Microeconomics

Lecture 5

Exchange Economies (revisited)

- **No production, only endowments, so no description of how resources are converted to consumables.**
- **General equilibrium: all markets clear simultaneously.**
- **1st and 2nd Fundamental Theorems of Welfare Economics.**

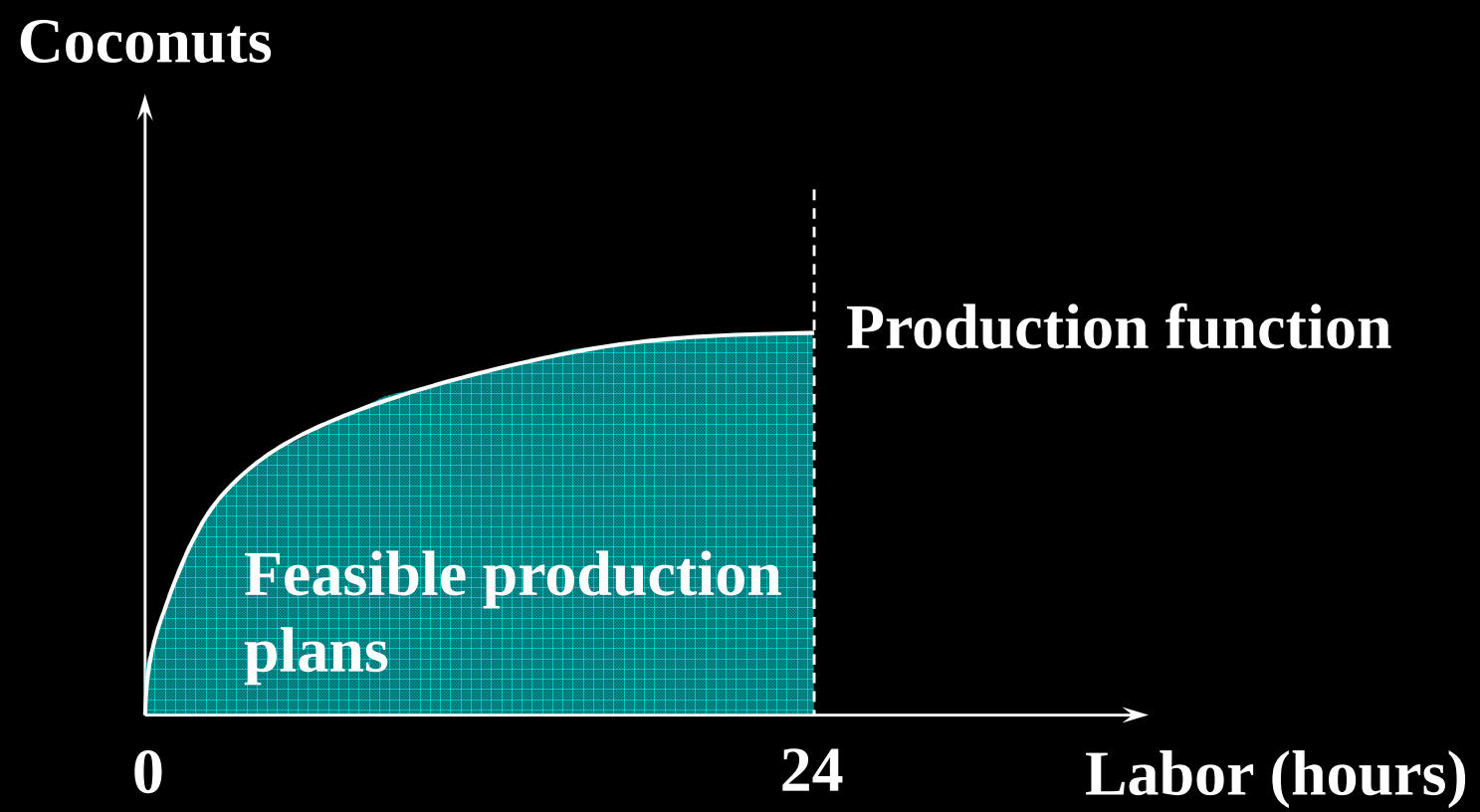
Now Add Production ...

- **Add input markets, output markets, describe firms' technologies, the distributions of firms' outputs and profits … That's not easy!**

Robinson Crusoe's Economy

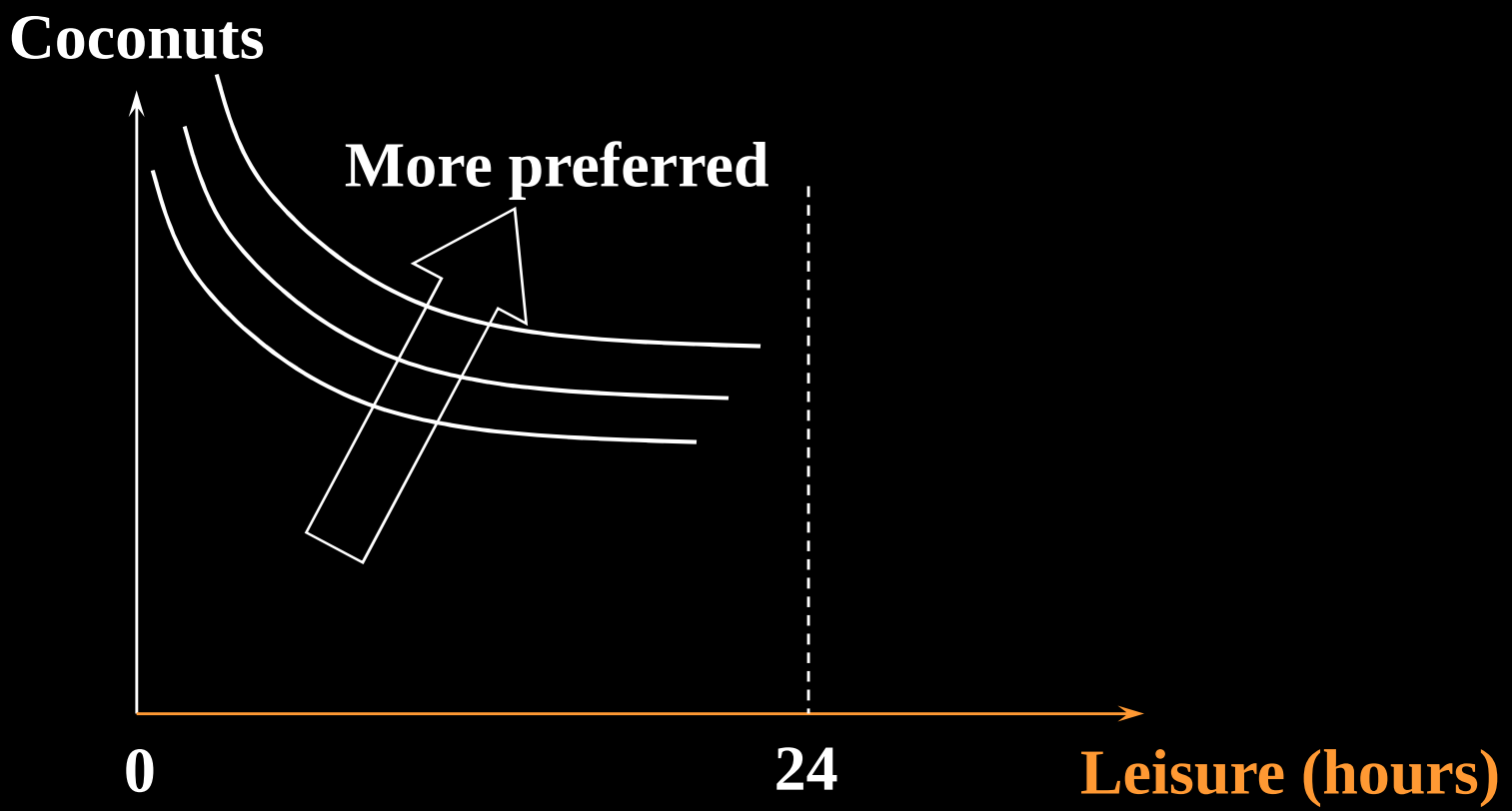
- **One agent, RC.**
- **Endowed with a fixed quantity of one resource -- 24 hours.**
- **Use time for labor (production) or leisure (consumption).**
- **Labor time = *L*. Leisure time = 24 - *L*.**
- **What will RC choose?**

Robinson Crusoe's Technology



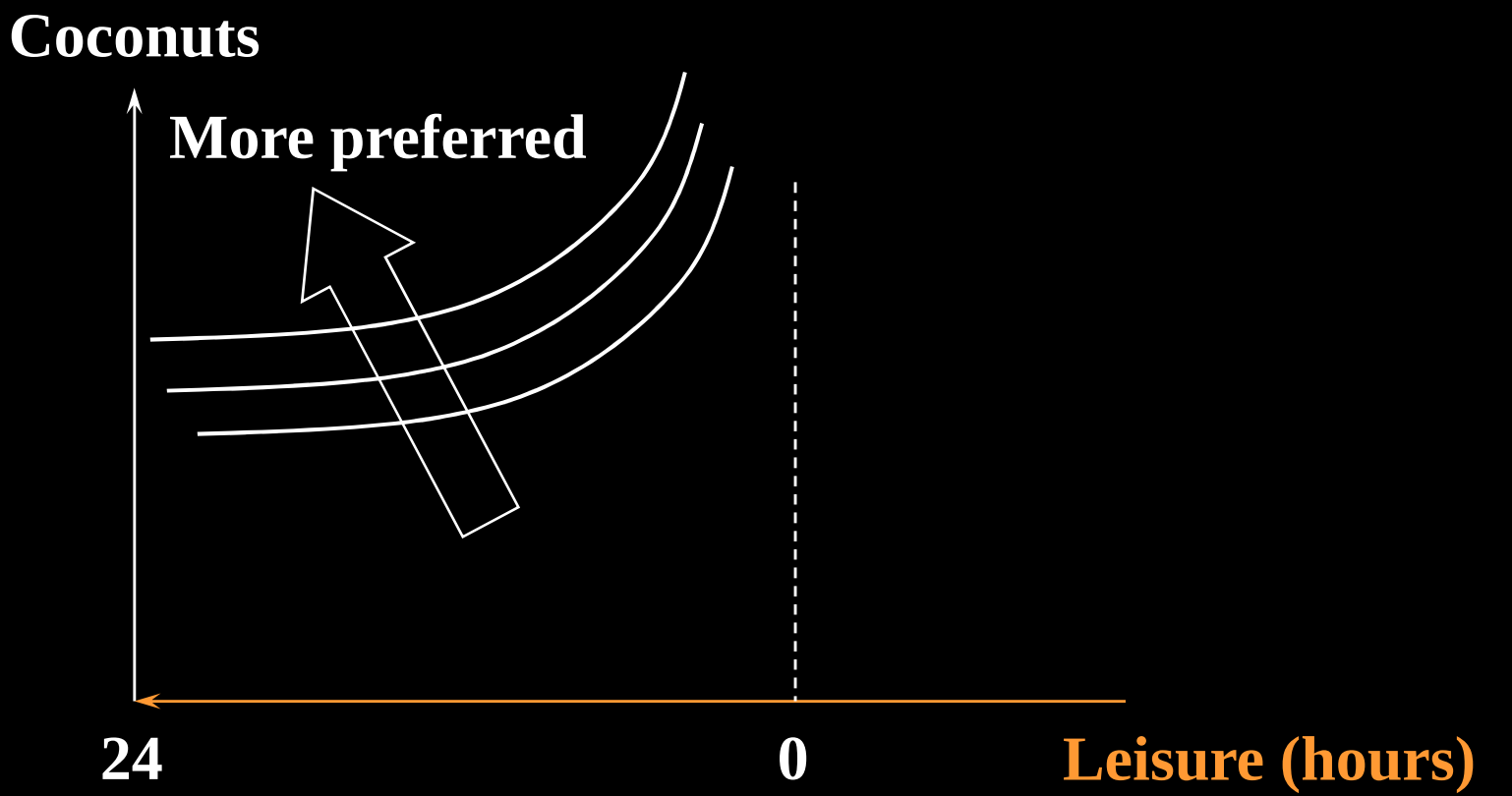
Technology: Labor produces output (coconuts) according to a concave production function.

