

Scarcity, Work, and Choice

ECONOMICS

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UCL

Lecture 3

CONTEXT

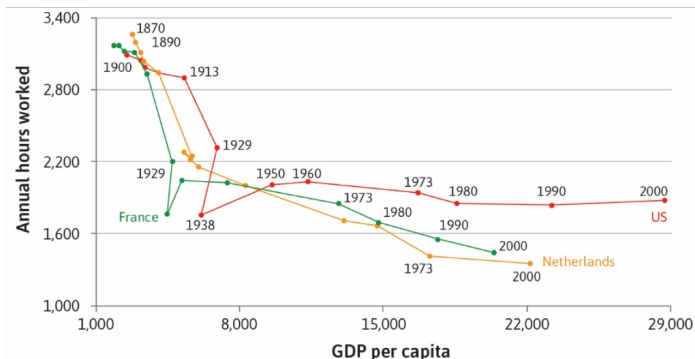
Unit 1: Labour is work.

Unit 2: Labour is an input in the production of goods and services.

Unit 3: New technologies raise the productivity of labour leading to higher per-hour wage.

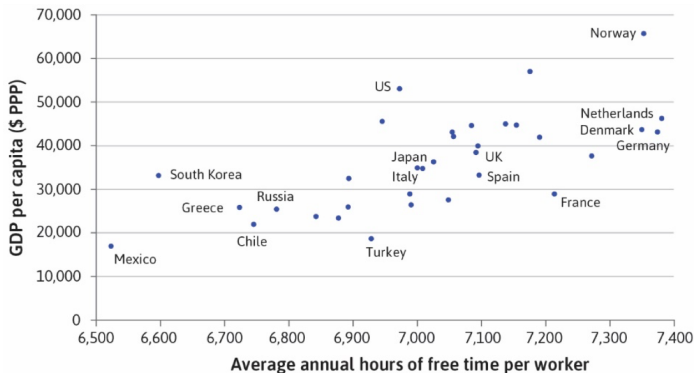
- How would technological progress affect living standards across the world?
- How would technological progress affect the individual's choice between free time and consumption?

FREE TIME AND LIVING STANDARDS



Living standards have greatly increased since 1870 but some countries still work more than others.

FREE TIME AND LIVING STANDARDS



How people across countries choose between consumption and working hours (free time)

EXAMPLE: GRADES AND STUDY HOURS

What is the production function of grade?

Students choose how many hours to study

Grade increases if number of hours studied increases.

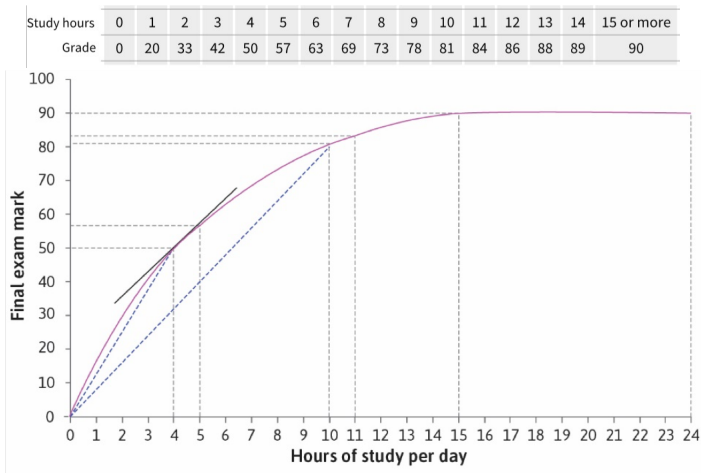
Grade increases with better environment.

	High study time	Low study time
Good environment	3.63 (11 students)	3.43 (31 students)
Poor environment	3.36 (31 students)	3.17 (11 students)

Source: Plant et. al. (Contemporary Educational Psychology, 2005).

