Robert Ackerman

- rkackerm@live.unc.edu
- Office Hours: 2:00-3:00PM T/Th
- Office: PA202
- November 11, 2013
Today

• Writing Assignment #2
• Circular Flow
• Income Determination
• Fiscal Policy
Writing Assignment #2

• Coming tomorrow
• Due November 19th
Circular Flow: a simplified example
Circular Flow

Households

Wages (profits, dividends)

(Domestic) Consumer Expenditures

Firms
Circular Flow

Households

Wages (profits, dividends)

Rest of World

Imports

(0.1)

(0.9)

(Domestic) Consumer Expenditures

Firms

(0.9)
Circular Flow

Households

Rest of World

Imports

(0.1)

Wages (profits, dividends)

(0.9) = MPC

(Domestic) Consumer Expenditures

Firms
Circular Flow
Marginal propensity to consume (MPC): the increase in consumption from a one unit increase in disposable income.
Circular Flow

Households

Wages (profits, dividends)

Firms

(0.9) (Domestic) Consumer Expenditures

Rest of World

Imports

Q: What happens when there is an injection of $100?
Circular Flow

Households
+$100

Rest of World

Imports

(0.1)

(Domestic) Consumer Expenditures

Firms

Wages (profits, dividends)

(0.9)

+$100

Rest of World
## Circular Flow

First time through?

<table>
<thead>
<tr>
<th>Out</th>
<th>In</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10</td>
<td>$90</td>
</tr>
</tbody>
</table>
Circular Flow
Second time through?

<table>
<thead>
<tr>
<th>Out</th>
<th>In</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10</td>
<td>$90</td>
</tr>
<tr>
<td>$9</td>
<td>$81</td>
</tr>
</tbody>
</table>
## Circular Flow

Keep going...

<table>
<thead>
<tr>
<th>Out</th>
<th>In</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10</td>
<td>$90</td>
</tr>
<tr>
<td>$9</td>
<td>$81</td>
</tr>
<tr>
<td>$8.1</td>
<td>$72.90</td>
</tr>
<tr>
<td>$7.29</td>
<td>$65.61</td>
</tr>
<tr>
<td>$6.56</td>
<td>$59.05</td>
</tr>
<tr>
<td>$5.90</td>
<td>$53.14</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>
Circular Flow

If we kept going and then added up everything under “In” we’d get $1,000 for a multiplier of 10.
Circular Flow
To see this note that what we have is the sum of a geometric series:

$$\text{Sum} = S = \$100 + \$100 \cdot c + \$100 \cdot c^2 + \$100 \cdot c^3 + \$100 \cdot c^4 \ldots$$

Now if we multiply everything by $c$ that gives us:

$$S \cdot c = \$100c + \$100 \cdot c^2 + \$100 \cdot c^3 + \$100 \cdot c^4 + \$100 \cdot c^5 \ldots$$

Notice that the only difference between $S$ and $S \cdot c$ is $\$100$, So:

$$S - cS = \$100$$

$$(1 - c)S = \$100$$

$$S = \frac{\$100}{1 - c} = \frac{\$100}{1 - 0.9} = \frac{\$100}{0.1} = \$1000$$
Circular Flow

Multiplier: \[ \frac{1}{1 - c} \]

In our specific example:

\[ \frac{1}{1 - 0.9} = 10 \]

\[
\text{\$100} \times 10 = \text{\$1,000}
\]
A More Realistic Circular Flow

- **Households**
  - \(+ \$100\)
  - (Domestic) Consumer Expenditures
  - Savings
  - Imports: (0.1) Rest of World

- **Banks**
  - Wages (profits, dividends)
  - Taxes
  - Investment

- **Gov’t**
  - Investment
  - Gov’t Spending

- **Firms**

Aggregate demand = \( Y = C + I + G + \text{EX-IM} \)
Income Determination

\[ Y = C + I + G + EX-IM \]

\( Y \) = aggregate demand: the total amount that all consumers, business firms, government agencies and foreigners spend on final goods and services in a given period of time.

