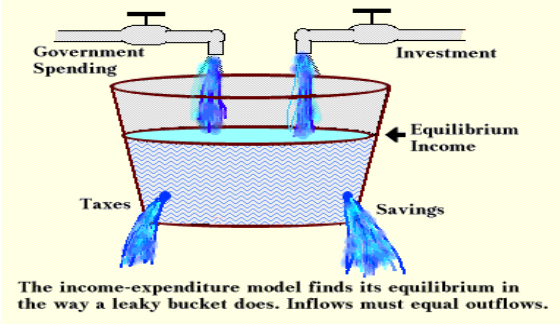
CHAPTER 11 LECTURE - INCOME AND EXPENDITURE



The income-expenditure model finds its equilibrium in the way a leaky bucket does. Inflows must equal outflows.

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WHAT YOU WILL LEARN IN THIS CHAPTER

- What is the importance of the multiplier, which summarizes how initial changes in spending lead to further changes?
- What is the aggregate consumption function?
- How do expected future income and aggregate wealth affect consumer spending?
- What determines investment spending and why do we need to distinguish between planned investment spending and unplanned inventory investment?
- How does the inventory adjustment process move the economy to a new equilibrium after a change in demand?
- Why is investment spending considered a leading indicator of the future state of the economy?

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THE MULTIPLIER: AN INFORMAL INTRODUCTION

- **Since households and firms are mutually interdependent (recall the circular flow), booms and busts involve chain reactions.**
- **The multiplier helps us understand the extent of the chain reactions.**
- ***Basically, we want to understand how much extra income and spending are created from an initial change in spending.***
  - **Example: If construction spending rises by $100 billion, how much does this affect the economy?**

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FOUR SIMPLIFYING ASSUMPTIONS FOR NOW (TO BE RECONSIDERED LATER)

1. We assume that **producers are willing to supply additional output at a fixed price.**
   - Changes in aggregate spending translate into changes in aggregate output (NOT PRICES)
2. We take the **interest rate as given.**
3. We assume that there is **no government spending and no taxes.**
4. We assume that **exports and imports are zero.**

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THE *MPC*

- A lot depends on **how much consumers spend when they receive more income**
- **Marginal propensity to consumer, or *MPC***

$$MPC = \frac{\Delta \text{ consumer spending}}{\Delta \text{ disposable income}}$$

- *For example, if consumer spending goes up by $8 and disposable income (**Income after tax**) goes up by $10,*

  MPC = *$8/10 = 0.8*

- **Whatever is not spent is saved, so:**
- **Marginal propensity to save, or *MPS*** = the fraction of an additional dollar of disposable income that is saved.

MPS* = 1 − *MPC

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THE MULTIPLIER EFFECT

- Each $1 increase in aggregate spending raises both real GDP and disposable income by $1—and causes people to spend money. **How much?**
  - **If investment spending rises by $100 billion, this will lead to a second-round increase of *MPC* × $100 billion. It is followed by a third-round increase in consumer spending of *MPC* × *MPC* × $100 billion, and so on up to:**
- **Total increase in real GDP = (1 + *MPC* + *MPC*^{2} + *MPC*^{3} + . . .) × $100 billion, OR**
- **Total increase in real GDP from a $100 billion rise is Investment, fore example is:**

$$\Delta GDP = \frac{1}{1 - \text{MPC}} \times \$100\text{billion}$$

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EXAMPLE

- If ΔAAS = autonomous change in aggregate spending and
- ΔY = change in real GDP

$$\Delta Y = \frac{1}{1-\text{MPC}} \times \Delta AAS$$

$$\text{And the multiplier} = \frac{\Delta Y}{\Delta AAS} = \frac{1}{1-\text{MPC}}$$

Let MPC = 0.8 and ΔAAS = 100 $Multiplier = \frac{1}{1-0.8} = 5$

$$\Delta Y = \frac{1}{1-0.8}(100) = 5(100) = 500$$

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LEARN BY DOING DISCUSSION QUESTION

- With a partner, answer the following:
- Suppose that the marginal propensity to save in an economy is equal to 0.2. Suppose that the level of investment spending increases by $200 this year.
- Trace out the total increase in real GDP, showing the increase in consumer spending for at least the second, third, and fourth round of spending and the overall increase in real GDP.
  - (Assume that in this economy there is no government sector, no taxes, and no transfers and that the aggregate price level and the interest rate are fixed.)