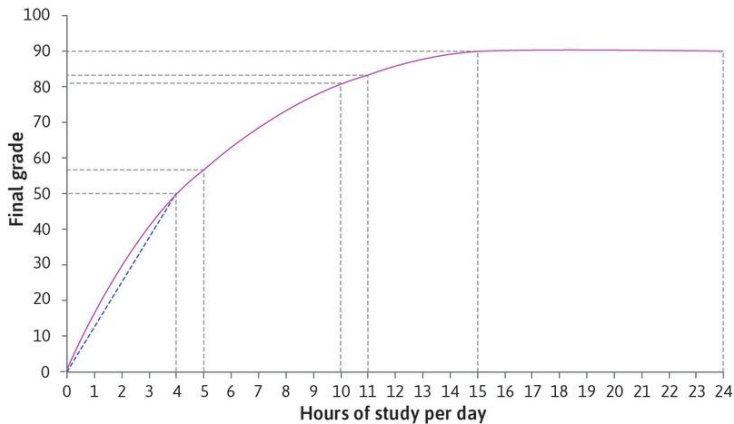
PRODUCTION FUNCTION

Production functions: inputs (hours) \rightarrow outputs (grade)



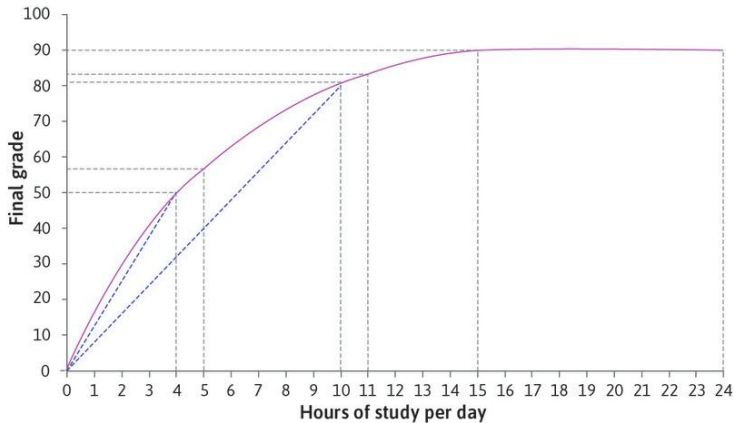
GRADE PRODUCTION

$$\text{Average product of hours worked} = \frac{50 \text{ (final Grade)}}{4 \text{ (hours worked)}}$$



GRADE PRODUCTION FUNCTION

$$\text{Average product of hours worked} = \frac{80 \text{ (final Grade)}}{8 \text{ (hours worked)}}$$



AVERAGE PRODUCT CALCULATION

Average product is vertical distance (*grade*) divided by horizontal distance (*hours*).

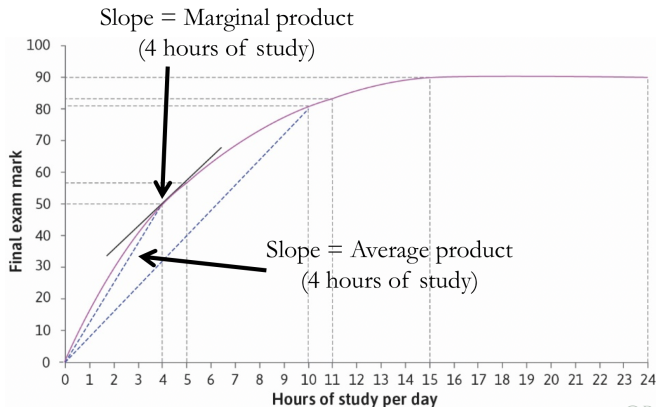
	Change		
<i>Hours worked</i>	4	10	+6
<i>Final grade</i>	50	80	+30
<i>Average product</i>	12.5	8	-4.5
	$= \frac{50}{4}$	$= \frac{80}{10}$	

What does the slope of the production function signify?

WHAT PRODUCTION FUNCTIONS TELL US?

Average product: Average output per unit of input

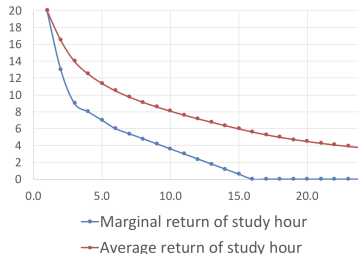
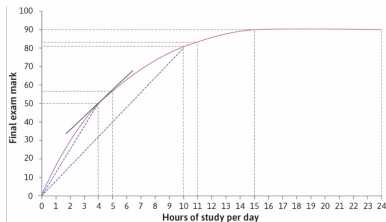
Marginal product: Change in output if input changes by a very small amount



DIMINISHING MARGINAL PRODUCT

Diminishing *marginal product*:

Studying becomes less productive, the more you study.

