Unit 3
Scarcity, Work and Choice

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Introduction

Introduction

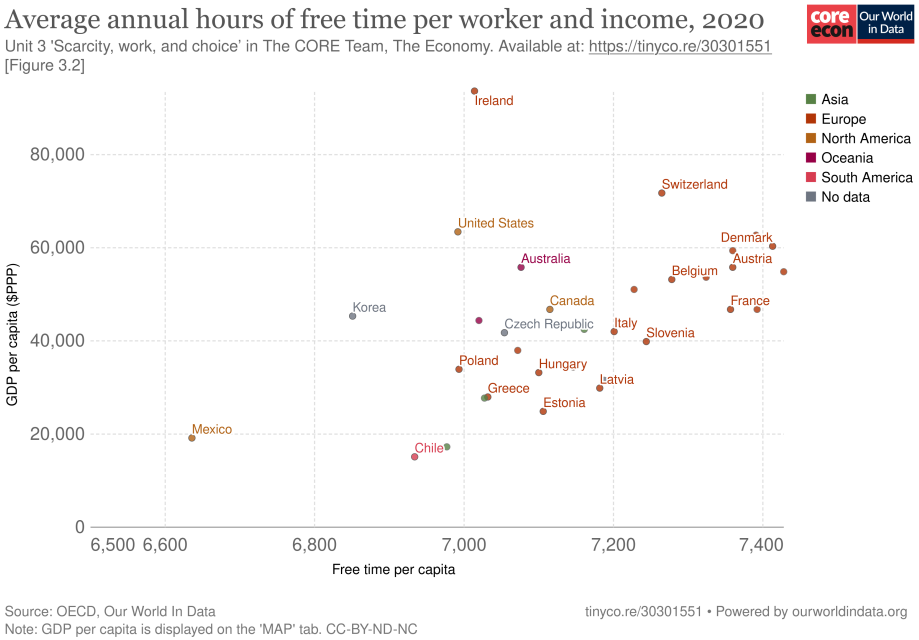
In this Unit I start to introduce consumer theory, i.e., individual behavior.

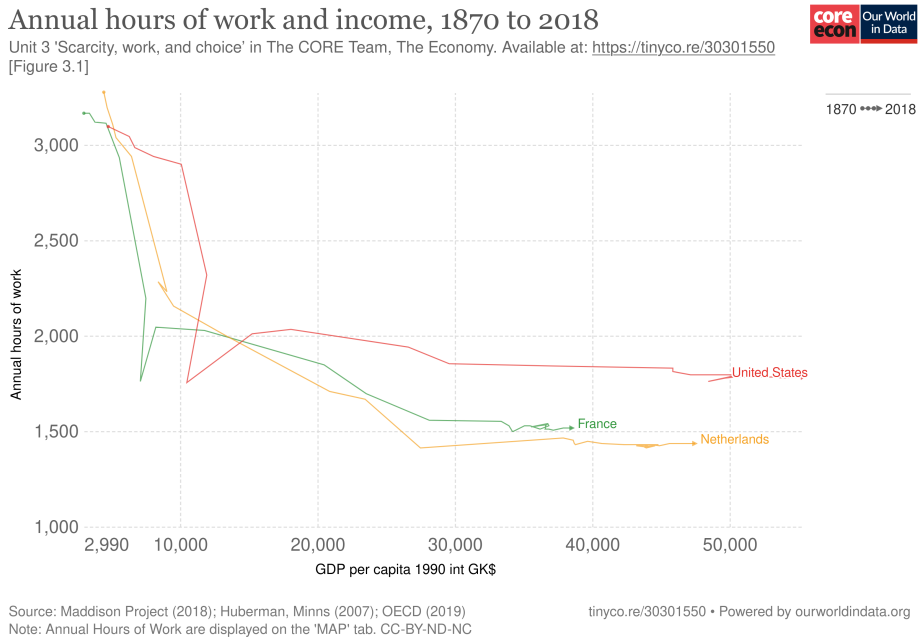
Why?! $\Rightarrow$ **Macro needs Micro foundation**, since

- aggregate behavior is the sum of individual decisions
- Lucas' critique: structures of economies change w/ policies b/c individual decision changed
- Need to know effect on individual behavior to know the aggregate effect!
- E.g. Two forces / reactions of COVID stimulus policy:
  1. $\Rightarrow$ workers have less incentive to work $\Rightarrow$ unemployment $\uparrow$ $\Rightarrow$ exacerbate recession
  2. $\Rightarrow$ funding $\uparrow$ $\Rightarrow$ firms have more incentive to hire workers $\Rightarrow$ mitigate recession

This Unit

Hours of work is different across countries and over time. Why?





