# Economy in the short run

## The Keynesian Framework

- **Aggregate demand Y=C+I+G+(X-M)**

- **Keynesian cross**

- **Consumption function**

- **Multiplier**

# Aggregate Demand

**Aggregate demand (AD) = total goods demanded in an economy.**

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

$$\underline{AD = C + I + G + NX}$$

# The Keynesian Model

*Basic premise*:

**Aggregate demand is the primary source of business-cycle instability and the most important cause of recessions.**

*The foundation* :

**Expenditures for aggregate production by the four macroeconomic sectors— household, business, government, and net exports.**
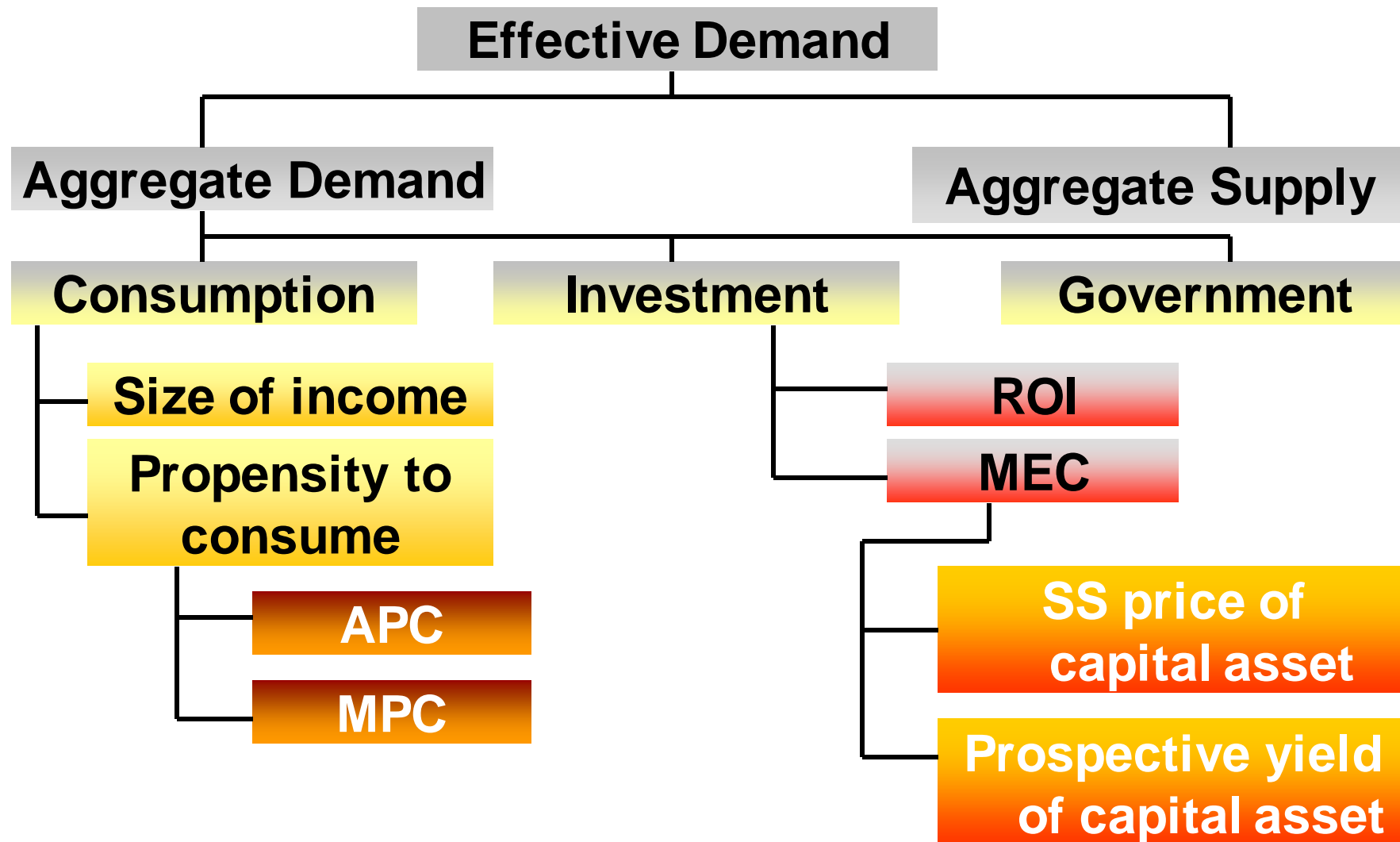
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# Aggregate Demand

- **Household and Consumption Expenditures: Includes** everyone in the economy and their purchases of production used for current satisfaction

- **Business and Investment Expenditures: Includes firms** and other entities that produce output and their expenditures.

- **Government and Government Purchases: Includes** state and local governments and their purchases of the production used to provide government services.

- **Foreign and Net Exports: Includes all households,** businesses and governments beyond the political boundaries of the domestic economy and their expenditure contribution.

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# Assumptions of the Model

- **Rigid prices**: Prices are inflexible especially in the downward direction.

- Effective Demand: Based on the notion of effective demand.

# The Keynesian Framework

**Effective Demand**

**Aggregate Demand**  **Aggregate Supply**

**Consumption**  **Investment**  **Government**

**Size of income**

**Propensity to consume**

**APC**

**MPC**

**ROI**

**MEC**

**SS price of capital asset**

**Prospective yield of capital asset**

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# The Keynesian Equilibrium

**Keynesian equilibrium is a balance between *aggregate expenditures and aggregate production*.**

**Aggregate expenditures are the sum of consumption expenditures, investment expenditures, government purchases, and net exports.**

**Aggregate production is the total market value of all final goods and services, as measured by gross domestic product.**

# The Keynesian Equilibrium

The concept of aggregate demand, AD is 'ex-ante', national income accounts are all in the 'ex-post' sense.

In other words, aggregate demand refers to the total goods and services that people want to buy, while national income refers to the total goods and services that are actually bought.

