CHAPTER 20

Aggregate Expenditure and Equilibrium Output

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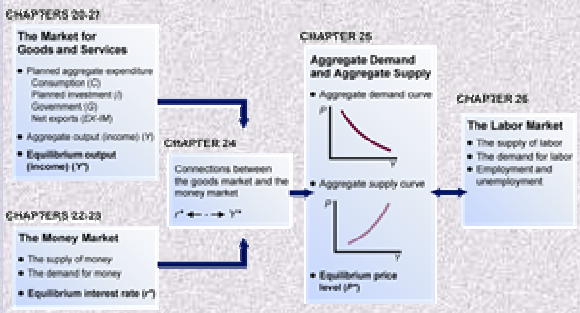
The Core of Macroeconomic Theory



Aggregate Output and Aggregate Income (*Y*)

- ***Aggregate output*** is the total quantity of goods and services produced (or supplied) in an economy in a given period.
- ***Aggregate income*** is the total income received by all factors of production in a given period.

Aggregate Output and Aggregate Income (*Y*)

- ***Aggregate output (income) (Y)*** is a combined term used to remind you of the exact equality between aggregate output and aggregate income.
- When we talk about output (*Y*), we mean ***real output***, or the quantities of goods and services produced, not the dollars in circulation.

Income, Consumption, and Saving (*Y*, *C*, and *S*)

- A household can do two, and only two, things with its income: It can buy goods and services—that is, it can *consume*—or it can save.
- ***Saving (S)*** is the part of its income that a household does not consume in a given period. Distinguished from *savings*, which is the current stock of accumulated saving.

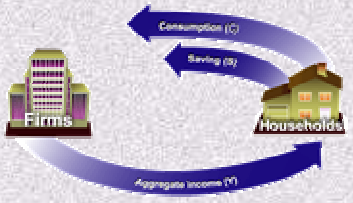
$$S \equiv Y - C$$

- The triple equal sign means this is an ***identity***, or something that is always true.

Explaining Spending Behavior

- All income is either spent on consumption or saved in an economy in which there are no taxes.

Saving ☜ Aggregate Income – Consumption



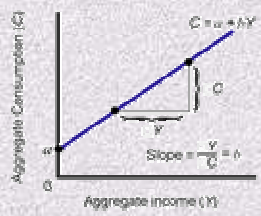
Household Consumption and Saving

- Some determinants of aggregate consumption include:
  1. Household income
  2. Household wealth
  3. Interest rates
  4. Households' expectations about the future
- In *The General Theory*, Keynes argued that household consumption is directly related to its income.

Household Consumption and Saving

- The relationship between consumption and income is called the ***consumption function***.
- For an individual household, the consumption function shows the level of consumption at each level of household income.

Household Consumption and Saving



$$C = a + bY$$

- The slope of the consumption function (b) is called the ***marginal propensity to consume (MPC),*** or the fraction of a change in income that is consumed, or spent.

$$0 < b < 1$$

Household Consumption and Saving

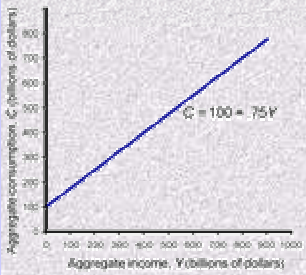
- The fraction of a change in income that is saved is called the ***marginal propensity to save (MPS).***

$$MPC + MPS \equiv 1$$

- Once we know how much consumption will result from a given level of income, we know how much saving there will be. Therefore,

$$S \equiv Y - C$$

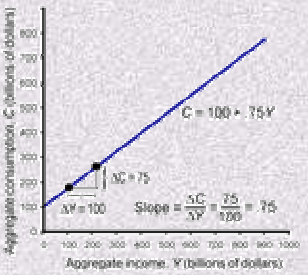
An Aggregate Consumption Function Derived from the Equation $C = 100 + .75Y$



$$C = 100 + .75Y$$

AGGREGATE INCOME, *Y* (BILLIONS OF DOLLARS)	AGGREGATE CONSUMPTION, *C* (BILLIONS OF DOLLARS)
0	100
80	160
100	175
200	250
400	400
400	550
800	700
1,000	850

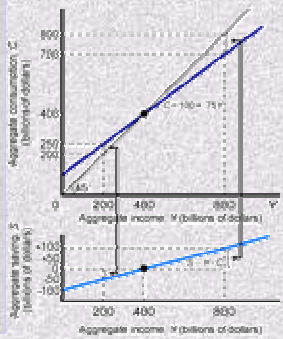
An Aggregate Consumption Function Derived from the Equation $C = 100 + .75Y$



$$C = 100 + .75Y$$

- At a national income of zero, consumption is $100 billion ($a$).
- For every $100 billion increase in income (ΔY), consumption rises by $75 billion ($\Delta C$).

