes** (T). This is shown as money flowing from households and businesses into the Treasury.

3. **Transfer payments** (TP). Transfers include all payments made to the public for which the government does not receive a good or service in return. Examples are welfare, veteran's benefits, Social Security payments, student aid grants and interest payments on the national debt. This would be shown as a flow from the Treasury to households, but is not shown for reasons explained in the next paragraph.

**Net Taxes.** (Tn) Transfer Payments can be treated as negative taxes. We can then define “net taxes” as the difference between taxes paid and transfers received, which simplifies the diagram somewhat by eliminating a separate line for transfer payments. Usually when we refer to “taxes” we will mean net taxes.

The fact that the government has two types of spending – purchases and transfer payments – is politically significant. The largest component on government purchases is for military spending. There is frequent disagreement between those who favor spending a lot on the military and those who favor spending a lot for transfer payments.

4. **The Government Budget Balance** (B) This is the difference between government income (primarily taxes) and spending (purchases and transfers). \( B = T_n - G \). There are three possibilities.
   a. **a budget deficit**, a negative budget balance, occurs if taxes are less than spending. The Treasury must borrow this much to cover its spending. This is the usual case in the US and most other countries.
   b. **a budget surplus**, a positive budget balance, occurs if taxes are greater than spending. The Treasury has this much left over after spending. This occurred in the US at the end of the 1990s.
   c. **a balanced budget** occurs if taxes equal purchases.

**The Treasury And Fiscal Policy in the Closed Model**
The closed model adds a significant idea to fiscal policy. The model insists that we keep track of where money from the budget balance comes from.
If the government spends more than it taxes, it has a **budget deficit**. This amount must be borrowed from the Credit Market. The arrow through B points to the right as money flows from the Credit Market to the Treasury.

In the case of a **budget surplus**, the money flows from the Treasury to the Credit Market -- the Treasury lends out the extra money it has collected but not spent.

### The Foreign Exchange Market: Exports, Imports & Foreign Capital Flows

The fourth participant in the macroeconomy (along with households, businesses, and the government) is the foreign sector: the rest of the world. The next figure adds the foreign exchange market (FxM), exports (E), imports (F) and foreign capital flows (K) to the circular flow diagram.

#### Net exports; Balance of Trade Deficits and Surpluses

The quantity E-F, the difference between imports and exports, is called the **balance of trade** or **net exports**.

If the balance of trade is positive (we export more than we import) we have a **trade surplus**; if the balance of trade is negative (we export less than we import) we have a **trade deficit**.

---

The **foreign exchange market** is used to indicate that goods purchased in other countries must ultimately be paid for in the currency of the producer country. That is, the money spent in the US to buy a Japanese automobile must eventually be traded for the yen needed to pay for the car in...
Japan. Likewise, foreigners who wish to buy US goods must get dollars to do so. The foreign exchange market exists to trade the currencies of different nations. It is crucial to the whole process of trade between countries.

Sometimes it helps in picturing the process of world trade if you imagine that in order to buy a good produced in another country you must first go to a foreign exchange bank, buy some foreign currency, and then use that currency to purchase the good from that country. This allows you to visualize the process of currencies being exchanged in order for international trade to proceed. It also allows you to see the effects of the value of a country's currency on its exports and imports.

**Foreign Capital Flows**

There are several reasons why a foreigner would want dollars.

1. **To buy our exports.** This is the major source of demand for our currency.
2. **To make financial investments in the US:** to buy American stocks and bonds or deposit money into an American bank. This demand for dollars will therefore be influenced by American interest rates. Higher US interest rates make dollars more attractive to foreigners.
3. **For foreign direct investment:** to buy American assets such as businesses and property.

In the diagram the last two flows are combined and shown as K -- a movement of money between foreigners and the US credit market, by way of the foreign exchange market. The symbol K is read as **foreign financial capital flows.** There is a lot of money flowing both in to and out of the US. We will think of K as the difference between the inflow and outflow. (A net capital flow)

A US capital inflow -- money going into the US credit market -- will be shown as a positive capital flow.

A US capital outflow -- money going out of the US -- will be shown as a negative capital flow.

The US has, for some years, experienced a capital inflow. Note that a financial capital inflow is likely to accompany a balance of trade deficit. The trade imbalance creates an excess supply of dollars around the world, likely to return to the US in the form of financial or direct investments.