# Equilibrium Output

**Equilibrium level of output refers to the output at which total desired spending on goods and services (desired aggregate demand) is equal to the actual level of output (Y).**

**Aggregate Demand (AD):**

$$AD = C + I + G + NX$$

**Equilibrium Output:**

$$Y = AD$$

Or,

$$\underline{Y = C + I + G + NX}$$

# Equilibrium Output

**Equilibrium output is the output level at which the quantity of *output produced* is equal to quantity of *output demanded*. At any output level,**

**Y, is equal to C + I + G + NX.**

**Does it mean all output levels are equilibrium output levels?**
**– The answer is 'No'.**

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# Equilibrium Output

**Keynesian equilibrium is only a balance between aggregate expenditures and aggregate production.**

**Full employment is not automatically achieved with Keynesian equilibrium.**

**The adjustment mechanism that achieves and maintains equilibrium is aggregate production. If aggregate expenditures are not equal to aggregate production, then aggregate production changes to restore balance.**

# Economy in the short run

## *The Keynesian Framework*

✓ **Aggregate demand Y=C+I+G+(X-M)**

- **Keynesian cross**

- **Consumption function**

- **Multiplier**

# The Keynesian Model
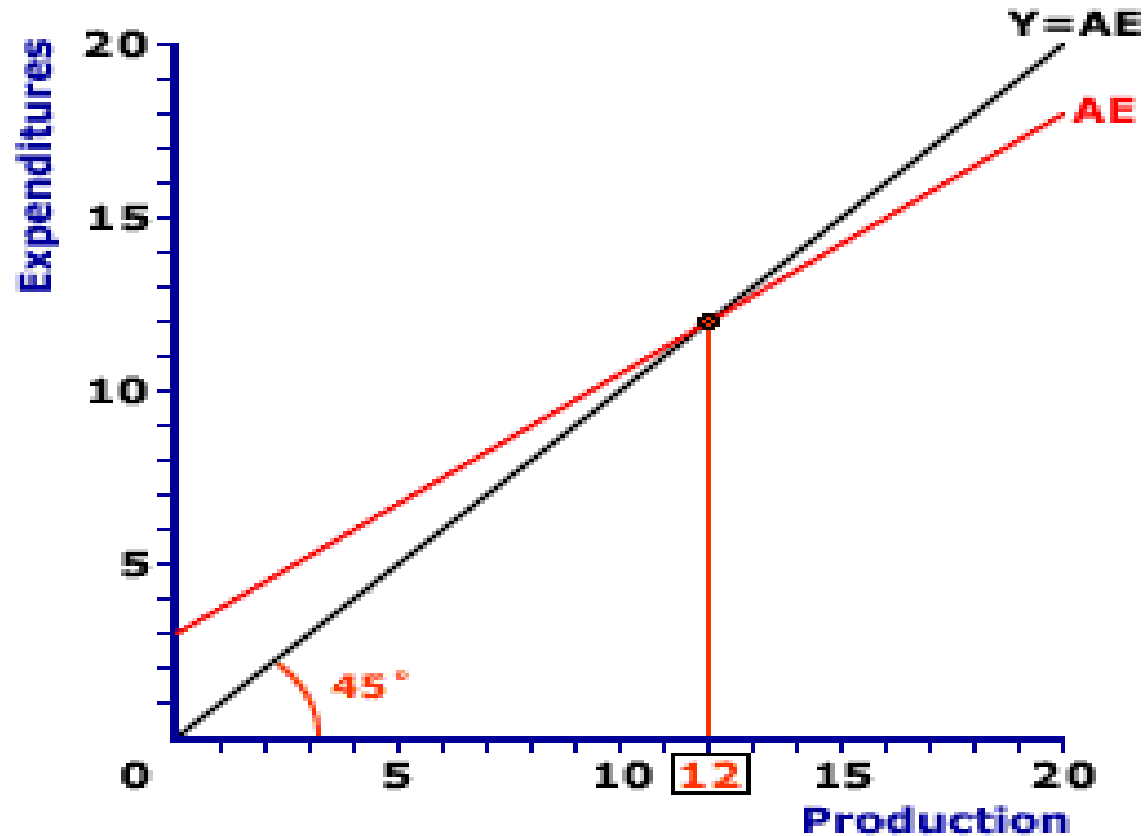
# The Keynesian Model

**The black Y=AE line, indicates all points in which aggregate expenditures is equal to aggregate production. If the economy is operating on this 45-degree line, then the aggregate product market is in equilibrium.**

**The red AE line, indicates the relation between aggregate expenditures and aggregate production. The aggregate expenditures are the combined expenditures by the four macroeconomic sectors-- consumption expenditures by the household sector, investment expenditures by the business sector, government purchases by the government sector, and net exports by the foreign sector.**

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# The Keynesian Model

## Aggregate production does not match AD (recessionary/expansionary gap)

If aggregate production is greater than Rs.12 trillion, the aggregate expenditures line lies beneath the 45-degree line. In this case, all output produced is not sold, business inventories increase, and the business sector is motivated to reduce production, which moves the economy toward the Rs.12 trillion equilibrium.

# The Keynesian Model

At output levels below 12, AD exceeds output. Consequently, the level of inventory with firms decreases. This unintended decline in inventories makes firms to increase their production, resulting in increase in income levels.

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# Keynesian Cross- Summary

- **Primary source of business-cycle instability: changes in aggregate demand.**

- **Full employment is not guaranteed.**

- **Persistent unemployment problems, result due to the lack of aggregate demand.**

- **Recommended way to maintain full employment is through government intervention; fiscal policy.**