Deriving a Saving Function from a Consumption Function



$$C = 100 + .75Y$$

$$S \equiv Y - C$$

Y	-	C	=	S
AGGREGATE INCOME (Billions of Dollars)		AGGREGATE CONSUMPTION (Billions of Dollars)		AGGREGATE SAVING (Billions of Dollars)
0		100		-100
80		160		-80
100		175		-75
200		250		-50
400		400		0
600		550		50
800		700		100
1,000		850		150

Planned Investment (*I*)

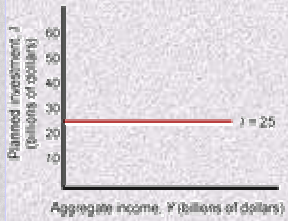
- ***Investment*** refers to purchases by firms of new buildings and equipment and additions to inventories, all of which add to firms' capital stock.
- One component of investment—inventory change—is partly determined by how much households decide to buy, which is not under the complete control of firms.

change in inventory = *production – sales*

Actual versus Planned Investment

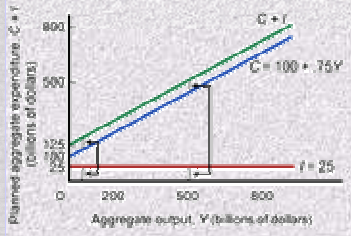
- ***Desired*** or ***planned investment*** refers to the additions to capital stock and inventory that are planned by firms.
- ***Actual investment*** is the actual amount of investment that takes place; it includes items such as unplanned changes in inventories.

The Planned Investment Function



- For now, we will assume that planned investment is fixed. It does not change when income changes.
- When a variable, such as planned investment, is assumed not to depend on the state of the economy, it is said to be an ***autonomous variable.***

Planned Aggregate Expenditure (*AE*)



- ***Planned aggregate expenditure*** is the total amount the economy plans to spend in a given period. It is equal to consumption plus planned investment.

$$AE \equiv C + I$$

Equilibrium Aggregate Output (Income)

- ***Equilibrium*** occurs when there is no tendency for change. In the macroeconomic goods market, equilibrium occurs when planned aggregate expenditure is equal to aggregate output.

Equilibrium Aggregate Output (Income)

aggregate output ⇦ Y
planned aggregate expenditure ⇦ AE ⇦ $C + I$

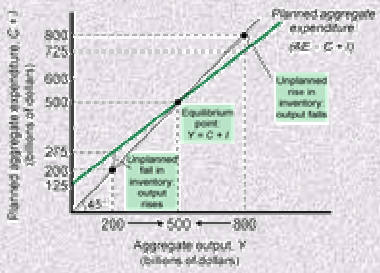
equilibrium: $Y = AE$, or $Y = C + I$

Disequilibria:

$Y > C + I$
aggregate output > planned aggregate expenditure
inventory investment is greater than planned
actual investment is greater than planned investment

$C + I > Y$
planned aggregate expenditure > aggregate output
inventory investment is smaller than planned
actual investment is less than planned investment

Equilibrium Aggregate Output (Income)



Equilibrium Aggregate Output (Income)

$C = 100 + .75Y$ $I = 25$

Deriving the Planned Aggregate Expenditure Schedule and Finding Equilibrium (All Figures in Billions of Dollars) The Figures in Column 2 are Based on the Equation $C = 100 + .75Y$.

