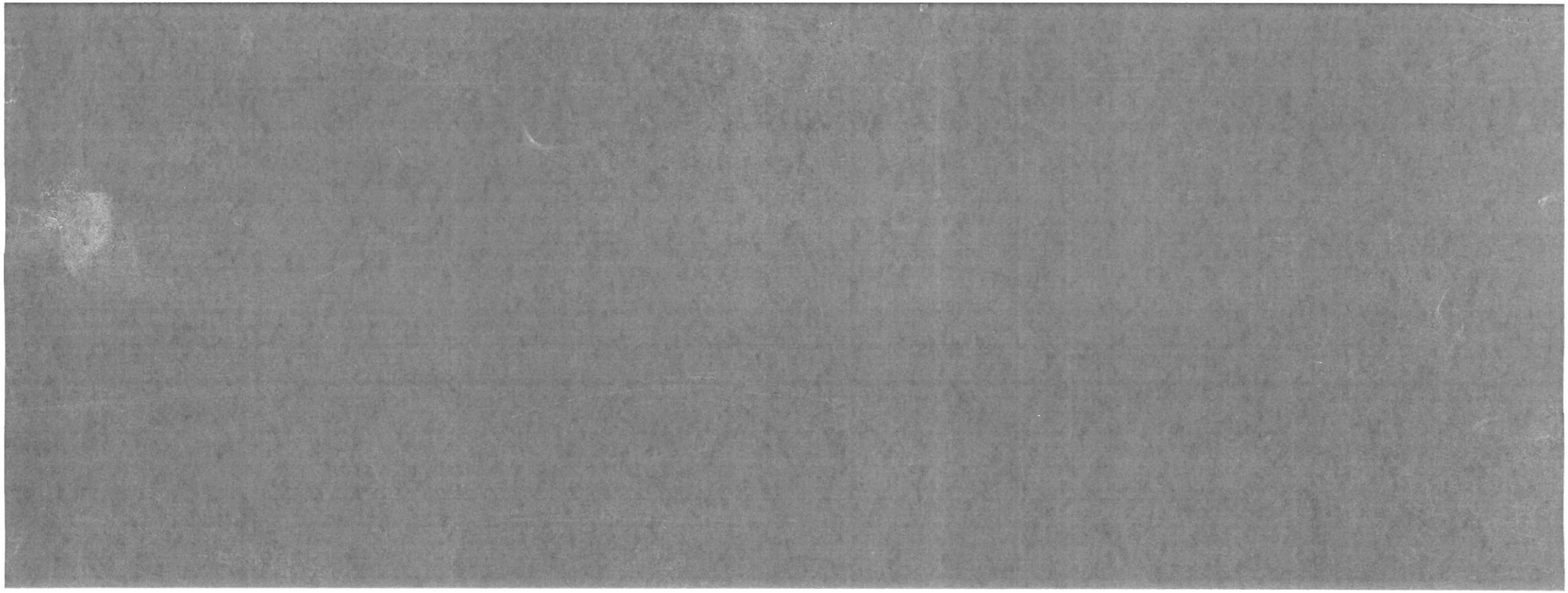


THE IS-LM FRAMEWORK

Kittichai Saelee
EE212
Semester 1/2018

THIS SECTION

- To introduce ***a macroeconomic framework*** that allows for the ***joint*** determination of **income and interest rate**
  - **Income = output = real GDP (Interchangeably used from now on)**

- Having a model usable for **impact analysis,** including **policy interventions**

THIS SECTION

- Didn't we actually see this already.
  - Interest rate / income in Keynesian cross model
  - Interest rate / income in Liquidity preference model

- **Yes, but we haven't seen the interconnection yet**

- The existing knowledge must be combined to create an integrated framework

HOW DO WE DO THIS?