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# Economy in the short run

## *The Keynesian Framework*

- ✓ **Aggregate demand Y=C+I+G+(X-M)**

- ✓ **Keynesian cross**

- **Consumption function**

- **Multiplier**

# Effective Demand



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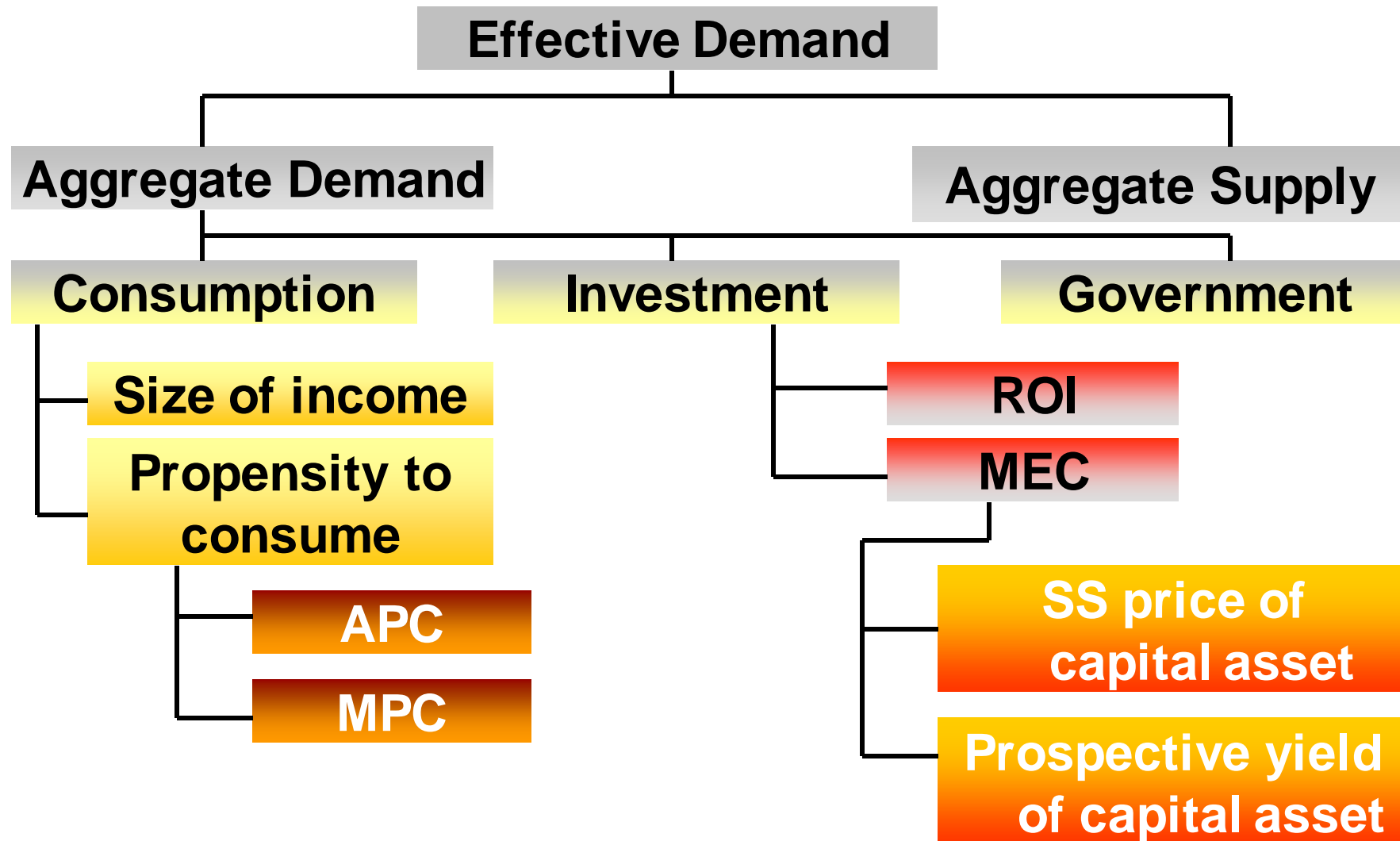
# Consumption Function

**Consumption expenditure (C) is one of the important components of aggregate demand. Although many factors influence the consumption expenditure, income (Y) is considered to be the most important influencing factor.**