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LEARN BY DOING DISCUSSION QUESTION (Answer)

- With a partner, answer the following:
- Suppose that the marginal propensity to save in an economy is equal to 0.2. Suppose that the level of investment spending increases by $200 this year.
- Trace out the total increase in real GDP, showing the increase in consumer spending for at least the second, third, and fourth round of spending and the overall increase in real GDP.

$200+$160+$128+$102.4+…

The total spending increase by $1,000 (correct answer)

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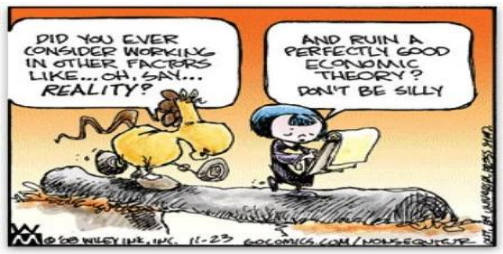
Refer to Handout:

11CHAPTER 11 LECTUREB-UNDERSTANDING THE MULTIPLIER



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LEARN BY DOING PRACTICE QUESTION 1

- Holding everything else constant in an economy, the larger the *MPS,* the:
  a) smaller the value of the multiplier.
  b) larger the value of the multiplier.

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CONSUMER SPENDING

- Consumer spending accounts for two-thirds of total spending on final goods and services.
- But what determines how much consumers spend? The most important factor is current disposable income.

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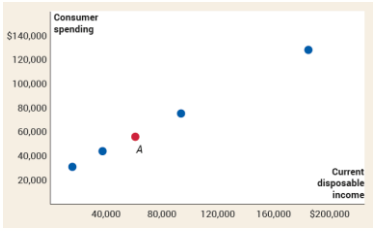
CURRENT DISPOSABLE INCOME AND CONSUMER SPENDING

- **Current disposable income:** income after taxes are paid and government transfers are received
- *2021 average disposable income = $60,957*
- *2021 average spending = $55,914*



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THE CONSUMPTION FUNCTION (1 of 3)

- **Consumption function:** an equation showing how an individual household's consumer spending varies with the household's disposable income

$$c = a + MPC \times yd$$

Where

c *= a household's consumer spending*

yd *= household disposable income*

MPC *= marginal propensity to consume*

a *= a constant, autonomous consumer spending—what a family would spend even with zero income*

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THE CONSUMPTION FUNCTION (2 of 3)

Recall,

$$MPC = \Delta c/\Delta yd$$

Multiplying both sides of the equation by Δyd*, we get:*

$$MPC \times \Delta yd = \Delta c$$

In other words, when *yd* goes up by $1, *c* goes up by *MPC* × $1.

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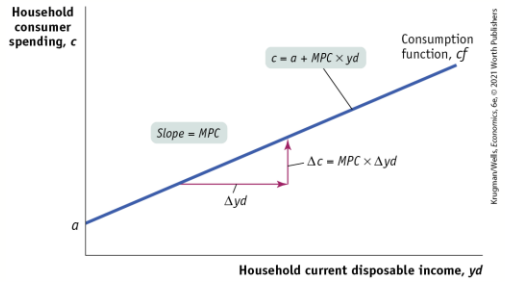
THE CONSUMPTION FUNCTION (3 of 3)

a is an individual household autonomous consumer spending, the value of ***c*** when ***yd*** is zero—the vertical **intercept**.
MPC is the **slope**: rise over run.