- Combing your knowledge from **Keynesian cross model** with **Liquidity preference model**

- The integrated framework is known as **the IS-LM model**
  - **IS : equilibrium in product market (real sector)**
  - **LM: equilibrium in money market (financial sector)**

AGENDA

- IS relation
  - Derivation of IS curve
  - Slope of IS curve
  - Shifts of IS curve
- LM relation
  - Derivation of LM curve
  - Slope of LM curve
  - Shifts of LM curve
- IS-LM combined
- Changes in Equilibrium under IS-LM

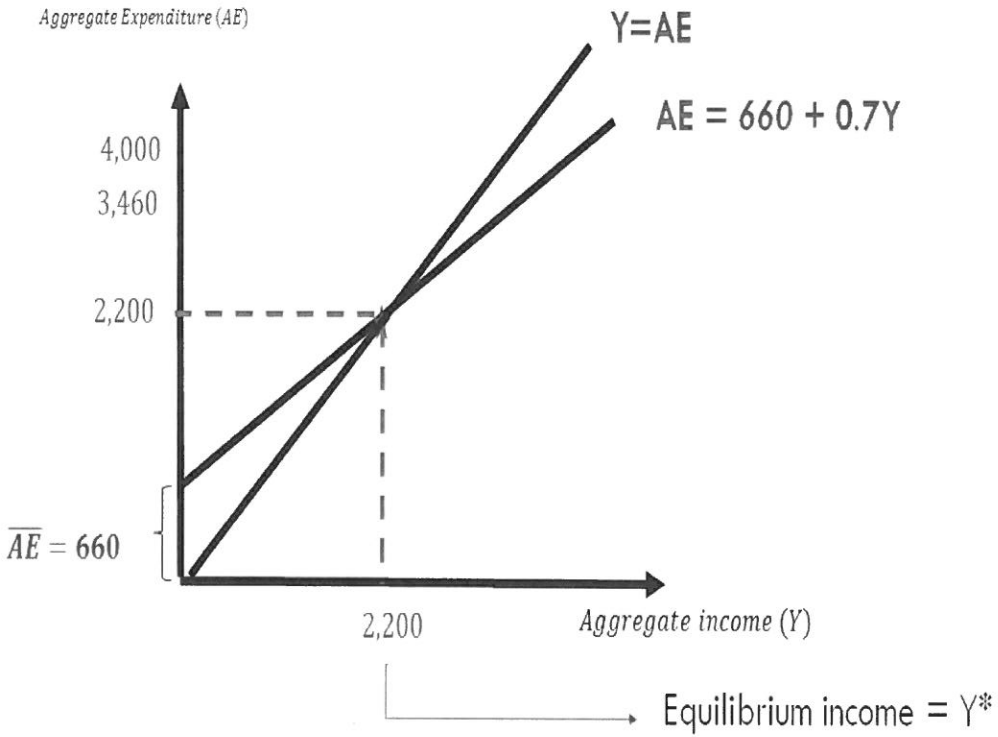
PRODUCT MARKET AND IS RELATION

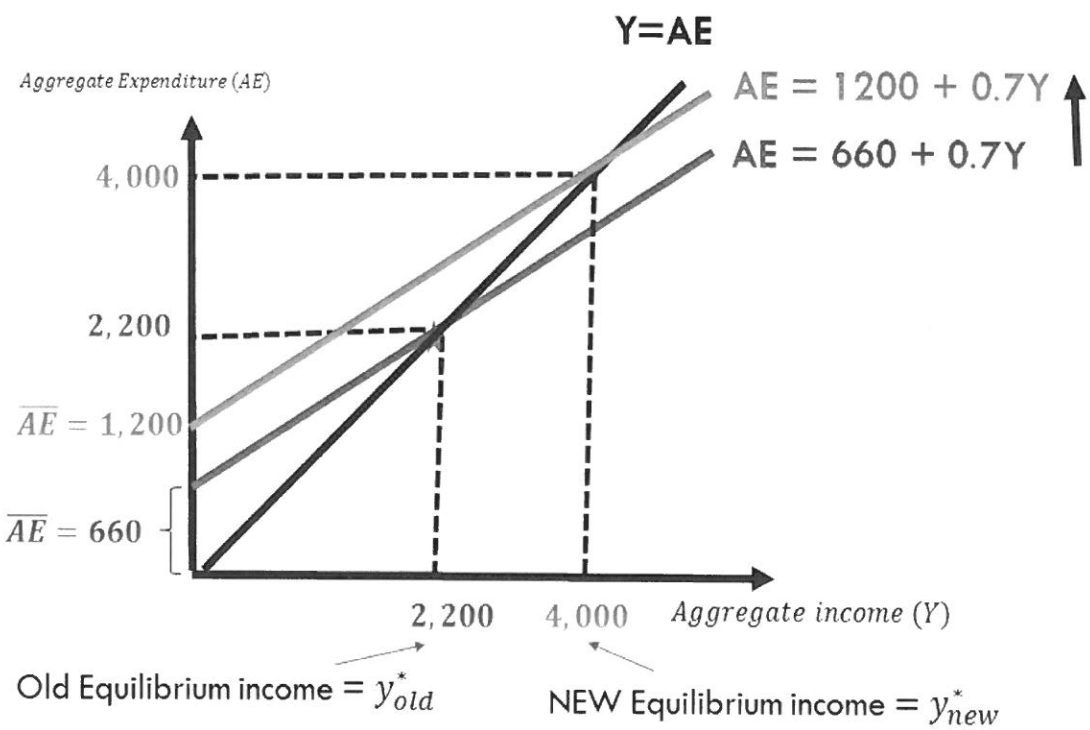
- Back to part before midterm exam
  - We studied about the determination of income
  - Income is determined in product market, i.e. the real sector
    - Product market: **a market where business/consumers/governments buy products from firms/producers**
    - Total value of output = Total value of income