**The relationship between consumption and income can be described using consumption function,**

$$C = f(Y)$$

# Consumption Function

**Other important factors that influence the consumption function are:**

- **Stock of Wealth**

- **Expectations**

- **Taxation Policy**

- **Distribution of Income**

- **Age Composition**

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# **Consumption Function**

**Consumption and income are positively related.**

**Assume: Consumption demand increases linearly with an increase in the income level. Then we have,**

$$\underline{C = a + bY}; \qquad a > 0, \ 0 < b < 1$$

**Where a = the consumption when the income level is zero and 'b' is the slope of the consumption function.**

**b= *Marginal Propensity to Consume* (MPC) i.e., the rate at which consumption changes for a unit change in income.**

# The Technical Attributes
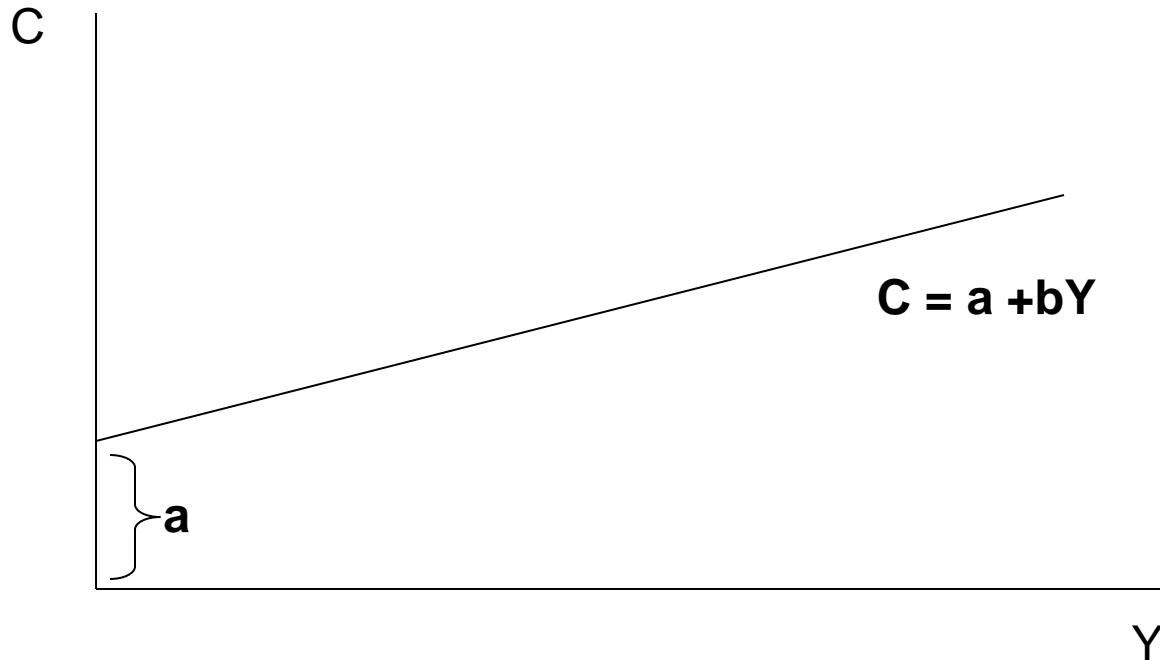
**APC=**     **Consumption / Income**

**APS=**     **Saving / Income**

**MPC=** $\dfrac{\text{Change in Consumption}}{\text{Change in Income}}$

**MPS=** $\dfrac{\text{Change in Saving}}{\text{Change in Income}}$

# Consumption Function

## $C = a + bY; a > 0, 0 < b < 1$
## Where $b = MPC$

C

$C = a + bY$

a

Y

# Consumption and Saving



SAVING

C

Consumption schedule

*MPC = Slope of C*

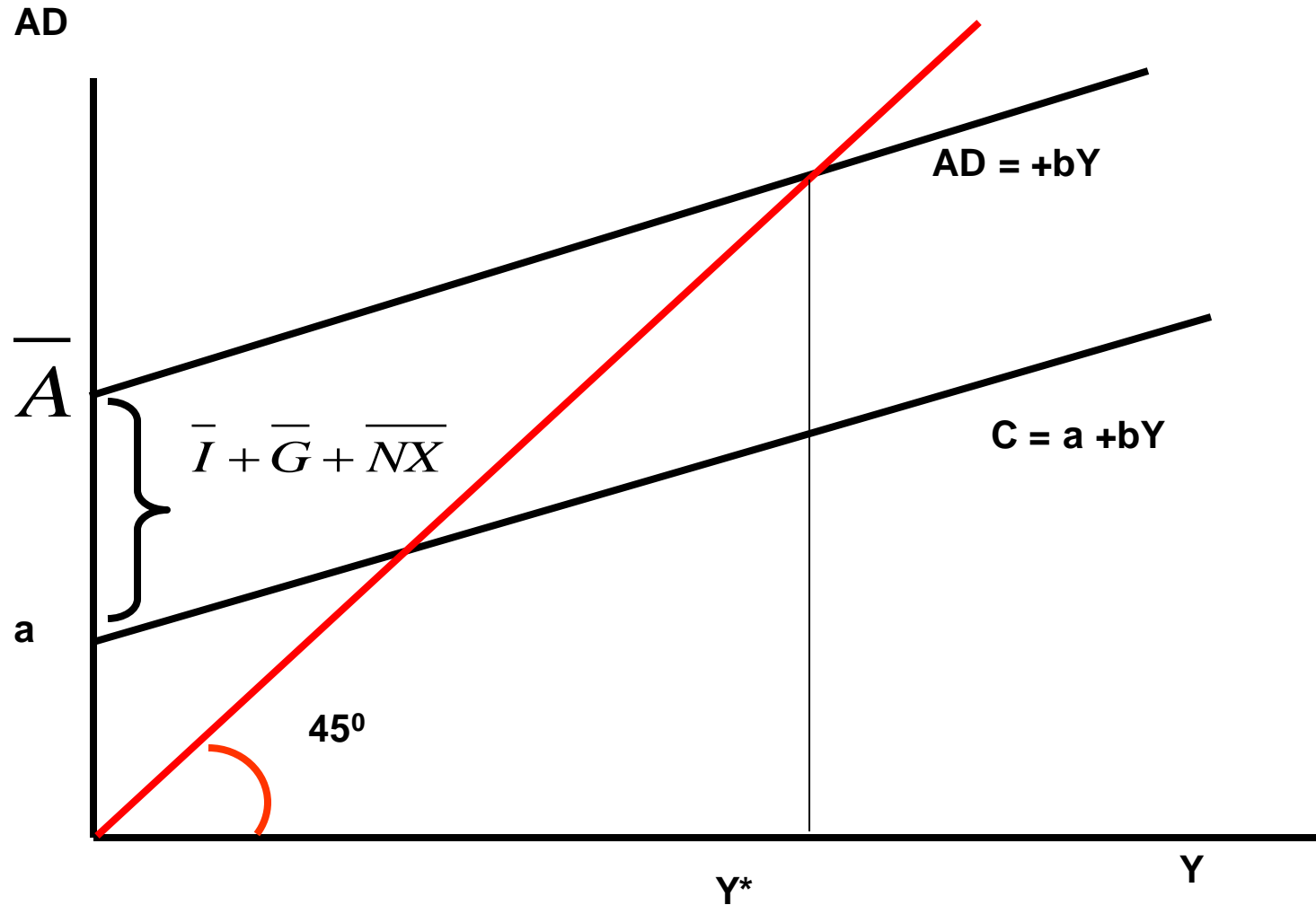*MPC + MPS = 1*

DISSAVING

45°

C

O

**Consumption**

**Disposable Income**
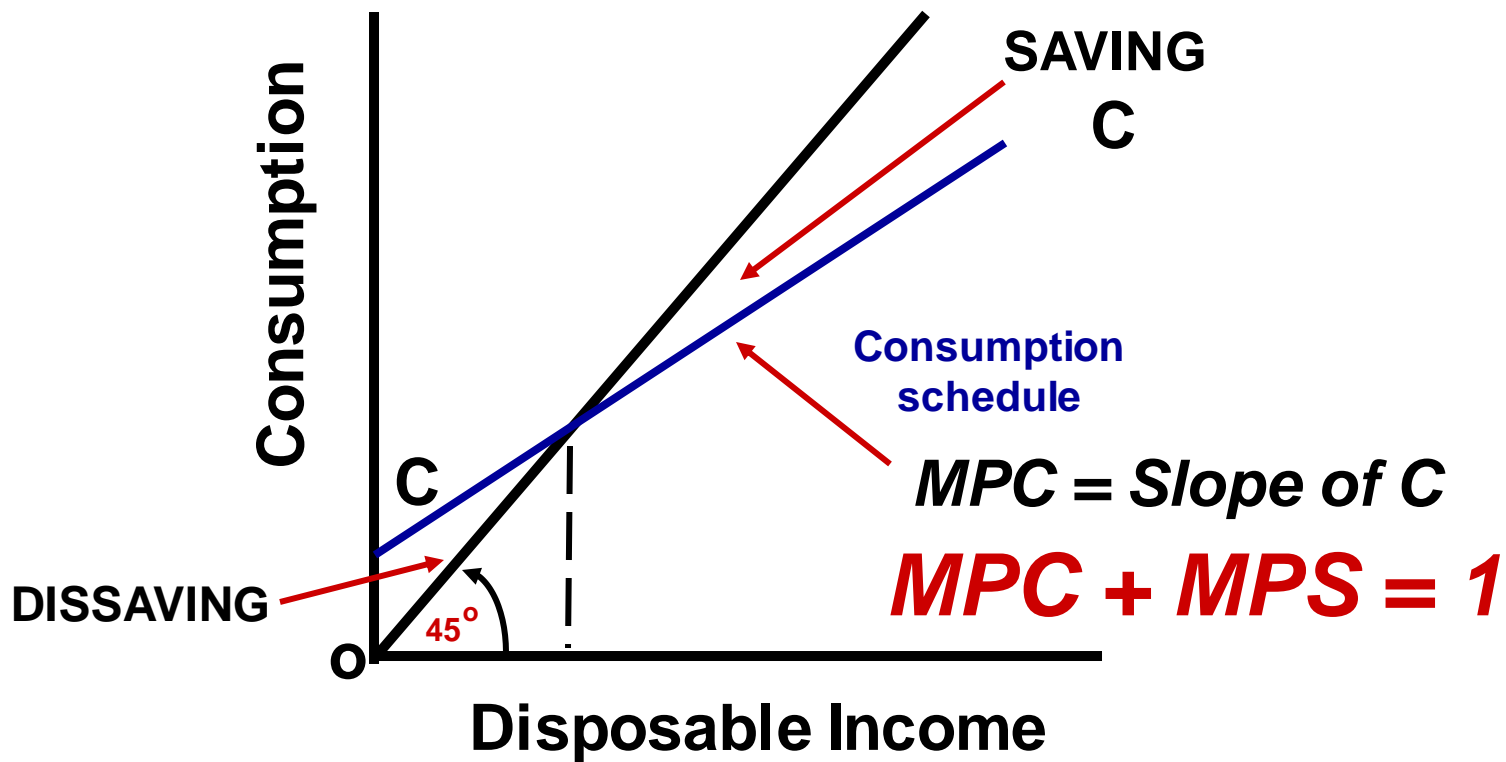
# Equilibrium Level of Income

$$Y = AD = C + \bar{I} + \bar{G} + \overline{NX}$$

$$= (a + bY) + \bar{I} + \bar{G} + \overline{NX}$$

$$= a + \bar{I} + \bar{G} + \overline{NX} + bY$$

$$= Y(1 - b) = \bar{A}$$

$$= Y = \frac{\bar{A}}{1 - b} = \frac{a + \bar{I} + \bar{G} + \overline{NX}}{1 - b}$$

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# Equilibrium Level of Income

**From the above formula, we know that larger the autonomous components (for a given b), the higher is the equilibrium level of income. Similarly, if b (slope of the AD curve) is less, then higher is the equilibrium level of income.**

# Equilibrium Income



AD

