CHAPTER 11

The Neo-Keynesian Model

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Summary

This chapter deals with the Keynesian (neo-Keynesian) model of the equilibrium output.

It covers: 1) the consumption function, including marginal propensity to consume; 2) saving function, including marginal propensity to save; 3) investment function; 4) government expenditure function; 4) aggregate expenditure function; and 5) equilibrium level of output.

It also covers the concept of Keynesian or "expenditure multiplier."

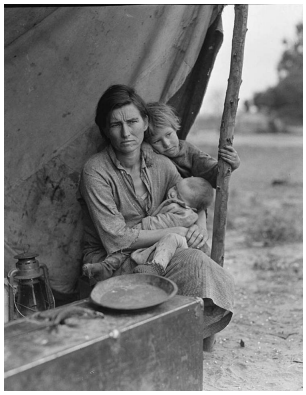
Introduction to neo-Keynesian Economics

Neoclassicals' laissez faire theories of the labor market and loanable funds market made no sense during the Great Depression of 1929-1939.

The theories and pictures did not match!

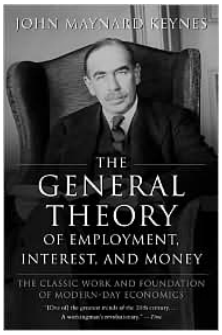
- Wages fell, but there was no increase in employment
- Interest rates fell, but there was no new investment
- Supply did not create its own demand

"Work is what I want, not charity.
Who will help me get a job?
7 years in Detroit, no money, sent away.
Furnish best of references, phone . ."



In *The General Theory of Employment, Interest and Money* (1936), Keynes challenged some aspects of these theories, as well as the Say's Law.

See: General Theory



Keynes went on to develop a new theory of:

1) How **output** and **employment** are determined.
2) How **interest rate** is determined.
3) What is the role of **money** in the economy.

Soon after, however, Keynes's ideas were simplified and incorporated into the neoclassical models.

This was the beginning of the "**neoclassical synthesis**" or "**neo-Keynesian**" model.

The Basic Neo-Keynesian Model

We start with the GNP (Y) identity:

$$Y = C + I_g + G + (X–M)$$

Simplifying assumptions

1) Economy is "closed": No X – M

$Y = C + I_g + G$

2) Economy is "private": No G

$Y = C + I_g$

3) There is no depreciation:
Gross investment = Net investment

$Y = C + I$

These assumption also make **output** (GNP) and **income** (disposable personal income) **equal**:

NNI = Y – Depreciation – IBTs

PI = NNI + Transfer payments

DPI = PI – Direct taxes

These assumption also make **output** (GNP) and **disposable personal income equal**:

NNI = Y – ~~Depreciation~~ – ~~IBTs~~

PI = NNI + ~~Transfer payments~~

DPI = PI – ~~Direct taxes~~

Y = DPI

Since

Y= DPI = Consumption + Savings

Then :

1) Y = C+S
2) Y = C+ I

1 and 2 imply:

3) S = I

Since C+S = C+ I

Note: S = I is just an accounting identity.

As we will see, S = I does not imply economic stability, since I is actual investment (I_a) as opposed to planned investment (I_p):

I_a = I_p + Δ Inventories

Stable economy implies:

Δ Inventories = 0 and

S= I_p

Consumption Function

Keynes hypothesized that consumption spending is a function of disposable personal income:
C= f(Y).

This idea became known as the consumption function:

Def. **Consumption function** (**C**): a relationship between **consumption spending** and income (disposable personal income).

After Keynes, it was argued that consumption depends on various other factors:

$$C = f\ (Y,\ W,\ i,\ E)$$

Where,

W: is wealth or assets,
i: is interest rate,
E: is expectation of future income.

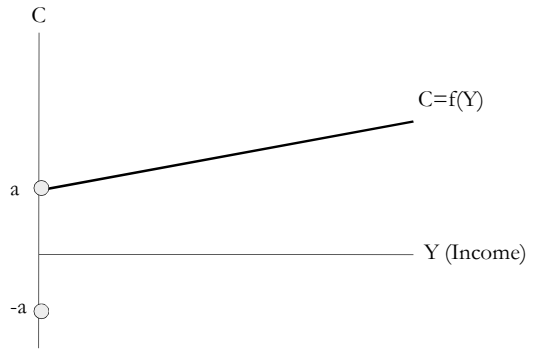
Keynes assumed:

1) There is a **minimum amount of consumption**; i.e., even when national income is zero, there is still some consumption. This is called autonomous consumption.