Robinson Crusoe's Preferences

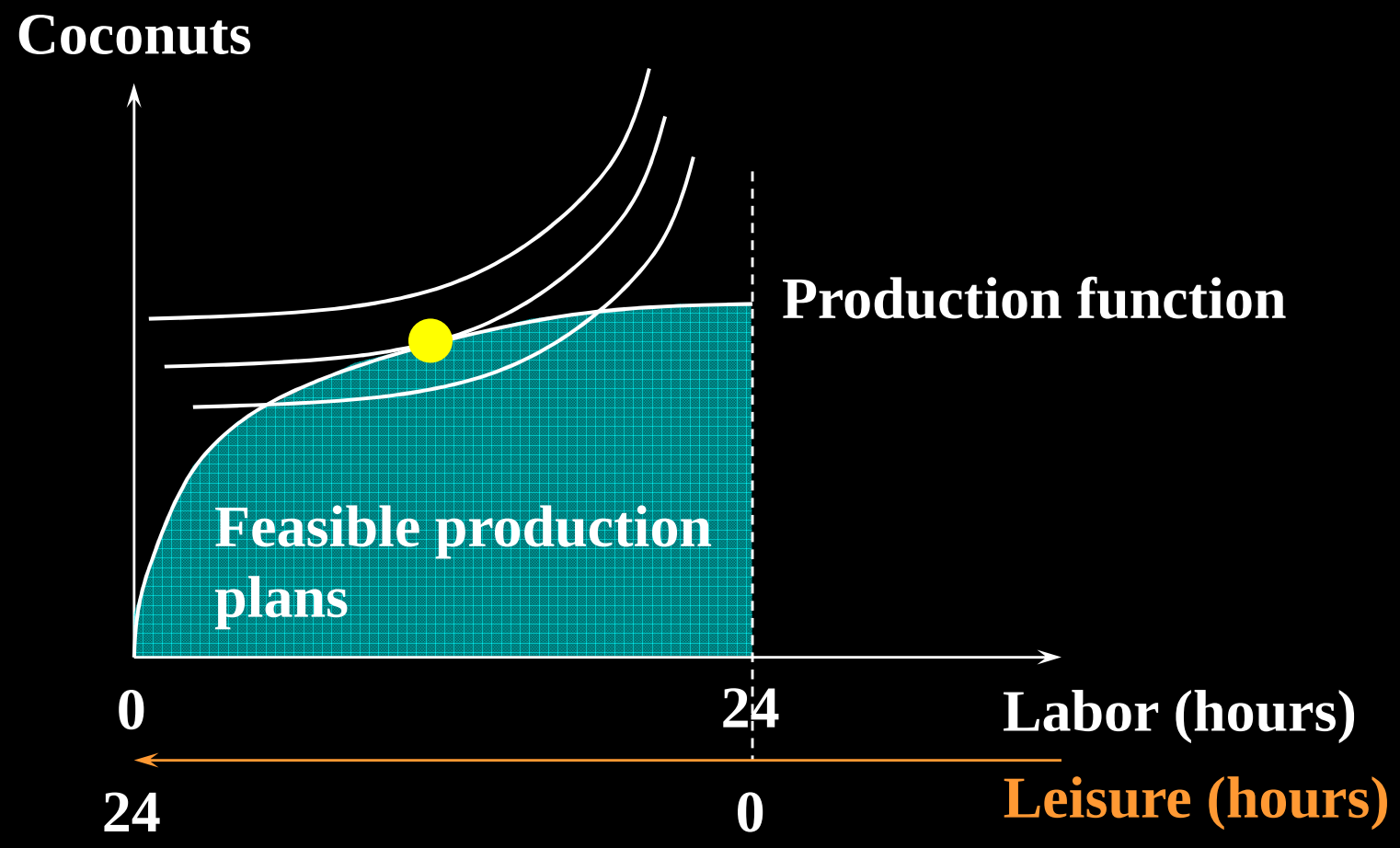


RC's preferences: **-coconut is a good**
-leisure is a good

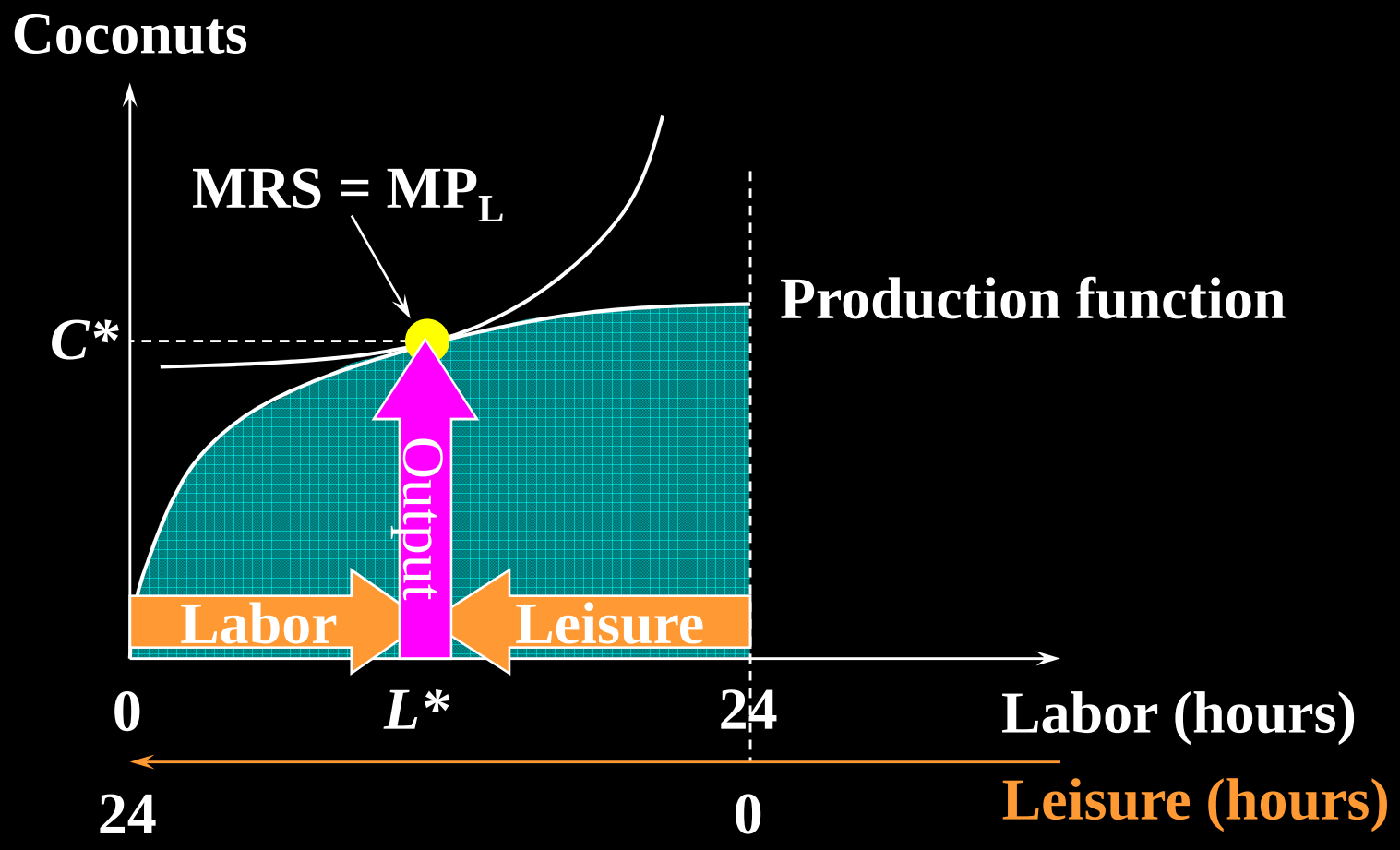
Robinson Crusoe's Preferences



Robinson Crusoe's Choice



Robinson Crusoe's Choice



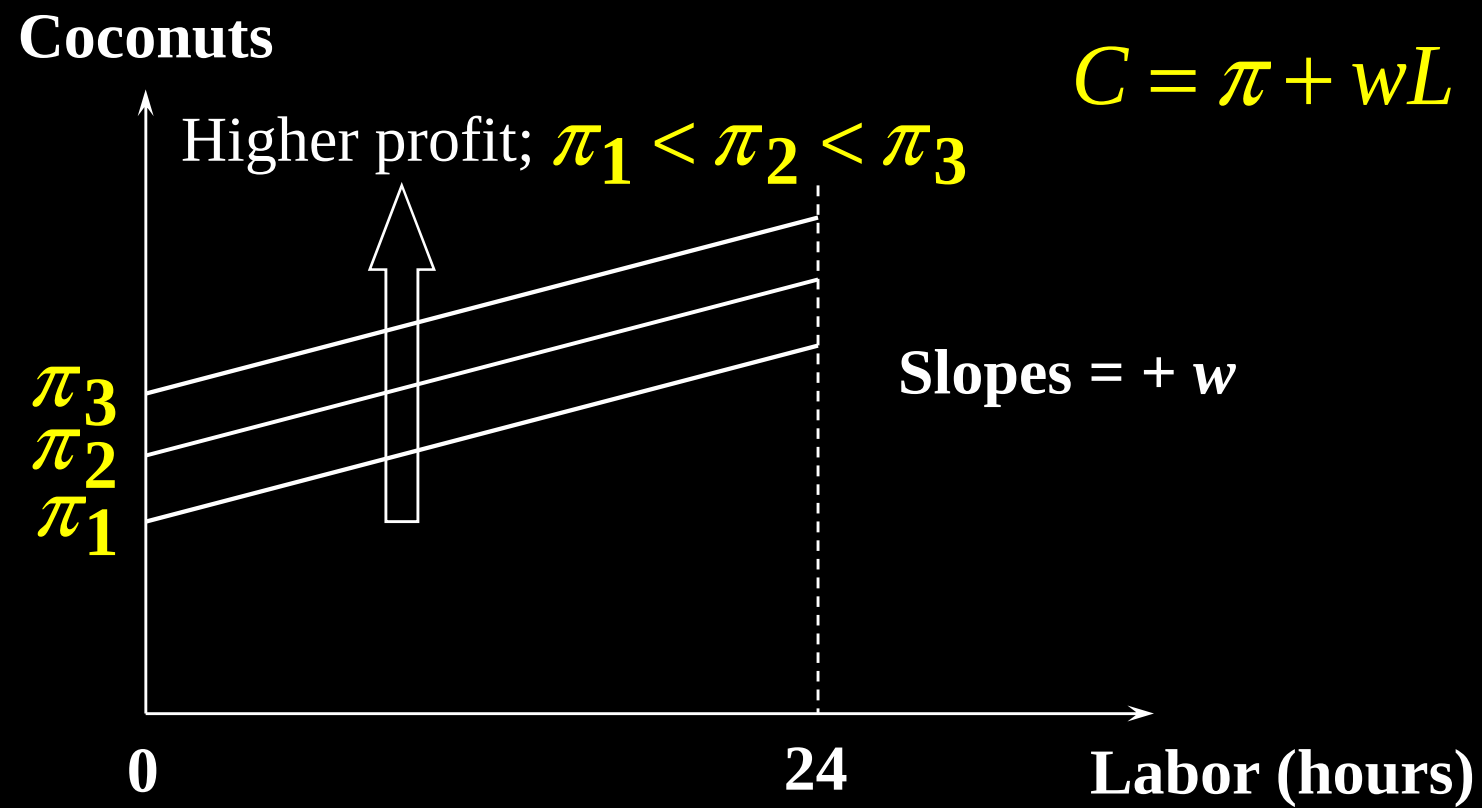
Robinson Crusoe as a Firm

- **Now suppose RC is both a utility-maximizing consumer and a profit-maximizing firm.**
