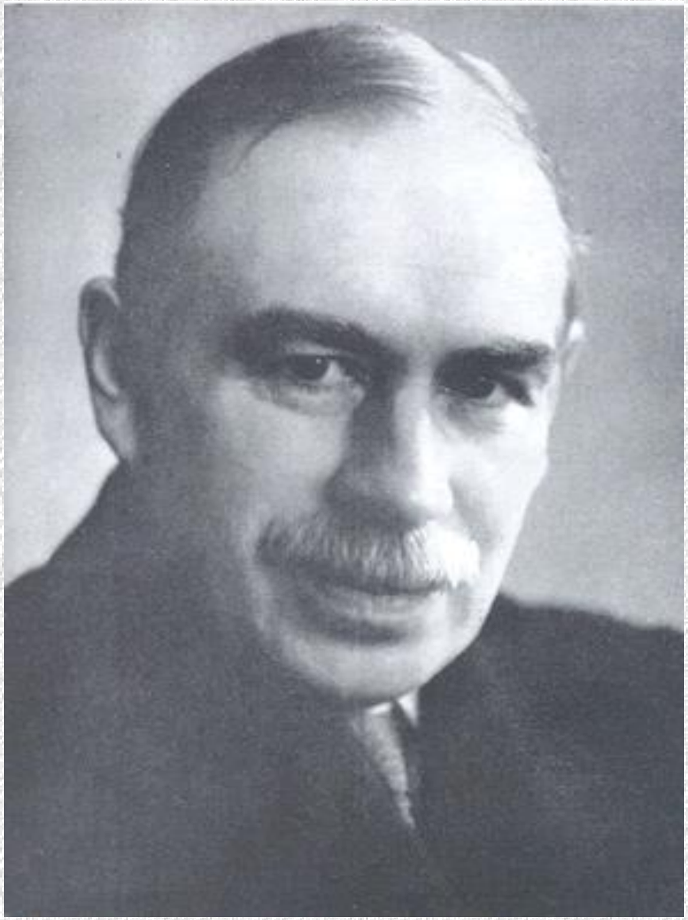
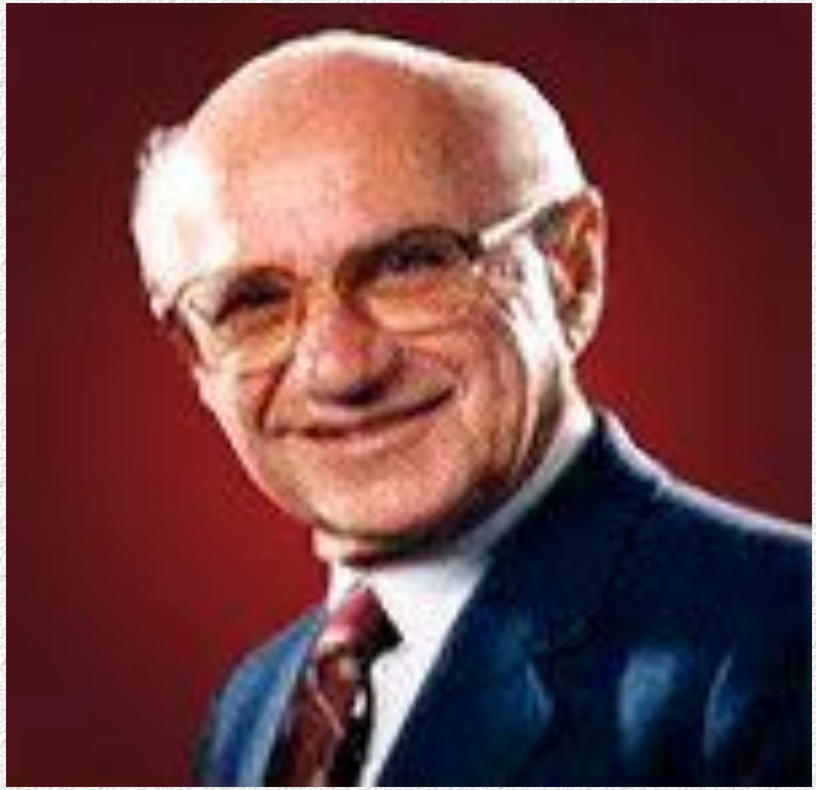
CHAPTER

3

Desired Aggregate Expenditure (DAE) and Equilibrium National Income

Who are they?





3.1 Introduction

- **John Maynard Keynes** ⇨ The General Theory of Employment, Money, and Interest

⇨ **Desired Aggregate Expenditure (DAE)**

⇨ **Actual Expenditure**

- In the economy without government and foreign sector

⇨ **Desired Aggregate Expenditure (DAE) = Desired C + Desired I**

⇨ **Actual Aggregate Expenditure = Actual C + Actual I**

- Desired vs. Actual concept

⇨ **Actual Consumption vs. Desired Consumption**

⇨ **Actual Investment vs. Desired Investment**

3.1 Introduction

Actual Investment vs. Desired Investment (Planned Investment)

- **Investment in building, machine**
  - ❖**Planned B&M investment** (Intend to build factory or buy machine)
  - ❖**Unplanned B&M investment** (eg.B&M bought b/c of shock in sales)
- **Inventory investment**
  - **Planned inventory investment** (Intend to stock some final goods)
  - **Unplanned inventory investment** (Final goods produced but cannot be sold)
- **Actual Investment = All firms' investments, including their unplanned changes in inventories**

3.2 Composition of DAE

In the economy with government and foreign sector

DAE = Desired (C + I + G + X – M)

- **Desired aggregate consumption**
- **Desired aggregate investment**
- **Desired aggregate government expenditure**
- **Desired aggregate net export**

3.2.1 Desired aggregate consumption

Factors determining aggregate C

- **Disposable Income (Y^d),** $Y^d = Y - T$ Y^d ↑ ⇨
- **Consumption loan**

  Low interest rate for consumption loan ⇨

  Low down payment for consumption loan ⇨

- **Population amount**

  Amount of population ↑ ⇨

3.2.1 Desired aggregate consumption

Factors determining aggregate C

- **Consumer expectation**

  Expect future income to ↑ ⇨ **Current C**

  Expect price of G&S to ↑ ⇨ **Current C**

- **Consumer taste**

Keynes consumption theory

- Main factor determining C is Y^d
- Consumption Function

$$C = f\,(Y^d, A1, A2, A3, \ldots)$$

Consumption Function

$C = C_a + bY^d$ $C = f(Y^d)$

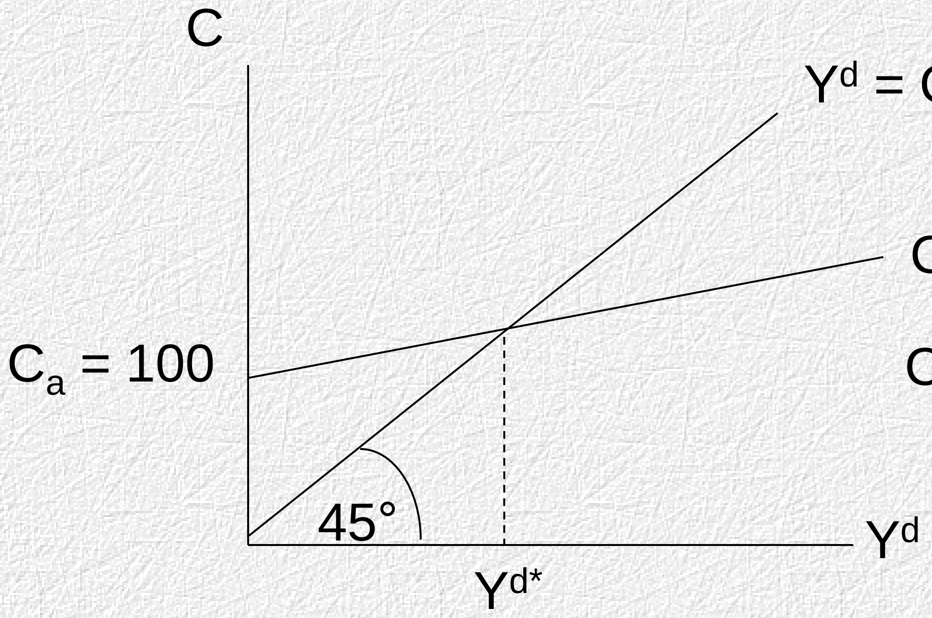
$C = 100 + 0.6Y^d$

APC = Average Propensity to Consume ⇨ **APC =** $\frac{C}{Y^d}$

MPC = Marginal Propensity to Consume ⇨ **MPC =** $\frac{\Delta C}{\Delta Y^d}$

MPC < 1 ⇨

Consumption Graph



$C = 100 + 0.6Y^d$

Slope =0.6

MPC = 0.6

Break-even Income

Note:

1) Y^d ↑ ⇨

2) Y^d ↑ 1 unit ⇨

3) Y^d ↑ ↑ ⇨

From consumption graph

- At point $Y^d = C$

$$C = 100 + 0.6Y^d$$

From consumption graph

$Y^d = 0$ ⇒

$0 < Y^d < Y^{d*}$ ⇒

$Y^d > Y^{d*}$ ⇒

$Y^d = Y^{d*}$ ⇒

Saving

Find saving function from consumption function

$Y^d = C + S$

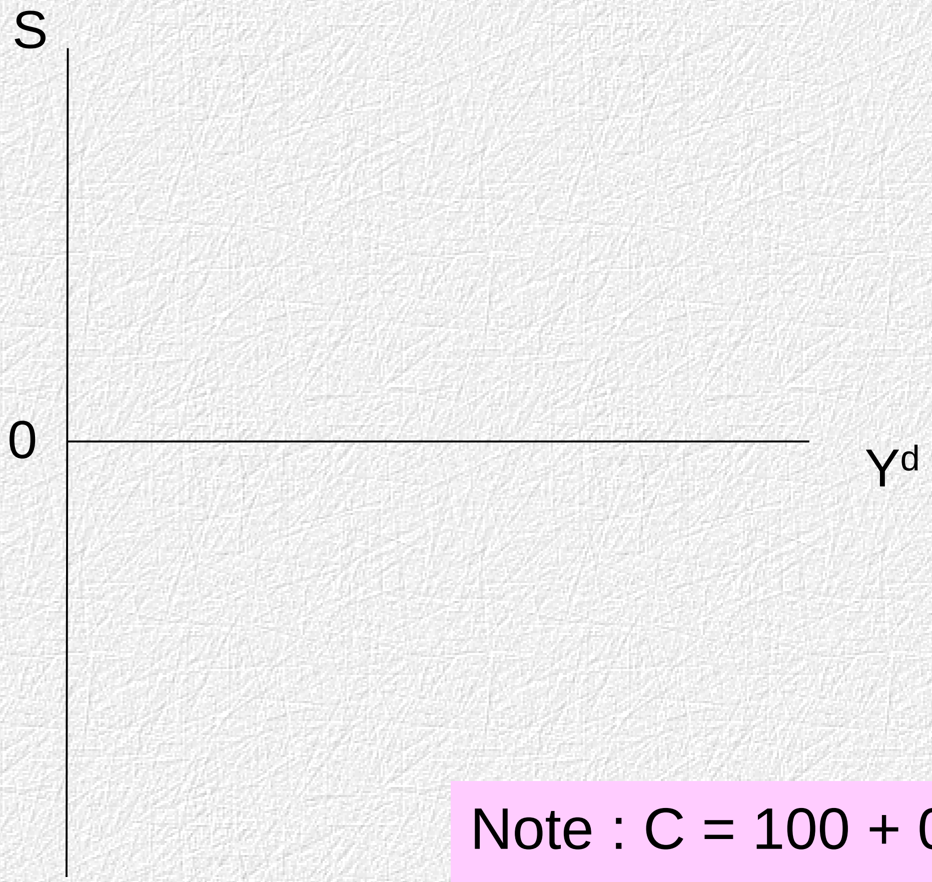
$C = C_a + bY^d$

$C = 100 + 0.6Y^d$

APS = Average Propensity to Save

MPS = Marginal Propensity to Save

Saving and Disposable Income



$S = -100 + 0.4Y^d$

$S = -C_a + (1\text{-}b)Y^d$

MPC + MPS = 1

Note : $C = 100 + 0.6Y^d$

: MPC = 0.6

Factors affecting saving

- Disposable Income (Y^d) , Y^d ↑ ⇨
- Interest rate, eg.