A NOTE: This treatment of foreign capital assumes that dollars leaving the US will, one way or the other, return to the US. This is not entirely true and is less true of the US dollar than for most other currencies. The dollar is so widely accepted throughout the world that a certain number of dollars leaving the US never return; they become circulating currency in some other country. This is particularly true since some countries have actually begun “dollarize” their economies: to use dollars as their national currency. We will ignore this fact. Despite that omission, the insights of the diagram are broadly valid.

---

1 This is the one time in this class that the word "capital" refers to money, rather than referring to physical capital.
A Summary in Equations
(The first three equations also apply to the Open Model)

1. \[ Y = C + F + S + T \] (Uses of Y) Income is used for domestic consumption, for savings, for exports, and to pay taxes. Note that I does not appear in the equation.

2. \[ X = C + E + I + G \] (types of spending) Total spending on currently produced output is the sum of the spending by the four sectors of the economy.

3. \[ B = Tn - G \] The government’s budget balance is the difference between net taxes (taxes minus transfers) and government purchases. This number is positive if taxes exceed purchases (This yields a budget surplus, where the excess money flows to the credit market) or negative if taxes are less than purchases. (This yields a budget deficit so the Treasury must borrow enough to finance the difference between spending and net taxes raised). The equation can be rewritten as: \[ Tn = G + B \], saying that net taxes either go to purchases government goods, or provide a budget surplus.

4. \[ F = E + K \] This equation describes the foreign exchange market. The flow of dollars into the foreign exchange market (ie. dollars flowing out of the US to pay for imports) must equal the flow of dollars out of the market (ie., into the US to pay for exports and to be loaned back to the US credit market). This equality need not hold at all times, but it does indicate that there is a strong tendency for the currency of any country to return to that country, one way or another. This can also be written as: \[ K = F - E \], which says that the world is able to lend to our credit market an amount equal to our trade deficit.

5. \[ S + K + BB = I \] This equation describes the credit market. This says that the funds flowing into the Credit Market, available for lending (domestic savings, foreign lending and the budget surplus) will equal the amount flowing out of the credit market as borrowing by the private sector for Investment. (When the role of money is added, this equation will be modified to be: \[ S + K + ΔMS + B = I + ΔMD^2 \])

\[ \text{PrM} \rightarrow X \rightarrow \text{Cd} \rightarrow \text{FxM} \rightarrow \text{CrM} \rightarrow \text{Trsy} \rightarrow \text{H/B} \rightarrow \text{Y} \]

\[ \text{FxM} \rightarrow \text{E} \rightarrow \text{I} \rightarrow \text{G} \rightarrow \text{Tn} \rightarrow \text{B} \rightarrow \text{F} \rightarrow \text{S} \]

2. ΔMD and ΔMS respectively represent “the change of money demand” and “the change of money supply.”
EXAMPLES

1. An open model example

For this example we will show the effect of an investment increase of $10. The simplest model will be the basic variation. We start by putting the initial values on to the diagram, as shown on the left. The result is shown on the right. Notice that the numbers are crossed out so that it is still possible to read and compare, both the old and new values. It is not necessary to draw both diagrams. A final answer would look like the one on the right alone.

We can look at the two diagrams and say that the effect of having investment increase by $10 is that injections and total spending rise by $10. The economy is given a boost by the rise in investment spending.

NOTES:
1. Y is not to be changed.
2. Leakages and injections do not have to be the same, nor, in the open model, do Y and X have to end up the same. The purpose of the open model is typically to explain how and why an economy grows or shrinks. X and Y are typically not the same at the problem’s end.
3. Two equations must hold true at all times:
   a. $Y = C + \text{Leakages}$
   b. $X = C + \text{Injections}$
4. X greater than Y shows a growing economy. X less than Y illustrates a falling economy.

Economic expansion -- $X > Y$ -- if _____________________________

Economic recession -- $X < Y$ -- if _____________________________

2. A closed model example.

We can ask the same question of the closed model: what happens if investment rises by $10? The diagrams below answer the question.
The closed model gives a different answer than did the open model because the closed model demands that the amount going into and out of the credit market be the same. In this case that means that savings must equal investment. So when investment rose to $10, it was necessary for savings to rise also. (Businesses cannot borrow and invest unless someone is saving). But if saving is to rise, then consumption spending must fall. Remember that Y can’t be changed. The final effect is more investment, more saving, less consumption, the same aggregate demand.

In this version of the problem, you must have:
1. \( Y = C + S \)
2. \( X = C + I \)
3. \( S = I \) Notice that this equation was not included in the open model, because there is not a Credit Market in that treatment.

Question. Can you make \( Y \) and \( X \) be different?