PRODUCT MARKET AND IS RELATION: KEYNESIAN CROSS

- Back to part before midterm exam
  - Based on the concept of **Keynesian cross**, equilibrium income (Y*) is determined by **autonomous expenditure**
    - The sum of components of autonomous spending; those with "bar" notation!
  - We knew that
    - Autonomous expenditure is driven by **various factors** that we assume **fixed**
    - Changes in those factors affect the autonomous expenditure, and hence the equilibrium income

PRODUCT MARKET AND IS RELATION:
AGGREGATE EXPENDITURE AND EQUILIBRIUM INCOME





INTEREST RATE, AUTONOMOUS EXPENDITURE AND INCOME

- Notice that **interest rate (r) is one of the factors** that determines the autonomous expenditure

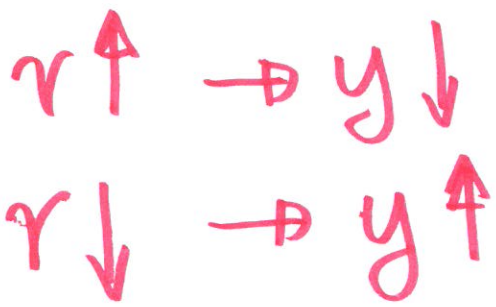
- Change in the interest rate "r" will affect
  - Private consumption spending (C) and Private investment spending (I)

- **As a result, change in the interest rate can affect the size of aggregate expenditure, and hence equilibrium income**

PRODUCT MARKET AND IS RELATION: DEFINITION OF IS RELATION

- Economists define the relation between "r" and "y" that put the product market under equilibrium as the IS relation "Y = C + I + G + X - M"
  - Equilibrium = income is exactly matched by expenditure

- The IS relation represents the negative relation between "r" and "y" (Why is it so?)



PRODUCT MARKET AND IS RELATION: WHY NEGATIVE RELATION?