- **Use coconuts as the numeraire good; i.e. price of a coconut = $1.**
- **RC's wage rate is *w*.**
- **Coconut output level is *C*.**

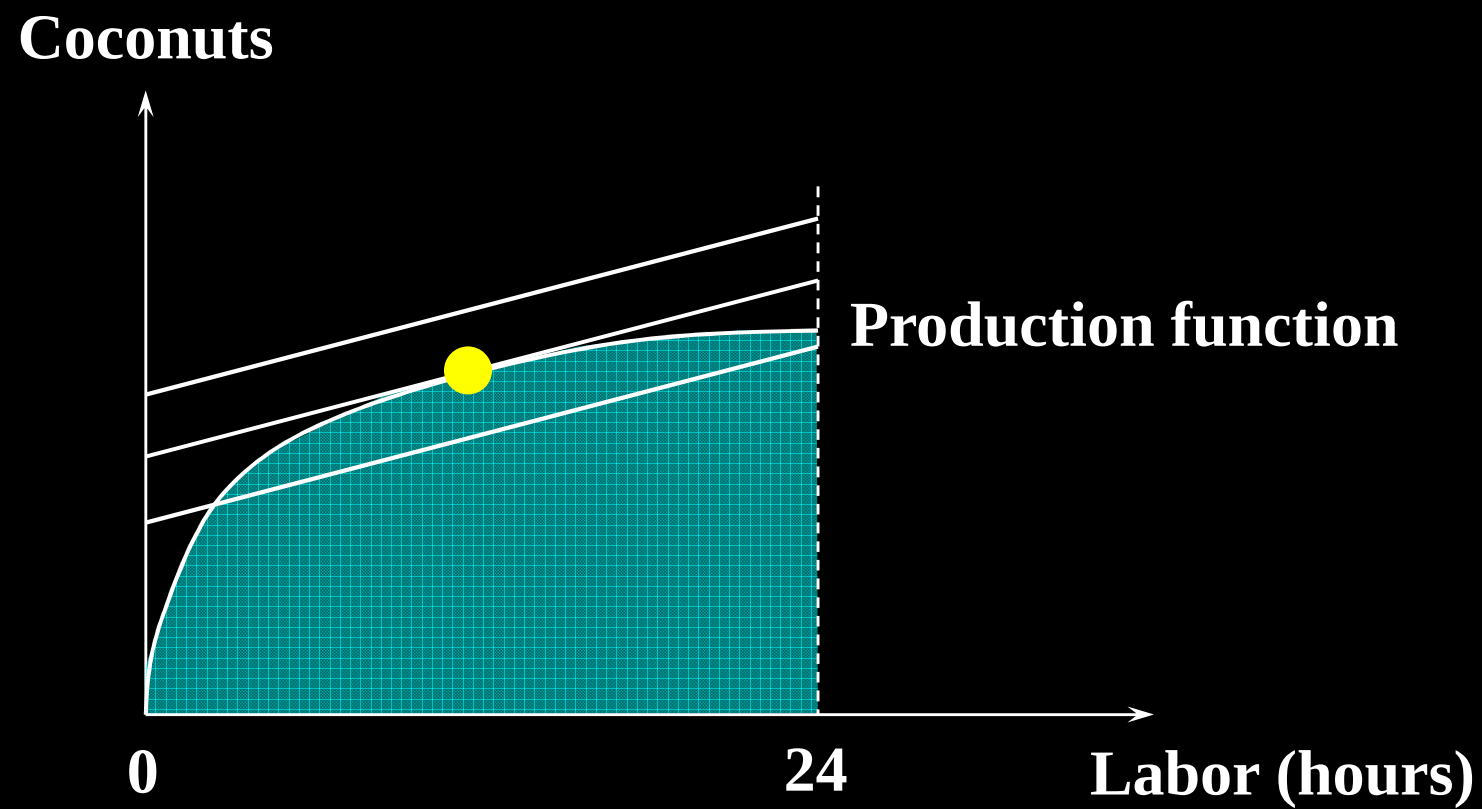
Robinson Crusoe as a Firm

- RC's firm's profit is $\pi = C - wL$.
- $\pi = C - wL \Leftrightarrow C = \pi + wL$, the equation of an isoprofit line.
- Slope = + w .
- Intercept = π .