  Interest rate for deposit ↑ ⇨

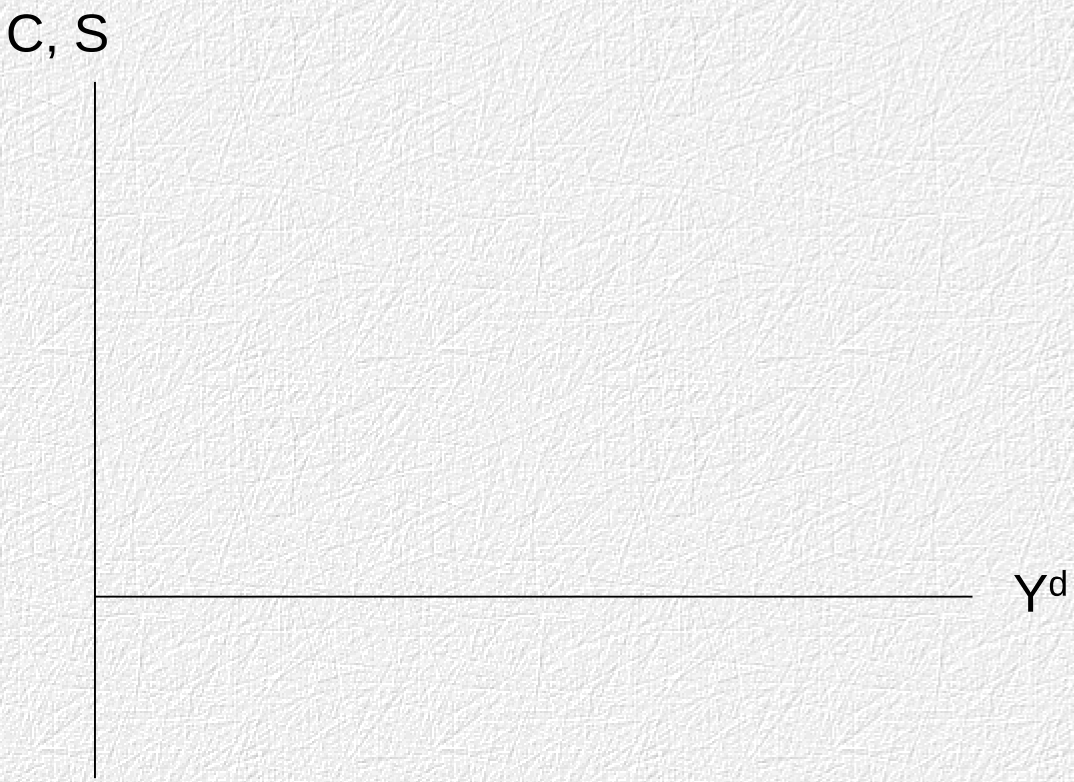
- Consumer expectation

  Expect future income to ↓ ⇨ Current saving

Consumption and Saving

$$C = C_a + bY^d$$

$$S = -C_a + (1 - b)Y^d$$



From graph of Consumption and Saving

$Y^d = 0$ ⇒ $C = C_a$, $S = -C_a$

$0 < Y^d < Y^{d*}$ ⇒

$Y^d > Y^{d*}$ ⇒

$Y^d = Y^{d*}$ ⇒

- From $Y^d = C + S$

Divide both sides by Y^d

⇒ At every level of disposable income

- from $\Delta Y^d = \Delta C + \Delta S$

Divide both sides by ΔY^d

Move Along VS. Shift in Consumption and Saving curve

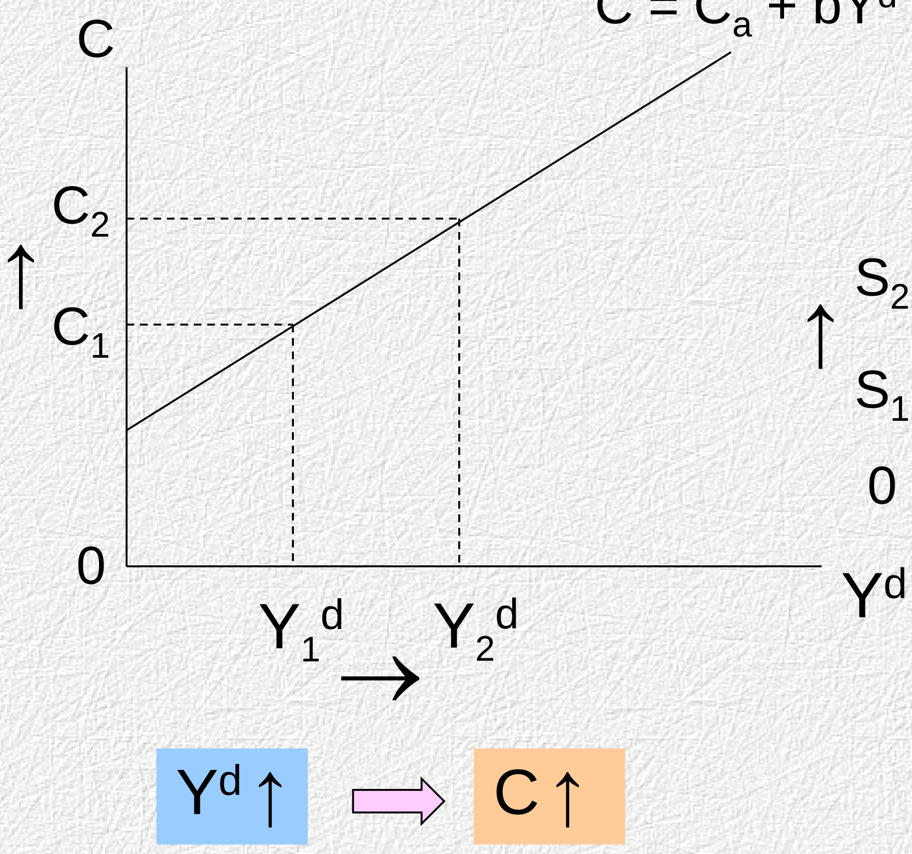
$Y^d\Delta$ ⇨ $C\Delta$ ⇨

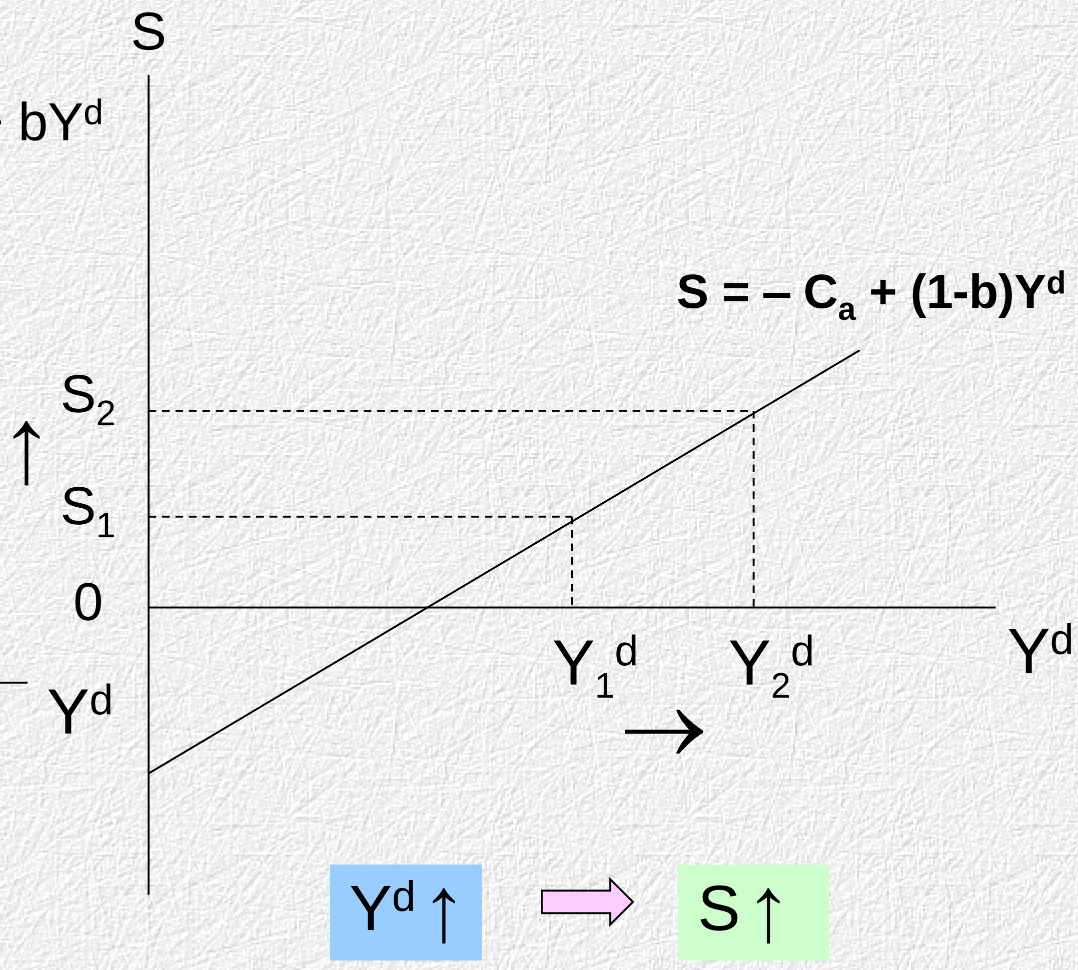
$Y^d\Delta$ ⇨ $S\Delta$ ⇨

Change in any factors (except Y^d) affecting C ⇨

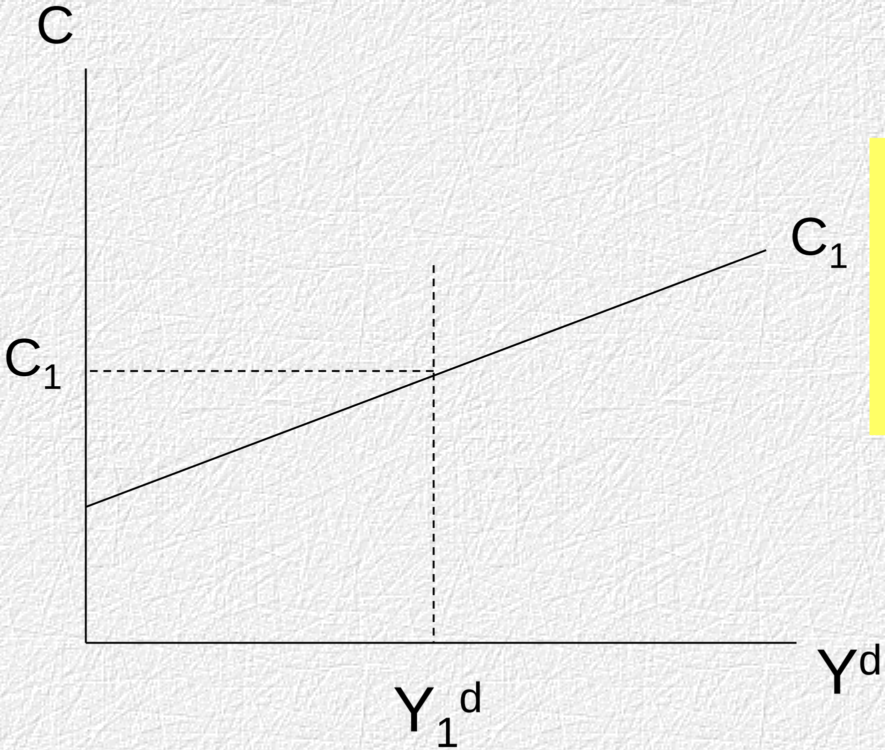
Change in any factors (except Y^d) affecting S ⇨

Example **Move Along** the Curve





Example **Shift** the Curve

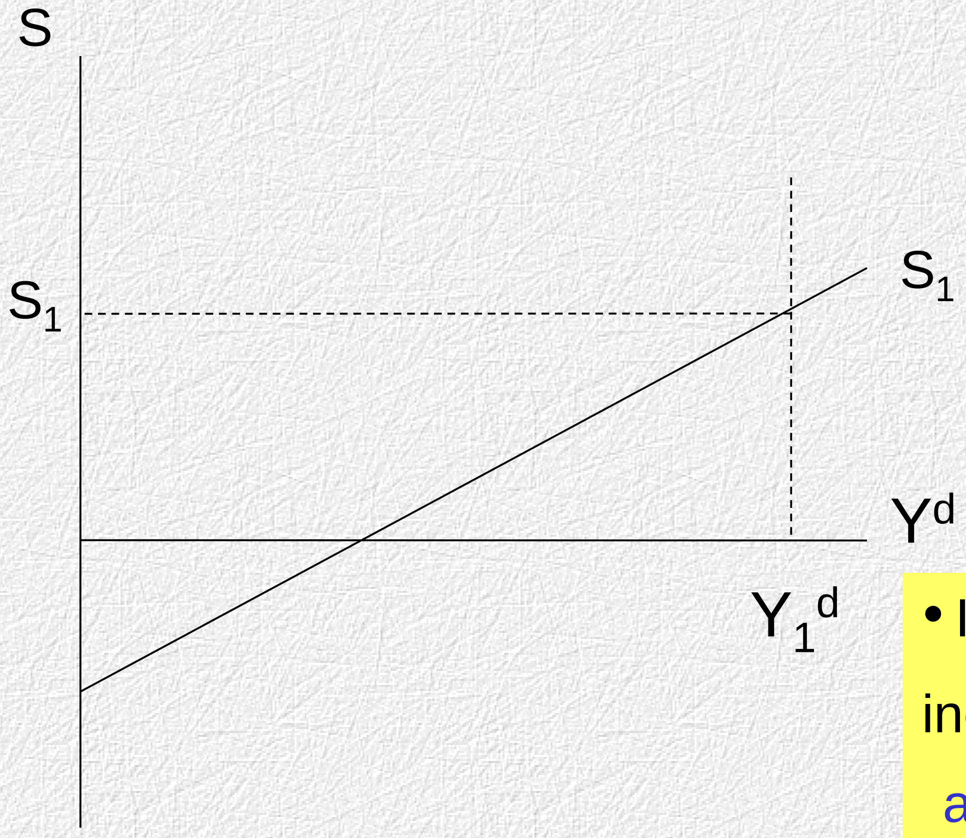


At level of disposable income $\mathbf{Y_1^d}$

- If interest rate for consumption loan ↓ : at the same level of disposable income $\mathbf{Y_1^d}$

- If expected disposable income ($\mathbf{Y_E^d}$) ↓: at the same level of disposable income $\mathbf{Y_1^d}$

Example **Shift** the Curve



At level of disposable income Y_1^d

- If interest rate for consumption loan ↓ at the same level of disposable income Y_1^d ⇨

- If expected disposable income (Y_E^d) ↓ at the same level of disposable income Y_1^d ⇨

Summarize Consumption Theory

Consumption Theory under Various Hypotheses

- Absolute Income Hypothesis
  (Keynes Consumption Theory)
- Permanent Income Hypothesis
- Life Cycle Hypothesis

Consumption Theory under Permanent Income Hypothesis

- Developed by Milton Friedman
- Assumption
  - Income (Y) can come from
    - Permanent Income (Y^p)
    - Temporary Income (Y^t)

$$Y = Y^p + Y^t$$

  - Consumption can come from
    - Permanent Consumption (C^p)
    - Temporary Consumption (C^t)

$$C = C^p + C^t$$

Consumption Theory under Permanent Income Hypothesis

- Assumption (continued)
  - Permanent Consumption (C^p) is a proportion of Permanent Income (Y^p)

    $$C^p = kY^p$$

    Where $k = MPC_p$

  - Temporary Income (Y^t) is not correlated with Permanent Income (Y^p)
  - Temporary Consumption (C^t) is not correlated with Permanent Consumption (C^p)
  - Temporary Consumption (C^t) is not correlated with Temporary Income (Y^t)

