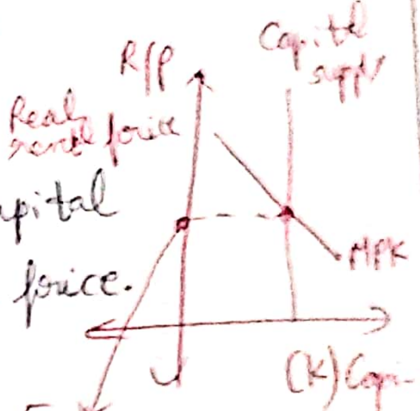
Business - fixed investment : → assumes that firms can borrow to buy capital whenever they feel doing so is profitable.

→ Std. model: Neoclassical model of investment

→ shows how investment depends on Capital demand (MPK), interest rate & tax rules affecting firms.

Firms

- Production firms — decide ? much capital to rent → rent the capital they use to produce goods & services. Production firms rent capital until capital demand = real rental price.
- Rental firms — decide ? much to invest. → own capital, rent it to prod^n firms.



earthquake / war ← ↓K
pop^n growth / immigration ← ↑L
Technological ↑ment ← ↑A

→ Eq. rental → Equilibrium rental price.

$$\frac{R}{P} = MPK = \alpha (A) \left(\frac{L}{K}\right)^{1-\alpha}$$

↳ prod^n firms rent capital.

→ Rental firms → rent when benefit / unit capital > cost.

Benefit (per unit capital) → $\frac{R}{P}$ → the income that rental firms earn from renting 1 unit of capital to production firms.

↳ The Cost of capital:

- Interest cost: Opportunity cost equal to the interest firms could have earned if they had purchased P_K worth of bonds instead of spending P_K from their own funds.

$$\boxed{\text{Interest cost}} = i \times P_K$$

P_K = nominal price of capital.

- Depreciation cost:

Depreciation rate (D) = % of cost that wears out each period.

Firm's capital = $(1 - D)$ (Worth of capital) after the depreciation period.

$$\boxed{\text{Depreciation cost}} = \delta \times (P_K)$$

δ = rate of depreciation.

P_K → current price of capital.

- Capital Loss: $= -\Delta P_K$.

A capital gain, $\Delta P_K > 0$ reduces cost of K).

(*) $\boxed{\text{Nominal cost of capital}} = \text{Interest} + \text{depreciation costs} + \text{Capital loss}$

$$= i \times P_K + \delta \times P_K - \Delta P_K$$

$$= P_K \left(i + \delta - \frac{\Delta P_K}{P_K} \right)$$

Real price of capital = P, $\frac{\Delta P_K}{P_K} = \Pi$.

Cost

∴ Nominal ~~price~~ of capital = $P_K(i + \delta - \Pi)$

$= P_K(r + \delta)$

Real cost of capital = $\left(\frac{P_K}{P}\right)(r + \delta)$

relative price of capital. | real interest rate | depreciation rate

Profit rate = SP − CP = $\frac{R}{P} - \frac{P_K}{P}(r+\delta) = MPK - \frac{P_K}{P}(r+\delta)$

→ >0 → firms rents ↑ capital (↑ K)

→ <0 → firm ↓ K by not replacing it as it depreciates.

→ determines a firm's net ~~interest rate~~ investment.

→ Net investment = $\Delta K = I\left[MPK - \frac{P_K}{P}(r+\delta)\right]$

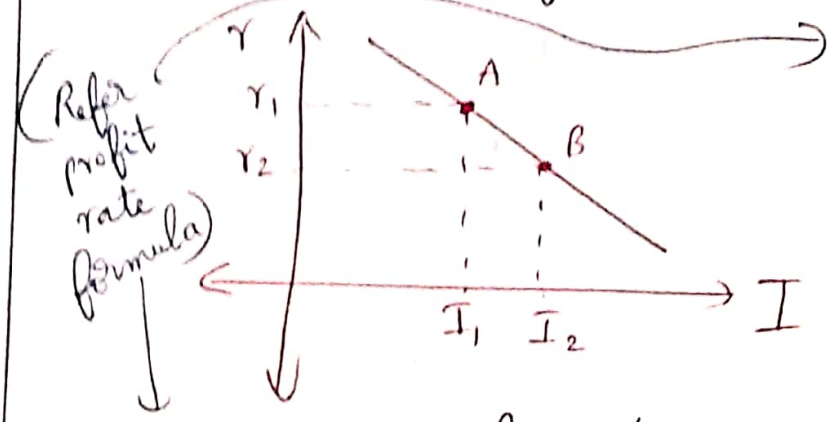
$I[\,]$ is a func^n

→ Gross investment = net investment + δK (replacement of depreciated K)

$$I = I_n\left[MPK - \frac{P_K}{P}(r+\delta)\right] + \delta K \quad \text{— (1)}$$