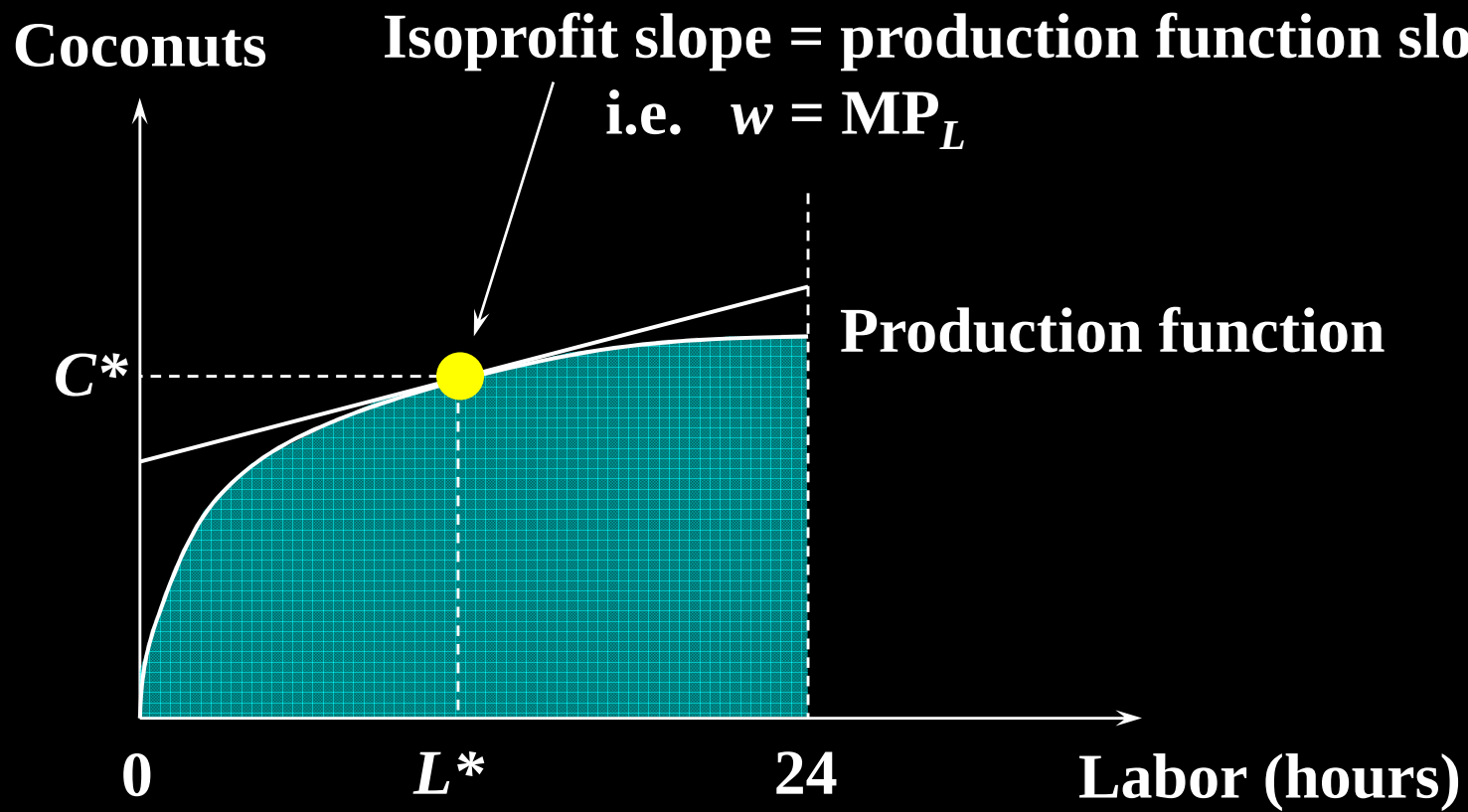
Isoprofit Lines



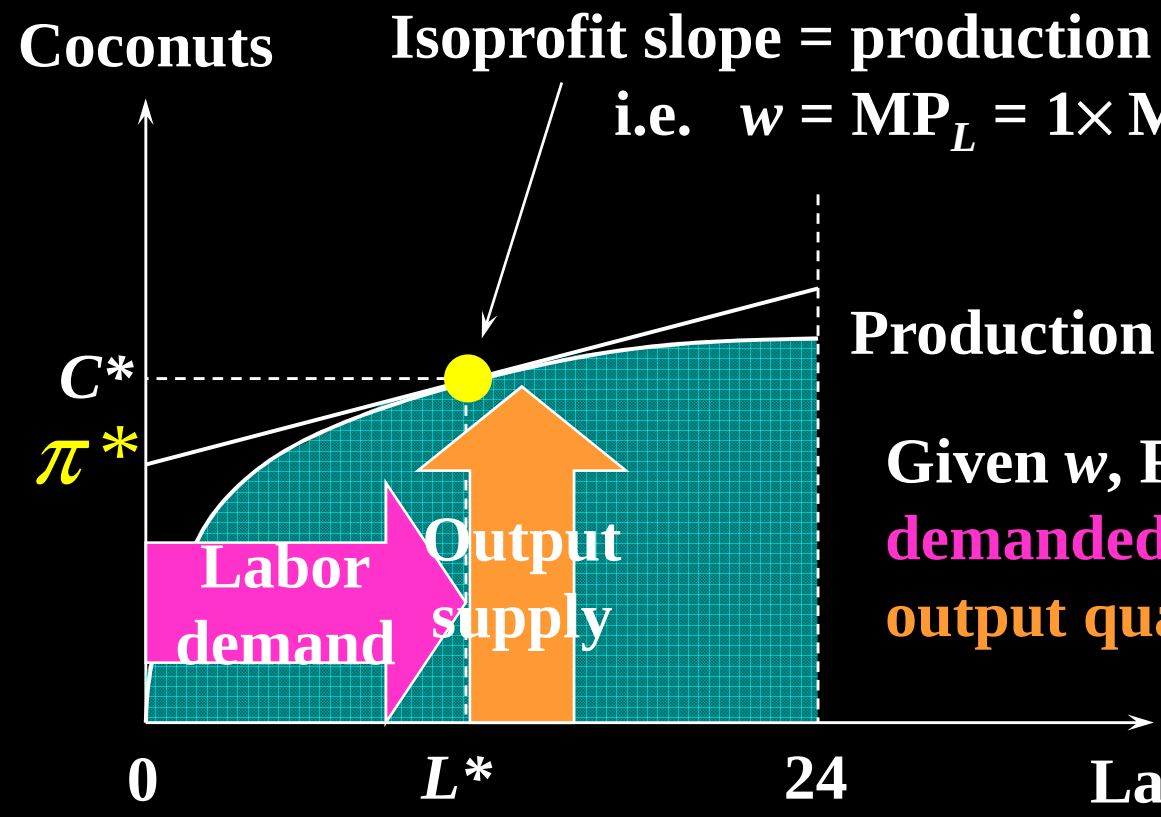
Profit-Maximization



Profit-Maximization



Profit-Maximization



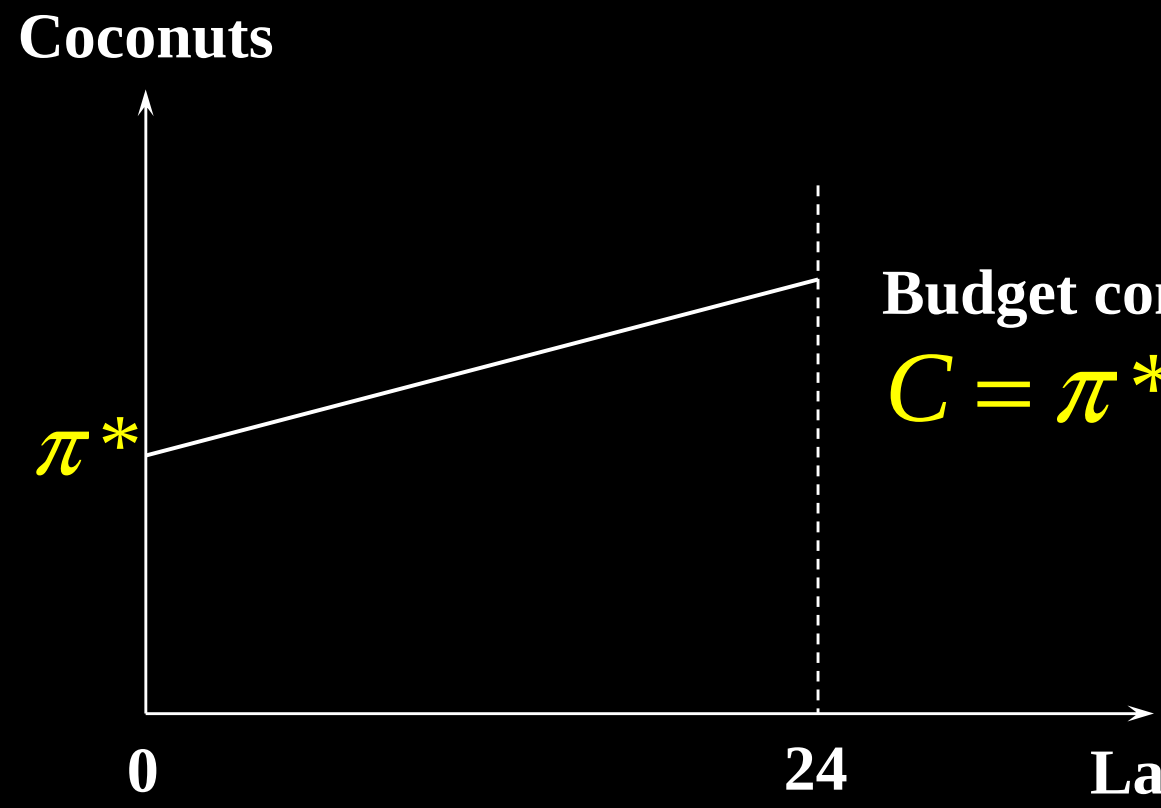
Given w, RC's **firm's quantity demanded of labor is L^*** and **output quantity supplied is C^*.**

RC gets $\pi^* = C^* - wL^*$

Utility-Maximization

- **Now consider RC as a consumer endowed with $\$\pi^*$ who can work for $\$w$ per hour.**
- **What is RC's most preferred consumption bundle?**
- **Budget constraint is** $C = \pi^* + wL.$