\( C \) = consumer expenditure (or consumption): the total amount spent by consumers on newly produced goods and services (excluding purchases of new homes, which are considered investment goods).
Income Determination

\[ Y = C + I + G + EX-IM \]

\[ I = \text{investment spending: the sum of the expenditures of business firms on new plant, equipment, software, and households on new homes. Financial investments are not included and neither are resales of existing physical assets.} \]

\[ G = \text{government purchases: refer to goods (such as airplanes and paper clips) and services (such as school teaching and police protection) purchased by all levels of government.} \]
Income Determination

\[ Y = C + I + G + EX-IM \]

\[ EX = \text{exports: what we sell to foreigners} \]
\[ IM = \text{imports: what we buy from foreigners} \]

Net exports = EX-IM

Note: this is also commonly referred to as the “balance of trade” or “trade balance”, and a positive balance is called a “trade surplus” and a negative balance is called a “trade deficit”.
U.S. Trade Balance (1989-2012)

Source: International Trade Administration, TradeStats Express http://tse.export.gov/TSE/
Economics 101

Circular Flow

Households

+$100

Firms

Wages (profits, dividends)

Rest of World

(0.1)

Imports

(Domestic) Consumer Expenditures

(0.9)

+$100
Income Determination

National income: is the sum of the incomes that all individuals in the economy earn in the forms of wages, interest rents, and profits. It excludes government transfer payments and is calculated before any deductions are taken for income taxes.

In general, national income = domestic product
Income Determination

Disposable income (DI): is the sum of the incomes of all individuals in the economy after all taxes have been deducted and all transfer payments have been added.

\[ DI = GDP - Taxes + Transfer Payments \]
\[ DI = GDP - (Taxes - Transfers) \]
\[ DI = GDP - T \]
Marginal propensity to consume (MPC): the increase in consumption from a one unit increase in disposable income.

Or: the ratio of the change in consumption relative to the change in disposable income that produces the change in consumption.

\[ MPC = \frac{\text{Change in } C}{\text{Change in DI}} \]
Income Determination

Consumption function: shows the relationship between total consumer expenditures and total disposable income, holding all other determinants of consumer spending constant.
Income Determination

Consumption function:

\[ MPC = \frac{\text{Change in } C}{\text{Change in DI}} = \frac{\$1900 - \$1000}{\$2000 - \$1000} = \frac{\$900}{\$1000} = 0.9 \]
Income Determination

Autonomous demand/expenditure (consumption): an expenditure (consumption) for which the level does not depend on the level of output in the economy.

Induced demand/expenditure (consumption): an expenditure (consumption) whose level depends upon the level of output in the economy.
Income Determination

Consumption function:

Real Consumer Spending

Real Disposable Income

Autonomous consumption

Induced consumption
Income Determination

Autonomous increase in consumption: is an increase in consumer spending without any increase in consumer incomes. It is represented on a graph as a shift of the entire consumption function.

Induced increase in consumption: is an increase in consumer spending that stems from an increase in consumer incomes. It is represented on a graph as a movement along a fixed consumption function.
Income Determination

Consumption function:

Real Consumer Spending

Real Disposable Income

Autonomous increase in consumption
Income Determination

Consumption function:

Real Consumer Spending

Induced increase in consumption

Real Disposable Income
Now we’re not looking at just consumption.
Income Determination: Example from 11/7

Expenditures

Autonomous expenditures

Induced expenditures

National Income
Income Determination: Example from 11/7

Q: Why?
A: Remember in general, national income = domestic product.

This is true when we have slope=1 which happens at the 45° line.
Income Determination: Example from 11/7

- Actual Expenditures
- Planned Expenditures

Diagram showing the relationship between National Income and Expenditures.
Income Determination: Example from 11/7

• The difference between planned and actual expenditure is unplanned inventory investment. When firms sell less of their product than planned, stocks of inventories rise.