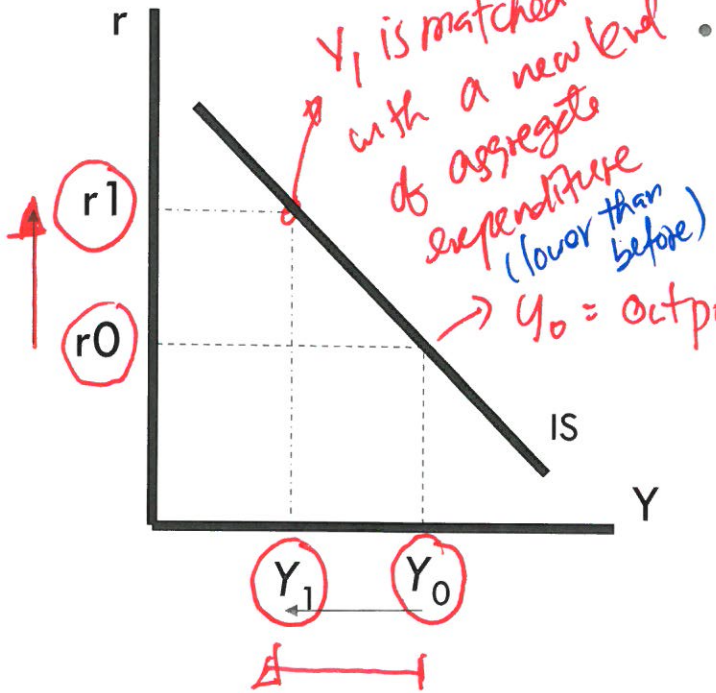
- Why negative relation?
  - Suppose we start from r0, the level of autonomous consumption and investment is determined.
  - Given the level of autonomous expenditure, equilibrium income can be determined, i.e y0
  - An increase in the interest rate from r0 → r1 will lower the level of autonomous consumption and investment
  - Aggregate expenditure drops for every level of income
  - In the equilibrium, income will fall from y0 to y1

r ↑ → y ↓

GRAPHICAL ILLUSTRATION OF IS RELATION: THE IS CURVE

Negative relation b/w "r", "y"

- IS curve is the graphical version of IS relation
  - Plotting "r" on vertical and "y" on the horizontal



Y_1 is matched with a new level of aggregate expenditure (lower than before)

→ Y_0 = output/income matched with "AE" determined at r_0

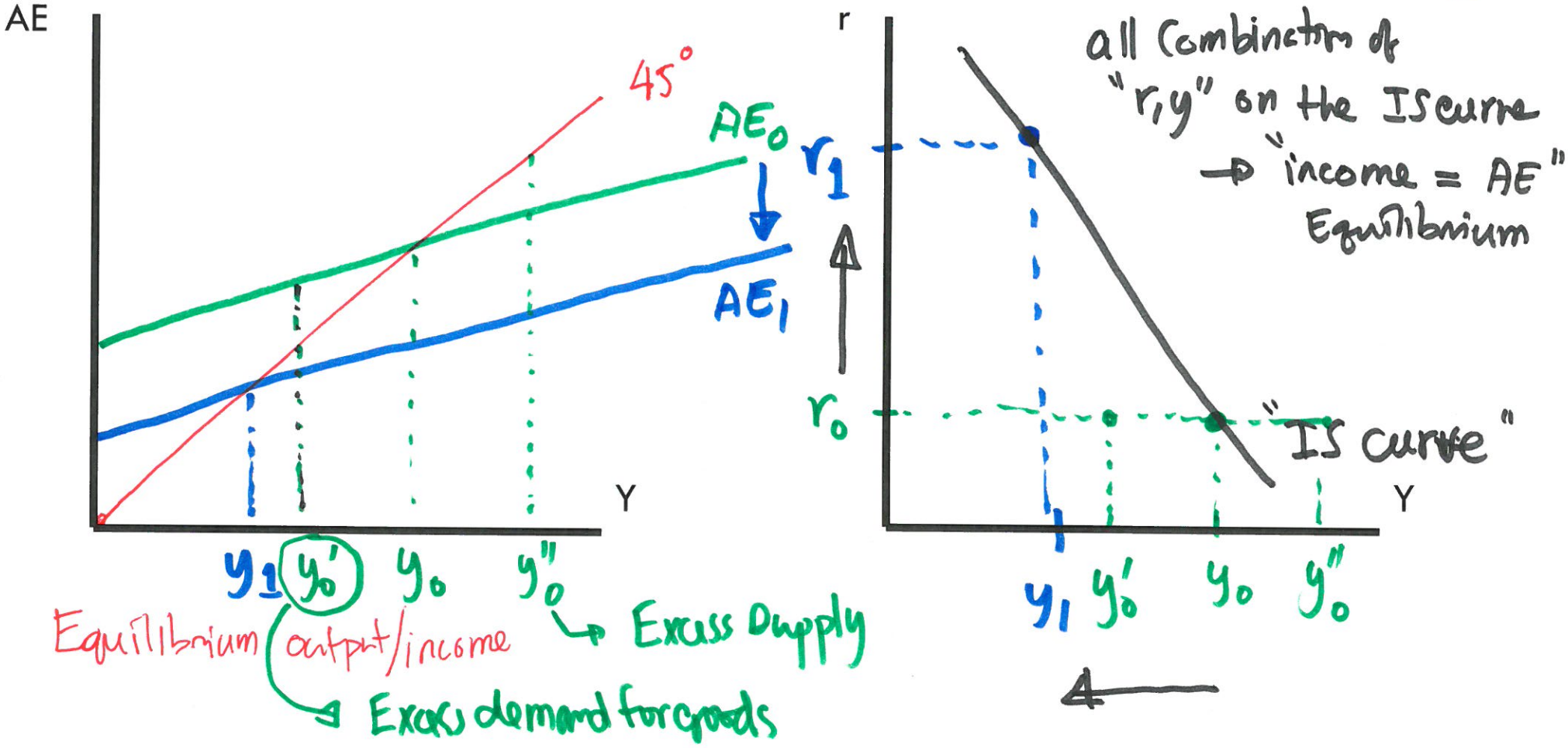
- An increase in the interest rate from r0 (=3 percent) to r1 (=6 percent) lowers aggregate expenditure (consumption/investment) and thus reduces equilibrium income from Y_0 to Y_1.