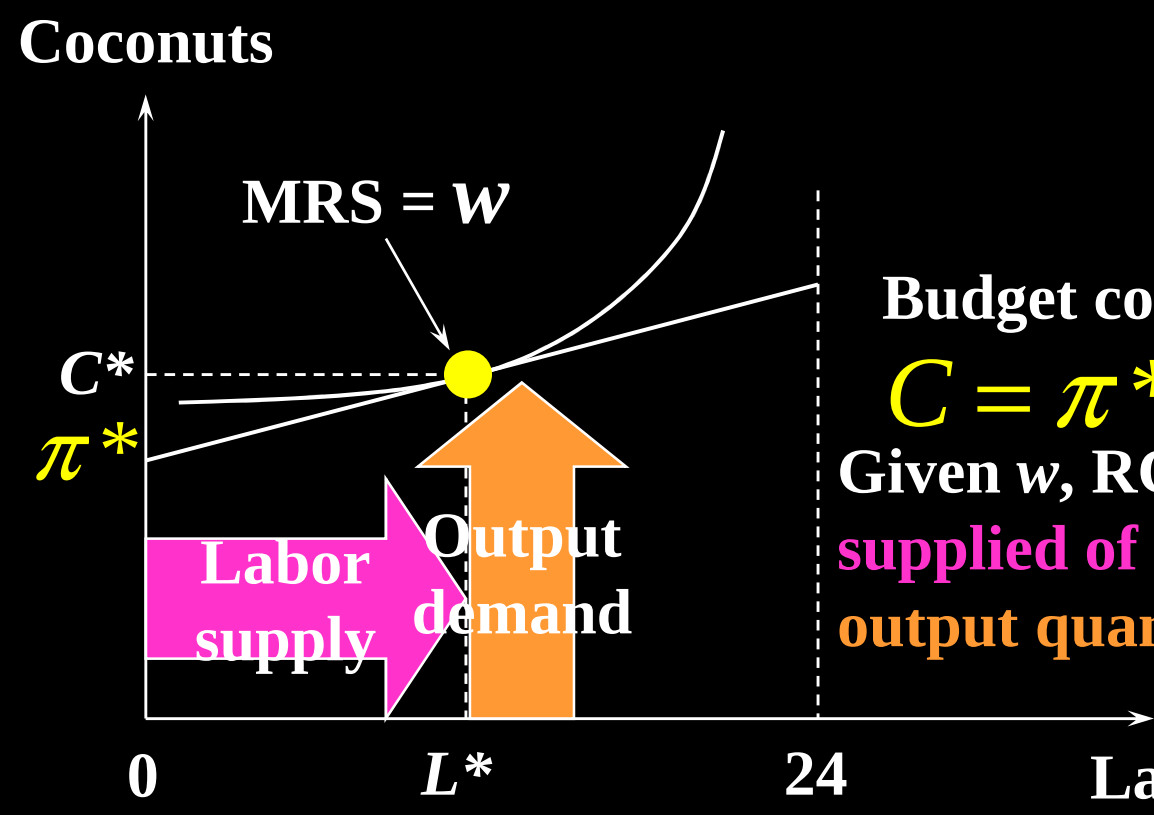
Utility-Maximization



Budget constraint; slope = *w*

$$C = \pi^* + wL.$$

Utility-Maximization



Budget constraint; slope = w

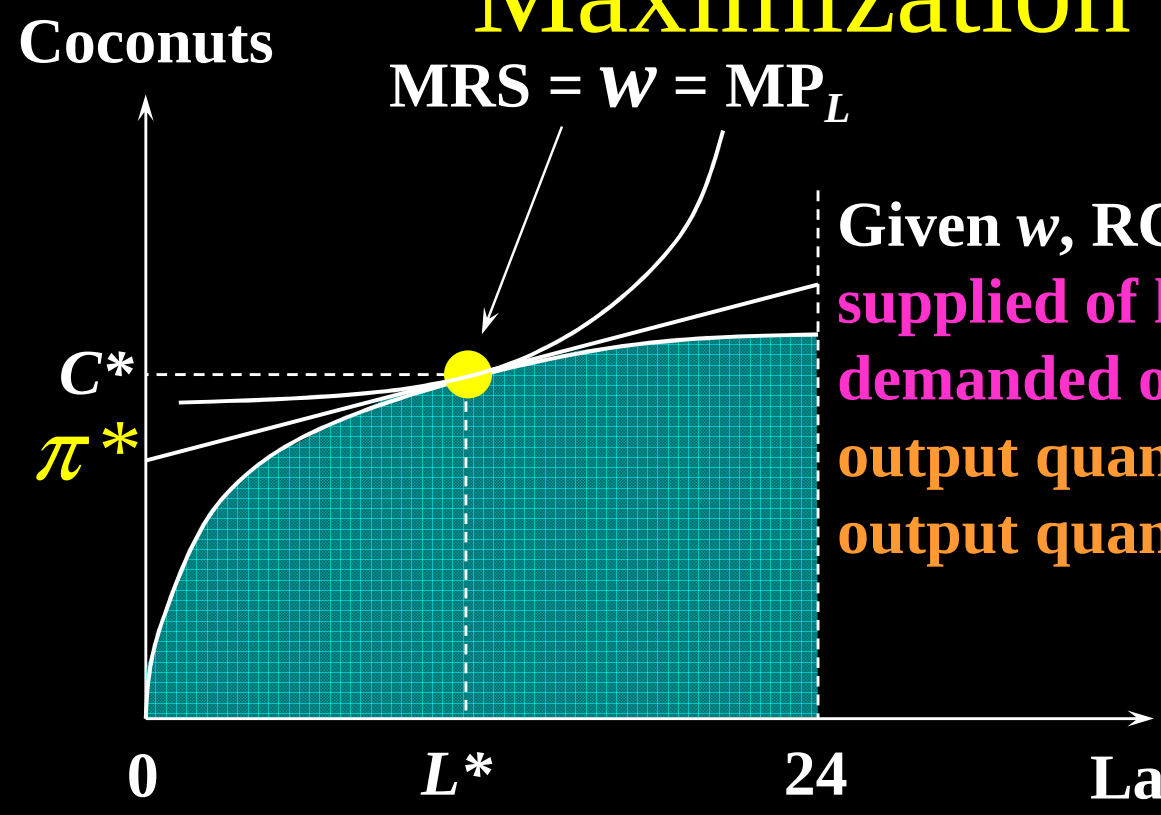
$$C = \pi^* + wL.$$

Given w, RC's quantity supplied of labor is L^* and output quantity demanded is C^*.

Utility-Maximization & Profit-Maximization

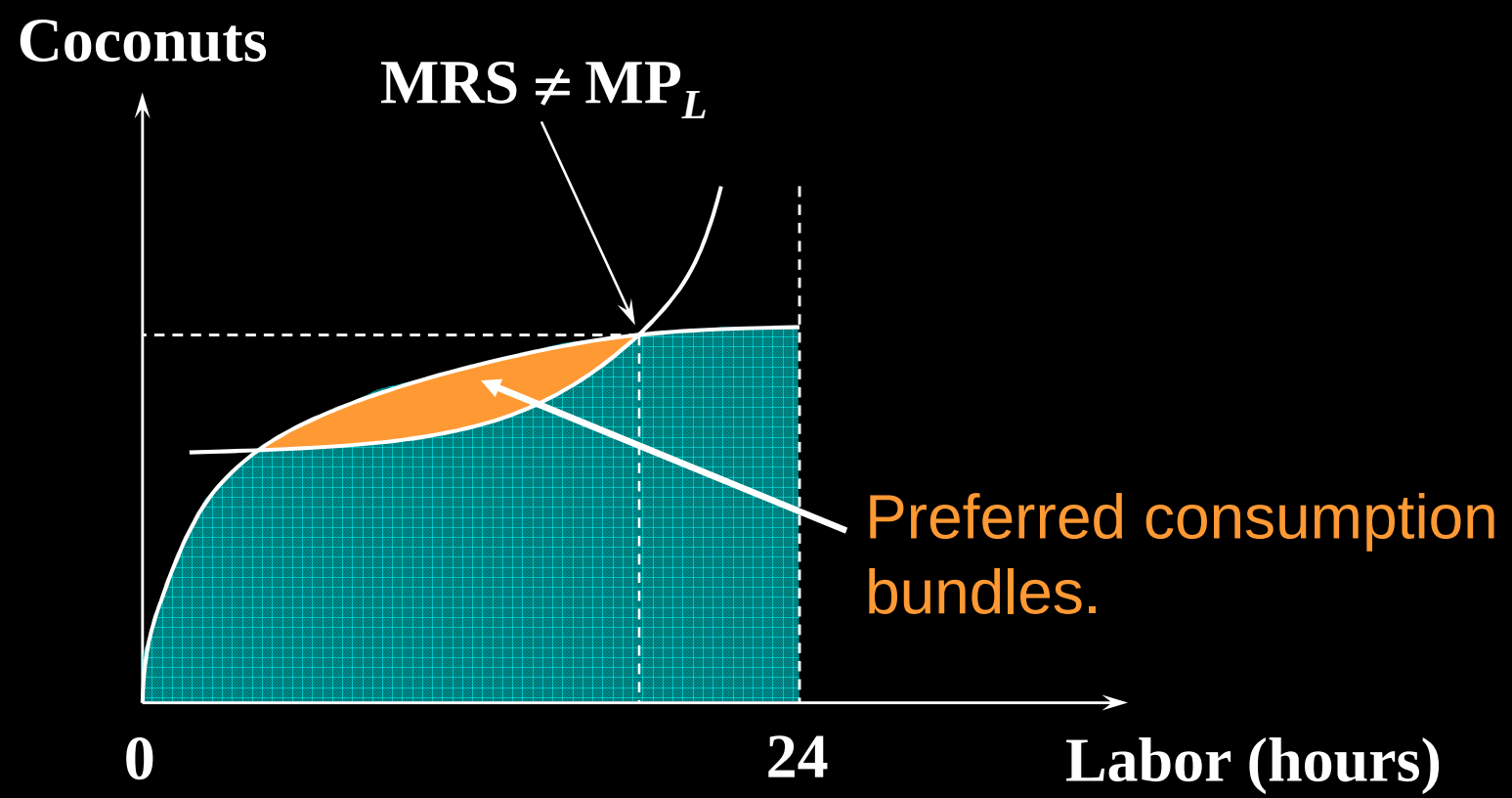
- **Profit-maximization:** **Coconut and labor markets both clear.**
  - **w = MP_L**
  - **quantity of output supplied = *C**
  - **quantity of labor demanded = *L****
- **Utility-maximization:**
  - **w = MRS**
  - **quantity of output demanded = *C****
  - **quantity of labor supplied = *L****

Utility-Maximization & Profit-Maximization



Given *w*, RC's quantity supplied of labor = quantity demanded of labor = *L and output quantity demanded = output quantity supplied = *C****.**