   Q: Where could this consumption come from?
   A: Past savings.

2) **Consumption rises as national income rises**, but it does **not** rise **as fast.**

Consumption function



Shifts or Changes in Consumption

If

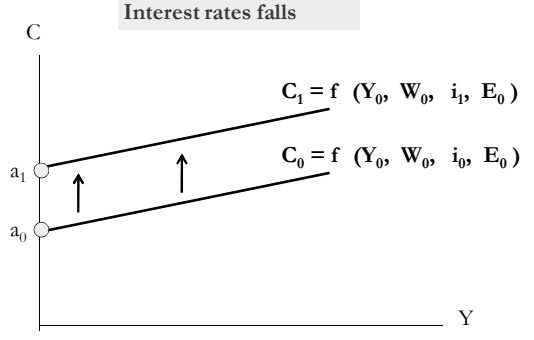
$C = f\ (Y,\ W,\ i,\ E)$,

then any change in W, i, or E will shift the consumption function.

Example,

What happens if **interest rates fall**?

Interest rates falls



Linear consumption function:

We assume that consumption function is given by :

$$C = a + bY$$

Where "**a**" is the C intercept and "**b**" is the **slope of the consumption function.**

It must be that:

$$0 < b < 1$$

Marginal Propensity to Consume

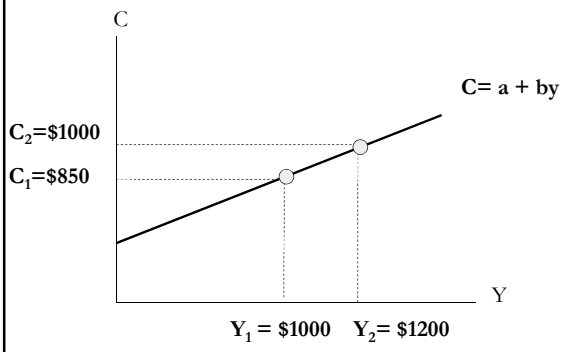
Def. Marginal Propensity to Consume (MPC) : The increase in consumption which results from an increase in income:

MPC = ΔC/ ΔY

This is obviously the same as the slope of the consumption function or "**b**":

MPC = b

Example



MPC = ΔC/ΔY

MPC = (C2 – C1) / (Y2 – Y1)

MPC = ($1000 – $850) / ($1200 – $1000)

MPC = $150/ $200

MPC = 3/4 = .75

Average Propensity to Consume

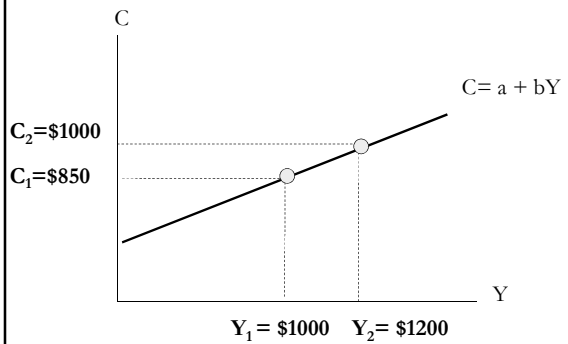
Def. Average Propensity to Consume (APC) :

The level of consumption divided by the level of income:

APC = C / Y

APC obviously changes as income changes.