$\overline{A}$

$\overline{I} + \overline{G} + \overline{NX}$

AD = +bY

C = a +bY

a

45⁰

Y*

Y

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# Equilibrium Income

In the figure, we have shown consumption function and the aggregate demand function. The parallel line above the consumption function is the AD line. Part of the aggregate demand, i.e. is autonomous and is independent to the income level, while remaining part 'bY' is dependent on income and output.

# Economy in the short run

## *The Keynesian Framework*

- ✓ **Aggregate demand Y=C+I+G+(X-M)**

- ✓ **Keynesian cross**

- ✓ **Consumption function**

- **Multiplier**

# **Multiplier**

**Multiplier refers to a multiple by which equilibrium income changes for a unit change in autonomous spending.**

**In other words, it refers to the rate at which the level of equilibrium income increases (decreases) for a unit increase (decrease) in autonomous spending. The multiplier is denoted by k.**

# **Multiplier**

Assuming a two sector model

$$Y = C + \overline{A} \Rightarrow Y = a + bY + \overline{A} \Rightarrow Y = \frac{a + \overline{A}}{1-b}$$

If initial investment is $\overline{A}_1 \Rightarrow Y_1 = \frac{a + \overline{A}_1}{1-b} \longrightarrow (1)$

Assuming investment increases to $A_2 \Rightarrow Y_2 = \frac{a + \overline{A}_2}{1-b} \rightarrow (2)$

$$(2) - (1) \Rightarrow Y_2 - Y_1 = \frac{1}{1-b}(\overline{A}_2 - \overline{A}_1) \Rightarrow \Delta Y = \frac{1}{1-b} \Delta A$$

$$k = \frac{\Delta Y}{\Delta A} = \frac{1}{1-b} = \frac{1}{1-MPC} = \frac{1}{MPS}$$

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# The Multiplier Process

## *Multiplier and Marginal Propensities*

**Inverse relationship between:**

**Multiplier & MPS**

$$\text{Multiplier} = \frac{1}{\text{MPS}} \quad or \quad \frac{1}{1 - \text{MPC}}$$
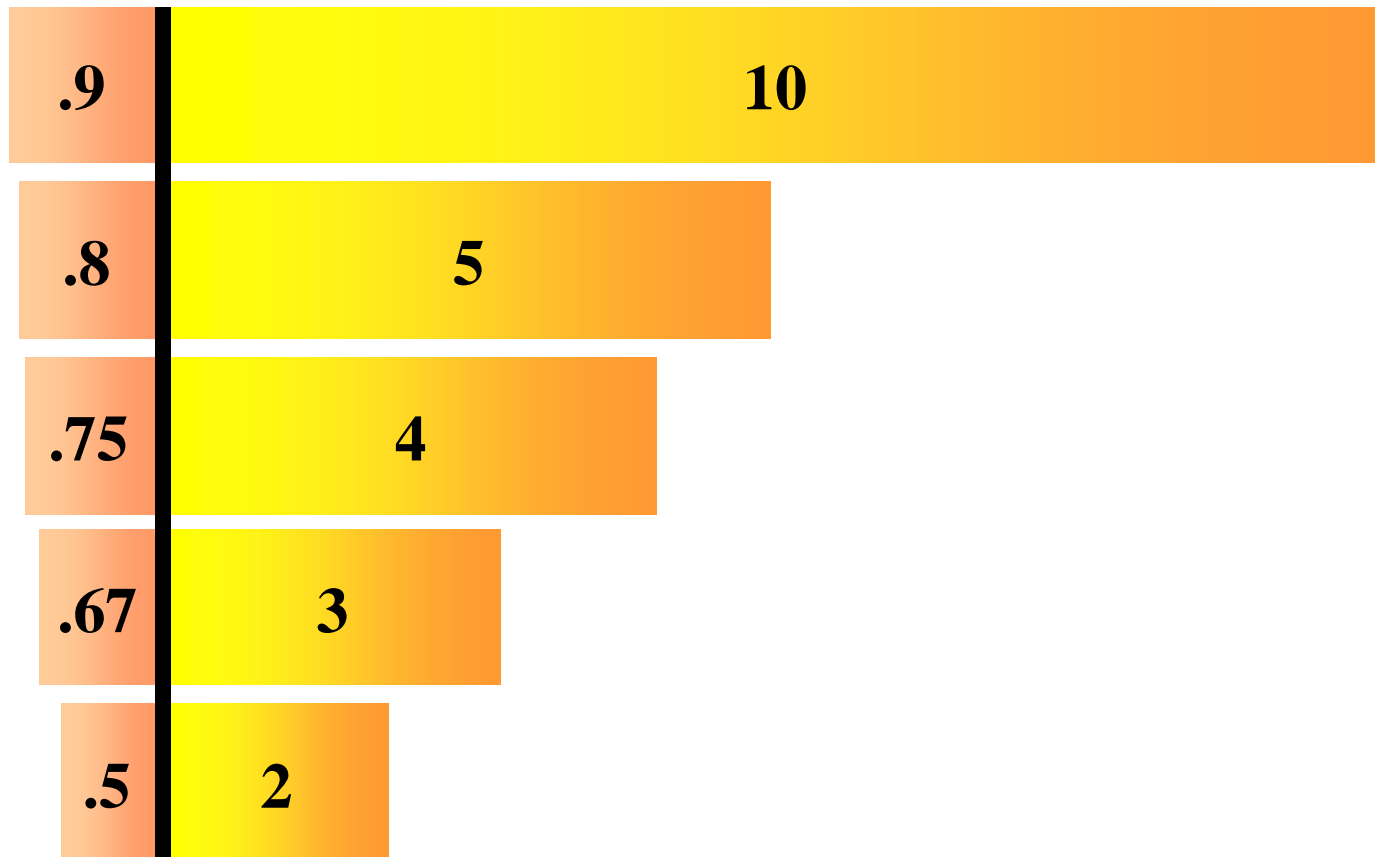
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# Multiplier

From the above multiplier equation we know that larger the marginal propensity to consume, larger is the value of the multiplier.