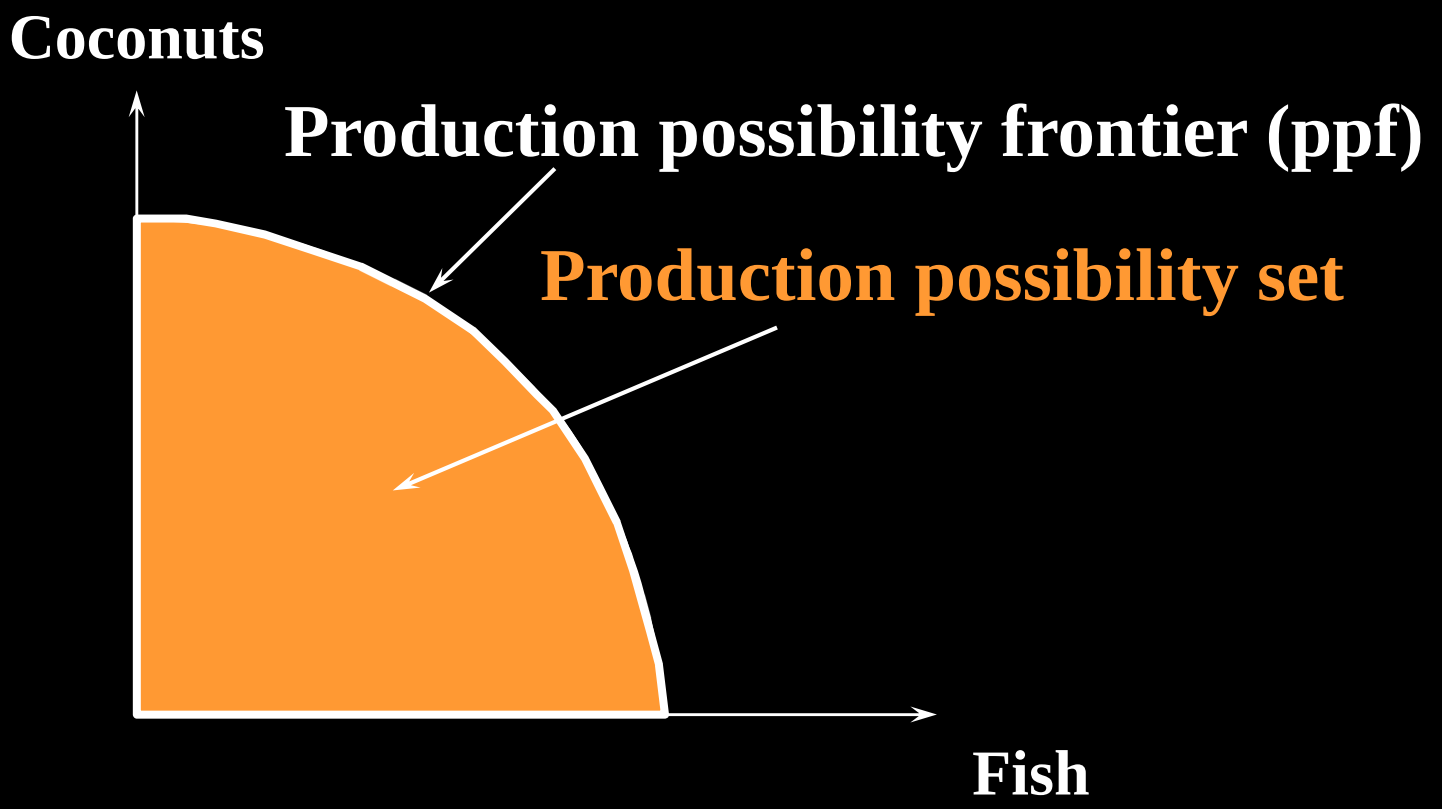
Pareto Efficiency



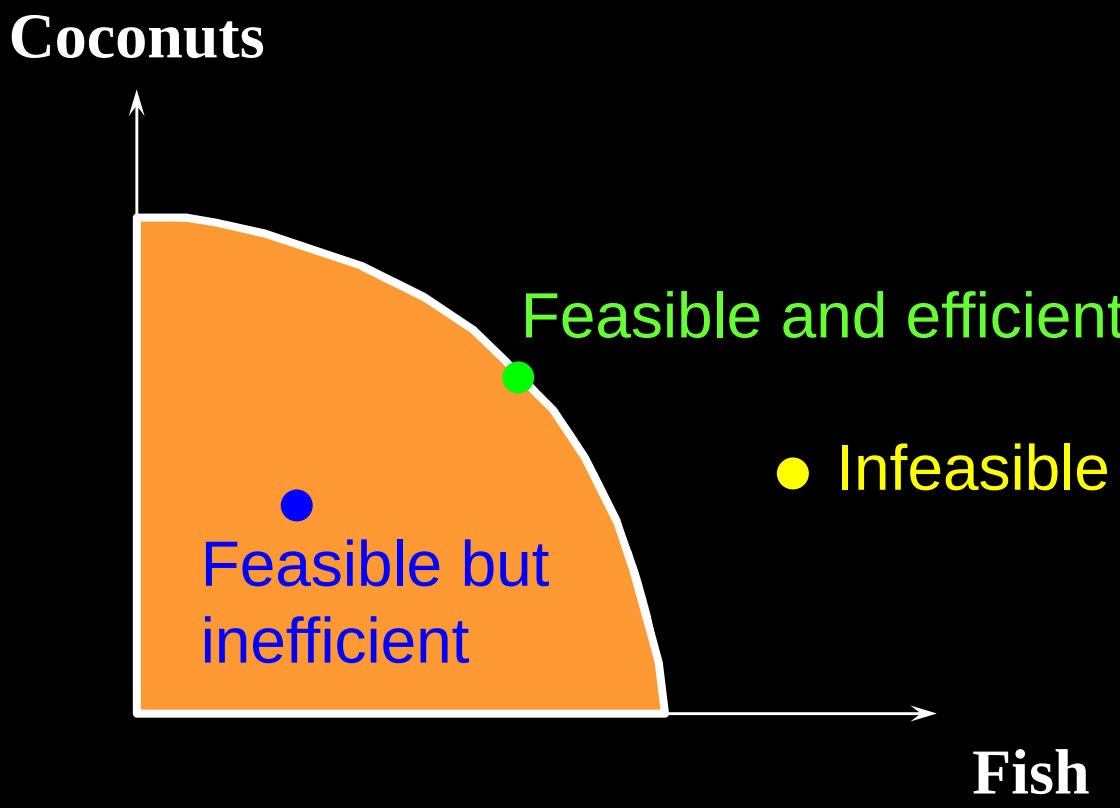
Production Possibilities

- **Resource and technological limitations restrict what an economy can produce.**
- **The set of all feasible output bundles is the economy's production possibility set.**
- **The set's outer boundary is the production possibility frontier.**

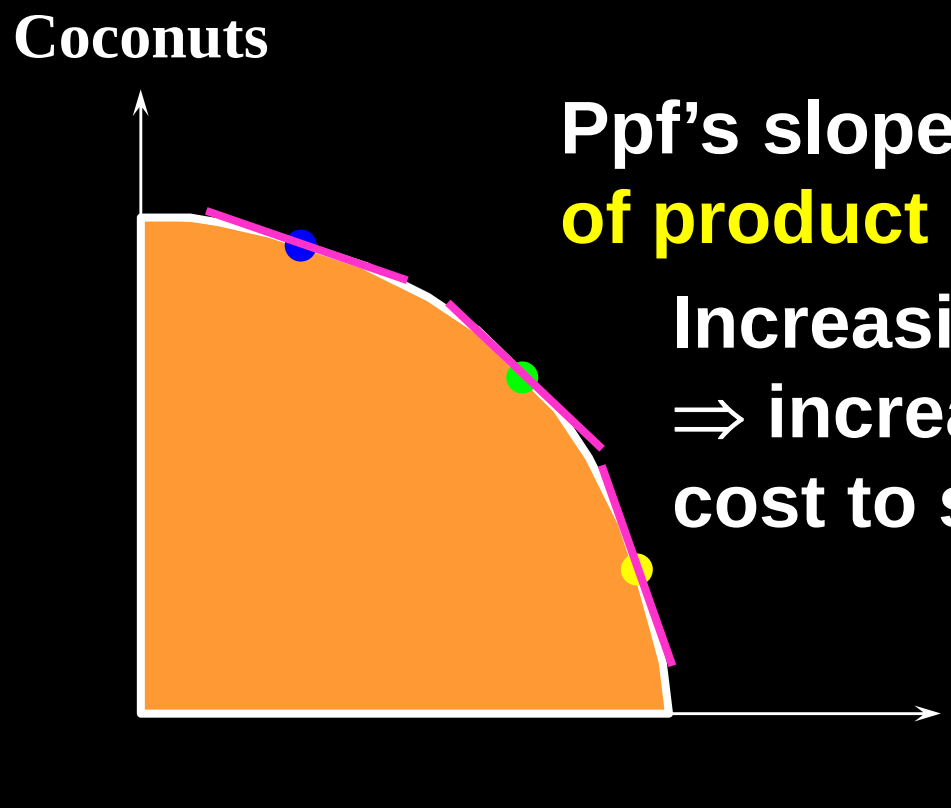
Production Possibilities



Production Possibilities



Production Possibilities



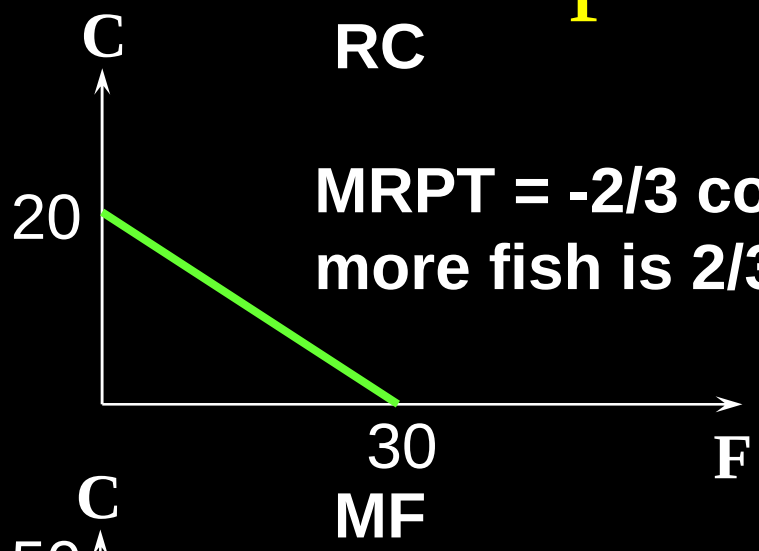
Ppf's slope is the marginal rate of product transformation.

Increasingly negative MRPT ⇒ increasing opportunity cost to specialization.

Comparative Advantage

- **Two agents, RC and Man Friday (MF).**
- **RC can produce at most 20 coconuts or 30 fish.**
- **MF can produce at most 50 coconuts or 25 fish.**

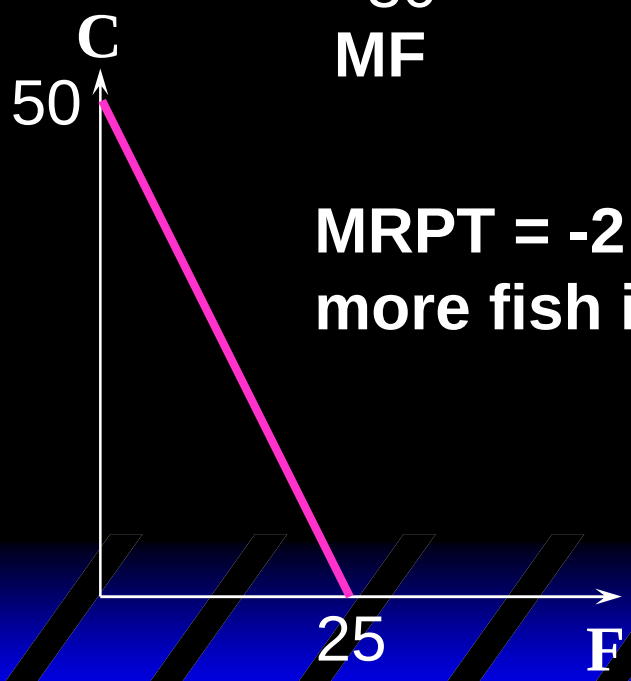
Comparative Advantage



RC

MRPT = -2/3 coconuts/fish so opp. cost of one more fish is 2/3 foregone coconuts.