$= \Delta K + \delta K$

↳ The investment func^n : (① prev. page)



(Refer profit rate formula)

↳ r ↑^{ses} ⇒

(i) ↑ in cost of capital

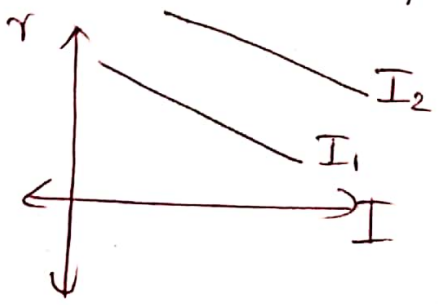
(ii) ↓ in profit rate & thus ↓ in investment

↳ MPK ↑^{ses} or $\frac{P_K}{P}$ ↓^{ses} :

→ ↑ in profit rate ⇒ ↑ in interest rate.

→ Shifts I curve to rt.

investment @ any



↳ Taxes affecting investment

Corporate income tax

↓

Tax on profits.

Conventional price of capital → used to compute profit. If P_K ↑^{ses} over time, profit is overstated. So, even if economic profit of firm = 0 ⇒ corporate income tax ✓. DISCOURAGES INVESTMENTS.

Investment Tax Credit (ITC)

↳ reduces the firm's taxes by certain amt. for every 1$ it spends on capital.

⇒ P_K ↓

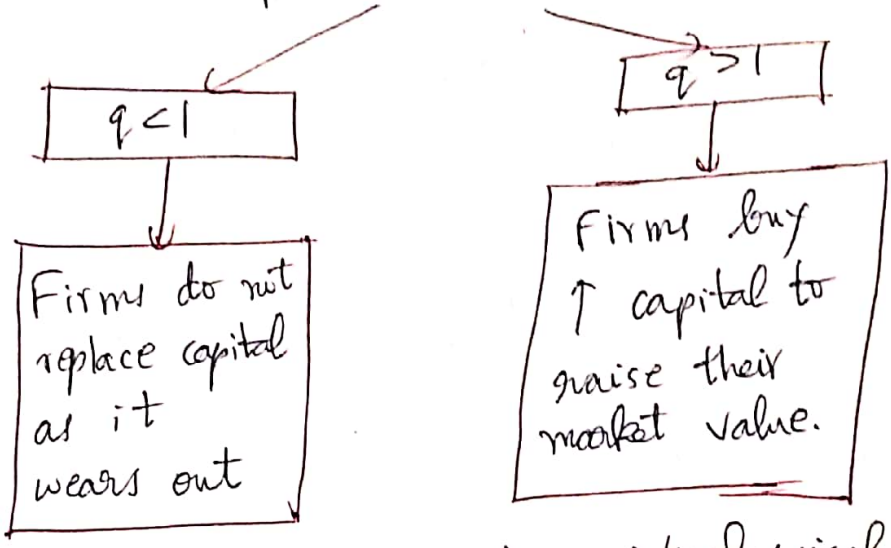
⇒ Profit rate ↑^{ses}

⇓

investment ↑.

Tobin's q:

$$q = \frac{\text{Market value of installed capital}}{\text{Replacement cost of installed capital}}$$



Relation b/w q theory & Neoclassical model:

→ Stock market value of capital depends on current & expected future profits of capital.

→ MPK > cost of capital → profit rate ↑ → q ↑

MPK < cost of capital → profit rate ↓ → q ↓.

Efficient Markets Hypothesis (EMH):

→ Market price of a company's stock is the fully rational valuation of the company, given current info about the company's business prospects.