Conversely, larger the marginal propensity to save the lower is the value of the multiplier.

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# MPC and the Multiplier

**MPC**              **Multiplier**

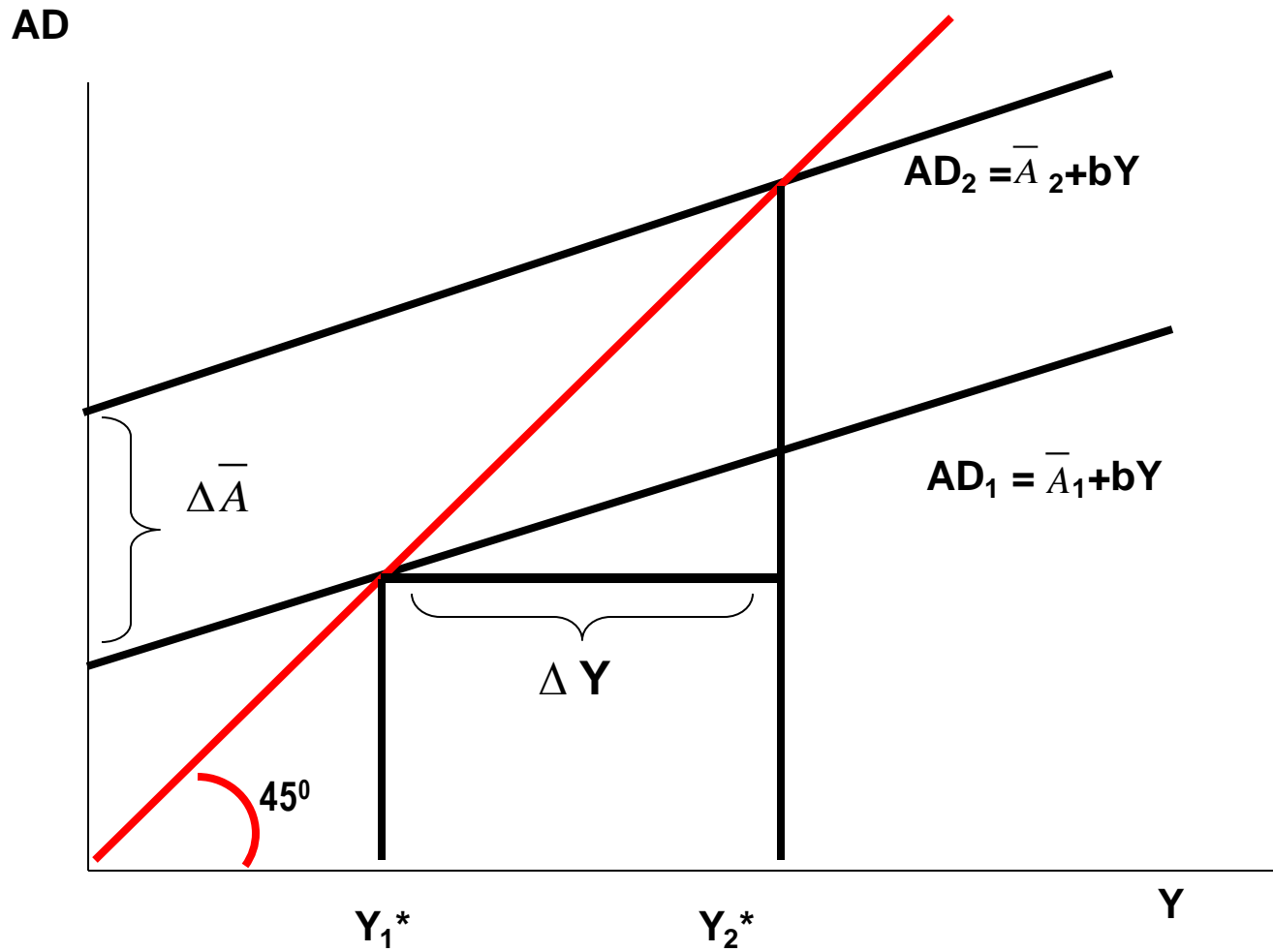| MPC | Multiplier |
|-----|-----------|
| .9  | 10 |
| .8  | 5 |
| .75 | 4 |
| .67 | 3 |
| .5  | 2 |

# The Multiplier Effect

$$\text{Multiplier} = \frac{\text{Change in Real GDP}}{\text{Initial Change in Spending}}$$

$$\text{Change in GDP} = \text{Multiplier} \times \text{initial change in spending}$$

# Multiplier

# Equilibrium Income

**For a change in autonomous expenditure (△A), there would be a greater change in equilibrium income (Y), because of the operation of the multiplier.**

# Process of Multiplier

Increase in autonomous spending adds to income, which in turn are spent partly on other goods and services, leading to increase in income. Part of this increased income is again spent on goods and services, causing further increase in income.

The magnitude of this increase is determined by how much income is passed on at each phase.