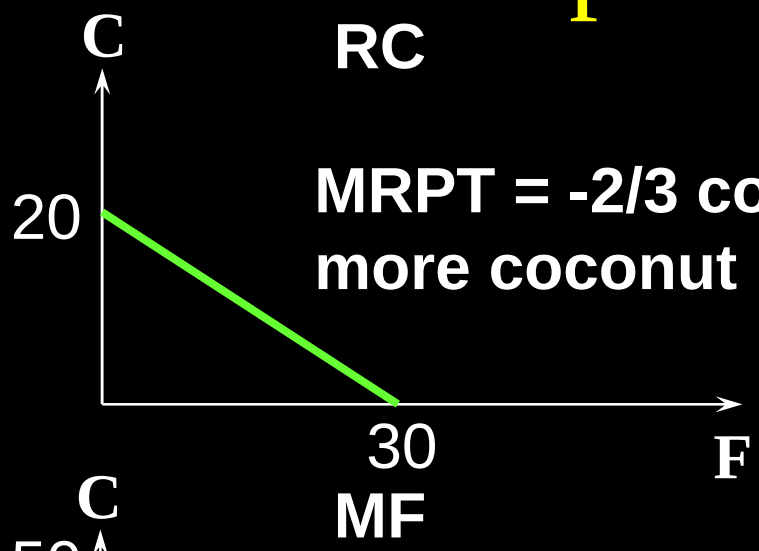
RC has the comparative opp. cost advantage in producing fish.



MF

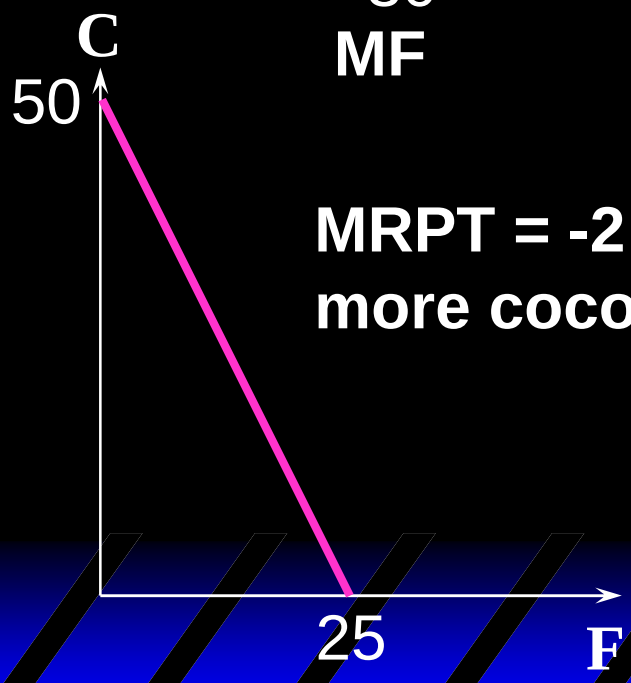
MRPT = -2 coconuts/fish so opp. cost of one more fish is 2 foregone coconuts.

Comparative Advantage



RC

MRPT = -2/3 coconuts/fish so opp. cost of one more coconut is 3/2 foregone fish.

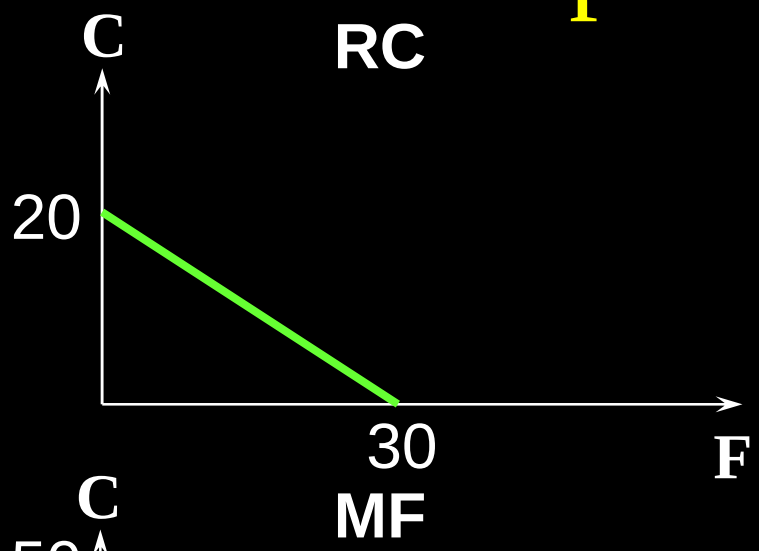


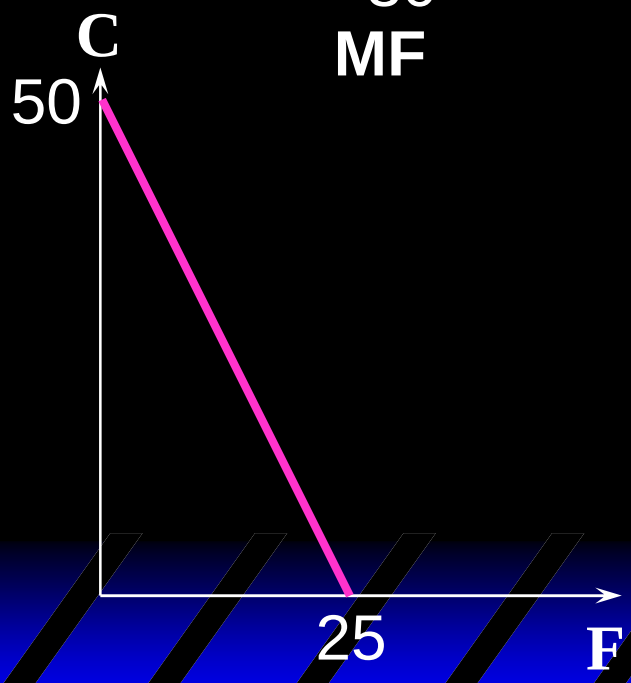
MF

MRPT = -2 coconuts/fish so opp. cost of one more coconut is 1/2 foregone fish.

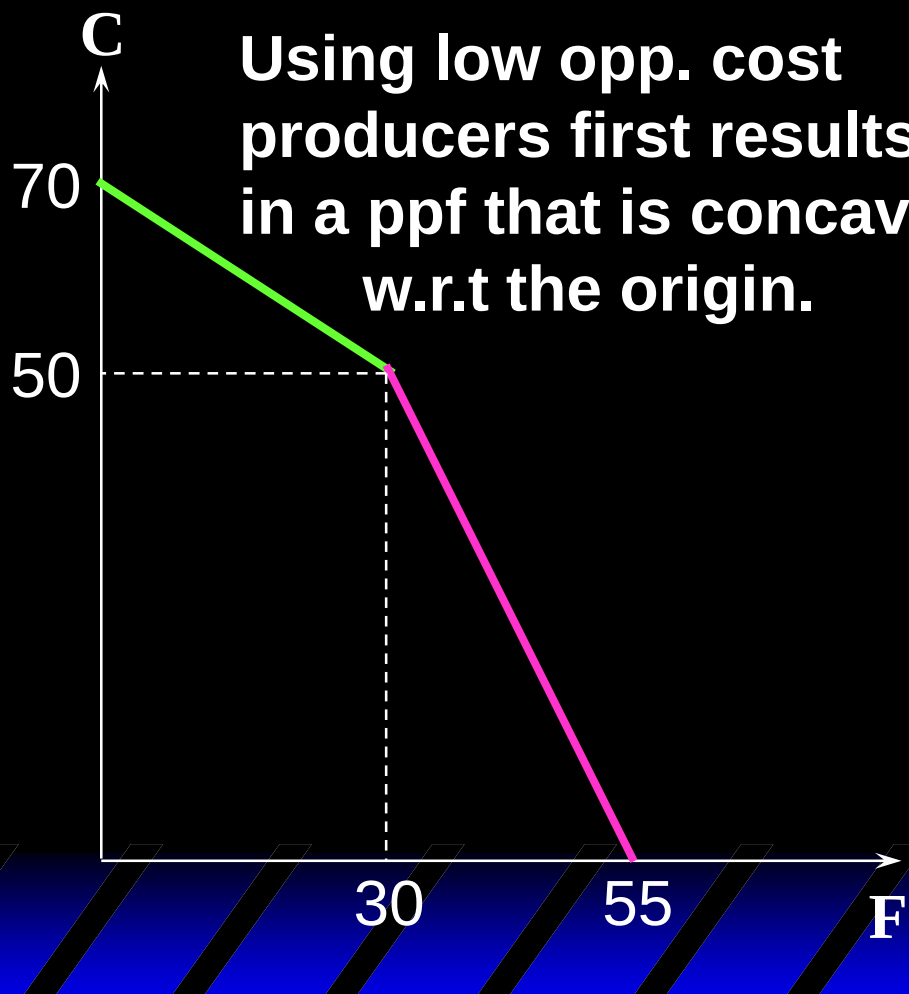
MF has the comparative opp. cost advantage in producing coconuts.

Comparative Advantage





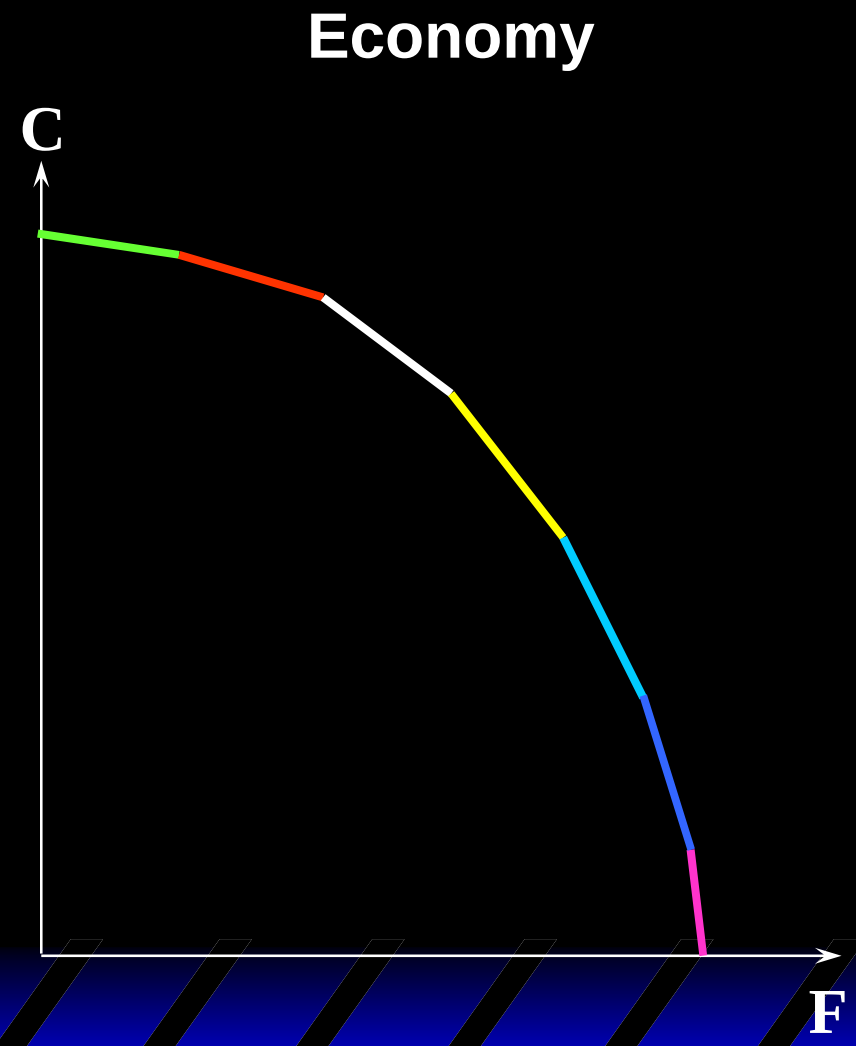
Economy



Using low opp. cost producers first results in a ppf that is concave w.r.t the origin.