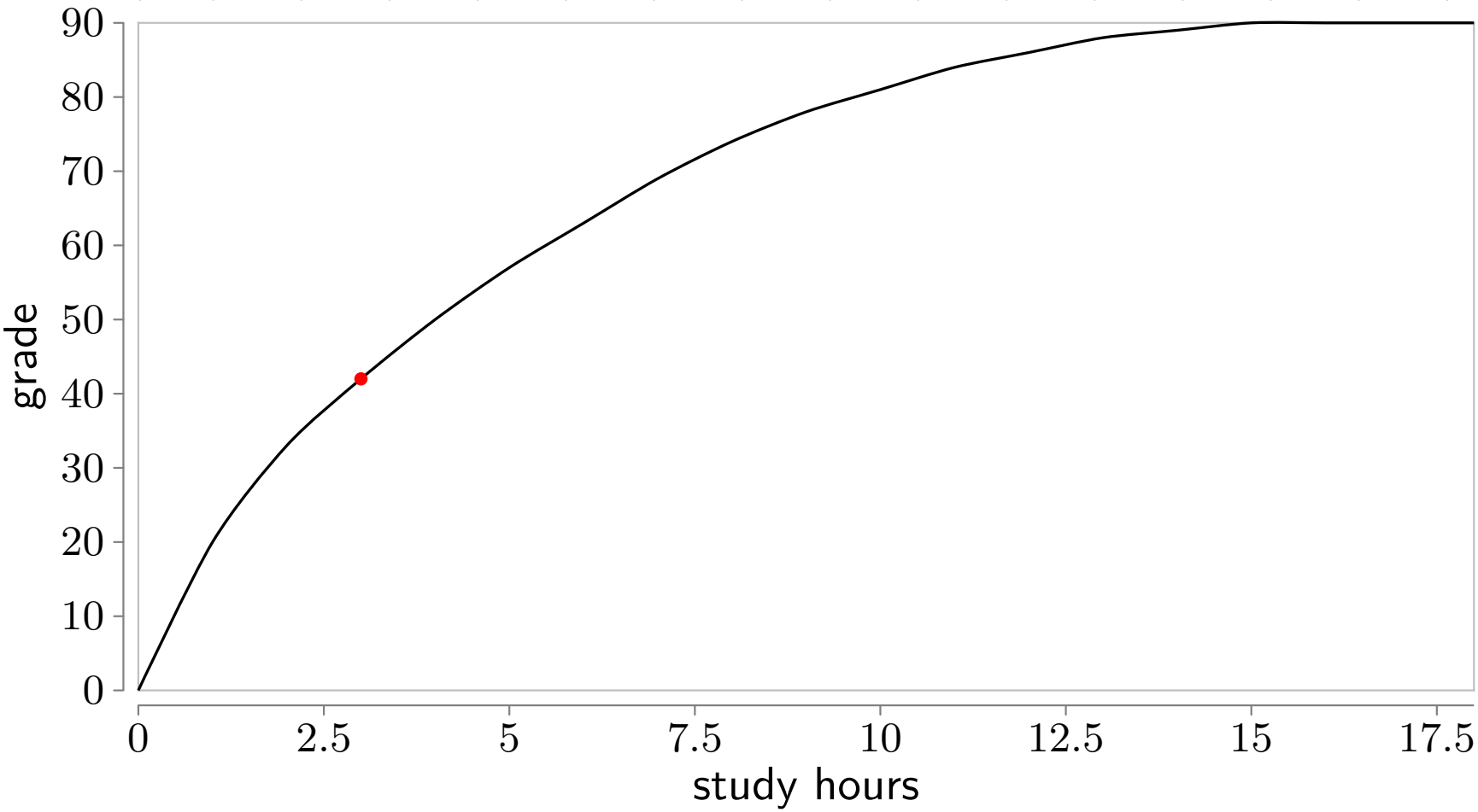
- Further reading: `https://tinyurl.com/4rhaepuk`