This in turn is dependent on the rise in consumption spending ($\Delta C/\Delta Y$) or the marginal propensity to consume for a unit rise in disposable income.
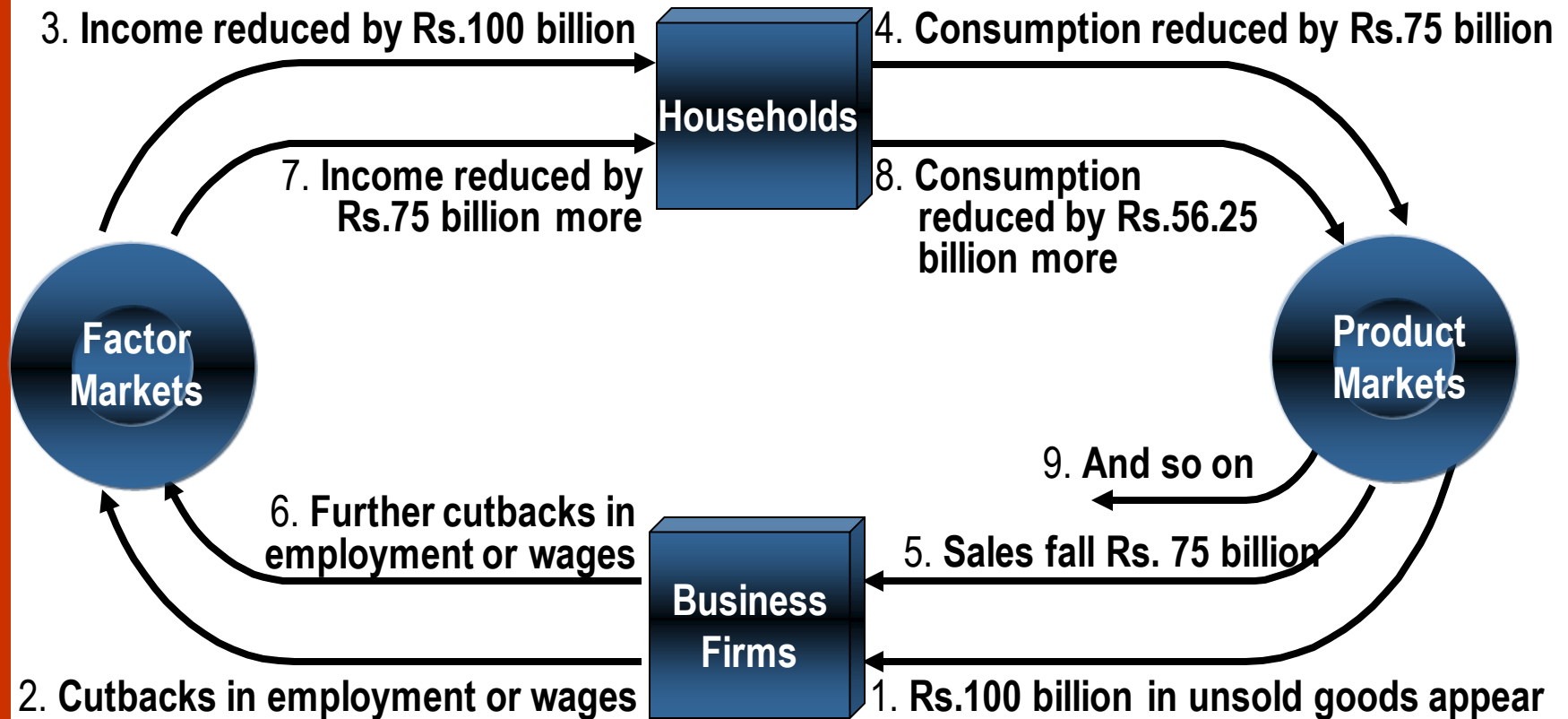
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# Party in Goa with the multiplier

- **During winter break, college students like to head to Goa.**

- **With money in their pockets, the students spend money on food and drink, hotel rooms, dance clubs, etc. This raise total income there by some multiple of itself.**

- **College students buy food and drinks. The people who sell these items find their incomes rising. They spend some fraction of their increased income, which generates additional income for others.**

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# Party in Goa with the multiplier

- **If the students spend Rs. 4 lakhs at Goa and the MPC is .60, then college students will increase income in Goa by Rs. 10 lakhs.**

- **When the TV networks show scenes on the beach, the common man sees college students having a good time.**

- **But – economists see the multiplier at work, generating higher levels of income for many of the residents of Goa.**

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# The Multiplier Process



3. **Income reduced by Rs.100 billion**

4. **Consumption reduced by Rs.75 billion**

**Households**

7. **Income reduced by Rs.75 billion more**

8. **Consumption reduced by Rs.56.25 billion more**

**Factor Markets**

**Product Markets**

9. **And so on**

6. **Further cutbacks in employment or wages**

5. **Sales fall Rs. 75 billion**

**Business Firms**

2. **Cutbacks in employment or wages**

1. **Rs.100 billion in unsold goods appear**

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# The Multiplier Cycles

| Spending Cycles | Change in Spending During Cycle | Cumulative decrease in Spending |
|---|---|---|
| First cycle | Rs. 100.00 | Rs.100.00 |
| Second cycle | 75.00 | 175.00 |
| Third cycle | 56.25 | 231.25 |
| Fourth cycle | 42.19 | 273.44 |
| Fifth cycle | 31.64 | 305.08 |
| Sixth cycle | 23.73 | 328.81 |
| . | . | . |
| Nth cycle | | 400.00 |

# The Multiplier

**Total change in spending**

**= 1/(1-MPC)x Rs.100 billion per year**

**= 1/(1-0.75)xRs.100 billion per year**

**= 4x Rs.100 billion per year**

**= Rs.400 billion per year**

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# The Multiplier

- **The cumulative decease in total spending is equal to the gap multiplied by the multiplier.**

- **A recessionary gap of Rs.100 billion per year would decrease total spending by Rs.400 billion per year *(If MPC = 0.75).***

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# The Multiplier Effect

|  | (1) Change in Income | (2) Change in Consumption (MPC = .75) | (3) Change in Saving (MPS = .25) |
|---|---|---|---|
| **Increase in Investment of Rs.5** | Rs. 5 | Rs. 3.75 | Rs. 1.25 |
| **Second Round** | 3.75 | 2.81 | .94 |
| **Third Round** | 2.81 | 2.11 | .70 |
| **Fourth Round** | 2.11 | 1.58 | .53 |
| **Fifth Round** | 1.58 | 1.19 | .39 |
| **All Other Rounds** | 4.75 | 3.56 | 1.19 |
| **Total** | Rs.20.00 | Rs.15.00 | Rs. 5.00 |

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# Working of Multiplier  [MPC = .5]

**Govt increases spending by Rs.1000 crores**

| Rs.1,000.00 | On new highways |
|---|---|
| 500.00 | Highway workers buy new boats |
| 250.00 | Boat builders buy plasma TVs |
| 125.00 | TV factory workers buy new cars |
| 62.50 | Auto workers buy clothes |
| 31.25 | Apparel workers spend Rs. on movies |
| 15.625 | Bollywood spend money on A.R. |
| 7.8125 | Rehman songs. |
| 3.90625 | |
| 1.953125 | |
| .9765625 | |
| .48828125 | |
| .244140625 | |
| .1220703125 | |
| .06103515625 | |
| .03051757 8125 | |
| .015258789062 | |

**Rs.2,000,000,000**
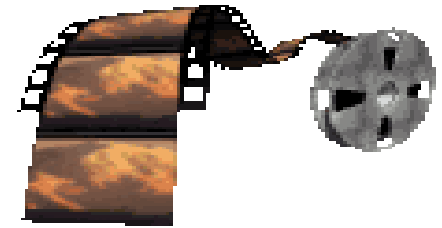
# The First Splash- The biggest

**If MPC is 75%**

**Govt. spends Rs.1000 crores on highways.**

**Highway workers save 25% of Rs.1000 crores [Rs.250 crore] & spend 75% or Rs.750 crores on boats.**

**Boat makers save 25% of Rs.750 bil. [Rs.187.50 crores] & spend 75% or Rs.562.50 crores on iPod**

# Multiplier Analysis

If consumption function is given by C = 50 + 0.5Y, what is the change in equilibrium income for an increase of Rs.100 crores in autonomous government expenditure?

