MAX PV(π) ① $F'(x) - \frac{C'(x) - F(x)}{P - C(x)} = S$ ← INTEREST OR DISCOUNT RATE

Hp: P is costant over time

What if P wasn't costant (more realistic)?

if P(t)

② $F'(x) - C'(x) \cdot F(x) = S - \frac{\dot{P}}{P - C(x)}$

this formula shows the optimal level of resource

If we want to study a specific resource we first need to study F(x) so describe the production function (done by field considerate experts) and thank we study how we harvest the resource and how H is affected by L, X and also K.

Through this semplification of the use of resources can describe π.

$\pi = P \cdot H - \underbrace{C(x)}_{\text{cost as function of x because it is affected by the stock}} \cdot H = \underbrace{[P - C(x)]}_{\text{unit profit = difference between P of good and C of production (for 1 unit more of this profit)}} \cdot H$

Our objective → what we want to maximize?

MAX $\underset{\text{present value}}{PV}$ $\underset{\text{all future } \pi}{(\pi)}$ = we want to max. the present value, that is the value today of all the profits that I can make from now on in the future (the H today affects the size of X remaining and next year H so π are linked)

① $F'(x) - \frac{C'(x) \cdot F(x)}{P - C(x)} = S$

$F'(x)$ = the speed, the growth rate of our resource (depends on the type)

$C'(x)$ = cost of harvesting, is the derivative and representation the speed of the variation

From the // of R and MR we find L prof (maximizing profit) and LFA (risky, free acess)

From using TSC and its parallel we find the point at which the social benefits are minimized

MAC (TR − TSC) to max social benefits

Max soc mean using even less labour ($L_{soc} < L_{prof}$)

because ~~our~~ costs increases (TC + TEC)

if we harvest we reduce the wellfare of our society, this value is identified as a cost TEC

This solution gives also the value of L_{CP}

L_{CP} = common property, where we bring to 0 not the π but the net social benefit.

Even in this case we are away from LFA and this distance depends on steep is the TSC (that depend on how high is the TEC)

Optimal use of RR → better L_{CP} then L_{FA} (always)

We want to have a sustainable harvest so the harvest that exactly how much the environment can reproduce for the following year → STEADY STATE SOLUTION

F(x) = production function of the resource (growth function of stock)

H = harvest → seen as a function of variables X and L (oggetti X)

$H = Q(L, X)$ e.g. $H = L \cdot X$ (simple ex)

$H = A \cdot L^a \cdot X^b$ (Cobb Douglas function) (more complicated ex)

add $\underline{K}$ = capital

$\pi = P \cdot H - \underbrace{C(x)}_{\text{cost of function } x} \cdot H = [P - C(x)] \cdot H$