Scarcity and Choice

Production Function for Study

Production function: how inputs translate into output

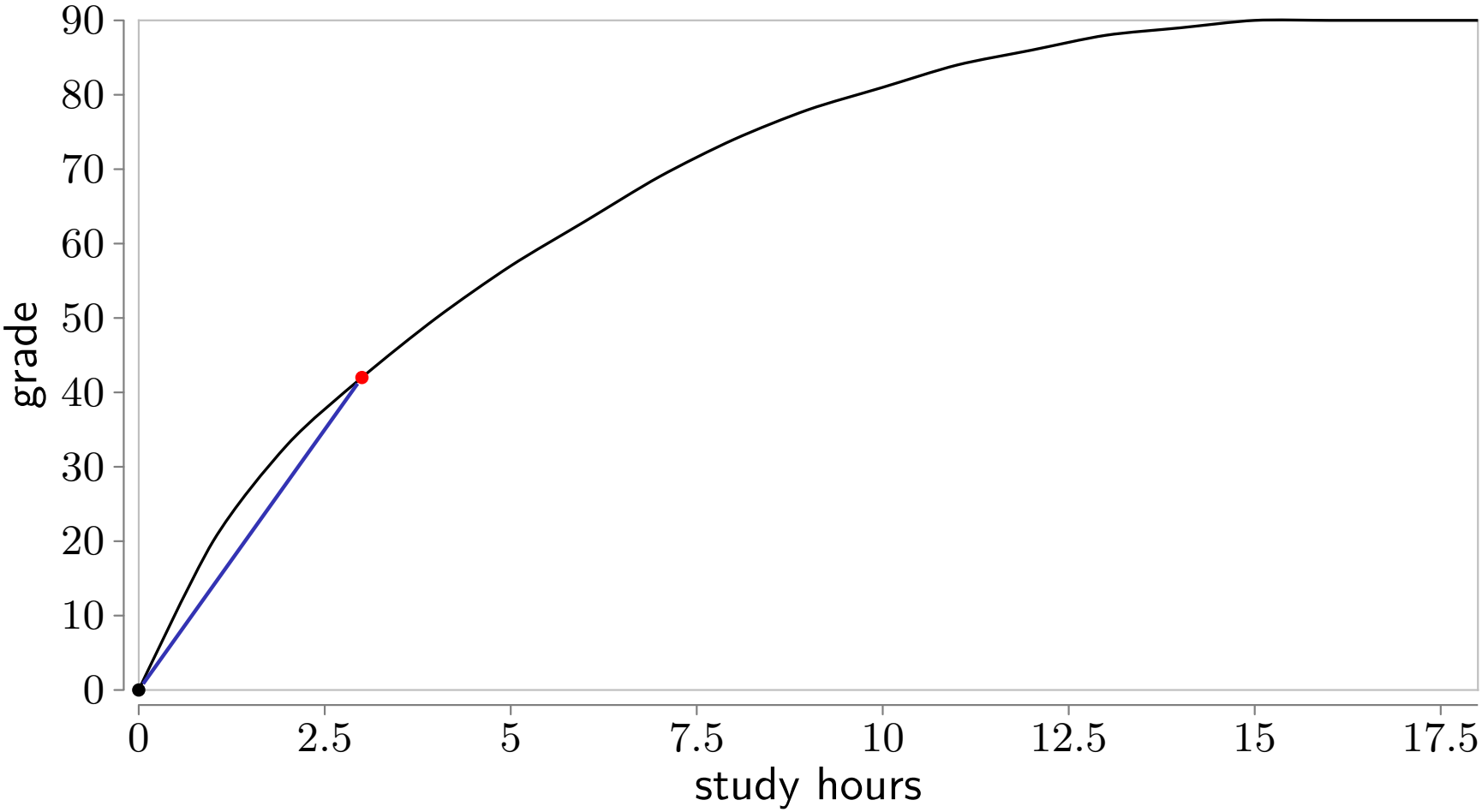
Study hours	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+
Grade	0	20	33	42	50	57	63	69	74	78	81	84	86	88	89	90