    That is $MPC_t = 0$

Consumption Theory under Permanent Income Hypothesis

- Important concept

  Consumption does not depend current income,

  but depends on the permanent income

Consumption Theory under Permanent Income Hypothesis

- Long-run Consumption

$$C^{LR} = C^p = kY^p$$

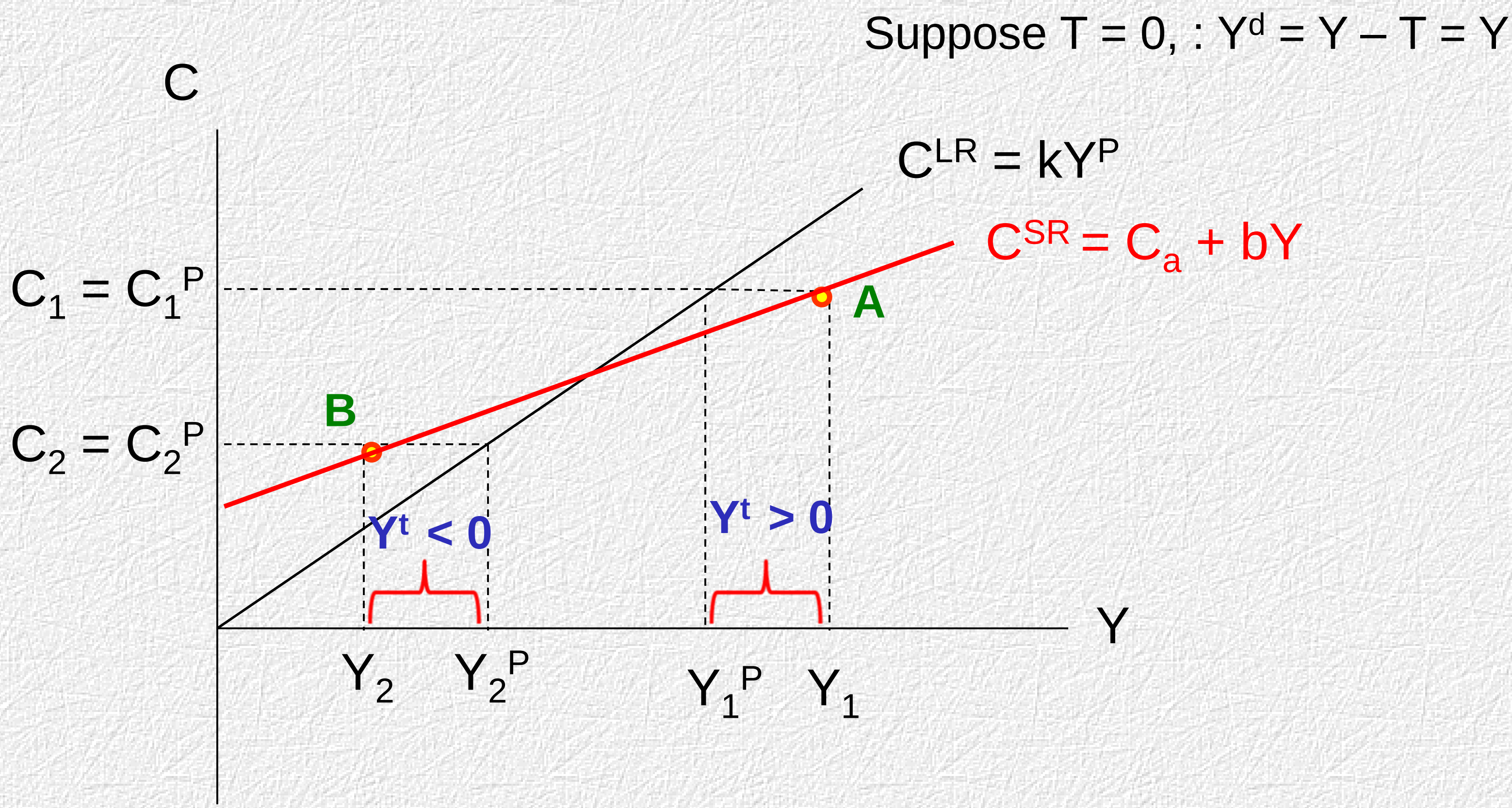
$$APC = MPC = k$$

- Short-run Consumption

$$C^{SR} = C_a + bY$$

$$APC > MPC$$

Consumption Theory under Permanent Income Hypothesis



Consumption Theory under Permanent Income Hypothesis

In short-run, income can vary around the long run trend

Boom period ⇒ $Y = Y_1$ ⇒ $Y_1^p < Y_1$ ⇒ $Y^t > 0$

At Y_1^p : Consumption = C_1^p ⇒ $C_1^p = C_1$

Therefore; at Y_1 : Consumption = C_1 ⇒ Point A

Recession period ⇒ $Y = Y_2$ ⇒ $Y_2^p > Y_2$ ⇒ $Y^t < 0$

At Y_2^p : Consumption = C_2^p ⇒ $C_2^p = C_2$

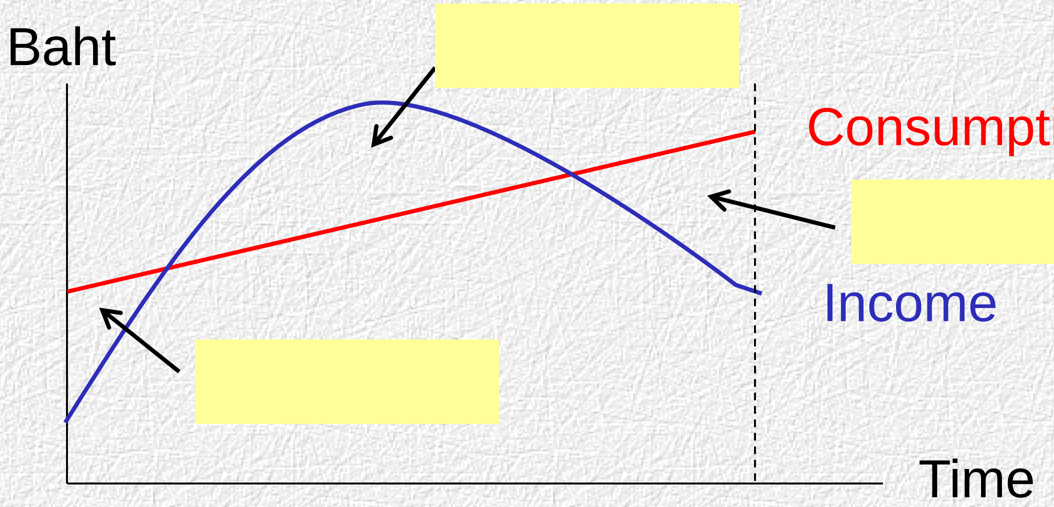
Therefore; at Y_2 : Consumption = C_2 ⇒ Point B

Draw line between point A and Point B, we will get C^{SR} line

Where **$C^{SR} = C_a + bY^d$**

Consumption Theory under Life Cycle Hypothesis

- Developed by Albert Ando and Franco Modigliani
- Assumption
  - Income life cycle is normally as follows



At young age and retired age

At working age

Consumption Theory under Life Cycle Hypothesis

- Important concept

  Consumption does not depend current income, but depends on present value of lifetime income

Consumption Theory under Life Cycle Hypothesis

Present Value of lifetime Income

Let n = number of years you will live from now on

Y_t = income at year t

r = real interest rate

PV = present value of lifetime income

Consumption Theory under Life Cycle Hypothesis

Year 0 ⇨

Year 1 ⇨

Consumption Theory under Life Cycle Hypothesis

Year 2 ⇨

Consumption Theory under Life Cycle Hypothesis

Present Value of life time income

$$= (\text{PV of } Y_1) + (\text{PV of } Y_2) + \ldots\ldots\ldots + (\text{PV of } Y_n)$$

$$= \frac{Y_1}{(1+r)} + \frac{Y_2}{(1+r)^2} + \ldots\ldots\ldots + \frac{Y_n}{(1+r)^n}$$

$$= \sum_{t=1}^{n} \frac{Y_t}{(1+r)^t}$$

Consumption Theory under Life Cycle Hypothesis

Present Value of lifetime Income

$$PV\ of\ life\,time\ income = \frac{Y_1}{1+r} + \frac{Y_2}{(1+r)^2} + \frac{Y_3}{(1+r)^2} + \cdots + \frac{Y_n}{(1+r)^n}$$

$$PV\ of\ life\,time\ income = \sum_{t=1}^{n} \frac{Y_t}{(1+r)^t}$$

Consumption at year t depends on present value of lifetime income

3.2.2 Desired Aggregate Investment (I)

- Desired (Planned) Aggregate Investment (I)
- Desired (Planned) Investment in building, machine, inventory investment, and residential investment
- **Purchasing bond** is not included in investment (in this definition) because it does not directly contribute to production of G&S

Factors determining investment

1) Real interest rate — r ↑ ⇒

2) National Income — Y ↑ ⇒

3) Changes in technology — Technology improvement ⇒

4) Existing level of capital stock — High level of existing capital stock ⇒

5) Government policy — Corporate income tax ↑ ⇒

6) Economic stability — Stable economy ⇒

Factors determining investment

7) Investment expectation

- Profit expectation — Expect profit to increase ⇨
- Government policy expectation
  - Expect corporate income tax to ↓ ⇨
- Economic situation expectation
  - Expect good economic situation ⇨

Investment Function

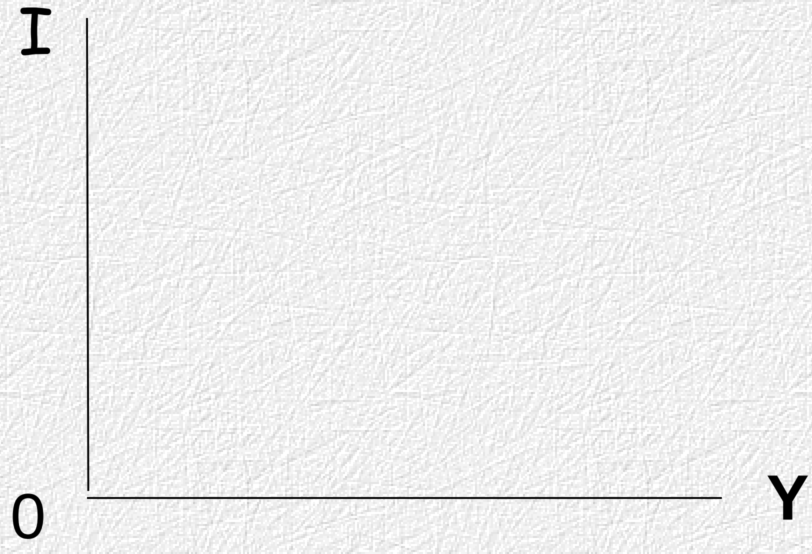
- Main factors determining investment are r, **Y**
- **Investment Function**

$$I = f(r, Y, B_1, B_2, B_3, \ldots)$$

Investment and National Income

- **Autonomous Investment ------ I_a**

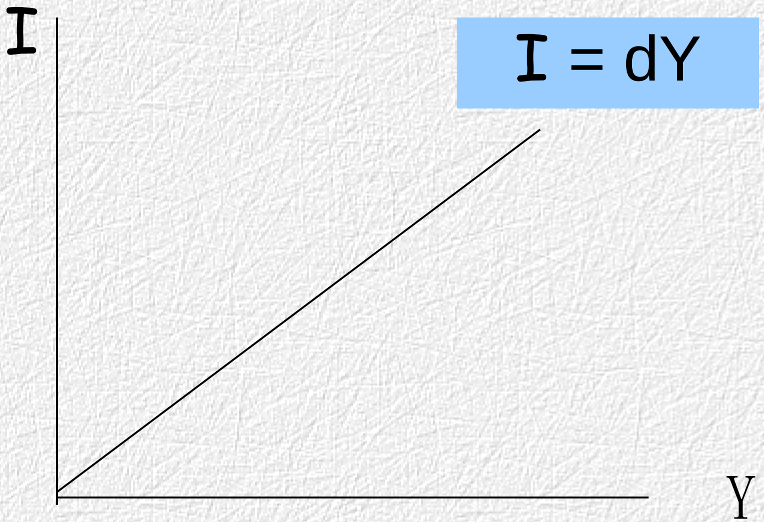
  Investment that does not depend on national income but depends on other factors, such as technology improvement, number of population and interest rate.

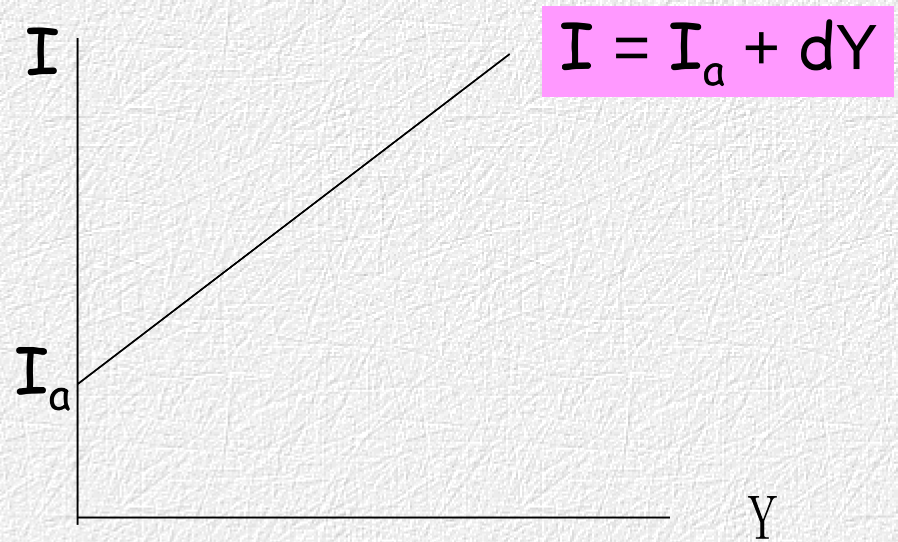


Investment and National Income

- Induced Investment ---- I_I

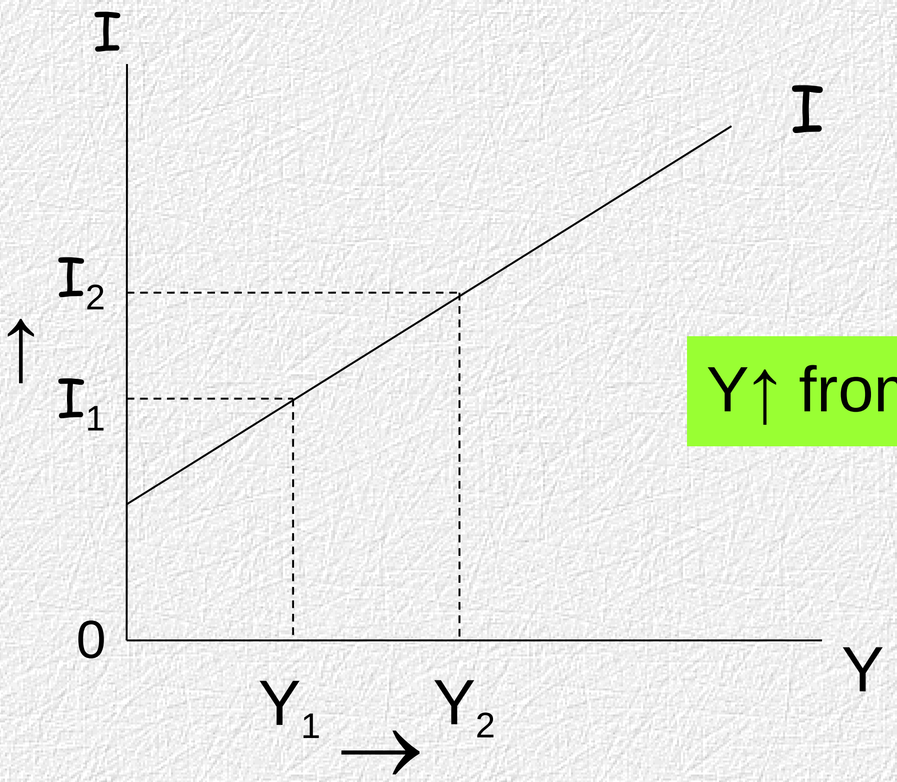
  Investment that depends on national income





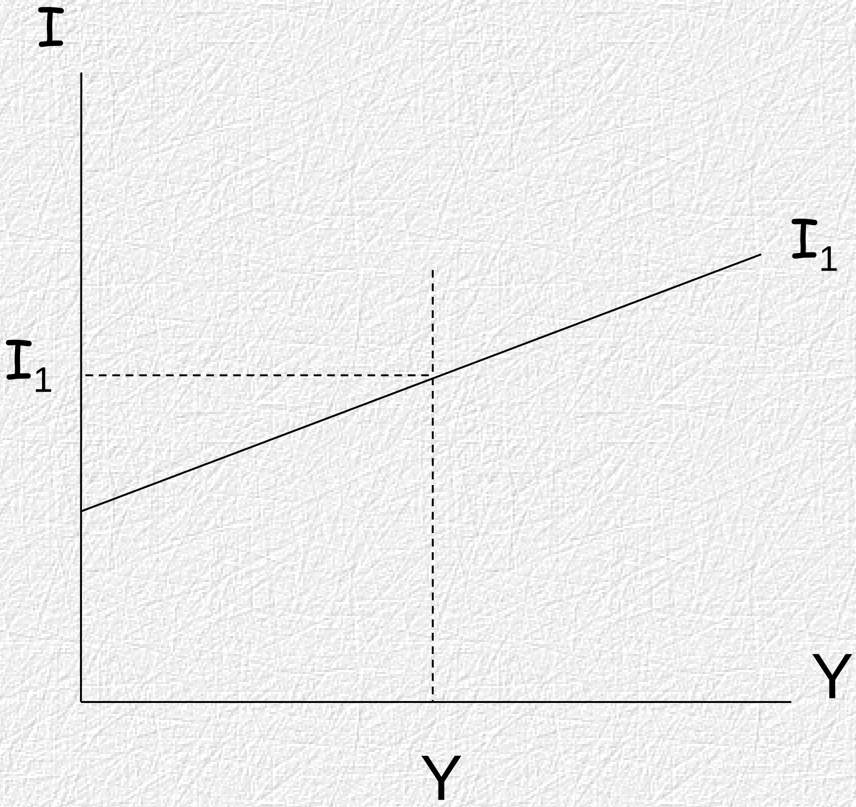
$Y \uparrow \Rightarrow I \uparrow$

Move Along Investment Curve



Y↑ from **Y_1** to **Y_2** ⇒ I↑ from I_1 to I_2

Example Shift of investment line



At level of national income Y_1

- Improvement in technology

- Changes in factors except **Y** affecting I (eg. interest rate, technology , population number)

Other matters in investment

- Present Value (**PV**) and Net Present Value (**NPV**) of Return on Investment
- Marginal Efficiency of Capital (**MEC**) or