Figure 11-3



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LEARN BY DOING PRACTICE QUESTION 2

- Suppose that when **Sue's disposable income is $10,000, she spends $8,000, and when her disposable income is $20,000, she spends $14,000.** Sue's autonomous consumer spending is equal to $_____ and her *MPS* is equal to _____.

a) 0; 0.2

b) 2,000; 0.2

c) 0; 0.6

d) 2,000; 0.4

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LEARN BY DOING PRACTICE QUESTION 2 (Answer)

- Suppose that when **Sue's disposable income is $10,000, she spends $8,000, and when her disposable income is $20,000, she spends $14,000.** Sue's autonomous consumer spending is equal to $_____ and her *MPS* is equal to _____.

a) 0; 0.2

b) 2,000; 0.2

c) 0; 0.6

d) 2,000; 0.4 (correct answer)

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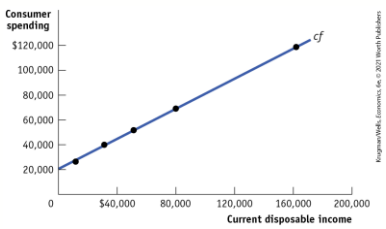
A CONSUMPTION FUNCTION FITTED TO DATA

- According to data, autonomous spending is around $20,195 and *MPC* = 0.60.
- The consumption function fitted to the data is:

$$C = \$20{,}195 + 0.60 \times yd$$

Figure 11-4



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AGGREGATE CONSUMPTION FUNCTION

- **Aggregate consumption function:** the relationship for the economy as a whole between aggregate disposable income and aggregate consumer spending

$$C = A + MPC \times YD$$

- *Same form as consumption function, just aggregate.*

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LEARN BY DOING PRACTICE QUESTION 3

- Assume aggregate consumer spending equals $5,000 when aggregate disposable income is zero, and when disposable income increases from $300 to $400, consumer spending increases by $70. What is the equation for the aggregate consumption function?
  - *a)* $C = 5{,}000 + 70YD$
  - *b)* $C = 500 + 0.7YD$
  - *c)* $C = 5{,}000 + 0.7YD$
  - *d)* $C = 5{,}000 + 7YD$

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LEARN BY DOING PRACTICE QUESTION 3 (Answer)

- Assume aggregate consumer spending equals $5,000 when aggregate disposable income is zero, and when disposable income increases from $300 to $400, consumer spending increases by $70. What is the equation for the aggregate consumption function?
  - *a)* $C = 5{,}000 + 70YD$
  - *b)* $C = 500 + 0.7YD$
  - ***c)*** ***$C = 5{,}000 + 0.7YD$* (correct answer)**
  - *d)* $C = 5{,}000 + 7YD$

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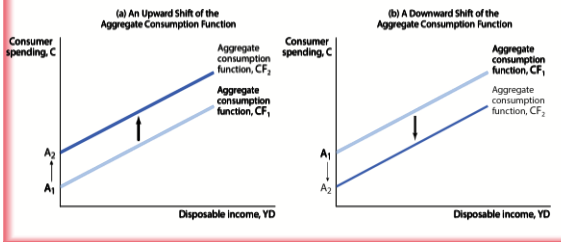
SHIFTS OF THE AGGREGATE CONSUMPTION FUNCTION (1 of 3)

- The aggregate consumption function shows the relationship between disposable income and consumer spending, other things equal.
- When "other things" change, the aggregate consumption function shifts.

Figure 11-5



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SHIFTS OF THE AGGREGATE CONSUMPTION FUNCTION (2 of 3)

- What causes shifts?
- **Changes in Expected Future Disposable Income:** Consumer spending depends on the income people expect to have over the long term rather than on their current income: the **permanent income hypothesis**.
  - For example, expectations of higher incomes lead consumers to spend more, shifting the aggregate consumption function up.
- **Changes in Aggregate Wealth:** consumers plan their spending—they try to smooth their consumption—over their lifetimes: **the life-cycle hypothesis**.
  - For example, a rise in aggregate wealth—say, because of a booming stock market—increases aggregate autonomous consumer spending, shifting the aggregate consumption function up.