Example



$APC_1 = C_1/Y_1$

APC_1 = $850/$1000

APC_1 = .85

$APC_2 = C_2/Y_2$

APC_2 = $1000/ $1200

APC_2 = .83333

Saving Function

Y = S +C, Therefore,

S = Y– C

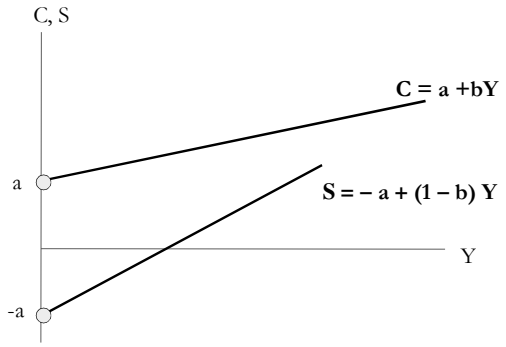
If **C = a + bY, then**

S = Y – (a + bY)

S = Y – a – bY

S = – a + (1 – b) Y

Saving function



Marginal Propensity to Save

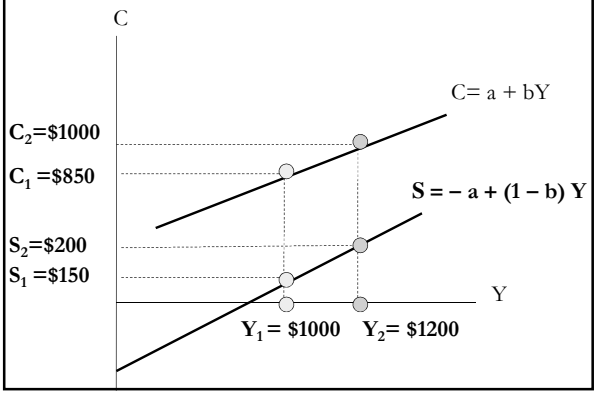
Def. Marginal Propensity to Save (MPS) : The increase in saving which results from an increase in income:

MPS = ΔS/ ΔY

This is the same as the slope of the savings function or "1–**b**"

MPS = 1 – b

Example



MPS = ΔS/ΔY

MPS = (S2 – S1) / (Y2 – Y1)

MPS = ($200 – $150) / ($1200 – $1000)

MPS = $50/ $200

MPS = 1/4 = .25

Q: What do we get when we add MPC and MPS?

A: One!

Our example:

MPC =.75
MPS =.25

MPC +MPS =.75 +.25 = 1

MPC + MPS = 1 is true by definition:

MPC = b
MPS = 1-b
MPC +MPS =b + 1- b = 1

Similarly

$Y = C + S$

$\Delta Y = \Delta C + \Delta S$

Divide both sides by ΔY

$\Delta Y / \Delta Y = \Delta C / \Delta Y + \Delta S / \Delta Y$

$1 = MPC + MPS$

Q: What do we get when we add APC and APS?

A: One, again!

Our example:

APC =.85
APS =.15

APC +APS =.85 +.15 = 1

APC +APS = 1 is also true by definition:

$Y = C + S$

Divide both sides by Y:

$Y/Y = C/Y + S/Y$

$1 = APC + APS$

Investment Function

Remember that **actual investment** (**I**) has 3 components:

1) Structures and equipment
2) Residential structures
3) Changes in inventories

Also remember the relation between actual investment (I_a) and planned investment (I_p):

I_a = I_p + Δ Inventories

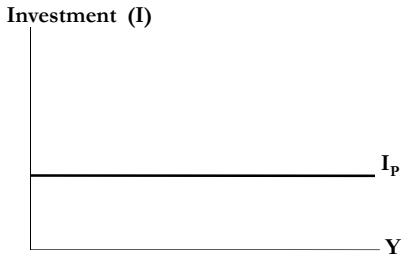
Def. **Planned investment** (**Ip**) is what firms wish or plan to invest.

Keynes assumed that **planned investment**:

1) Is independent of the level of national income.

2) Depends on **interest rate**, as we shall see later.

Planned investment function



Equilibrium Level of GNP (Y)

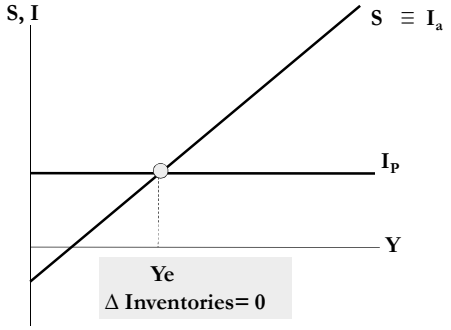
Q: At what level of consumption, saving and investment will the GNP be in equilibrium, i.e., it is neither expanding nor contracting?