Production Function for Study

Average product: slope of the line connected with origin

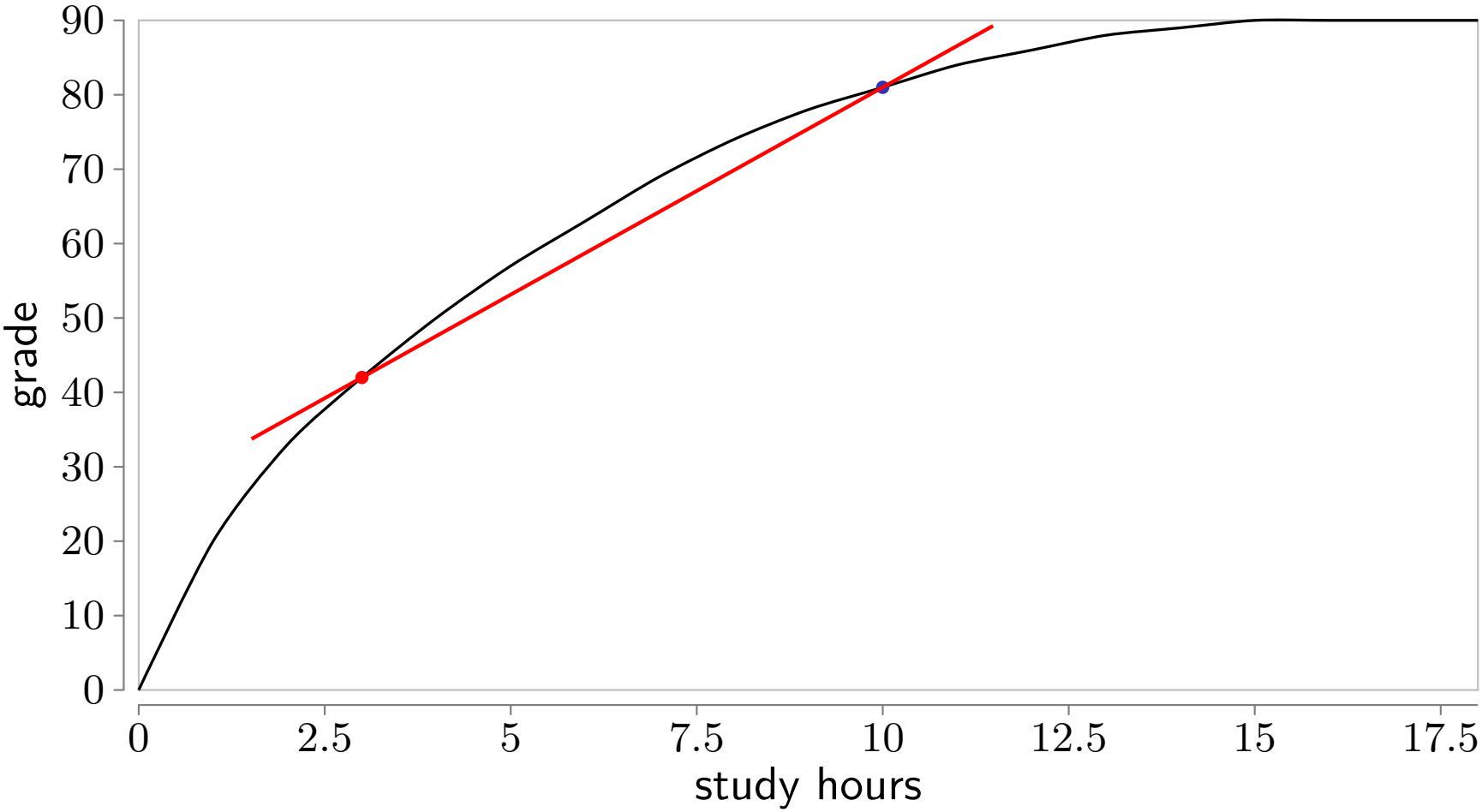
Study hours	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+
Grade	0	20	33	42	50	57	63	69	74	78	81	84	86	88	89	90



Production Function for Study

What if I want to know the average grade from 3hr to 10hr?