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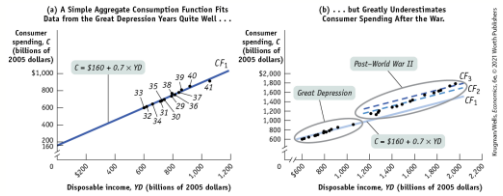
SHIFTS OF THE AGGREGATE CONSUMPTION FUNCTION (3 of 3)

- Panel (a) shows aggregate data on disposable income and consumer spending from 1929 to 1941 when a simple linear consumption function, CF_1, fitted the data well.
- Panel (b) shows that the aggregate consumption function shifted up after World War II because consumers grew increasingly confident that economic boom would continue, and wealth was steadily increasing.

Figure 11-6



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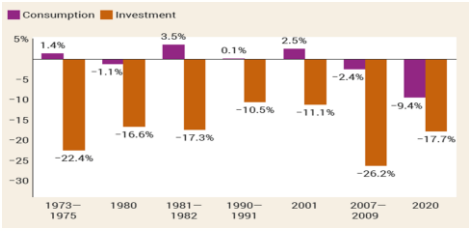
INVESTMENT SPENDING

Small yet powerful: Although much smaller than consumer spending, **investment spending tends to drive the booms and busts in the business cycle.** ***(Shown here: seven recent recessions)***



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WHAT DRIVES (PLANNED) INVESTMENT SPENDING?

Planned investment spending: the investment spending that businesses intend to undertake during a given period

It depends on:

1. **Interest rate**
2. **Expected future real GDP**
3. **Current level of production capacity**

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THE INTEREST RATE AND INVESTMENT SPENDING

Interest rates are often the cost of investment projects.

When interest rates are low, more loans are undertaken and investment rises (other things equal).

FIGURE 11-8 Krugman/Wells, *Macroeconomics*, 5e, © 2018 Worth Publishers
Data from: Federal Reserve Bank of St. Louis.

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EXPECTED FUTURE REAL GDP, PRODUCTION CAPACITY, AND INVESTMENT SPENDING

If your firm has extra capacity and doesn't expect sales to increase, its investment will be lower.

According to the **accelerator principle:**

- A higher rate of growth in real GDP leads to higher planned investment spending.
- A lower growth rate of real GDP leads to lower planned investment spending.

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INVENTORIES AND UNPLANNED INVESTMENT SPENDING

Inventories: stocks of goods held to satisfy future sales

Inventory investment: the value of the change in total inventories held in the economy during a given period

Unplanned inventory investment: unplanned changes in inventories that occur when actual sales are more or less than businesses expected

Actual investment spending: the sum of planned investment spending and unplanned inventory investment

So, in any period: $I = I_{Unplanned} + I_{Planned}$

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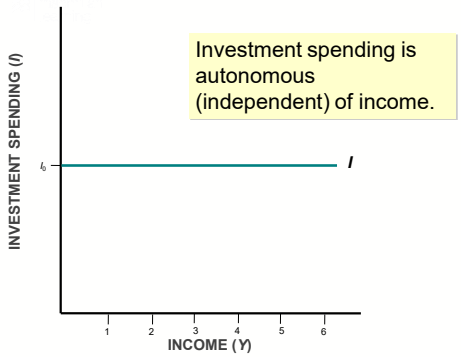
AGGREGATE INVESTMENT SCHEDULE



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THE INCOME–EXPENDITURE MODEL

- Let's take a more detailed look at how changes in spending get multiplied.
- We'll see that the multiple rounds of changes in real GDP are accomplished through changes in the amount of output produced by firms—changes they make in response to changes in inventories.