With the increase of autonomous government expenditure by Rs.100 crores, the demand income increases by Rs.100 crores in the first phase. This induces a demand of Rs.50 crores in the second phase due to consumption of 0.5 or 50% of increased income; Rs.25 crores in the third phase; Rs.12.5 in the fourth phase; Rs.6.25 in the fifth phase; 3.125 in the sixth phase; and so on.

Thus, the total increase in equilibrium income (ΔY)

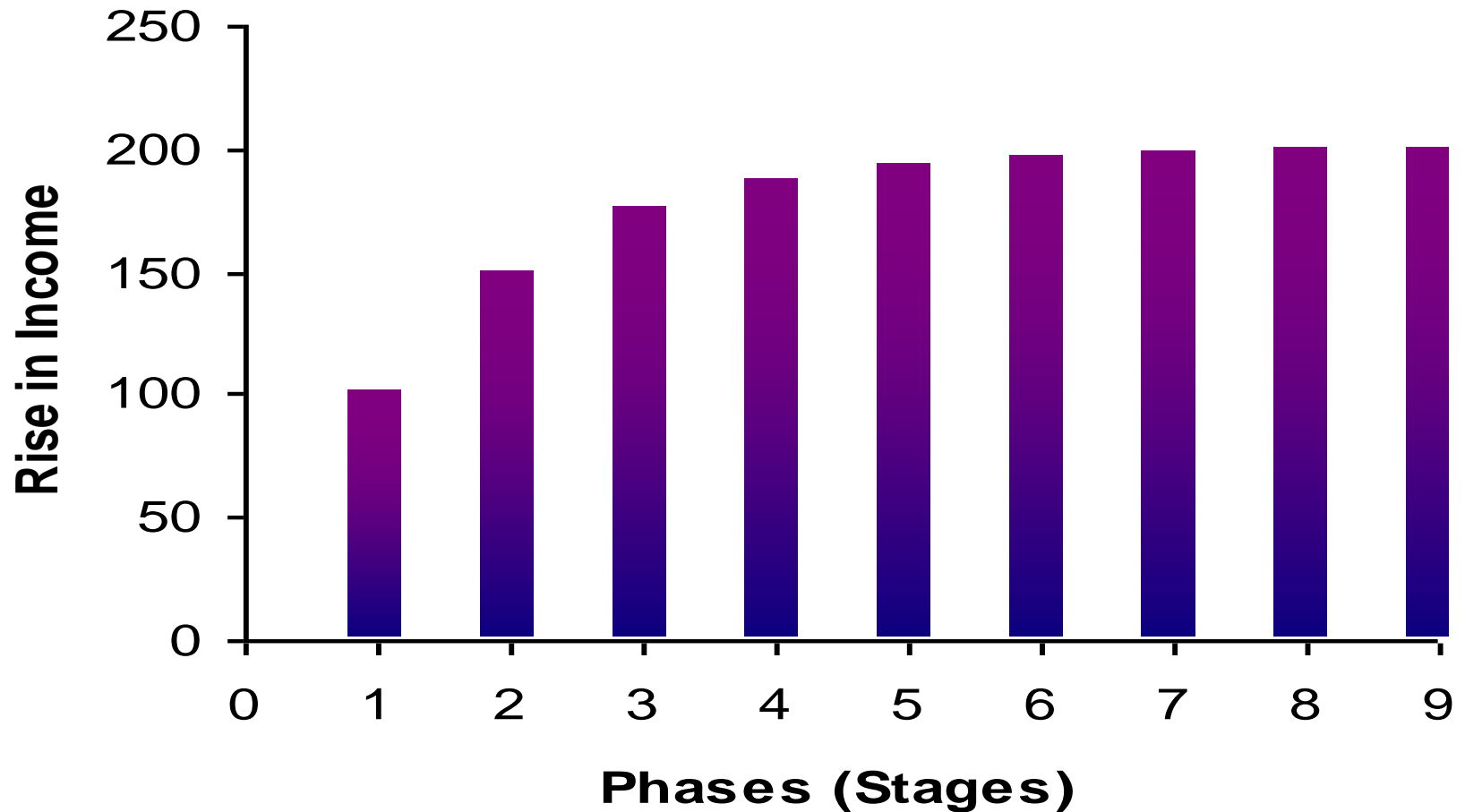= 100 + 50 + 25 + 12.5 + 6.25 + 3.125 + 1.5625 + 0.78125 + … = 200

Multiplier x ΔE =

$$\frac{1}{1-MPC}x100 = \frac{1}{1-0.5}x100 = \frac{1}{0.5}x100 = 200$$

# Multiplier at work

| Stages | MPC x Change in Income | Rise in Income | Total Income |
|---|---|---|---|
| 1 | 100 | 100 | 100 |
| 2 | 0.5x 100 | 50 | 150 |
| 3 | 0.5x 50 | 25 | 175 |
| 4 | 0.5x 25 | 12.5 | 187.5 |
| 5 | 0.5x 12.5 | 6.25 | 193.75 |
| 6 | 0.5x 6.25 | 3.125 | 196.875 |
| 7 | 0.5x 3.125 | 1.5625 | 198.4375 |
| 8 | 0.5x 1.5625 | 0.78125 | 199.2188 |
| 9 | 0.5x 0.7815 | 0.39 | 199.6088 |

# The Multiplier Process

# Uses of the Multiplier

- The Multiplier process indicates different phases of trade cycles; helps the business community to plan its transactions accordingly.

- A government, by multiplier analysis, can know the quantity of investment that has to be made to reach full employment level.

- The Multiplier principle shows the importance of deficit budgeting.

# Limits of the Multiplier

- **Works only when there is adequate availability of consumer goods.**

- **Full value of multiplier achieved only when various increments in investments are repeated at regular intervals.**

- **No change in the MPC during the process of income propagation.**

- **No time lags between the receipt of income and its spending, unrealistic.**

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# Economy in the short run

## *The Keynesian Framework*

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✓ **Consumption function**

✓ **Multiplier**