  Internal Rate of Return (**IRR**) of investment
- The Accelerator Principle

PV and NPV

PV and NPV concept

If R_t = Return on Investment at year t

r = Discount rate

PV = Present Value of Return on Investment

n = Number of years of the investment project

C = Cost of investment

PV and NPV

$$PV = \frac{R_1}{1+r} + \frac{R_2}{(1+r)^2} + \frac{R_3}{(1+r)^3} + \cdots + \frac{R_n}{(1+r)^n}$$

$$PV = \sum_{t=1}^{n} \frac{R_t}{(1+r)^t}$$

$$NPV = PV - C$$

$$NPV = \sum_{t=1}^{n} \frac{R_t}{(1+r)^t} - C$$

PV and NPV

Investment Decision

If NPV > 0 → Invest — Necessary condition for investment

NPV < 0 → Not invest

NPV = 0 → Indifference between invest and not invest

Marginal Efficiency of Capital (MEC) or Internal Rate of Return (IRR)

MEC or IRR is the discount rate that make NPV = 0

$$NPV = \sum_{t=1}^{n} \frac{R_t}{(1+MEC)^t} - C = 0$$

$$\sum_{t=1}^{n} \frac{R_t}{(1+MEC)^t} = C$$

$$C = \frac{R_1}{(1+MEC)} + \frac{R_2}{(1+MEC)^2} + \frac{R_3}{(1+MEC)^3} + \cdots + \frac{R_n}{(1+MEC)^n}$$

We call this specific discount rate as internal rate of return or marginal efficiency of capital

Marginal Efficiency of Capital (MEC) or Internal Rate of Return (IRR)

For example,

- You invest by buying machine at Year 0 = 100 Baht
- Suppose your machine last only one year
- At year 1, you have a return = 110 Bahts

Please find IRR or MEC

Year 0 — Year 1

C = 100 Baht — R_1 = 110 Baht

MEC or IRR is the discount rate where NPV = 0 or where

$$C = \frac{R_1}{(1+MEC)} + \frac{R_2}{(1+MEC)^2} + \frac{R_3}{(1+MEC)^3} + \cdots + \frac{R_n}{(1+MEC)^n}$$

In this case, time horizon is just one period

$$C = \frac{R_1}{(1+MEC)}$$

$$C + (C * MEC) = R_1$$

$$C * MEC = R_1 - C$$

$$MEC = \frac{R_1 - C}{C}$$

$$MEC = \frac{110 - 100}{100}$$

$$MEC = 0.1$$

$$MEC = 10\%$$

We also call this MEC as IRR (Internal Rate of Return) because we use only internal information for our calculation

Year 0 Year 1

C = 100 Baht R_1 = 110 Baht

Think another way

When discount rate = 10%, PV of R_1 = ?

$$PV\ of\ R_1 = \frac{R_1}{(1+0.1)}$$

$$PV\ of\ R_1 = \frac{110}{1.1}$$

$$PV\ of\ R_1 = 100$$

We can see that when $PV\ of\ R_1 = 100$ C = 100 Baht

NPV = 0

Marginal Efficiency of Capital (MEC) or Internal Rate of Return (IRR)

Investment Decision (also depends on return on other investment)

Suppose i = interest rate (rate of return) on other investment

Investors normally compare **MEC** with **i**

If

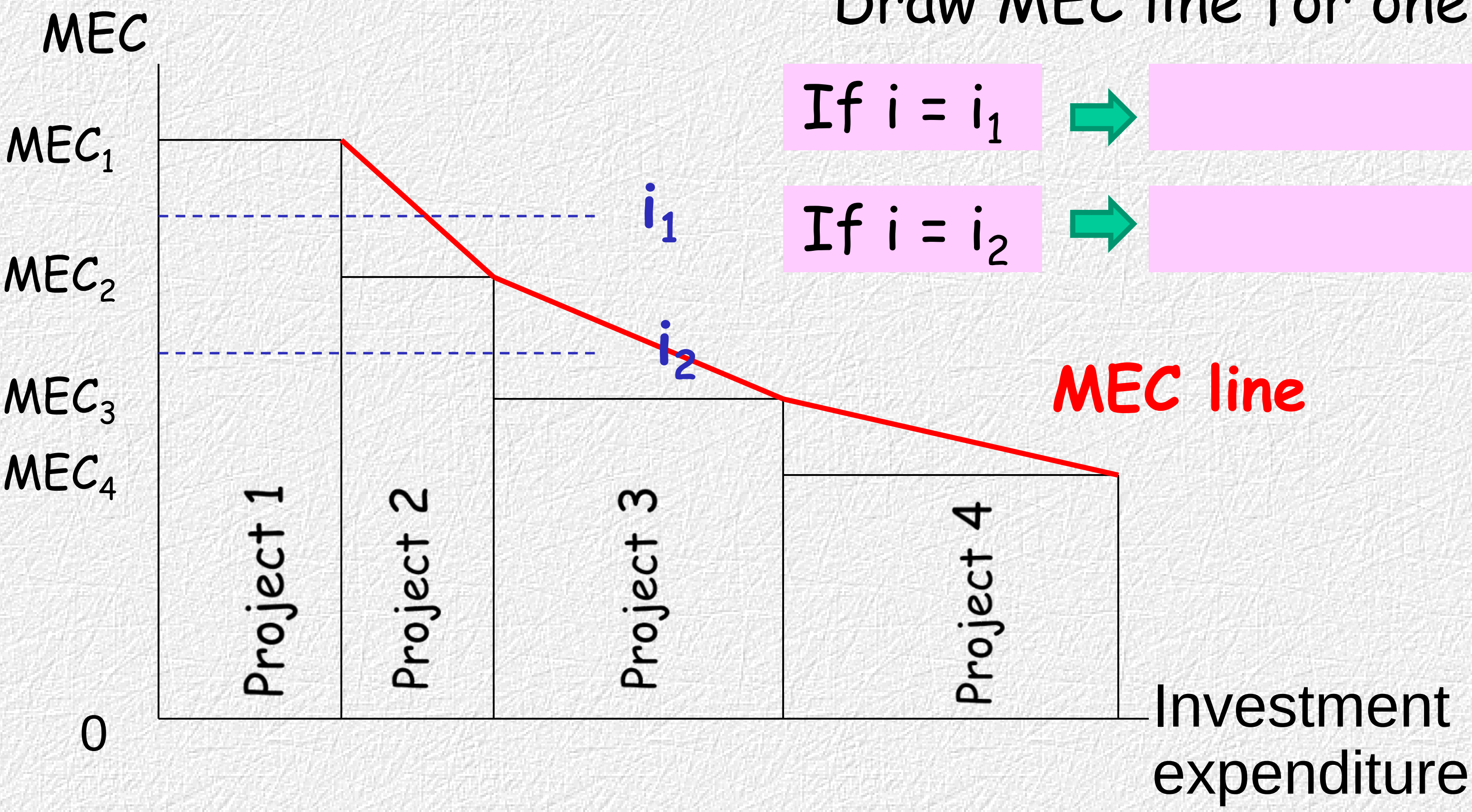
MEC > i	⇒	Sufficient condition for investment
MEC < i	⇒	
MEC = i	⇒	

Marginal Efficiency of Capital (MEC) or Internal Rate of Return (IRR)

Draw MEC line for one firm

If $i = i_1$ →

If $i = i_2$ →



The Accelerator Principle

The principle is based on the idea that

demand for investment is the derived demand of demand for output

If K^d_t = Desired capital stock at year t

K_t = Actual capital stock at year t

$I_{n,t}$ = Net investment at year t

Y_t = Output at year t

The Accelerator Principle

Assumption

1. $K_t^d = \alpha Y_t$
2. $K_{t-1} = K_{t-1}^d = \alpha Y_{t-1}$
3. $I_{n,t} = K_t^d - K_{t-1}$

α is the accelerator.

That is, Y↑ accelerates net investment to ↑

Then, $I_{n,t} = K_t^d - K_{t-1}$

$$I_{n,t} = \alpha Y_t - \alpha Y_{t-1}$$

$$I_{n,t} = \alpha(Y_t - Y_{t-1})$$

$$I_{n,t} = \alpha \Delta Y_t$$

⇒ $\alpha = \dfrac{I_{n,t}}{\Delta Y_t}$

$\alpha > 0$

The Accelerator Principle

Problems of the Simple Accelerator Model

- Investment may depend on other factors rather than ΔY_t (such as new technology for new investment opportunity)

- If investors think that changes output (or demand for output) is temporary, they may not change level of investment

- When $Y_t \uparrow$ investment may not $\uparrow$ because firms may have some excess capacity of capital

3.2.3 Government spending (G)

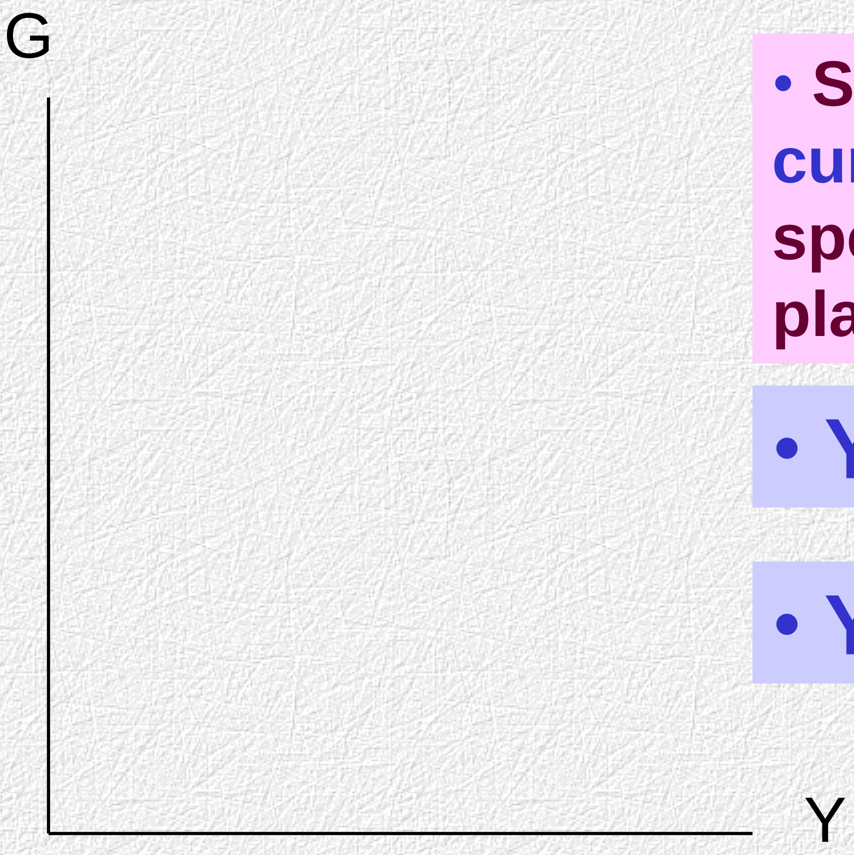
Factors determining G

- Government policy → **Fiscal Policy**

Expansion Fiscal Policy → **G ↑**

Contraction Fiscal Policy → **G ↓**

Relationship between G and Y

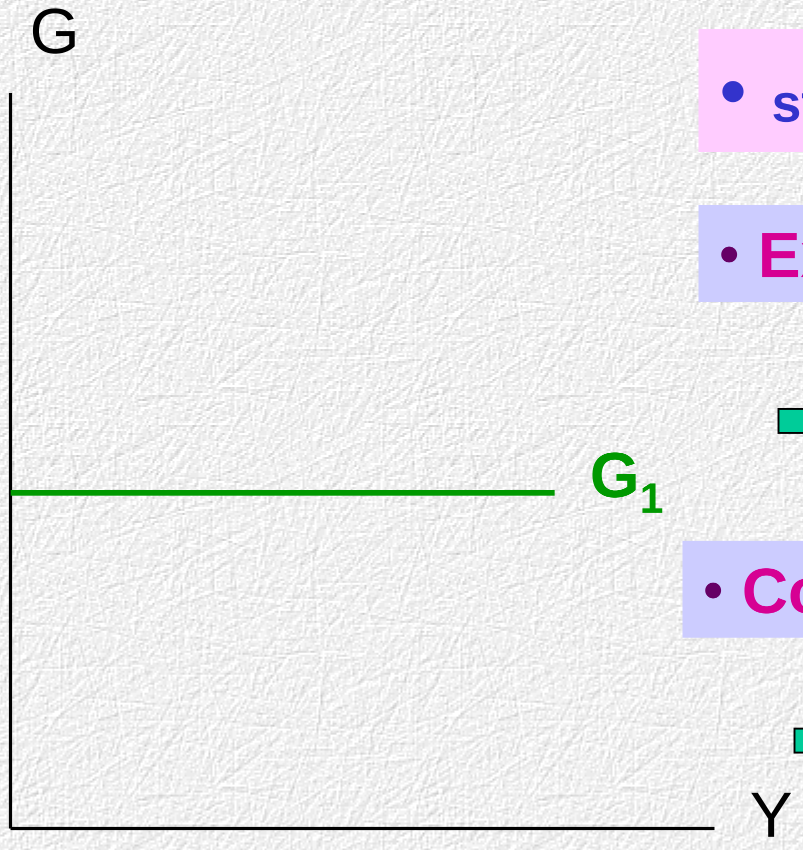


- **Suppose G does not depend on current Y (since government spending budget needs to be planned in advance)**

- **Y ↑ ⇒**

- **Y ↓ ⇒**

Shift of government spending curve (G)



- start with government spending level G_1

- **Expansion Fiscal Policy**

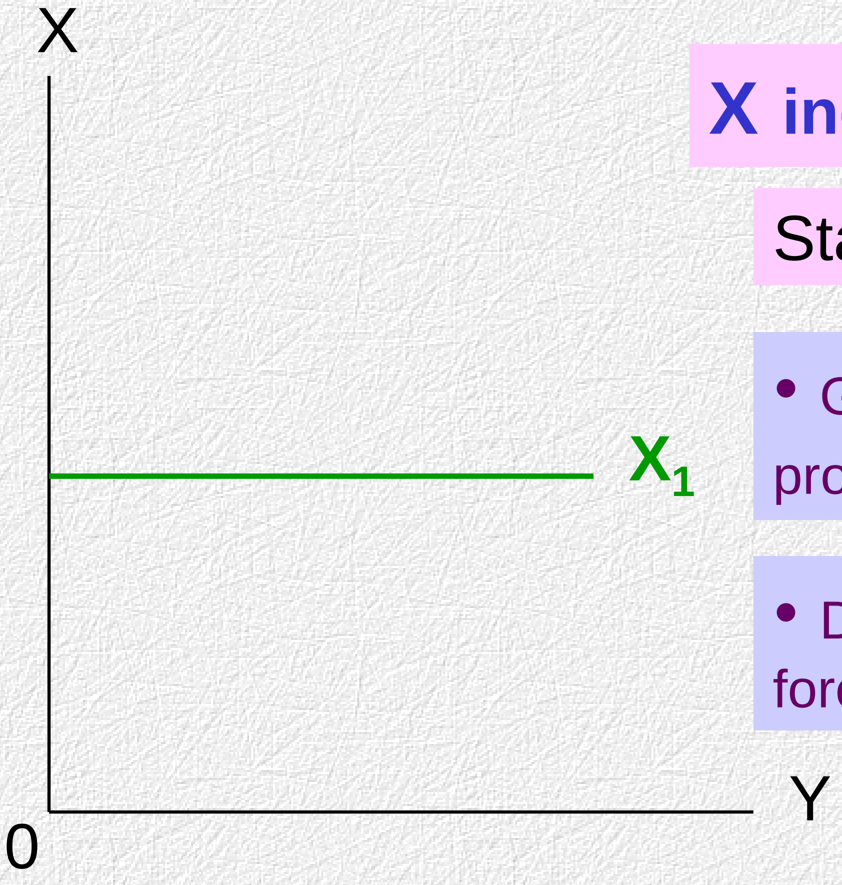
- **Contraction Fiscal Policy**

3.2.4 Net export (X-M)

Factors determining export

- Government export policy
- Political and economic stability
- Price of export G&S (compared with other countries)
- Demand from foreign market