IS curve ⇒ a downward sloping curve

GRAPHICAL APPROACH TO THE DERIVATION OF IS CURVE

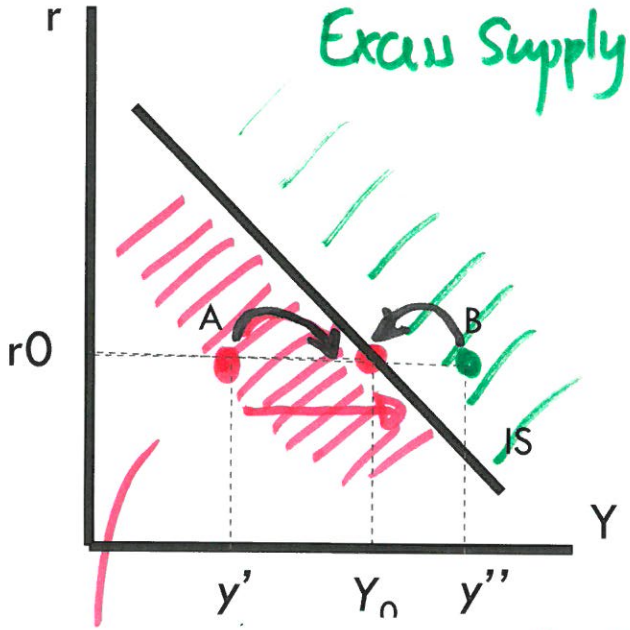
$r_0 \rightarrow \bar{C}_0, \bar{I}_0 \rightarrow \bar{AE}_0$

r_1 (higher than before) $\rightarrow \bar{C}_1, \bar{I}_1$ (both lower) $\rightarrow \bar{AE}_1 \downarrow$



IS CURVE AND DISEQUILIBRIUM

- Combination of "r" and "y" on the IS curve represents the equilibrium situation in product market
  - Off the IS curve → disequilibrium