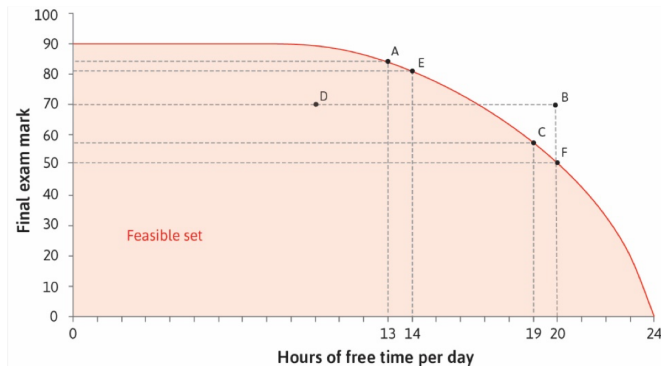


General Principle: As more inputs are used, output increases by less and less *at the margin*.

FEASIBLE PRODUCTION FRONTIER

Feasible production frontier is the maximum output achievable with given amount of input.

Marginal rate of transformation is the slope of the feasible frontier.



OPPORTUNITY COST

Opportunity cost of an action what you have to give up to take the action.

Uber driver:

Opportunity cost of taking a lunch break is the expected fare lost

Take a lunch break if value it more than expected loss of fare. Better to take it during the non-peak period.

OPPORTUNITY COST

Young parents with a baby:

Opportunity cost of leisure is cost of baby sitter.

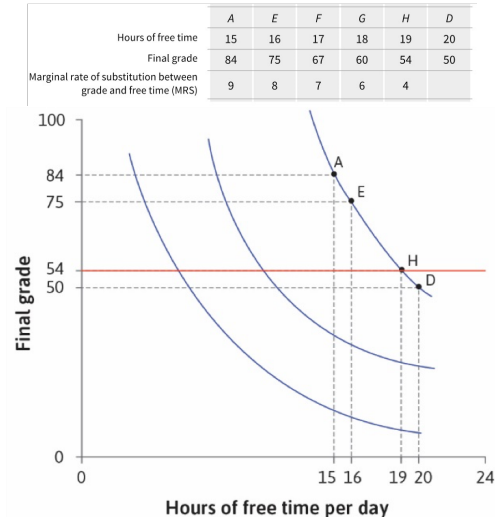
Choose leisure if value of leisure greater than cost of baby sitter.

Students deciding on University:

Opportunity cost of pursuing a degree is lost earning and experience forgone.

Pursue a degree if value of degree greater than expected loss of earnings.

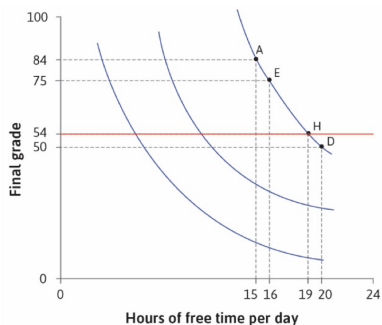
CHOICE FROM DEMAND PERSPECTIVE



INDIFFERENCE CURVES

Indifference curves: all combinations of goods that give the same utility.

Marginal rate of substitution (MRS) is the slope of the indifference curve and represents the tradeoffs an individual faces.



CHOICE AND CONSTRAINT

Stage 1:

Choice: trade-off between *leisure* and *number of hours of worked*

Constraint: 24 hours per day

Stage 2:

Choice: trade-off between different *types of consumption goods*

i.e., food, travel, entertainments ...