Export Curve



X independent to Y

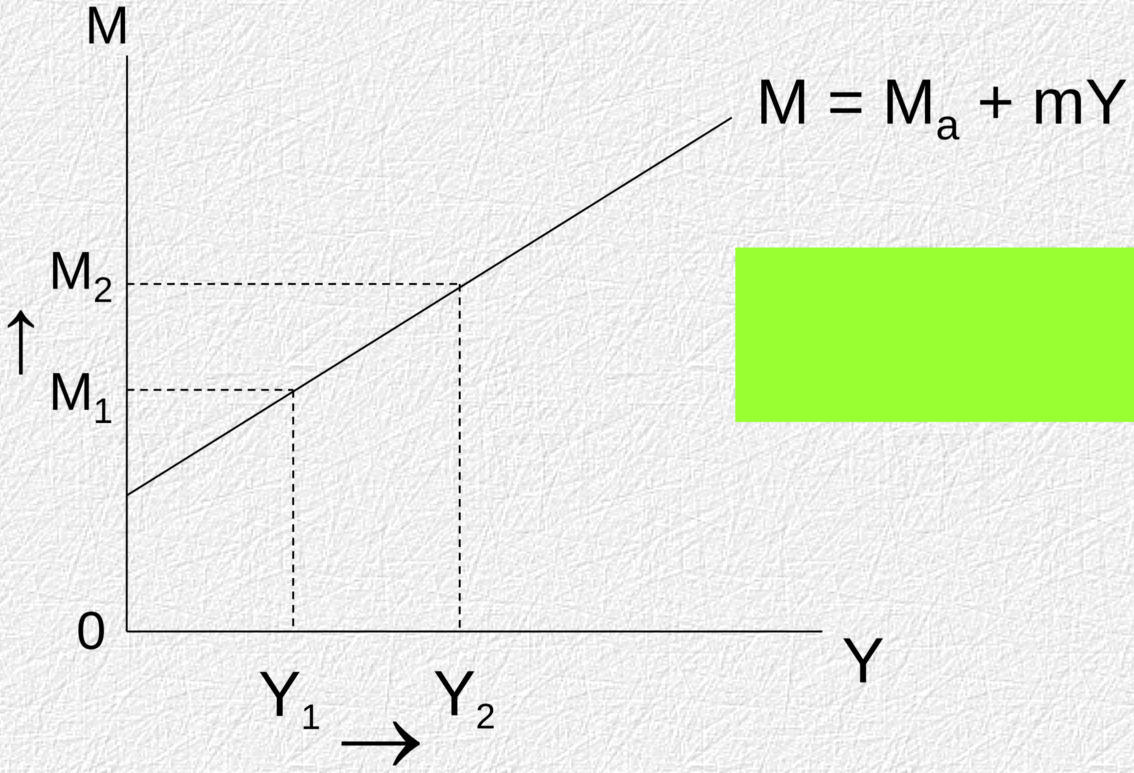
Start with export level X_1

- Government export promotion policy

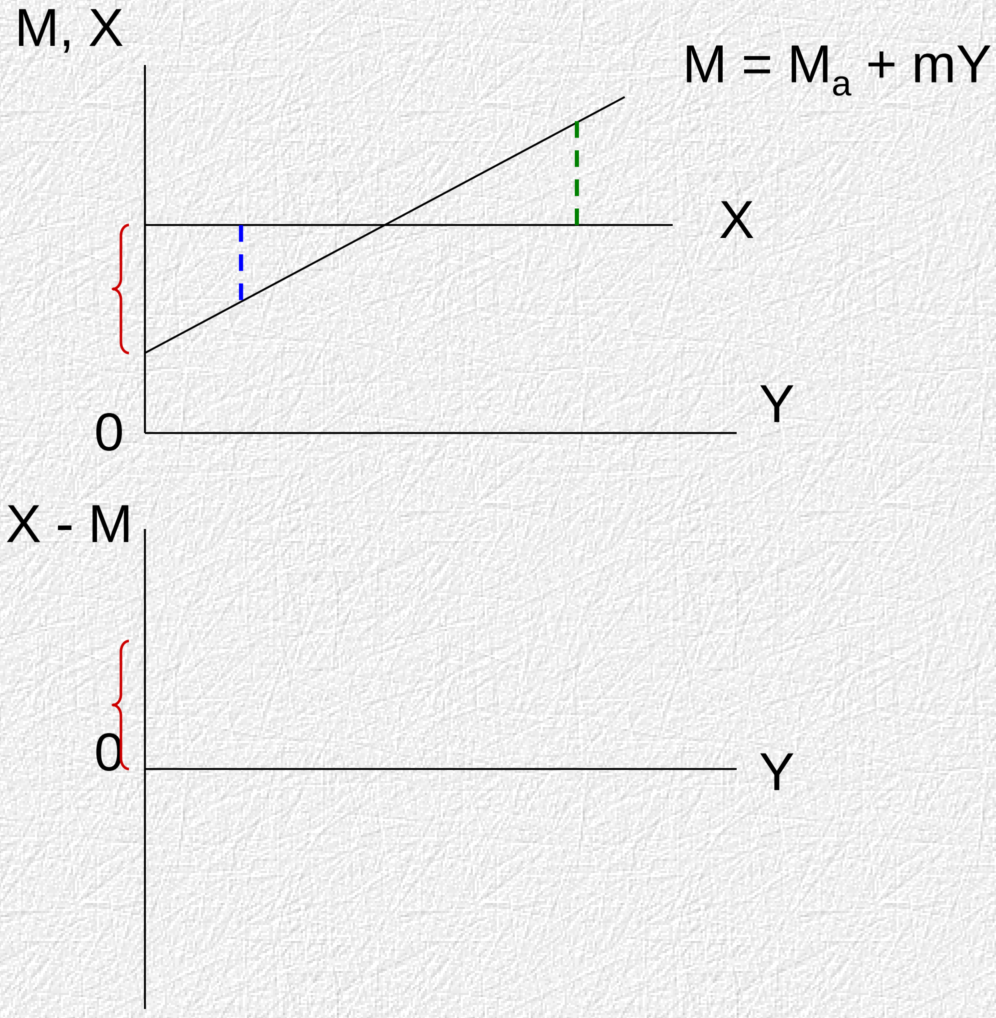
- Demand from foreign market ↓

Factors determining Import

Import curve



Net export (X – M) curve



Equation for DAE

Suppose T = 0, : $Y^d = Y - T = Y$

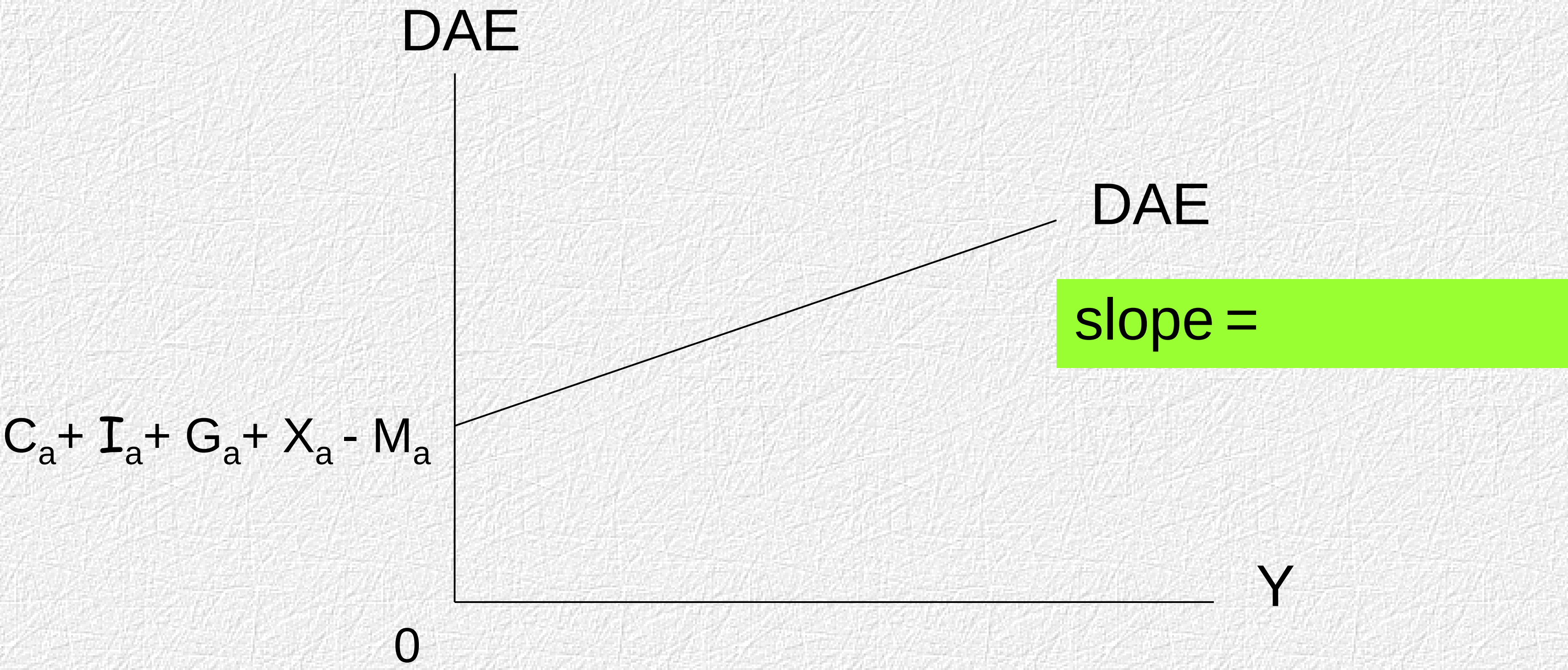
$$DAE = C + I + G + X - M$$

$$= (C_a + bY) + (I_a + dY) + G_a + X_a - (M_a + mY)$$

$$= (C_a + I_a + G_a + X_a - M_a) + (bY + dY - mY)$$

$$= (C_a + I_a + G_a + X_a - M_a) + (b + d - m)\,Y$$

DAE line



3.3 Equilibrium National Income

3.3.1 Definition

- Equilibrium occurs when there is no tendency for change.
- In **good markets** equilibrium occurs when

Aggregate Output = Desired Aggregate Expenditure

$$Y = DAE$$

- **Equilibrium income, Equilibrium output** (Y_e)

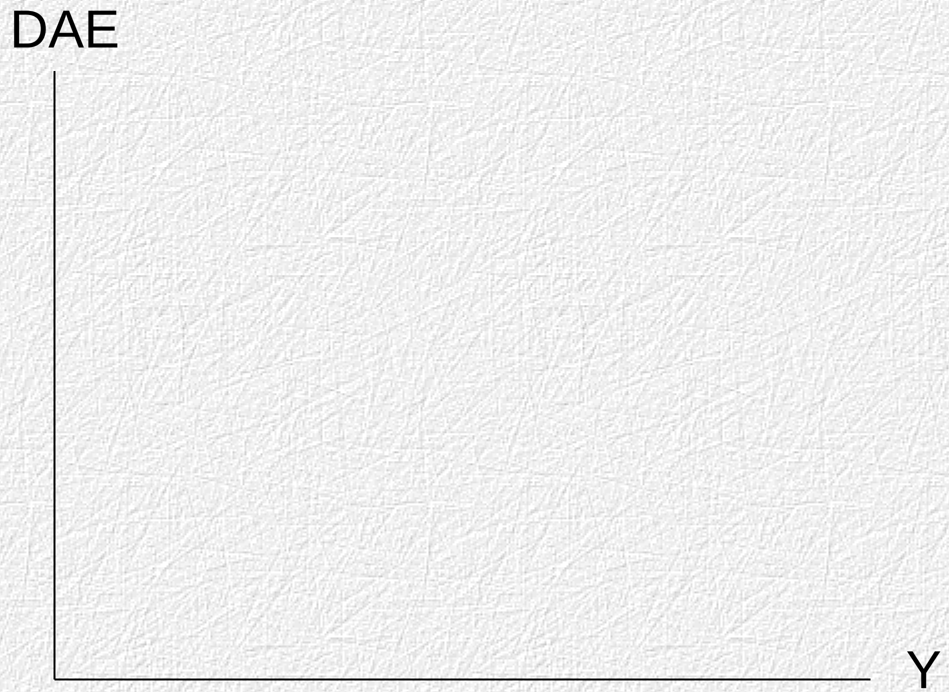
Level of national income (output) at which Y = DAE

3.3.2 Determination of equilibrium national income (Y_e)

1. Y = DAE approach

2. Injection = Leakage approach

3.3.2 a Find Y_e using Y = DAE approach



Adjustment to equilibrium, Y = DAE approach

When $Y < Y_E$

Adjustment to equilibrium, Y = DAE approach

When $Y > Y_E$

Adjustment to equilibrium, Y = DAE approach

when $Y = Y_E$ → **DAE = Y** → Equilibrium point since there would be no further adjustment from this point (unless there is at least one factor affecting DAE changes

Note : Y = DAE approach

- Closed economy, without government

$$DAE = C + I$$

- Closed economy, with government

$$DAE = C + I + G$$

- Open economy, with government

$$DAE = C + I + G + (X - M)$$

Find equilibrium national income, Y = DAE approach

Case 1: Closed economy, without Government

In closed economy, lets T = 0, : $Y^d = Y – T = Y$

$C = C_a + bY^d$

$I = I_a$

At equilibrium

Find autonomous spending multiplier

Case 1: Closed economy, without Government

From equilibrium income $Y_E = \frac{1}{(1-b)}(C_a + I_a)$

if $C_a \uparrow 1$ unit ⇨

Autonomous Consumption multiplier = =

if $I_a \uparrow 1$ unit ⇨

Autonomous Investment multiplier = =

Find equilibrium national income, Y = DAE approach

Case 2: Closed economy, with Government

$C = C_a + bY^d$

$Y^d = Y - T$

$T = T_a$

$I = I_a$

$G = G_a$

At equilibrium

Autonomous spending multiplier, Y = DAE approach
Case 2: Closed economy, with Government

From equilibrium income $Y_E = \dfrac{1}{(1-b)} (C_a - bT_a + I_a + G_a)$

Autonomous Consumption multiplier = =

Autonomous Investment multiplier = =

Autonomous Government spending multiplier = =

Autonomous Tax multiplier =

Numerical Example: Y = DAE approach

Case 2: Closed economy, with Government

$C = 100 + 0.6Y^d$ | $T = 10$ | $I = 40$ | $G = 60$

$C = C_a + bY^d$ | $T = T_a$ | $I = I_a$ | $G = G_a$

$Y^d = Y - T$

$$
\begin{aligned}
C &= C_a + bY^d \\
&= C_a + b(Y - T) \\
&= C_a + b(Y - T_a) \\
&= C_a + bY - bT_a \\
&= (C_a - bT_a) + bY
\end{aligned}
$$

$$
\begin{aligned}
DAE &= C + I + G \\
&= (C_a - bT_a) + bY + I_a + G_a \\
&= (C_a - bT_a + I_a + G_a) + bY
\end{aligned}
$$