→ EMH ⇒ stock prices should only change as new info arrives. (random-walk / stock prices are un-predictable)

→ Stock prices ↓ ser ⇒ ↓ in technological progression.
↳ ↓ in household wealth
↳ ↓ in household consumption etc.,

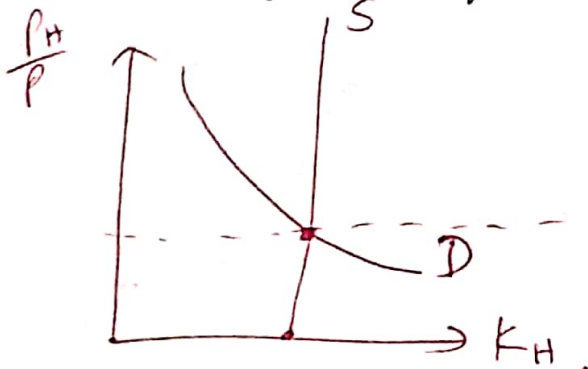
Residential - fixed investment :

→ depends of $\frac{P_H}{P}$ = $\frac{\text{Nominal price of houses}}{\text{Real } \text{ } \text{ } \text{ } \text{ } \text{ } \text{ }}$

↳ depends on supply & demand of existing houses.

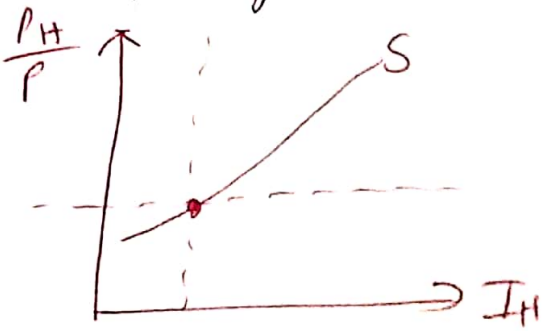
→ determined as follows :

Market for housing



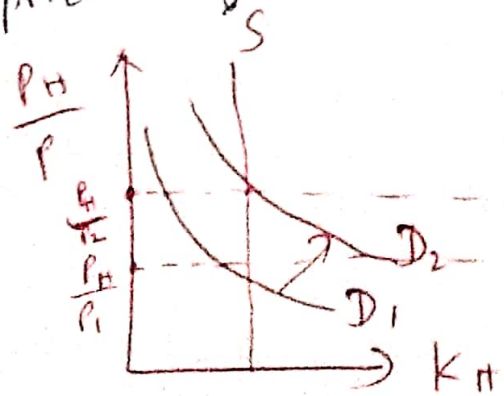
(Stock of housing capital)

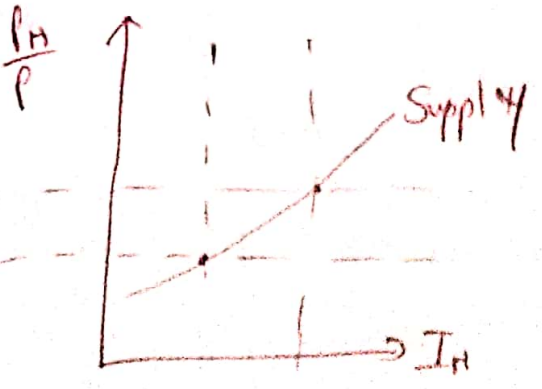
Supply of new housing



(Flow of residential investment)

Interest rate ↓ ⇒ demand for houses ↑ ⇒ ↑ relative price ↑ ser ⇒ ↑ ser residential investment.





D_1 to D_2 curve shift.

Tax treatment of housing:
Subsidise home ownership by allowing ppl to deduct mortgage interest.
↳ applies to nominal mortgage rate ⇒ subsidy ↑ ⇒ IRT & Mortgage rate (nominal) ↑

Inventory investment:
~1% of GDP.

→ Reasons: (Motives of investment)

① Prodⁿ Smoothing → Sales < prodⁿ → inventories ↑
→ Sales > prodⁿ → inventories ↓.

② Factor of prodⁿ → spare parts when machines break down.

③ Stock-out avoidance → avoid lost sales when demand > expected.

④ Work in progress → Works not yet completed → goods still under construction → inventory.

Accelerator Model:
→ A simple theory that explains the behaviour of inventory investment without focusing on any particular investment.

→ N = stock of inventories, ΔN = inventory investment

Assuming that firms hold a stock of inventories

∝ o/p, $N = \beta Y$

β → exogenous parameter

⇒ $\Delta N = \beta \Delta Y$ ⇒ Inventory investment ∝ change in o/p.

→ o/p ↑ sales ⇒ inventory investment ↑ sales

→ o/p ↓ sales ⇒ " " ↓ sales

→ opportunity cost of holding goods in the inventory = [Interest earned on revenue from selling the goods.

real interest ↑

⇓

opportunity cost of maintaining inventories ↑

⇓

firms ↓ inventories & produce only when required.

So, inventory depends of interest rates.