(1) AGGREGATE OUTPUT (INCOME) (Y)	(2) AGGREGATE CONSUMPTION (C)	(3) PLANNED INVESTMENT (I)	(4) PLANNED AGGREGATE EXPENDITURE (AE) $C + I$	(5) UNPLANNED INVENTORY CHANGE $Y - (C + I)$	(6) EQUILIBRIUM? ($Y = AE$?)
100	175	25	200	– 100	No
200	250	25	275	– 75	No
400	400	25	425	– 25	No
500	475	25	500	0	Yes
600	550	25	575	+ 25	No
800	700	25	725	+ 75	No
1,000	850	25	875	+ 125	No

Equilibrium Aggregate Output (Income)

(1) $Y = C + I$
(2) $C = 100 + .75Y$
(3) $I = 25$

By substituting (2) and (3) into (1) we get:

$Y = 100 + .75Y + 25$

$Y = 100 + .75Y + 25$

There is only one value of Y for which this statement is true. We can find it by rearranging terms:

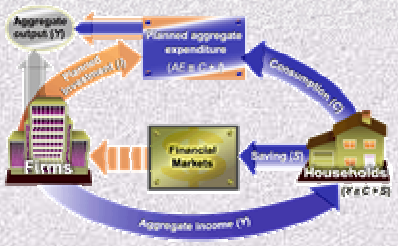
$Y - .75Y = 100 + 25$

$Y - .75Y = 125$

$.25Y = 125$

$Y = \frac{125}{.25} = 500$

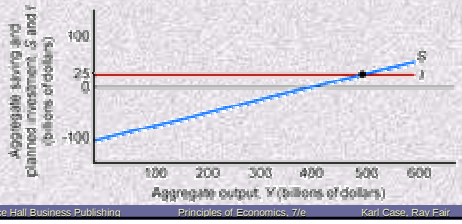
The Saving/Investment Approach to Equilibrium



If planned investment is exactly equal to saving, then planned aggregate expenditure is exactly equal to aggregate output, and there is equilibrium.

The $S = I$ Approach to Equilibrium

- Aggregate output will be equal to planned aggregate expenditure only when saving equals planned investment ($S = I$).



The Multiplier

- The ***multiplier*** is the ratio of the change in the equilibrium level of output to a change in some autonomous variable.
  - An ***autonomous variable*** is a variable that is assumed not to depend on the state of the economy—that is, it does not change when the economy changes.
- In this chapter, for example, we consider planned investment to be autonomous.

The Multiplier

- The multiplier of autonomous investment describes the impact of an initial increase in planned investment on production, income, consumption spending, and equilibrium income.
- The size of the multiplier depends on the slope of the planned aggregate expenditure line.

The Multiplier Equation

- The marginal propensity to save may be expressed as:

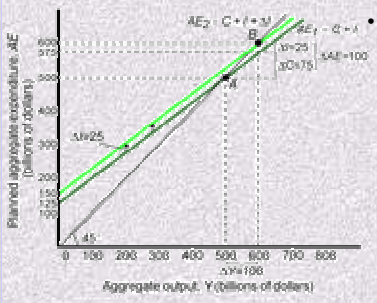
$$MPS = \frac{\Delta S}{\Delta Y}$$

- Because ΔS must be equal to ΔI for equilibrium to be restored, we can substitute ΔI for ΔS and solve:

$$MPS = \frac{\Delta I}{\Delta Y} \text{ therefore, } \Delta Y = \Delta I \times \frac{1}{MPS}$$

$$multiplier = \frac{1}{MPS}, \text{ or } multiplier = \frac{1}{1 - MPC}$$

The Multiplier

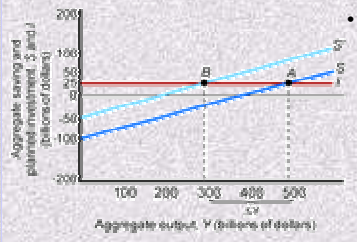


- After an increase in planned investment, equilibrium output is four times the amount of the increase in planned investment.

The Size of the Multiplier in the Real World

- The size of the multiplier in the U.S. economy is about 1.4. For example, a sustained increase in autonomous spending of $10 billion into the U.S. economy can be expected to raise real *GDP* over time by $14 billion.

The Paradox of Thrift



- When households become concerned about the future and decide to save more, the corresponding decrease in consumption leads to a drop in spending and income.
- Households end up consuming less, but they have not saved any more.

Review Terms and Concepts

- actual investment
- aggregate income
- aggregate output
- aggregate output (income) (*Y*)
- autonomous variable
- change in inventory
- consumption function
- desired, or planned, investment (*I*)
- equilibrium
- identity
- investment
- marginal propensity to consume (*MPC*)
- marginal propensity to save (*MPS*)
- multiplier
- paradox of thrift
- planned aggregate expenditure (*AE*)
- saving (*S*)