Numerical Example: Y = DAE approach

Case 2: Closed economy, with Government

$C = 100 + 0.6Y^d$ | $T = 10$ | $I = 40$ | $G = 60$

At equilibrium

$$Y = DAE$$

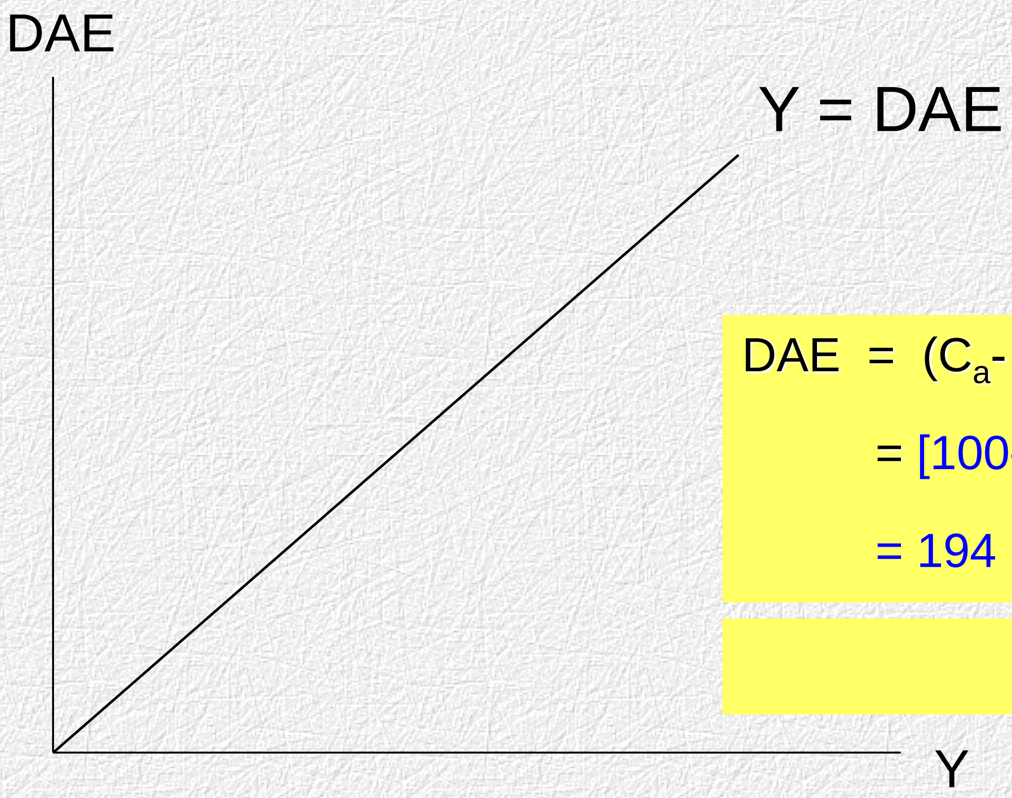
$$= (C_a - bT_a + I_a + G_a) + bY$$

$$(1 - b)Y = (C_a - bT_a + I_a + G_a)$$

$$Y_E = \frac{1}{1 - b}(C_a - bT_a + I_a + G_a)$$

Numerical Example

Case 2: Closed economy, with Government



$$DAE = (C_a - bT_a + I_a + G_a) + bY$$

$$= [100 - 0.6(10) + 40 + 60] + 0.6\,Y$$

$$= 194 + 0.6\,Y$$

Numerical Example

Autonomous spending multiplier, Y = DAE approach

Case 2: Closed economy, with Government

$C = 100 + 0.6Y^d$ | $T = 10$ | $I = 40$ | $G = 60$

From equilibrium income $Y_E = \dfrac{1}{(1-b)}(C_a - bT_a + I_a + G_a)$

Autonomous Consumption multiplier = = =

Autonomous Investment multiplier = = =

Autonomous Government spending multiplier = = =

Autonomous Tax multiplier = = =

Find equilibrium national income, Y = DAE approach

Case 3: Open economy, with Government

$C = C_a + bY^d$ $\quad$ $Y^d = Y - T$ $\quad$ $T = T_a$ $\quad$ $I = I_a$ $\quad$ $G = G_a$

$X = X_a$ $\quad$ $M = M_a + mY$

$$\begin{aligned} C &= C_a + bY^d \\ &= C_a + b(Y - T) \\ &= C_a + b(Y - T_a) \\ &= C_a + bY - bT_a \\ &= (C_a - bT_a) + bY \end{aligned}$$

$$\begin{aligned} X\text{-}M &= X_a - (M_a + mY) \\ &= X_a - M_a - mY \end{aligned}$$

$$\begin{aligned} DAE &= C + I + G + (X - M) \\ &= (C_a - bT_a + bY) + I_a + G_a + X_a - M_a - mY \\ &= (C_a - bT_a + I_a + G_a + X_a - M_a) + (b-m)Y \end{aligned}$$

At equilibrium **Y = DAE**

$$Y = (C_a - bT_a + I_a + G_a + X_a - M_a) + (b - m)Y$$

$$(1-b+m)\,Y = (C_a - bT_a + I_a + G_a + X_a - M_a)$$

$$Y_E = \frac{1}{1 - b + m}(C_a - bT_a + I_a + G_a + X_a - M_a)$$

Autonomous spending multiplier, Y = DAE approach
Case 3: Open economy, with Government

From equilibrium income $Y_E = \dfrac{1}{(1 - b + m)}(C_a - bT_a + I_a + G_a + X_a - M_a)$

Autonomous Consumption multiplier = =

Autonomous Investment multiplier =

Autonomous Government spending multiplier =

Autonomous Export multiplier =

Autonomous spending multiplier, Y = DAE approach

Case 3: Open economy, with Government

From equilibrium income $Y_E = \dfrac{1}{(1 - b + m)} (C_a - bT_a + I_a + G_a + X_a - M_a)$

Autonomous Tax multiplier =

Autonomous Import multiplier =

Numerical Example (Homework #4)

Case 3: Open economy, with Government

$C = 80 + 0.4Y^d$

$I = 50 + 0.6Y$

$G = 30$

$T = 10 + 0.1Y$

$X = 40$

$M = 20 + 0.16Y$

Note $Y^d = Y - T$

1. Finds equilibrium national income
2. Draw graph show equilibrium national income
3. Finds multipliers of all autonomous variables and explain the meaning of those multipliers
4. If autonomous government spending increase 4 units, and autonomous tax increase 20 units, find the new level of equilibrium national income

Balanced budget multiplier

If G_a multiplier $= \frac{1}{1-b}$

If T_a multiplier $= \frac{-b}{1-b}$

when G ↑ **1,000** Baht and T ↑ **1,000** Baht ⟹ $\Delta Y = ?$

ΔY =

= , $\Delta T = \Delta G$

=

$\Delta Y =$

Therefore; when G ↑ **1,000** Baht and T ↑ **1,000** Baht ⟹

3.3.2 b Find Y_e using injection = leakage approach

From DAE = Y

Desired Aggregate Expenditure

measured by Expenditure approach

Actual Aggregate Expenditure

Can be measured by Product, Expenditure, or Income Approaches

If we choose income approach, it can be measured from source of income or use of income

Source of income = Use of Income

Find Y_e , Injection = Leakage Approach

Case 1: Closed economy, without Government

Use of Income

DAE = Y

Find Y_e , Injection = Leakage Approach
Case 2: Closed economy, with Government

Use of Income

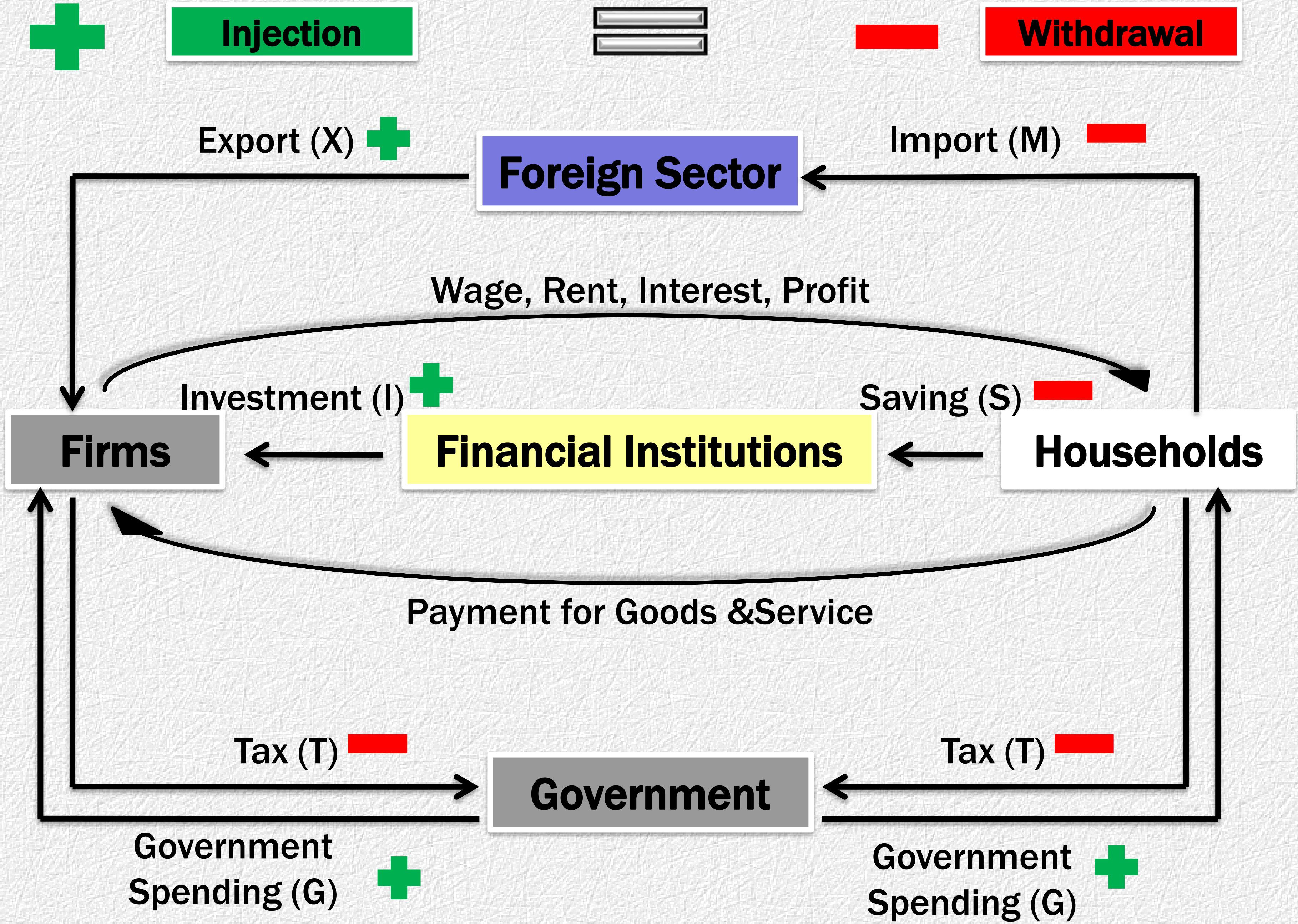
DAE = Y

Find Y_e , Injection = Leakage Approach

Case 3: Open economy, with Government

Use of Income

DAE = Y


Injection
Withdrawal
Export (X)
Foreign Sector
Import (M)
Wage, Rent, Interest, Profit
Investment (I)
Saving (S)
Firms
Financial Institutions
Households
Payment for Goods &Service
Tax (T)
Tax (T)
Government
Government Spending (G)
Government Spending (G)

Find Y_e , Injection = Leakage Approach
Case 1: Closed economy, without Government

Suppose $T = 0$, : $Y^d = Y - T = Y$

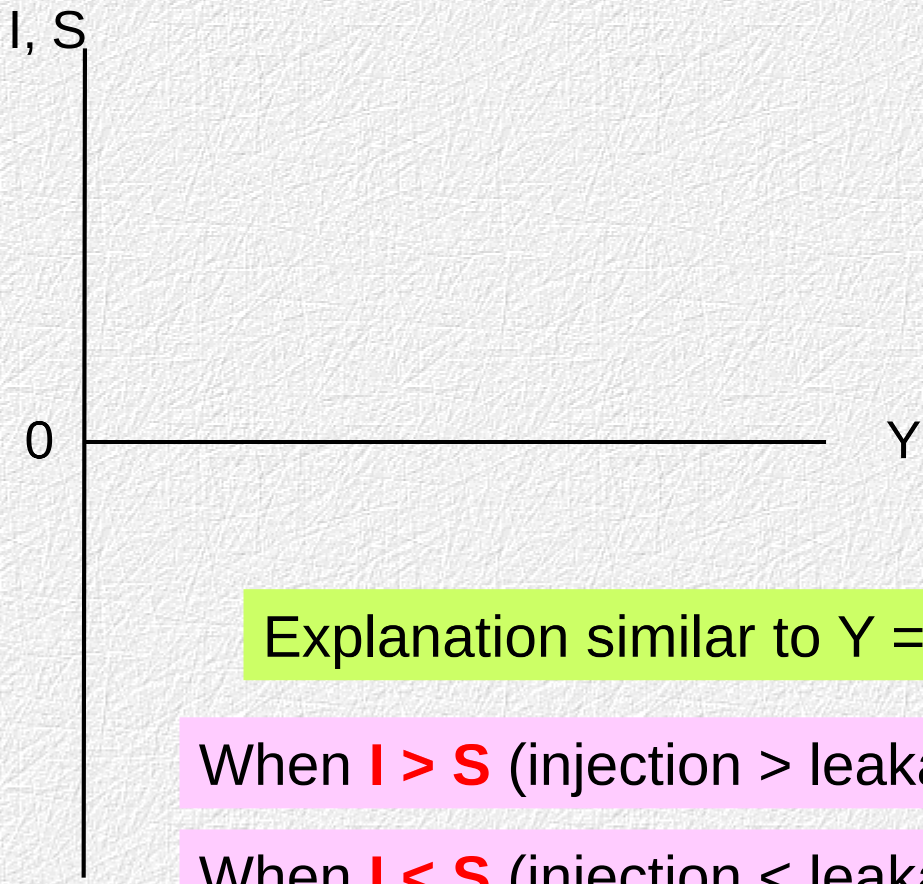
$C = C_a + bY^d = C_a + bY$

$I = I_a$

At equilibrium

Explain adjustment to equilibrium
Injection = Leakage Approach

Case 1: Closed economy, without Government



Explanation similar to Y = DAE approach

When **I > S** (injection > leakage) ⇨

When **I < S** (injection < leakage) ⇨

Adjustment to equilibrium, Y = DAE approach

When $Y < Y_E$ → **I > S** (injection > leakage) → **DAE > Y** → Producers sell their stock of goods →

Inventory ↓
Actual inventory investment < planned inventory investment
→ Production of good ↑ → Use of factors of production by producer ↑

→ Y ↑ Until Y = DAE

Adjustment to equilibrium, Y = DAE approach

When $Y > Y_E$ → **I < S** (injection < leakage) → **DAE < Y** → Goods sold less than goods produced →

Inventory ↑

Actual inventory investment **>** planned inventory investment

→ Production of good ↓ → Use of factor of production by producer ↓

Y ↓ Until Y = DAE

Adjustment to equilibrium, $Y = DAE$ approach

when $Y = Y_E$ ⇨ **DAE = Y** ⇨ **I = S**

(injection = leakage)

⇨ Equilibrium point since there would be no further adjustment from this point (unless there is at least one factor affecting DAE changes