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THE INCOME–EXPENDITURE MODEL: ASSUMPTIONS

- **Recall the assumptions underlying the multiplier process:**
  - **Changes in overall spending lead to changes in aggregate output.**
  - **The interest rate is fixed.**
  - **Taxes, government transfers, and government purchases are all zero.**
  - **Exports and imports are both zero.**
- *(Future chapters loosen these assumptions.)*

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PLANNED AGGREGATE SPENDING AND REAL GDP (1 of 2)

- Since we assume that there are no taxes or transfers,

  $GDP = C + I$ *and*

  $YD = GDP$

  and our aggregate consumption function is

  $C = A + MPC \times YD$

  and we assume $I_{planned}$ is fixed, so

  $AE_{Planned} = C + I_{Planned}$

  where $AE_{Planned}$, **planned aggregate spending**, is the total amount of planned spending in the economy.

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PLANNED AGGREGATE SPENDING AND REAL GDP (2 of 2)

- *Example: If* $C = 300 + 0.6 \times YD$, *then*

TABLE 2 Equilibrium When Real GDP = $YD = AE_{Planned}$

Real GDP (billions of dollars)	YD (billions of dollars)	C (billions of dollars)	$I_{Planned}$ (billions of dollars)	$AE_{Planned}$ (billions of dollars)
$0	$0	$300	$500	$800
500	500	600	500	1,100
1,000	1,000	900	500	1,400
1,500	1,500	1,200	500	1,700
2,000	2,000	1,500	500	2,000
2,500	2,500	1,800	500	2,300
3,000	3,000	2,100	500	2,600
3,500	3,500	2,400	500	2,900

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THE AGGREGATE CONSUMPTION FUNCTION AND PLANNED AGGREGATE SPENDING

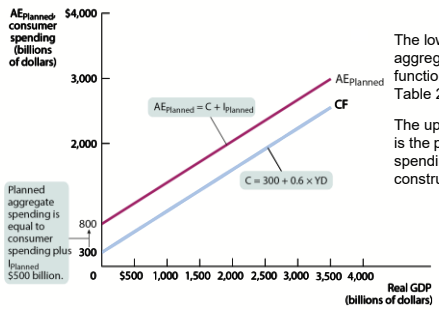

Figure 9

The lower line, CF, is the aggregate consumption function constructed from Table 2.

The upper line, $AE_{Planned}$, is the planned aggregate spending line, also constructed from Table 2.

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INCOME–EXPENDITURE EQUILIBRIUM (1 of 4)

- The economy moves to a situation in which there is no unplanned inventory investment: the income–expenditure equilibrium.

Table 3: Equilibrium When $I_{Unplanned} = 0$

Real GDP	$AE_{Planned}$	$I_{Unplanned}$
	(billions of dollars)	
$0	$800	−$800
500	1,100	−600
1,000	1,400	−400
1,500	1,700	−200
2,000	**2,000**	**0**
2,500	2,300	200
3,000	2,600	400
3,500	2,900	600

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INCOME–EXPENDITURE EQUILIBRIUM LOGIC (2 of 4)

Planned aggregate spending can be different from real GDP only if there is unplanned inventory investment, $I_{Unplanned}$, in the economy.

If firms have **underestimated sales** and produced too little, there will be unintended drops in inventories **(and $I_{Unplanned}$ will be negative).**

If firms have **overestimated sales** and produced too much, there will be unintended additions to inventories **(and $I_{Unplanned}$ will be positive).**

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LEARN BY DOING PRACTICE QUESTION 4

- Suppose the level of planned aggregate expenditure in an economy is $500 and real GDP is $600. According to our model:
  a) unplanned increases in inventories are occurring.
  b) unplanned decreases in inventories are occurring.
  c) inventories will be unaffected and will remain at the planned inventory level.
  d) excess production will continue, since there is no mechanism to restore the level of production to the level of spending.

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LEARN BY DOING PRACTICE QUESTION 4 (Answer)

- Suppose the level of planned aggregate expenditure in an economy is $500 and real GDP is $600. According to our model:
  a) unplanned increases in inventories are occurring. (correct answer)
  b) unplanned decreases in inventories are occurring.
  c) inventories will be unaffected and will remain at the planned inventory level.
  d) excess production will continue, since there is no mechanism to restore the level of production to the level of spending.