• Because of this, actual expenditure can be above or below planned expenditure.

• Planned > Actual implies firms will decrease production

• Planned < Actual implies firms will increase production
Consumption function:

\[ C = \hat{C} + \text{MPC} \times (Y-T) \]

Where,

\( \hat{C} \) = autonomous consumption  
\( \text{MPC} \times (Y-T) \) = induced consumption
Income Determination: Example from 11/7

Imports:

\[ IM = IM + MPM \times (Y-T) \]

Where,

- \( IM \) = autonomous imports
- \( MPM \times (Y-T) \) = induced imports
- \( MPM \) = marginal propensity to import: the increase in value of imports due to a one unit increase in disposable income
Income Determination: Example from 11/7

Autonomous expenditures ($):
\[ C = 200 \]
\[ I = 100 \]
\[ G = 200 \]
\[ EX = 160 \]
\[ IM = 100 \]

Marginal Propensities
\[ MPC = 0.8 \]
\[ MPM = 0.1 \]

Taxes ($)
\[ T = 200 \]
Income Determination: Example from 11/7

Question: What is equilibrium level of income?
Income Determination: Example from 11/7

Remember:

\[ Y = C + I + G + EX - IM \] (rearrange)
\[ Y + IM = C + I + G + EX \]

In our current example:

\[ Y = \hat{C} + MPC(Y-T) + I + G + EX - [IM + MPM(Y-T)] \]
\[ Y + [IM + MPM(Y-T)] = \hat{C} + MPC(Y-T) + I + G + EX \]
<table>
<thead>
<tr>
<th>Y</th>
<th>I'M</th>
<th>MPM*(Y-T)</th>
<th>Total Sources</th>
<th>Total Uses</th>
<th>Ĉ</th>
<th>MPC*(Y-T)</th>
<th>I</th>
<th>G</th>
<th>EX</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>100</td>
<td>10</td>
<td>410</td>
<td>740</td>
<td>100</td>
<td>80</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>400</td>
<td>100</td>
<td>20</td>
<td>520</td>
<td>820</td>
<td>100</td>
<td>160</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>500</td>
<td>100</td>
<td>30</td>
<td>630</td>
<td>900</td>
<td>100</td>
<td>240</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>600</td>
<td>100</td>
<td>40</td>
<td>740</td>
<td>980</td>
<td>100</td>
<td>320</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>700</td>
<td>100</td>
<td>50</td>
<td>850</td>
<td>1060</td>
<td>100</td>
<td>400</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>800</td>
<td>100</td>
<td>60</td>
<td>960</td>
<td>1140</td>
<td>100</td>
<td>480</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>900</td>
<td>100</td>
<td>70</td>
<td>1070</td>
<td>1220</td>
<td>100</td>
<td>560</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1000</td>
<td>100</td>
<td>80</td>
<td>1180</td>
<td>1300</td>
<td>100</td>
<td>640</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1100</td>
<td>100</td>
<td>90</td>
<td>1290</td>
<td>1380</td>
<td>100</td>
<td>720</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1200</td>
<td>100</td>
<td>100</td>
<td>1400</td>
<td>1460</td>
<td>100</td>
<td>800</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1300</td>
<td>100</td>
<td>110</td>
<td>1510</td>
<td>1540</td>
<td>100</td>
<td>880</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1400</td>
<td>100</td>
<td>120</td>
<td>1620</td>
<td>1620</td>
<td>100</td>
<td>960</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1500</td>
<td>100</td>
<td>130</td>
<td>1730</td>
<td>1700</td>
<td>100</td>
<td>1040</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1600</td>
<td>100</td>
<td>140</td>
<td>1840</td>
<td>1780</td>
<td>100</td>
<td>1120</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1700</td>
<td>100</td>
<td>150</td>
<td>1950</td>
<td>1860</td>
<td>100</td>
<td>1200</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1800</td>
<td>100</td>
<td>160</td>
<td>2060</td>
<td>1940</td>
<td>100</td>
<td>1280</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1900</td>
<td>100</td>
<td>170</td>
<td>2170</td>
<td>2020</td>
<td>100</td>
<td>1360</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>Y</td>
<td>IM</td>
<td>MPM*(Y-T)</td>
<td>Total Sources</td>
<td>Total Uses</td>
<td>Ĉ</td>
<td>MPC*(Y-T)</td>
<td>I</td>
<td>G</td>
<td>EX</td>
</tr>
<tr>
<td>----</td>
<td>-----</td>
<td>-----------</td>
<td>---------------</td>
<td>------------</td>
<td>---</td>
<td>-----------</td>
<td>---</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>300</td>
<td>100</td>
<td>10</td>
<td>410</td>
<td>740</td>
<td>100</td>
<td>80</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>400</td>
<td>100</td>
<td>20</td>
<td>520</td>
<td>820</td>
<td>100</td>
<td>160</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>500</td>
<td>100</td>
<td>30</td>
<td>630</td>
<td>900</td>
<td>100</td>
<td>240</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>600</td>
<td>100</td>
<td>40</td>
<td>740</td>
<td>980</td>
<td>100</td>
<td>320</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>700</td>
<td>100</td>
<td>50</td>
<td>850</td>
<td>1060</td>
<td>100</td>
<td>400</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>800</td>
<td>100</td>
<td>60</td>
<td>960</td>
<td>1140</td>
<td>100</td>
<td>480</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>900</td>
<td>100</td>
<td>70</td>
<td>1070</td>
<td>1220</td>
<td>100</td>
<td>560</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1000</td>
<td>100</td>
<td>80</td>
<td>1180</td>
<td>1300</td>
<td>100</td>
<td>640</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1100</td>
<td>100</td>
<td>90</td>
<td>1290</td>
<td>1380</td>
<td>100</td>
<td>720</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1200</td>
<td>100</td>
<td>100</td>
<td>1400</td>
<td>1460</td>
<td>100</td>
<td>800</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1300</td>
<td>100</td>
<td>110</td>
<td>1510</td>
<td>1540</td>
<td>100</td>
<td>880</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1400</td>
<td>100</td>
<td>120</td>
<td>1620</td>
<td>1620</td>
<td>100</td>
<td>960</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1500</td>
<td>100</td>
<td>130</td>
<td>1730</td>
<td>1700</td>
<td>100</td>
<td>1040</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1600</td>
<td>100</td>
<td>140</td>
<td>1840</td>
<td>1780</td>
<td>100</td>
<td>1120</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1700</td>
<td>100</td>
<td>150</td>
<td>1950</td>
<td>1860</td>
<td>100</td>
<td>1200</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1800</td>
<td>100</td>
<td>160</td>
<td>2060</td>
<td>1940</td>
<td>100</td>
<td>1280</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>1900</td>
<td>100</td>
<td>170</td>
<td>2170</td>
<td>2020</td>
<td>100</td>
<td>1360</td>
<td>100</td>
<td>200</td>
<td>160</td>
</tr>
</tbody>
</table>
Income Determination: Example from 11/7

- Actual Expenditures: $420 + 0.7 \times GDP
- Planned Expenditures

Diagram:
- Vertical axis: Expenditures
- Horizontal axis: National Income
- Graph shows a linear relationship between national income and expenditures.
Income Determination: Example from 11/7

Where did $420 + 0.7*GDP(Y) come from?

\[ Y = C + I + G + EX - IM \] (rearrange)
\[ Y + IM = C + I + G + EX \]

In our current example:

\[ Y = \hat{C} + MPC(Y-T) + I + G + EX - [IM + MPM(Y-T)] \]
\[ Y = 200 + 0.8(Y-200) + 100 + 200 + 160 - [100 + 0.1(Y-200)] \]
\[ Y = 560 + 0.8(Y-200) - 0.1(Y-200) \]
\[ Y = 560 + 0.7Y - 0.7*200 \]
\[ Y = 560 + 0.7Y - 140 \]
\[ Y = 420 + 0.7Y \]
\[ Y = \frac{420}{0.3} = \$1400 \]
Income Determination: Example from 11/7

Actual Expenditures

$420 + 0.7 \times GDP

Planned Expenditures

$1400
Income Determination: Example from 11/7

What Happens when Planned spending falls?