A: We can answer this question in 2 ways:

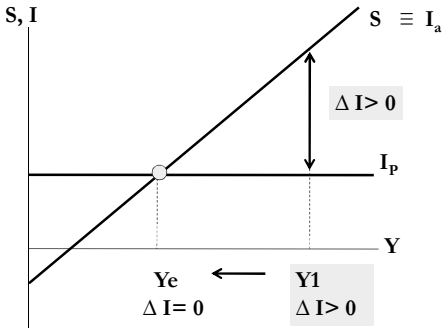
1) By looking at the relationship between savings and investment, or

2) By looking at the relation between expenditures (C and I) and national income.

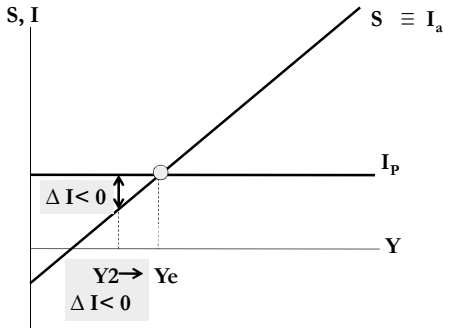
Savings and Investment: Equilibrium level of GNP



Savings and Investment: Equilibrium level of GNP



Savings and Investment: Equilibrium level of GDP



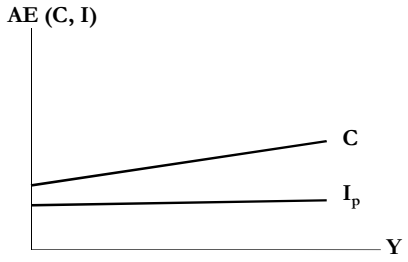
Aggregate Expenditure

We can also look at the level of equilibrium GDP by looking at where **aggregate expenditure** is equal to income.

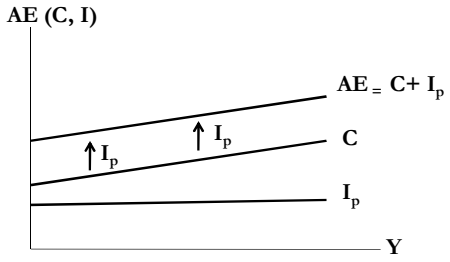
Def. **Aggregate Expenditure** (**AE**): Is the sum of the spending. So far we have:

AE = C+I

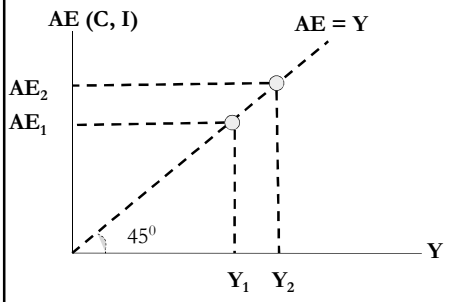
Aggregate Expenditure



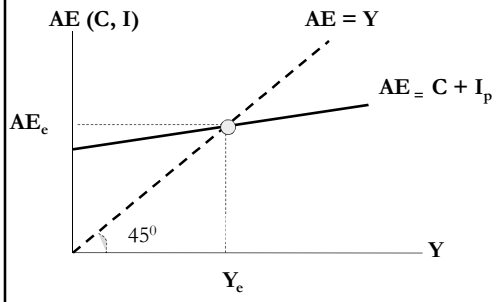
Aggregate Expenditure



The 45^0 line



Equilibrium level of GDP

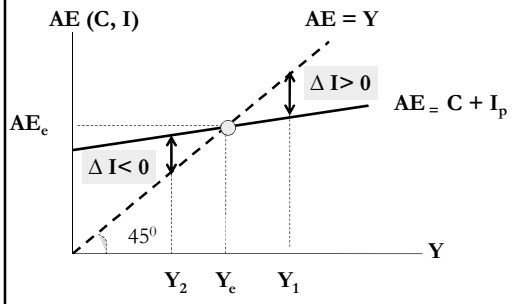


Note: **At equilibrium level of output, Ye, all income is spent.**

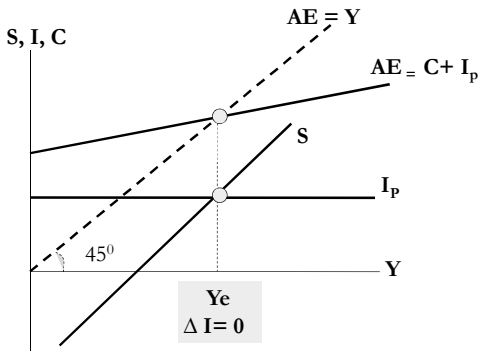
Economy is neither expanding not contacting.