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INCOME–EXPENDITURE EQUILIBRIUM EQUATION (3 of 4)

$$GDP = C + I$$
$$= C + I_{Planned} + I_{Unplanned}$$
$$= AE_{Planned} + I_{unplanned}$$

Whenever real GDP exceeds $AE_{Planned}$, $I_{Unplanned}$ is positive.

Whenever real GDP is less than $AE_{Planned}$, $I_{Unplanned}$ is negative.

(But firms will act to correct their mistakes by producing more or less accordingly.)

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INCOME–EXPENDITURE EQUILIBRIUM (4 of 4)

- **The economy is in *income–expenditure equilibrium* when aggregate output (real GDP) is equal to planned aggregate spending.**
- ***Income–expenditure equilibrium GDP (Y*):* the level of real GDP at which real GDP equals planned aggregate spending.**

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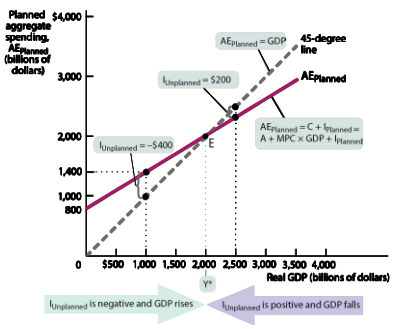
FIGURE 10: INCOME–EXPENDITURE EQUILIBRIUM



Income–expenditure equilibrium occurs at *E* where $AE_{Planned}$ crosses the 45-degree line.

This type of diagram is known as the Keynesian cross.

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INCOME–EXPENDITURE EQUILIBRIUM GRAPH

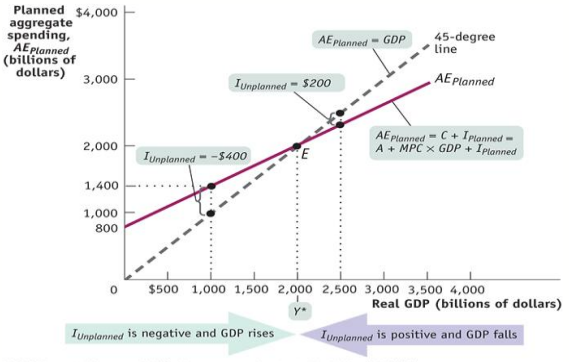

FIGURE 11-10 Krugman/Wells, *Macroeconomics*, 5e, © 2018 Worth Publishers

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LEARN BY DOING DISCUSSION QUESTION 2

- Suppose an economy is producing at a point where output is greater than expenditures.
- **Is this an income–expenditure equilibrium? What evidence might you see in inventory levels?**
- **Describe what will happen to move the economy toward equilibrium.**

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THE MULTIPLIER PROCESS AND INVENTORY ADJUSTMENT (1 of 3)

- What happens when there's a shift of the planned aggregate spending line?
- In our simple model, there are only two possible sources of a shift of the planned aggregate spending line:
  - **a change in planned investment spending, $I_{Planned}$,**
  - **a shift of the aggregate consumption function, *CF*.**
- A change in $I_{Planned}$ can occur because of a change in the interest rate.
- A shift of the aggregate consumption function (a change in its vertical intercept, A) can occur because of a change in aggregate wealth—say, due to a rise in house prices.

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REAL GDP BEFORE AND AFTER AUTONOMOUS SPENDING INCREASES BY 400 (MPC = 0.6)

Real GDP	$AE_{Planned}$ before autonomous change	$AE_{Planned}$ after autonomous change
	(billions of dollars)	
$0	$800	$1,200
500	1,100	1,500
1,000	1,400	1,800
1,500	1,700	2,100
2,000	**2,000**	2,400
2,500	2,300	2,700
3,000	2,600	**3,000**
3,500	2,900	3,300
4,000	3,200	3,600

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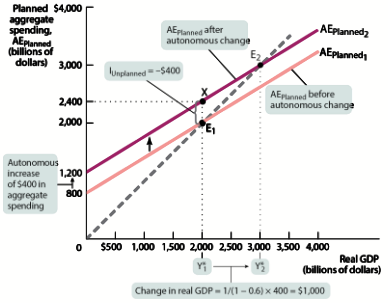
THE MULTIPLIER

The economy is initially at equilibrium point E_1.