Find Y_e , Injection = Leakage Approach

Case 2: Closed economy, with Government

$C = C_a + bY^d$

$Y^d = Y - T$

$T = T_a$

$I = I_a$

$G = G_a$

Find Y_e , Injection = Leakage Approach
Case 2: Closed economy, with Government

$$S = -C_a - (1-b)T_a + (1-b)Y$$

At equilibrium

$$S + T = I + G$$

$$-C_a - (1-b)T_a + (1-b)Y + T_a = I_a + G_a$$

$$(1-b)Y = C_a + I_a + G_a + (1-b)T_a - T_a$$

$$Y_E = \frac{1}{1-b}(C_a - bT_a + I_a + G_a)$$

$$S + T = -C_a + bT_a + (1-b)Y$$

$$I + G = I_a + G_a$$

Numerical Example: Injection = Leakage approach

Case 2: Closed economy, with Government

$C = 100 + 0.6Y^d$ | $T = 10$ | $I = 40$ | $G = 60$

$C = C_a + bY^d$ | $T = T_a$ | $I = I_a$ | $G = G_a$

Follows the step of previous two slides

At equilibrium

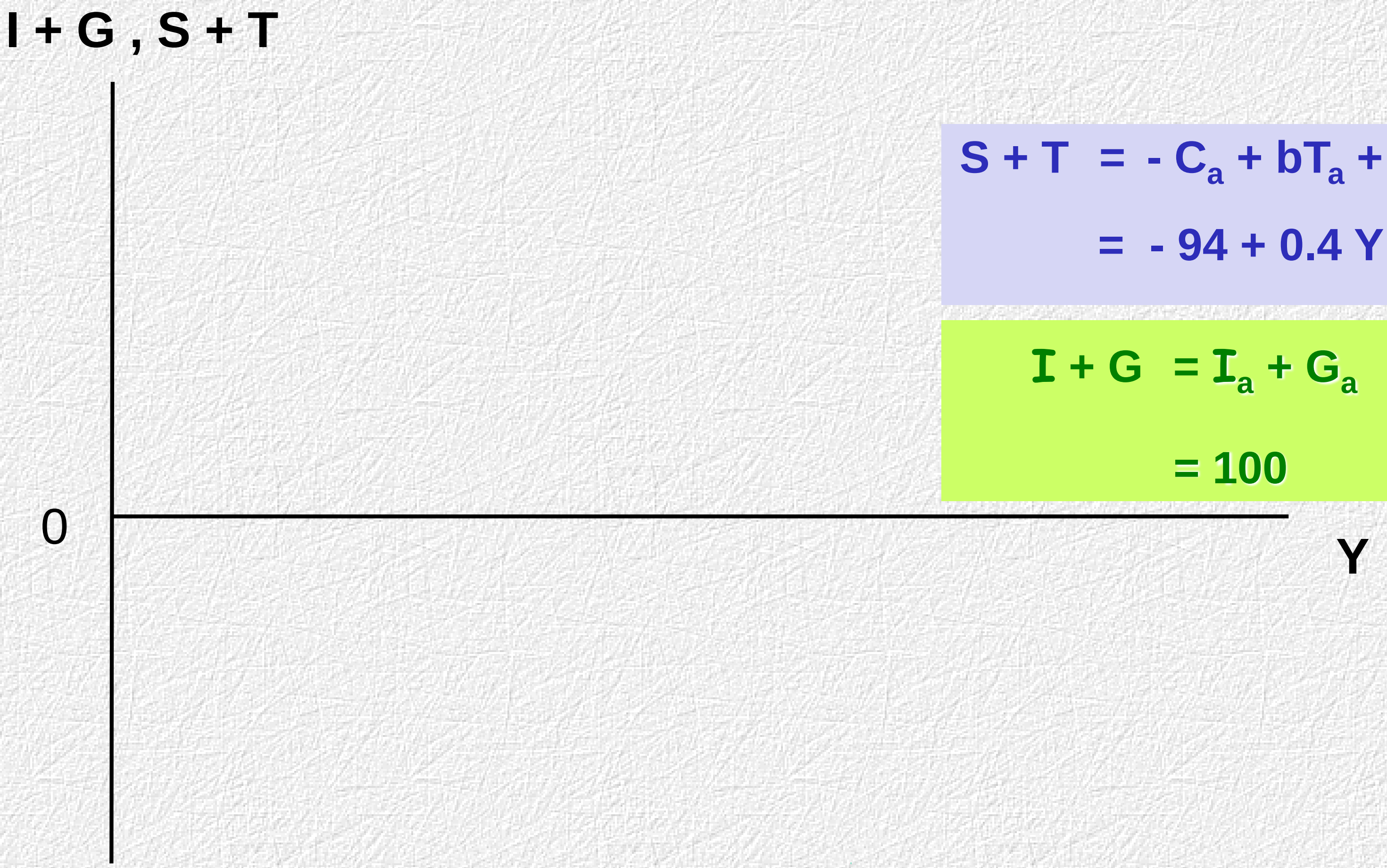
$$Y_E = \frac{1}{1-b}(C_a - bT_a + I_a + G_a)$$

$$S + T = -C_a + bT_a + (1-b)Y$$
$$= -100 + 0.6(10) + (1-0.6)Y$$
$$= -94 + 0.4Y$$

$$I + G = I_a + G_a$$
$$= 40 + 60$$
$$= 100$$

Numerical Example: Injection = Leakage approach

Case 2: Closed economy, with Government



$$S + T = -C_a + bT_a + (1-b)Y$$
$$= -94 + 0.4Y$$

$$I + G = I_a + G_a$$
$$= 100$$

Find Y_e , Injection = Leakage Approach
Case 3: Open economy, with Government

$S = -C_a - (1-b)T_a + (1-b)Y$ | $I = I_a$ | $G = G_a$ | $X = X_a$ | $M = M_a + mY$

At equilibrium

$$S + T + M = I + G + X$$

$$-C_a - (1-b)T_a + (1-b)Y + T_a + M_a + mY = I_a + G_a + X_a$$

$$(1-b+m)Y = C_a + I_a + G_a + X_a - M_a + (1-b)T_a - T_a$$

$$Y_E = \frac{1}{1-b+m}(C_a - bT_a + I_a + G_a + X_a - M_a)$$

$S + T + M = -C_a + bT_a + M_a + (1-b+m)Y$ | $I + G + X = I_a + G_a + X_a$

Numerical Example (Homework #5)

Case 3: Open economy, with Government

$C = 80 + 0.4Y^d$

$I = 50 + 0.6Y$

$G = 30$

$T = 10 + 0.1Y$

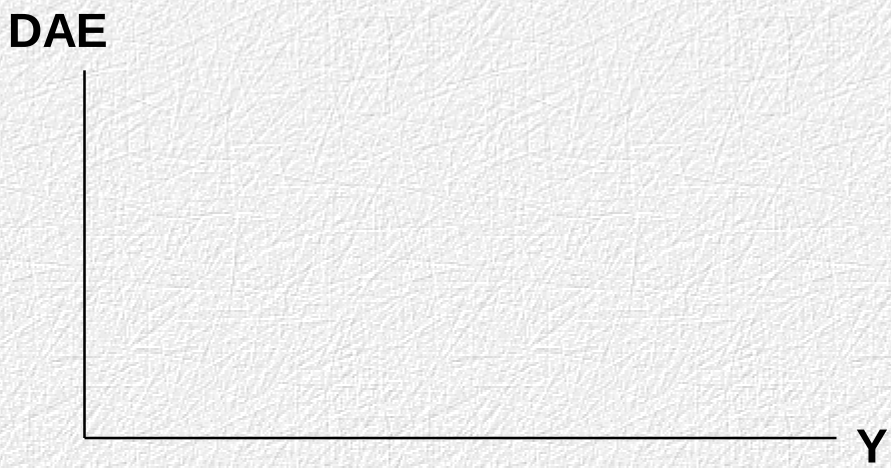
$X = 40$

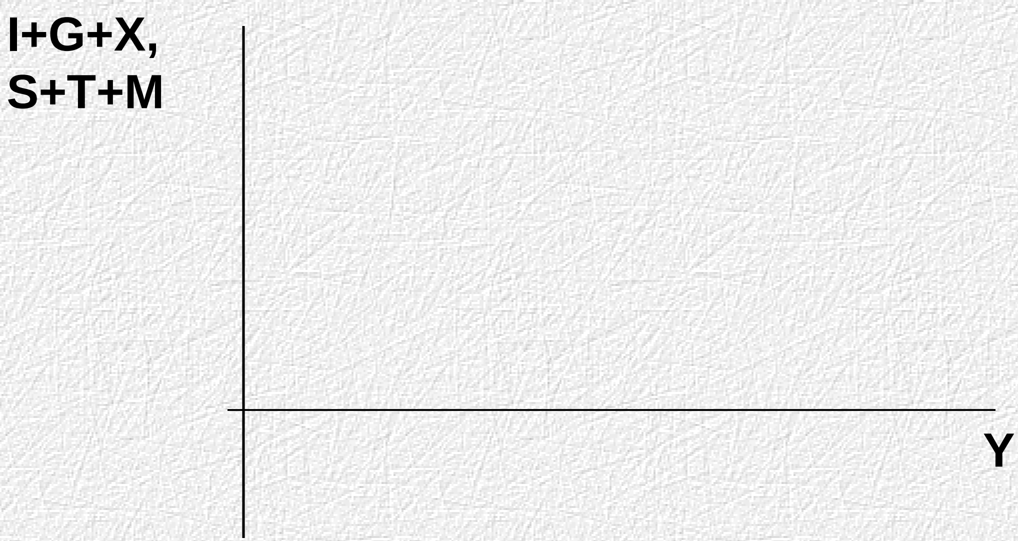
$M = 20 + 0.16Y$

Note $Y^d = Y - T$

1. Finds equilibrium national income using injection = leakage approach
2. Draw graph show equilibrium national income
3. Finds multipliers of all autonomous variables and explain the meaning of those multipliers
4. If autonomous government spending increase 4 units, and autonomous tax increase 20 units, find the new level of national income
5. From question 1 and 2, if current income equals to 700 Baht (Not at the equilibrium income, what would be the adjustment process? Explain.

3.3.3 Changes in equilibrium and adjustment to new equilibrium





DAE = C + I + G + (X - M)

If **C or I or G** or **X - M** change

↓

DAEΔ → **DAE shift**

Changes in any factor (rather than Y) that affect DAE will result in a **shift of DAE**

3.3.3 Changes in equilibrium and adjustment to new equilibrium

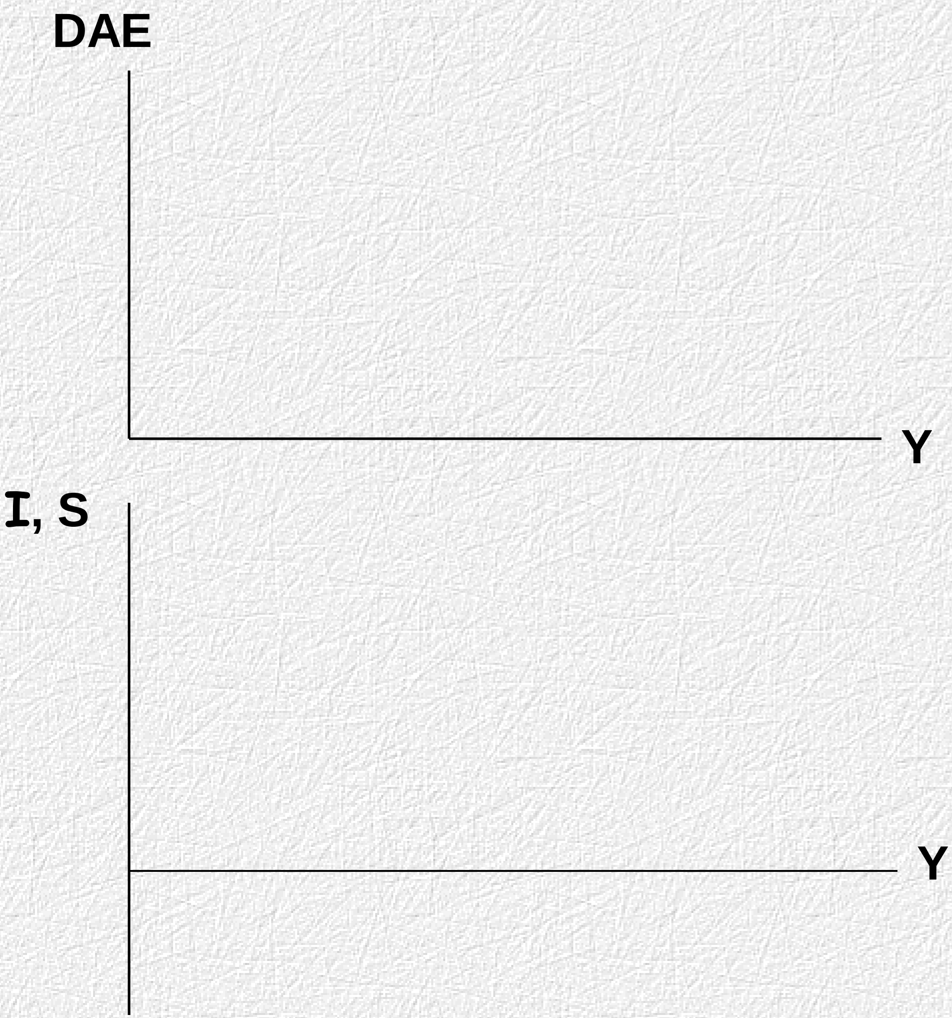
If I↑

when DAEΔ to **DAE₂**

when **DAE Δ**
eg. **from IΔ**

YΔ for how much ?
Calculate from
multiplier

3.3.3 Changes in equilibrium and adjustment to new equilibrium



In the case of closed economy, without government

From equilibrium condition

From equilibrium condition

Multiplier (revisit)

Ratio between changes in income compared to changes in autonomous spending

(Case of closed economy without government)

$C = C_a + bY$

$I = I_a$

For example
When I↑ →

when I↑ ⇒ Y ↑ for how much depends on MPC and MPS

If MPC = 0.6, MPS = 0.4

If I↑ **1,000** million Baht to built a factory ⇒ Pay to construction contractor ⇒ Contractor pays owner's of factor of production including profits for contractor as an entrepreneur compensation ⇒ **1st round** income of all owner of factor of production altogether will ↑ **1,000 million Baht**

Multiplier (revisit)

when **I**↑
1,000
million Baht

→ **Y** ↑ = 1,000 + 1000(0.6) + 1000(0.6)(0.6) + 1000(0.6)(0.6)(0.6) + …

=

=

= | = | =

I↑ **1,000**
Million Baht

→ **Y** ↑ =

, I↑1 unit →

Multiplier

Investment multiplier $= \frac{1}{1 - MPC} = \frac{1}{MPS}$

∴ MPC↑ ⇨ Investment multiplier

∴ MPS↑ ⇨ Investment multiplier

Closed economy without government

Case 1 $C = C_a + bY$, $I = I_a$

At equilibrium

$Y = DAE$

$Y = C + I$

$Y = C_a + bY + I_a$

$Y - bY = C_a + I_a$

$Y(1-b) = C_a + I_a$

$$Y = \frac{1}{(1-b)}(C_a + I_a)$$

Autonomous Consumption multiplier = =

Autonomous Investment multiplier =

if $C_a \uparrow$ 1 unit ⇒ $Y\uparrow = \frac{1}{1-b}$ unit

if $I_a \uparrow$ 1 unit ⇒ $Y\uparrow = \frac{1}{1-b}$ unit

Closed economy without government

Case 2

$C = C_a + bY$, $I = I_a + dY$

At equilibrium

$Y = DAE$

$Y = C + I$

$Y = C_a + bY + I_a + dY$

$Y - bY - dY = C_a + I_a$

$Y(1 - b - d) = C_a + I_a$

$$Y = \frac{1}{(1 - b - d)}(C_a + I_a)$$

Autonomous Consumption multiplier =

Autonomous Investment multiplier =

$I_a \uparrow$ → DAE↑ → $Y \uparrow$

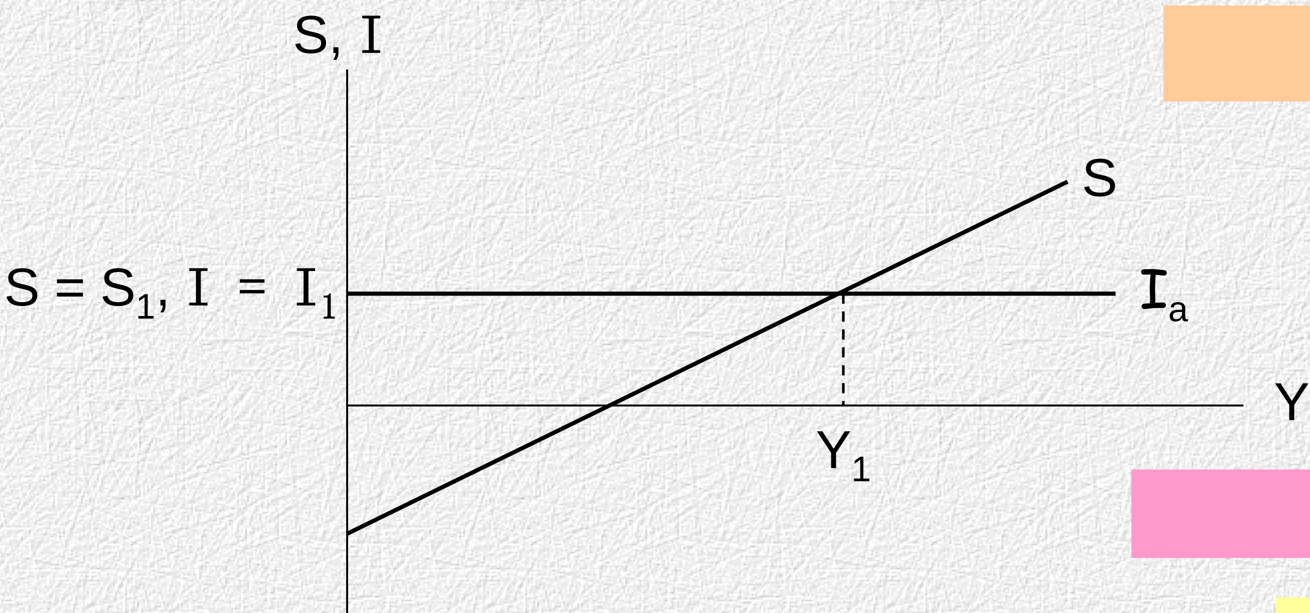
3.4 Paradox of Thrift

Case 1 I = Autonomous investment $I = I_a$

Closed economy, without government

Existing Equilibrium $S = S_1$, $I = I_1$, $Y = Y_1$

If people change behavior to save more



• $Y = C + S$, when Y stay the same

S ↑

Y ↓

S ↑

3.4 Paradox of Thrift

Case 1 continue

- Y ↓ > S↑

ΔY > ΔS

b/c of multiplier: S ↑ ⇒ C ↓ ⇒ DAE ↓ ⇒ Y ↓ ⇒ C ↓

ΔS ↑ = ΔC ↓

So, **S↑** → **Y↓** for how much depends on multiplier effect.