Excess Supply (Surplus of goods) → over production

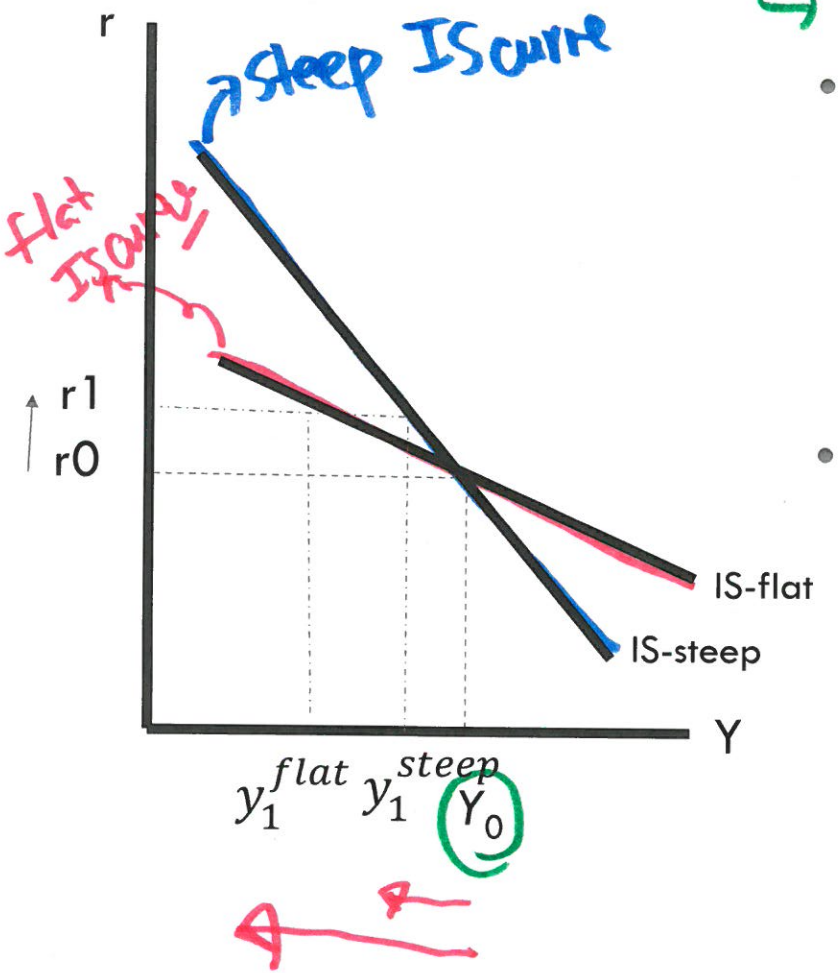
- E(r0,y0) = Equilibrium
  - Income is exactly matched by expenditure
- A(r0,y') = disequilibrium
  - Income is too low → Excess demand for goods
- B(r0,y'') = disequilibrium
  - Income is too high → Excess supply of goods

Excess demand (shortage of goods) → under production

"slope"

FACTORS DETERMINES OF IS CURVE

↳ Sensitivity of income/output to interest rates.



- Steep IS curve:
  - Income changes little when there is a change in the interest rate
  - Income is insensitive to interest rate

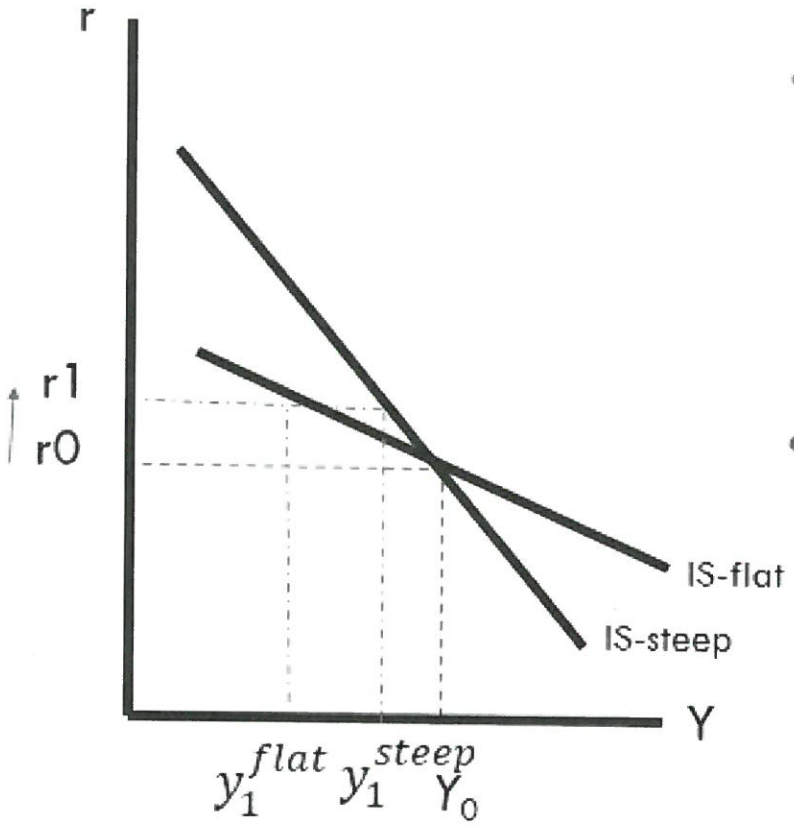
- Flat IS curve:
  - Income changes a lot when there is a change in the interest rate
  - Income is sensitive to interest rate