An autonomous increase shifts $AE_{Planned}$ upward by 400. The economy is now at point X. $I_{Unplanned}$ = −400. Firms increase production, and the economy reaches a new income–expenditure equilibrium at E_2.



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THE MULTIPLIER PROCESS AND INVENTORY ADJUSTMENT (2 of 3)

- We can summarize these results in an equation, where $\Delta AAE_{Planned}$ represents the autonomous change in $AE_{Planned}$, and $\Delta Y^* = Y^*_2 - Y^*_1$, the subsequent change in income–expenditure equilibrium GDP:

$$\Delta Y^* = Multiplier \times \Delta AAE_{Planned} = \frac{1}{1 - MPC} \times \Delta AAE_{Planned}$$

- Since $MPC < 1$, each round of increases in disposable income leaks out into savings. As a result, increases in real GDP diminish from one round to the next. At some point, the increase in real GDP is negligible, and the economy converges to a new income–expenditure equilibrium GDP.

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THE MULTIPLIER PROCESS AND INVENTORY ADJUSTMENT (3 of 3)

- When planned spending does not equal the aggregate output, this difference shows up in changes in inventories.
- Firms respond to inventory changes and move real GDP to the point at which real GDP and planned aggregate spending are equal.
- That's why changes in inventories are a leading indicator of future economic activity.

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THE PARADOX OF THRIFT

- **The outcome of many individual actions can generate a result that is different from and worse than the simple sum of those individual actions**.
- The multiplier shows how it unfolds. Suppose there is a slump in investment spending (e.g., the one before 2007). This causes a fall in income–expenditure equilibrium GDP that is several times larger than the original fall in spending. It leaves consumers and producers worse off than they would have been if they hadn't cut their spending.

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WHAT ABOUT EXPORTS AND IMPORTS? (1 of 2)

- In the real world, countries have international trade. How do we deal with exports and imports in our model?
- **Exports are like an increase in autonomous spending** because income earned from exports is a source of spending on domestically produced goods and services.
- **Foreign trade makes the multiplier process weaker:** When consumer spending changes, part of that change leaks to imports, which reduces the multiplier. The extent to which the multiplier falls depends on the **marginal propensity to import** (how much of an additional dollar of spending falls on imports rather than domestic goods).

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WHAT ABOUT EXPORTS AND IMPORTS? (2 of 2)

- **Economic interdependence:** Trade links between economies are one reason **business cycles are often international in scope.** Many countries tend to have recessions and recoveries at the same time.

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The Multiplier Effect Process

If asked to do so, explain the **process** that lies behind the multiplier effect – focusing on the extra demand and factor incomes created

The government injects £200m in a project to build thousands of affordable new houses

A new house building project injects £200m of extra demand and output into the economy

Many businesses benefit directly including building supply industries, architects etc.

Constructing new houses generates **a new flow of factor incomes** – including wages and profits

Will the extra incomes stay inside the **circular flow of income and spending**? This is key!

If so, the **multiplier effect** is likely to be strong and the resultant impact on GDP quite large

https://www.slideshare.net/mattbentley34/the-multiplier-effect-explained

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RECESSIONARY GAP

THE INCREASE IN AGGREGATE SPENDING NECESSARY TO BRING A DEPRESSED ECONOMY BACK TO FULL EMPLOYMENT

- This is not the total deficiency in GDP, which is called the GDP gap. The recessionary gap is the spending needed to close the GDP gap when boosted by the multiplier.

INFLATIONARY GAP

THE DECREASE IN AGGREGATE SPENDING NECESSARY TO BRING AN OVERHEATED ECONOMY BACK TO FULL EMPLOYMENT

- Inflationary pressures occur when an economy produces output above full employment. Excess spending results in higher prices, which can lead to other economic problems

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