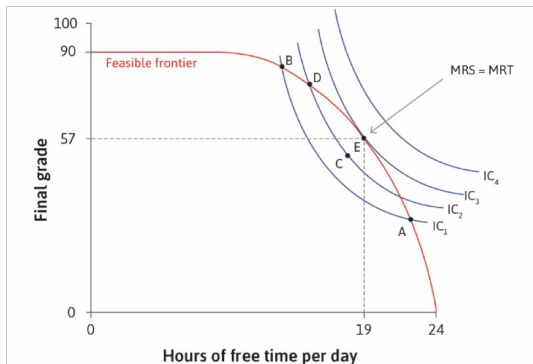
Constraint: *income*, which is determined by the *number of hours of worked*

In effect, it is a choice between *leisure* and *consumption goods*

OPTIMAL DECISION MAKING

Utility-maximising choice: where the trade off on the demand side (MRS) *equals* the tradeoff on the supply side (MRT)

$$MRS = MRT$$



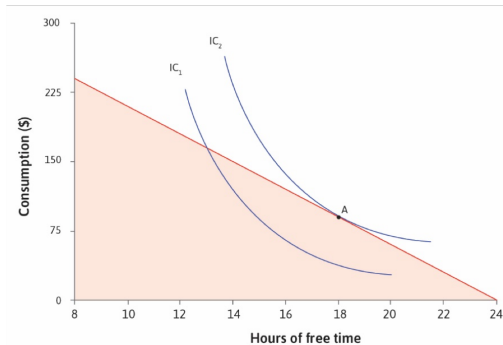
CONSTRAINED CHOICE

		Choice	Slope of ...
<i>MRS</i>	<i>Marginal rate of substitution</i>	<i>choose between desired consumption goods</i>	<i>indifference curve</i>
<i>MRT</i>	<i>Marginal rate of transformation</i>	<i>choose between hours worked and leisure</i>	<i>feasible frontier</i>

If you worked for a fixed hourly wage, then your income gives you a simple budget constraint.

Budget constraints are the feasible frontiers for consumption choices

Hours of work	0	2	4	6	8	10	12	14	16
Free time, t	24	22	20	18	16	14	12	10	8
Consumption, c (\$)	0	30	60	90	120	150	180	210	240



The optimal choice is where the *slope of the indifference curve* equals the *slope of the budget constraint*, i.e., the wage

TWO IMPORTANT EFFECTS

If *wage increases*, there are two distinct effects

1. If you work the same hours, your income increases

You are richer and *buy more of everything including leisure*.

What would you do if you won a lottery?

Buy things and go on holiday?

2. The cost of leisure increases

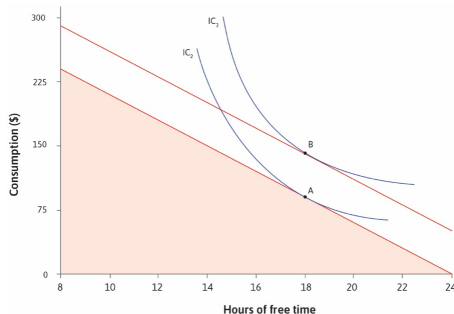
... the *opportunity cost of leisure* is lost wage earning, which has increased

Buy less of leisure?

... it is more *costly for Uber drivers* to take a lunch break during peak hours.

INCOME EFFECT

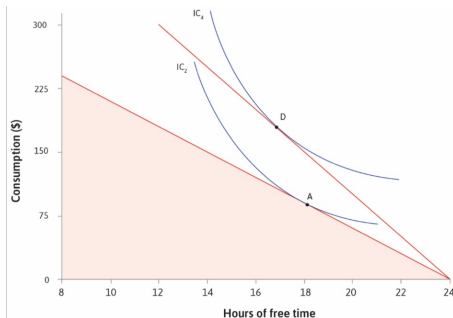
Income effect: a wage increase gives more income per hour worked.
Budget constraint shifts out.



Incentive to buy more of everything ($A \rightarrow B$) including leisure.
More money to spend on everything.