highly

"determine the slope" of IS curve

"Degree of income/output sensitivity to interest rate."

FACTORS DETERMINES slope OF IS CURVE

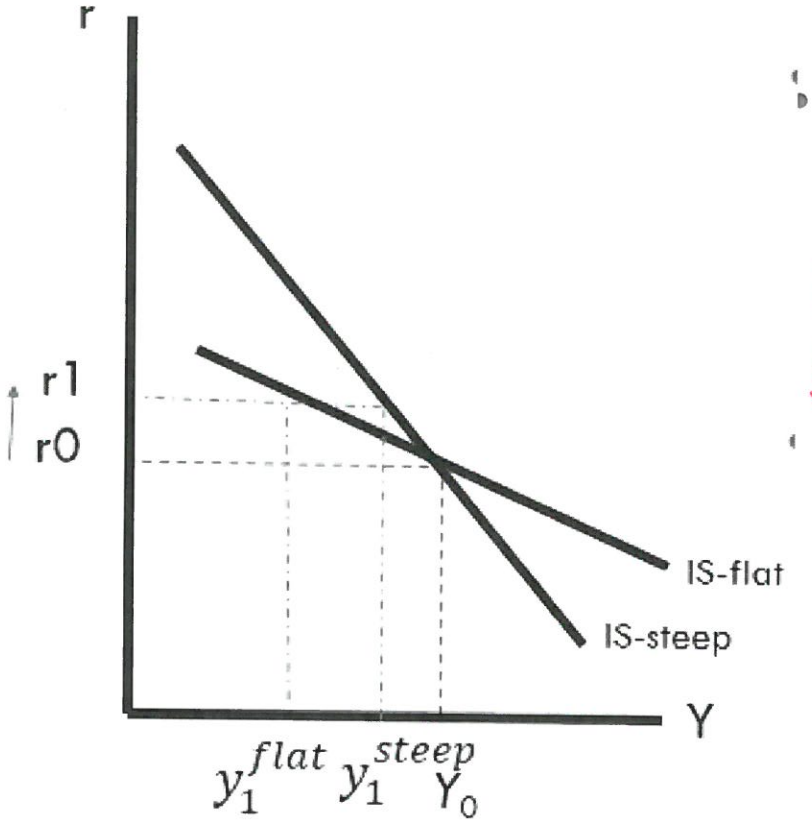


- Recall that downward sloping IS curve is due to the following mechanism

$$r \uparrow \rightarrow \bar{C} \downarrow \text{ and } \bar{I} \downarrow \rightarrow \overline{AE} \downarrow \rightarrow Y \downarrow$$

- Drop in income is large because of two possibilities:
  1. Large decline in $\bar{C} \downarrow$ and $\bar{I} \downarrow$
  2. Big response of income to change in autonomous expenditure