If consumption multiplier = $\frac{1}{1 - MPC}$, ΔY = $\frac{1}{1 - MPC}$ ΔC

- In short run if we want to stimulate economy we should ↓S, ↑C
  In long run we should ↑S so that there could be fund for future investment

- Fallacy of composition

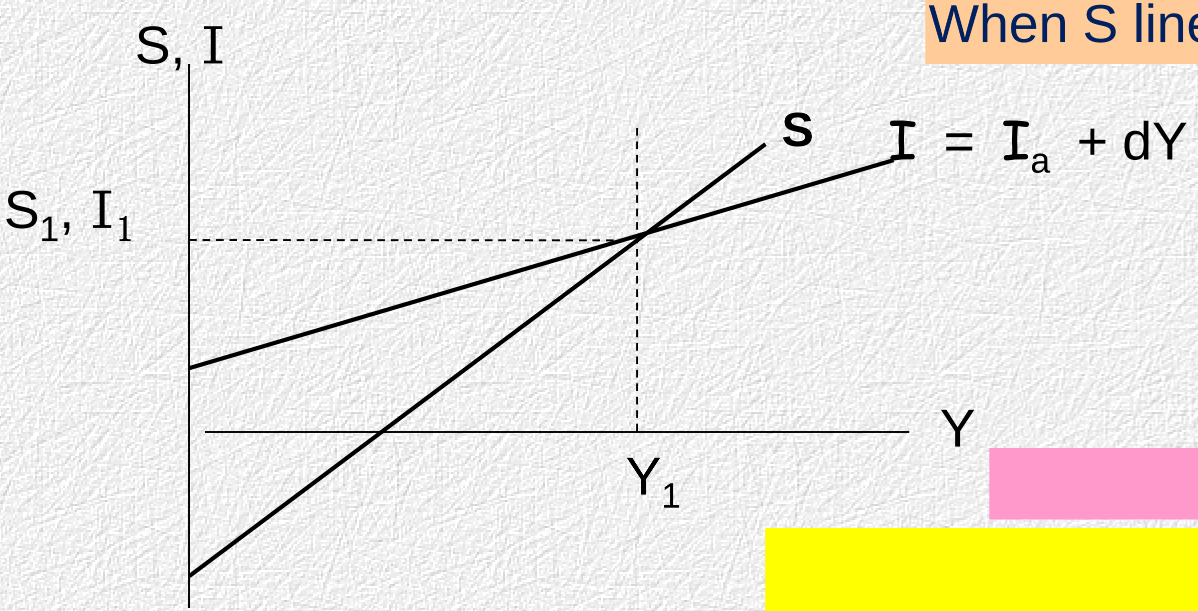
3.4 Paradox of Thrift

$I = I_a + dY$

Closed economy, without government

Case 2

I = Autonomous Investment + Induced investment



When S line shifts from S to S´

• S ↑

• S ↑

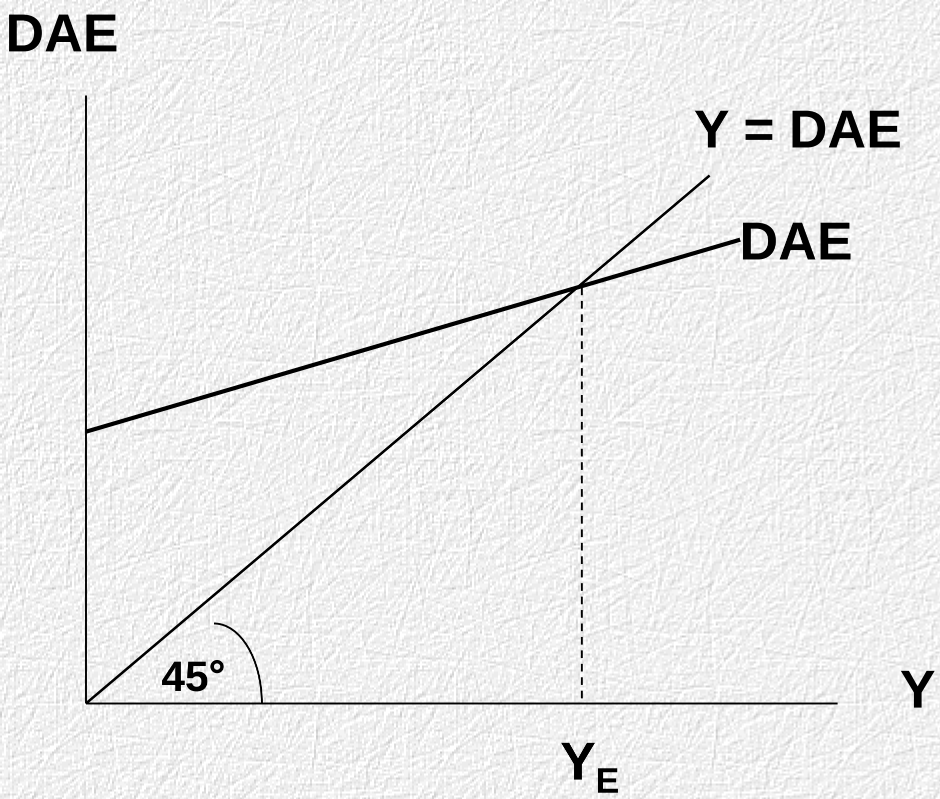
• when **S↑,** in the case of induced investment **Y↓ >** the case of autonomous investment b/c there exists the effect from ↓ in I

3.5 Inflationary and deflationary gap

GDP gap → When national income is more or less than income at the full employment level

Potential Output or **Full Employment Output**

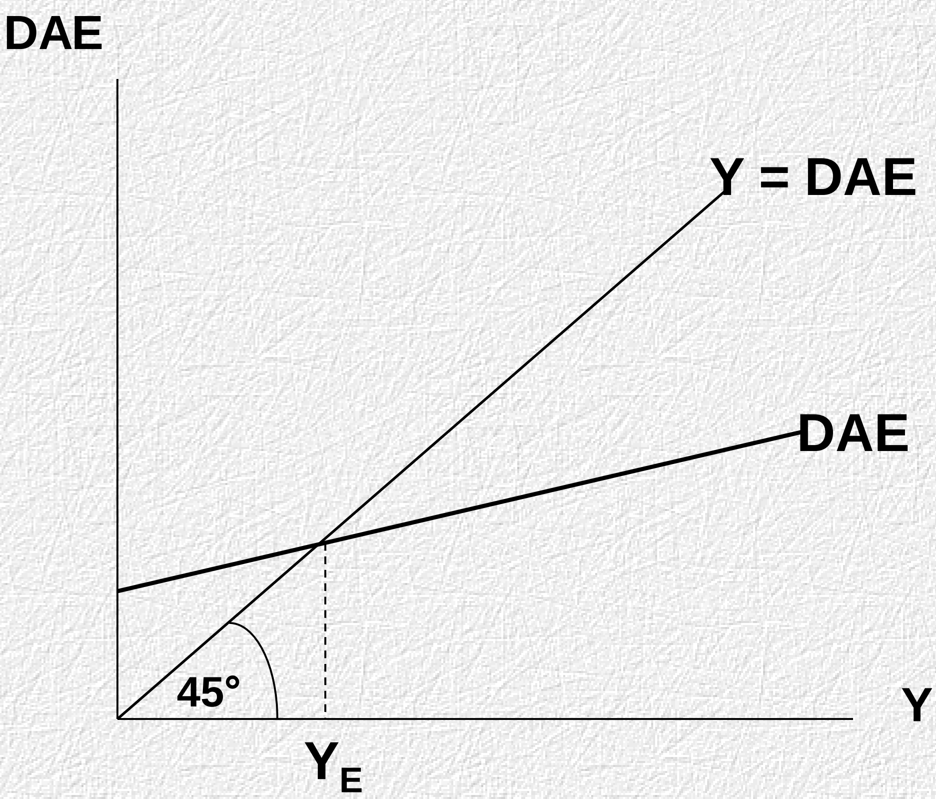
3.5.1 (Inflationary Gap)



• DAE > DAE^F , existing DAE is higher than DAE corresponding to gross output at full employment

• at Y_F

3.5.2 Deflationary Gap



- DAE < DAE^F , existing DAE is less than DAE corresponding to gross output at full employment

- at Y_F ⇨

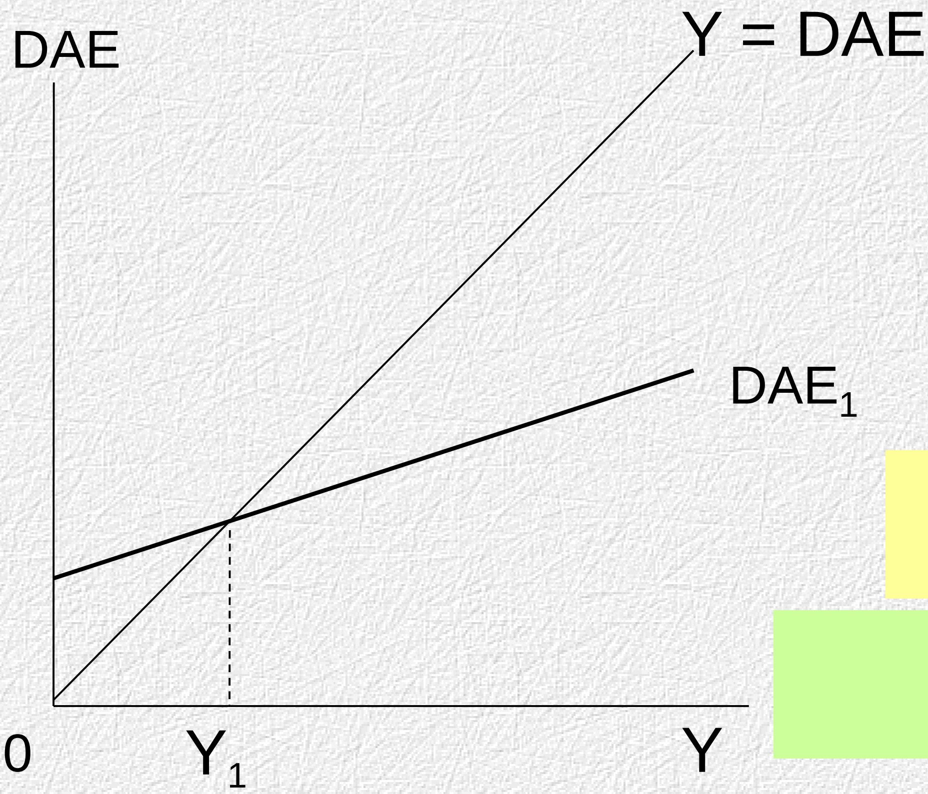
3.6 Keynesian, Classical and Non-Keynes non-classic concept

Keynes
- Economy operates lower than full employment level
- When DAE changes, price doesn't change

Classic
- Economy operates at full employment level
- When DAE changes, price changes

Non-Keynes non classic
- Economy operates lower than full employment level
- When DAE changes, price changes

3.6 Keynesian and Classical concept

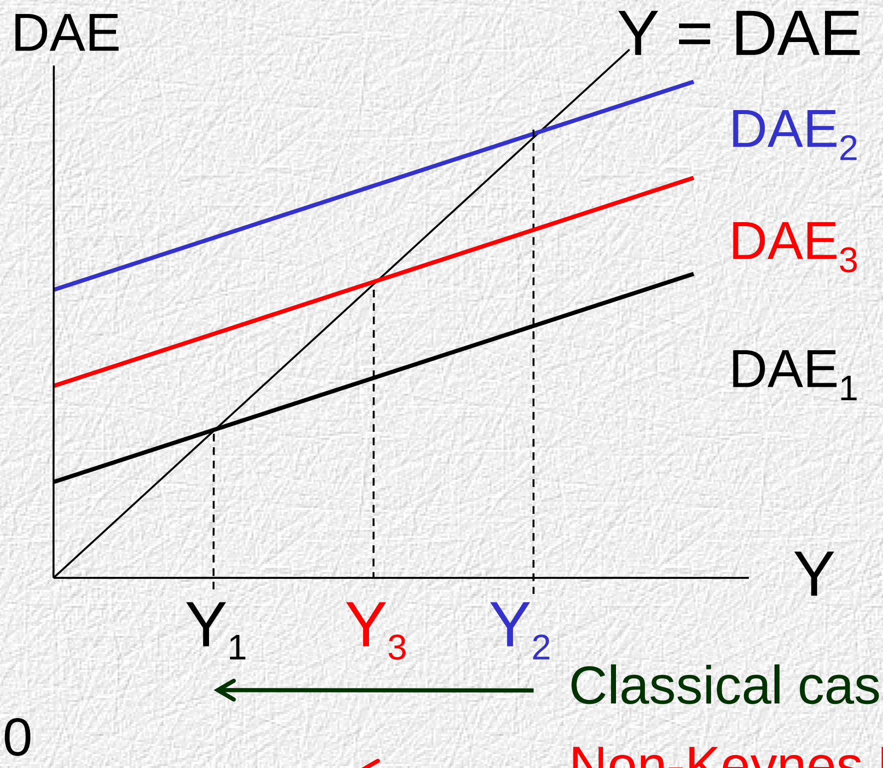


Suppose composition of DAE changes such as C ↑

In **Non-Keynes non-classic** case

In **Classical** case

3.6 Keynesian and Classical concept



Classical case (Y_1)

Non-Keynes Non-Classic case (Y_3)

Keynes case (Y_2)

Change in Y in Keynes case		Change in Y in Non-Keynes Non-Classic case		Change in Y in Classical case
Multiplier effect in Keynesian case		Multiplier effect in Non-Keynes Non-Classic case		Multiplier effect in Classical case