SUBSTITUTION EFFECT

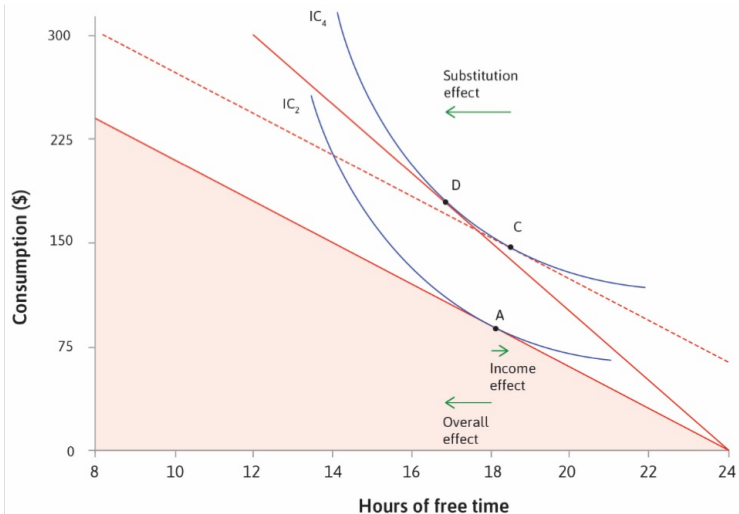
Substitution effect: a wage increase raises the opportunity cost of free time or leisure. *Budget constraint steeper.*



Incentive to reduce leisure and work more ($A \rightarrow D$).

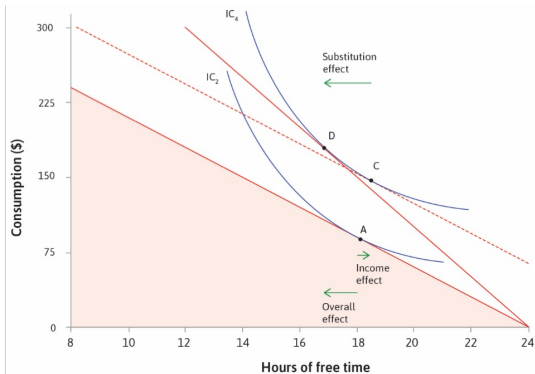
Leisure became more expensive

INCOME AND SUBSTITUTION EFFECT



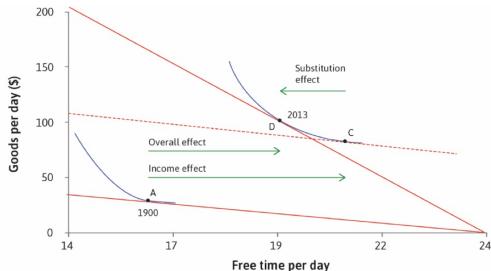
INCOME AND SUBSTITUTION EFFECT

	<i>Income effect</i>	<i>substitution effect</i>	<i>Overall Effect</i>
<i>Leisure</i>	<i>more</i>	<i>less</i>	<i>ambiguous</i>
<i>Consumption</i>	<i>more</i>	<i>more</i>	<i>more</i>
	$A \rightarrow C$	$C \rightarrow D$	



WORKING HOURS: DIFFERENCES OVER TIME

Income and *substitution effects* can explain trends in working hours

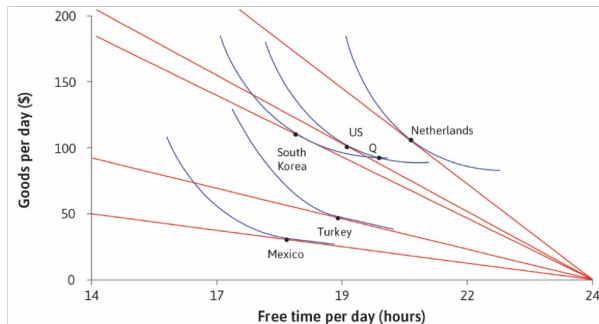


US: Income effect dominated substitution effect.

Both consumption and free time increased.

CROSS-COUNTRY DIFFERENCES IN WORKING HOURS

Difference in *wages* and *trade-offs* between consumption and leisure



Other explanations?

Differences in culture (norms), politics (legal limits on hours), social norm and preferences (e.g. '*Keeping up with the Joneses*').

SUMMARY

Simple model of *decision-making under scarcity*

Indifference curves represent preferences

Feasible frontier represents constraint on choices

Utility-maximising choice where $MRS = MRT$

Explain *effect of technological progress on labour choices* with a model

Net effect = Income effect + Substitution effect