FACTORS DETERMINES OF IS CURVE

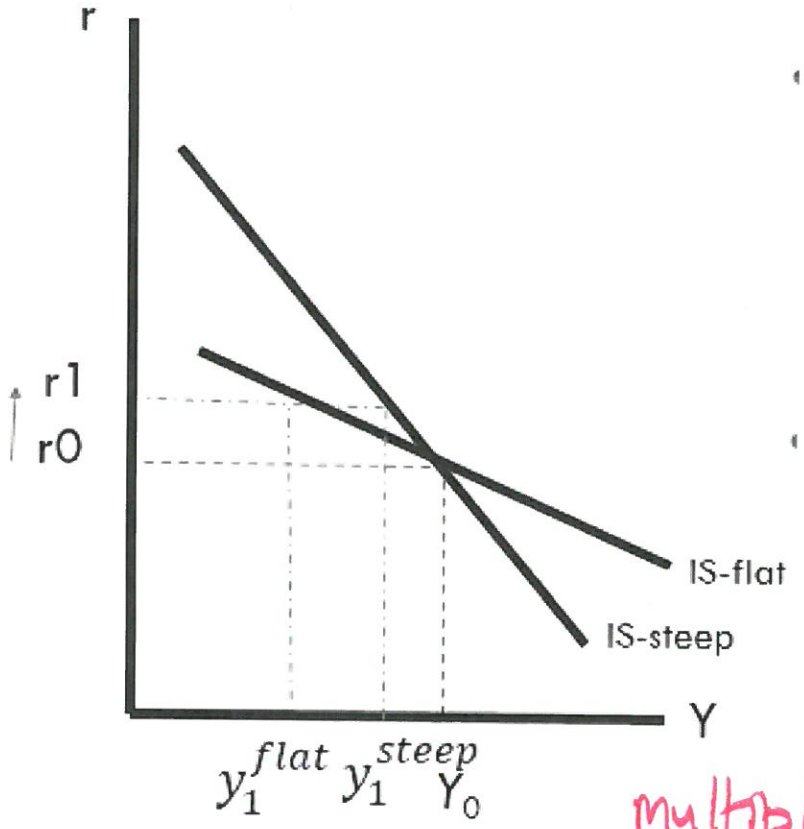


- Recall that downward sloping IS curve is due to the following mechanism

$$r \uparrow \rightarrow \overline{C} \downarrow \text{ and } \overline{I} \downarrow \rightarrow \overline{AE} \downarrow \rightarrow Y \downarrow$$

Large decline in $\overline{C} \downarrow$ and $\overline{I} \downarrow$:
Consumption and investment is sensitive to interest rate → IS curve is flat!

FACTORS DETERMINES OF IS CURVE



- Recall that downward sloping IS curve is due to the following mechanism

$$r \uparrow \rightarrow \bar{C} \downarrow \text{ and } \bar{I} \downarrow \rightarrow \overline{AE} \downarrow \rightarrow Y \downarrow$$

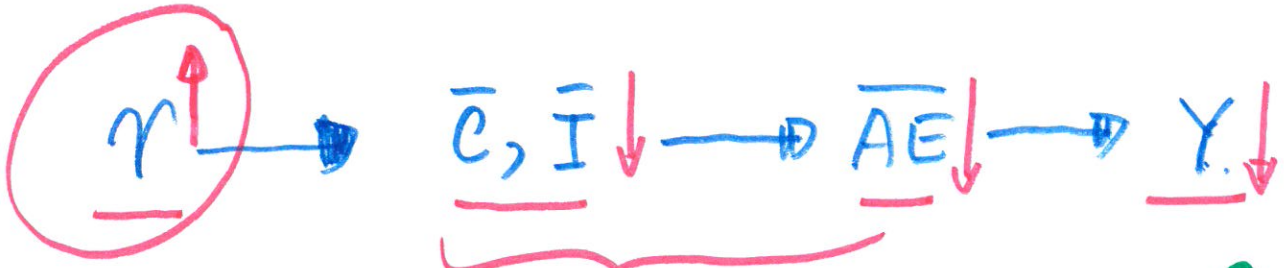
- **Big response of income to change in autonomous expenditure**

Recall the multiplier concept!

Large multiplier generates flatter IS curve

change in output/income related to change in the $\overline{AE}$

multiplier $\Rightarrow \frac{1}{1 - c_1 - I_1 + M_1}$ ↳ marginal propensity to consume, invest, import



keep all other factors affecting $\bar{AE}$ fixed

Combination of "r" and "y" that put the product market in Equ^{m}

↓

firms sell product to agents

- households
- Busines
- government
- External part

↑ change in these factors → shifts in IS curve

"output" "income" "meted" by the expenditure