It is stable and $\Delta \mathbf{I = 0}$.

Equilibrium level of GDP



Equilibrium level of GNP: Everything together



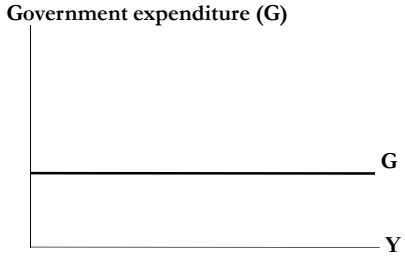
Government expenditure

Suppose the equilibrium level of output is achieved at a low level of employment.

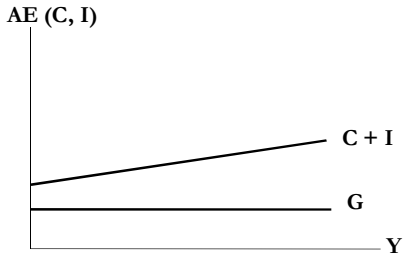
Keynesian economics then advocates government spending money on goods and services.

We assume that government expenditure, **G,** is independent of national income:

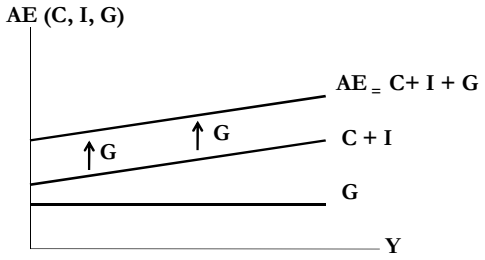
Government expenditure function



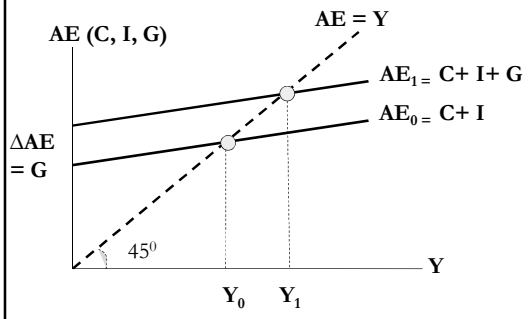
Aggregate Expenditure Again



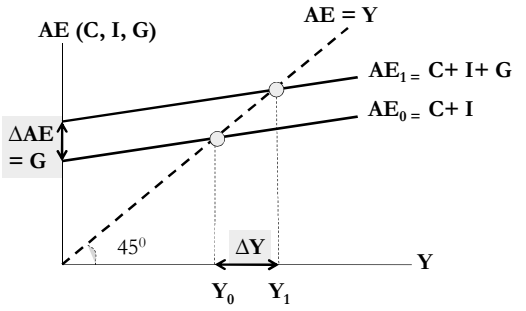
Aggregate Expenditure



Equilibrium level of GNP again



Note: $\Delta Y > \Delta AE$



The Multiplier Effect

Def. **Multiplier Effect**: Any change in spending will bring about greater change in income or output:

$$\Delta Y > \Delta AE$$

A Numerical Example

Suppose **MPC=1/2** and **investment increases by \$1000**, i.e., **ΔI = \$1000**.

What happens to he national income?