Comparative Advantage

More producers with different opp. costs "smooth out" the ppf.



Coordinating Production & Consumption

- **The ppf contains many technically efficient output bundles.**
- **Which are Pareto efficient for consumers?**
- **MRS = MRPT is necessary for a Pareto optimal economic state.**

Decentralized Coordination of Production & Consumption

- **RC and MF jointly run a firm producing coconuts and fish.**
- **RC and MF are also consumers who can sell labor.**
- **Price of coconut = p_C.**
- **Price of fish = p_F.**
- **RC's wage rate = w_{RC}.**
- **MF's wage rate = w_{MF}.**

Decentralized Coordination of Production & Consumption

- L_{RC}, L_{MF} are amounts of labor purchased from RC and MF.
- Firm's profit-maximization problem is choose C, F, L_{RC} and L_{MF} to

$$\max \pi = p_C C + p_F F - w_{RC} L_{RC} - w_{MF} L_{MF}.$$

Decentralized Coordination of Production & Consumption

$$\max \pi = p_C C + p_F F - w_{RC} L_{RC} - w_{MF} L_{MF}.$$

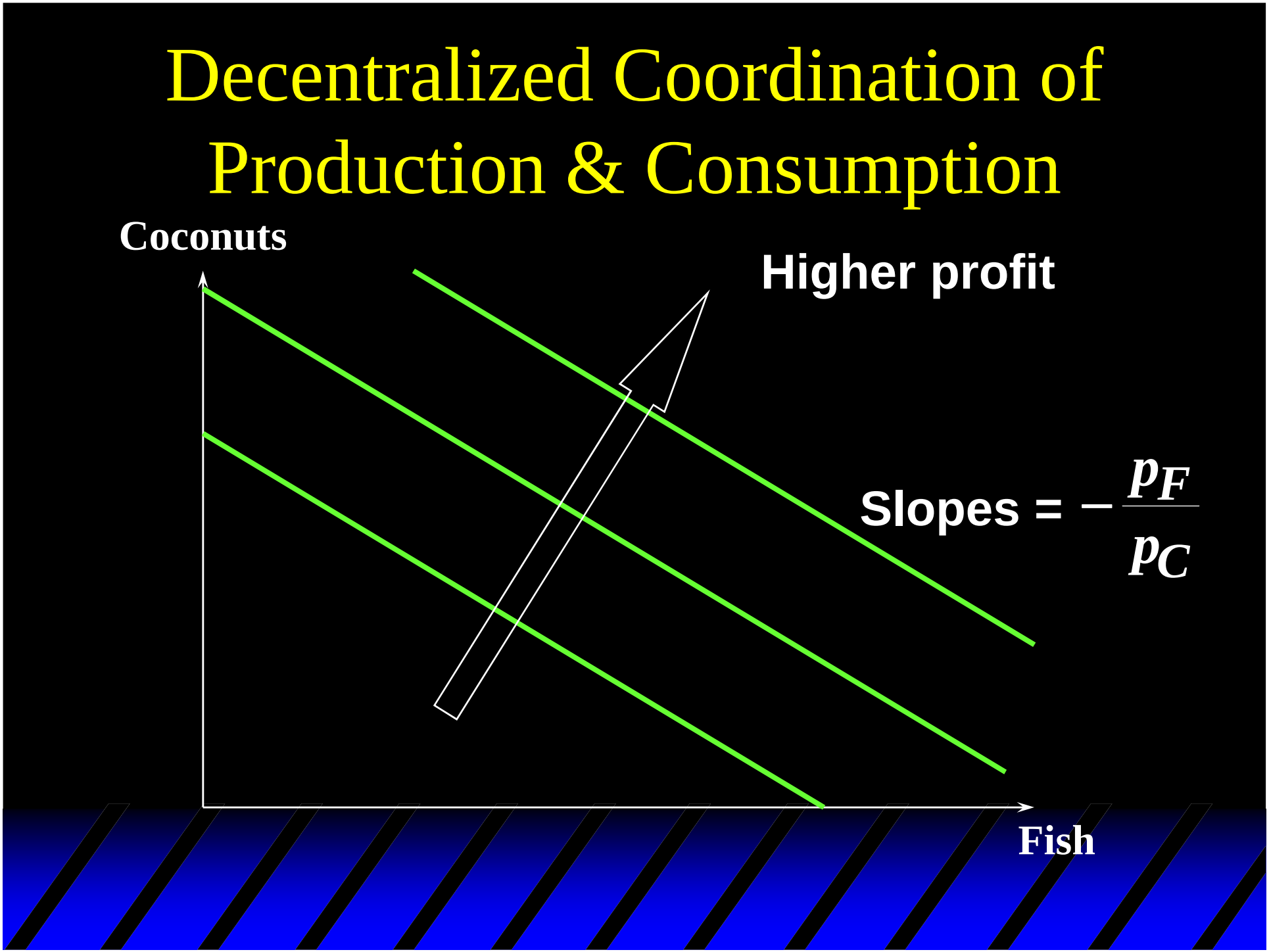
Isoprofit line equation is

$$\text{constant } \pi = p_C C + p_F F - w_{RC} L_{RC} - w_{MF} L_{MF}$$

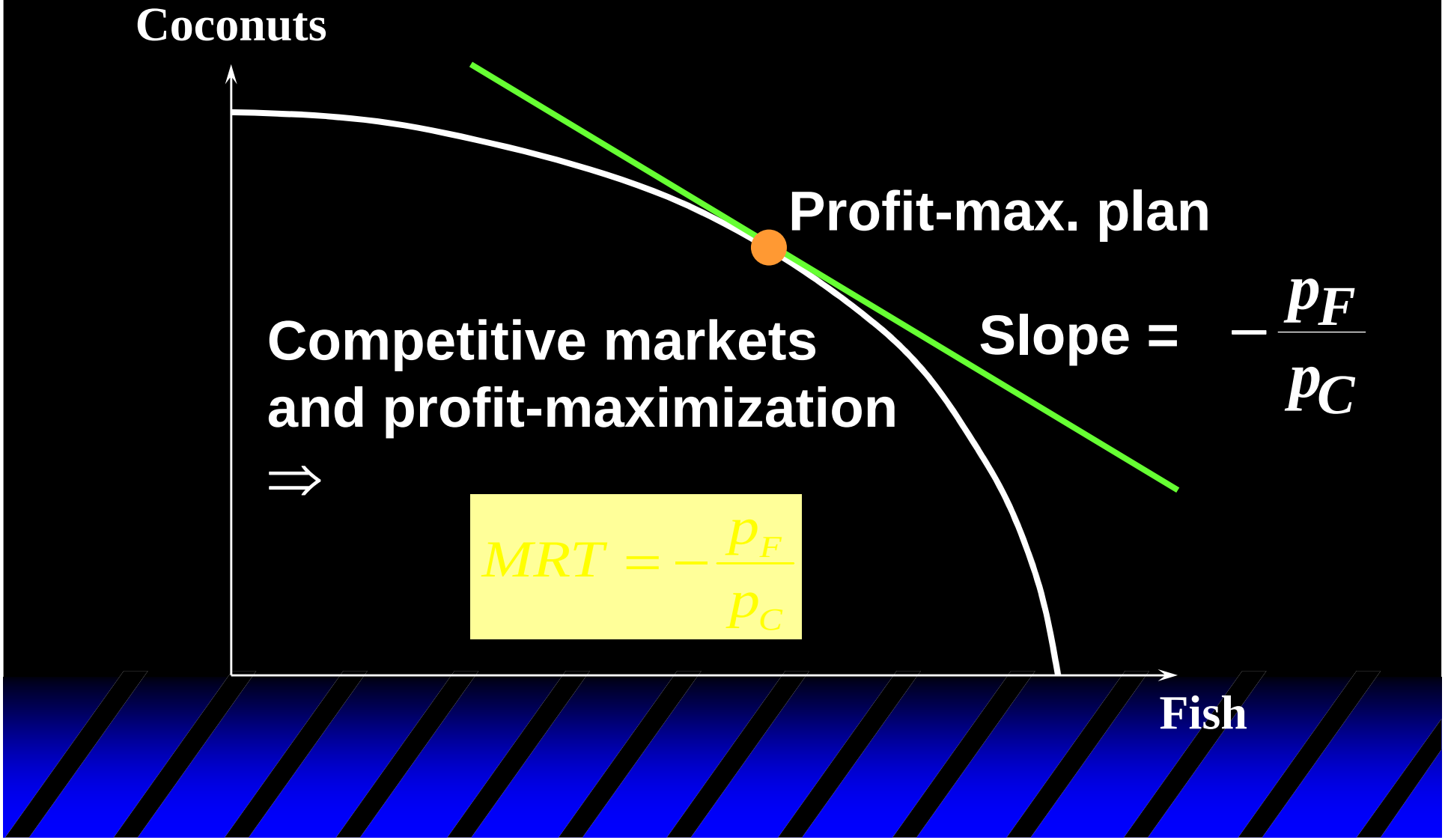
which rearranges to

$$C = \underbrace{\frac{\pi + w_{RC} L_{RC} + w_{MF} L_{MF}}{p_C}}_{\text{intercept}} - \underbrace{\frac{p_F}{p_C}}_{\text{slope}} F$$

Decentralized Coordination of Production & Consumption



Decentralized Coordination of Production & Consumption



Decentralized Coordination of Production & Consumption

- **So competitive markets, profit-maximization, and utility maximization all together cause**

$$MRT = -\frac{p_F}{p_C} = MRS$$

the condition necessary for a Pareto optimal economic state.

Decentralized Coordination of Production & Consumption