One outcome of financial crisis: consumers spending less as they “unwind” their credit-card debt.

This leads to less autonomous consumption, less planned expenditure, and less GDP.

Illustration? Suppose autonomous consumption falls by 150.
Income Determination: Example from 11/7

Actual Expenditures:
$420 + 0.7 \times GDP

Planned Expenditures:
$270 + 0.7 \times GDP

Expenditures

National Income

$270
Income Determination: Example from 11/7

Actual Expenditures: $420 + 0.7 \times GDP$

Planned Expenditures: $270 + 0.7 \times GDP$

National Income = Actual Expenditures

Expenditures

$900$

$270$

$900$
Income Determination: Example from 11/7

New equilibrium Y = 900.

Autonomous expenditure drops by 150, but Y drops by 500.

Multiplier: the increase in equilibrium output when autonomous expenditure rises by one unit.

In our example, the multiplier is:

\[ \frac{1}{1 - 0.7} = \frac{1}{0.3} \approx 3.33 = \frac{500}{150} \]
Fiscal Policy

Important consequence of short-run output determination: changes in autonomous expenditures change the equilibrium level of output.

Fiscal Policy: adjustment of government expenditures or taxes to achieve a desired equilibrium level of short-run output.

Note: both G and T are components of autonomous expenditure.
Fiscal Policy
Changes in government spending have a multiplier effect on changes in equilibrium output.

Stabilization policies: government polices that are used to affect planned aggregate expenditure, with the objective of eliminating output gaps.

Contractionary: reduced expenditure/reduced output.

Expansionary: increased expenditure/increased output.
Fiscal Policy
In the context of our example, if we saw a drop in autonomous consumer spending the government could try to offset that by increasing government spending or lowering taxes.

Let’s start with our original equation.

Say the government increases $G$ by $30$. 
Fiscal Policy: Example from 11/7

Expenditures

$1500

National Income

$1500

Actual Expenditures

Planed Expenditures

$450 + 0.7 * GDP

$420 + 0.7 * GDP

$1500
What is the multiplier?

\[
\frac{1}{1 - 0.7} = \frac{1}{0.3} \approx 3.33 = \frac{100}{30}
\]
Fiscal Policy: Example from 11/7
What about lowering taxes?

How much would the government need to lower taxes to achieve the same result?

Remember, consumers are only spending a portion of their disposable income on domestic consumption. So, in order to get an autonomous increase of $30 we need to cut taxes by more than $30.
Fiscal Policy: Example from 11/7
What about lowering taxes?

How much?

\[
\frac{30}{\text{MPC-MPM}} = \frac{30}{0.7} \approx 42.86
\]
Fiscal Policy: Example from 11/7

Does this give us the desired level of output?

\[ Y = 560 + 0.8[Y-(200-42.86)] - 0.1[Y-(200-42.86)] \]
\[ Y = 560 + 0.7Y - 0.7 \times 157.14 \]
\[ Y = 560 - 110 + 0.7Y \]
\[ Y = 450 + 0.7Y \]
\[ Y = \frac{450}{0.3} = 1500 \]
Fiscal Policy: Example from 11/7

Now what is the multiplier?

\[ 0.7 \times 3.33 \approx 2.33 \approx \frac{100}{42.86} \]

What’s missing? So far we’ve only talked about demand, we also need to think about supply.

This is covered in Chapter 27.