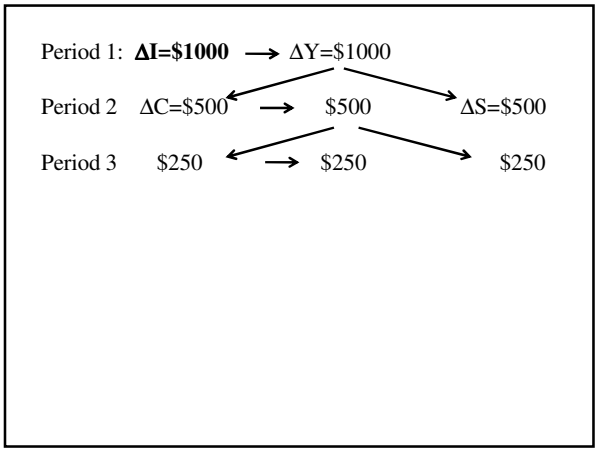
Period 1: **ΔI=\$1000** → ΔY=\$1000

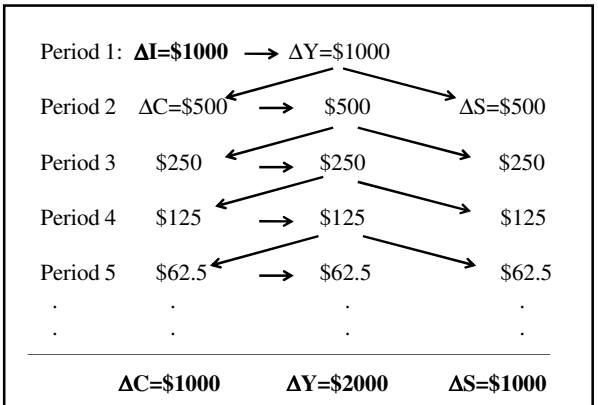
Period 2 ΔC=\$500 ΔS=\$500

Period 1: **ΔI=\$1000** → ΔY=\$1000

Period 2 ΔC=\$500 → \$500 ΔS=\$500

Period 3 \$250 → \$250





Remember the geometric series:

$S= a + ar + ar^2 + ar^3 + ar^4 + \ldots$

Where

$0 < r < 1$

The series converges:

$S = a/(1- r)$

Net Result:

$\Delta Y = \$1000 + \$500 + \$250 + \$125 + \$62.5 + \ldots$

$\Delta Y = \$1000 + \$1000\,(1/2) + \$1000\,(1/2)^2 + \ldots$

$\Delta Y = \$1000/(1-1/2) = \$1000/(1/2) =$ **2** x $1000

$\Delta Y = \$2,000$

Algebraic method of calculating multiplier

$$\Delta Y = \Delta AE / (1-MPC) = \Delta AE / (MPS)$$

We call $k = \frac{1}{1-MPC} = \frac{1}{MPS}$

the multiplier factor, Keynesian or expenditure multiplier.

Proof (not required)

1) $Y = C+I$

2) $\Delta Y = \Delta C + \Delta I$

3) $\Delta Y - \Delta C = \Delta I$ (divide both sides by ΔY)

4) $(\Delta Y - \Delta C) / \Delta Y = \Delta I / \Delta Y$

5) $1 - MPC = \Delta I / \Delta Y$

6) $\Delta Y = \Delta I / (1 - MPC)$

Our previous example :

Investment increased by $1000 and MPC= 1/2.
By how much will national income rise?

$\Delta Y = \Delta AE / (1-MPC)$

$\Delta Y = \Delta I / (1 - MPC)$

$\Delta Y = \$1000/ (1 - 1/2)$

$\Delta Y = \$1000/ (1/2)$

$\Delta Y = \$2000$

Another example of multiplier:

Suppose government expenditure, G, falls by $150 and MPC = 2/3. By how much will national income fall?

$\Delta Y = \Delta AE / (1-MPC)$

$\Delta Y = \Delta G / (1 - MPC)$

$\Delta Y = - \$150/ (1 - 2/3)$

$\Delta Y = - \$150/ (1/3)$

$\Delta Y = - \$450$

Does the multiplier work in reality?

Some Keynesians argue that "**automatic stabilizers**" might hinder the effectiveness of multiplier.

Def. **Automatic stabilizers a**re economics forces that try to stabilize economy automatically.

Examples of automatic stabilizers

- **Progressive income tax**: as income goes up, people fall in higher marginal tax rate.
- **Prices**: as economy expands, inflation rises, reducing spending.
- **Interest rate**: also, as economy expands , interest rates rise, slowing expenditures.

Next stop: Chapter 11.