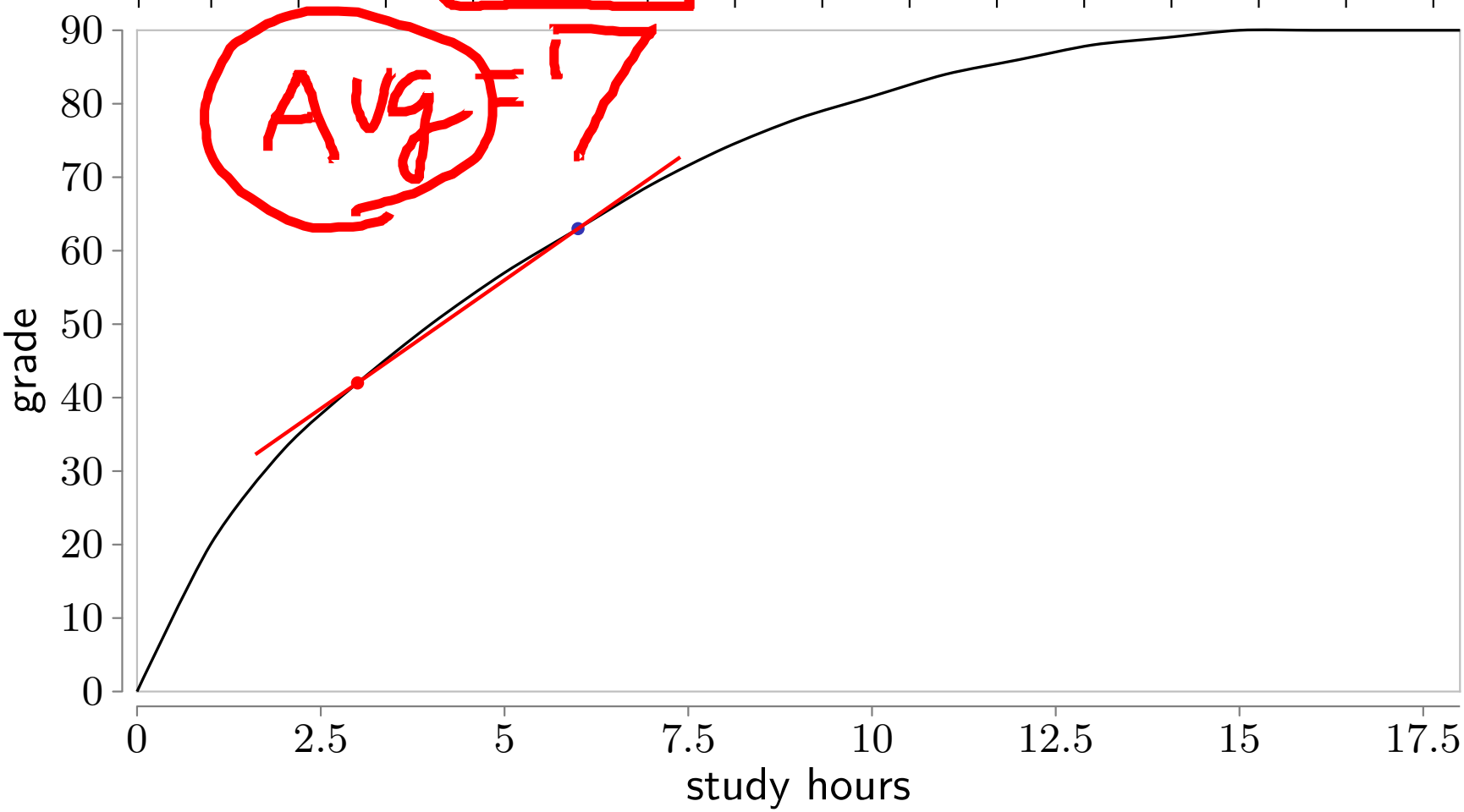
Study hours	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+
Grade	0	20	33	42	50	57	63	69	74	78	81	84	86	88	89	90



Production Function for Study

What if I want to know the average grade from 3hr to 6hr?

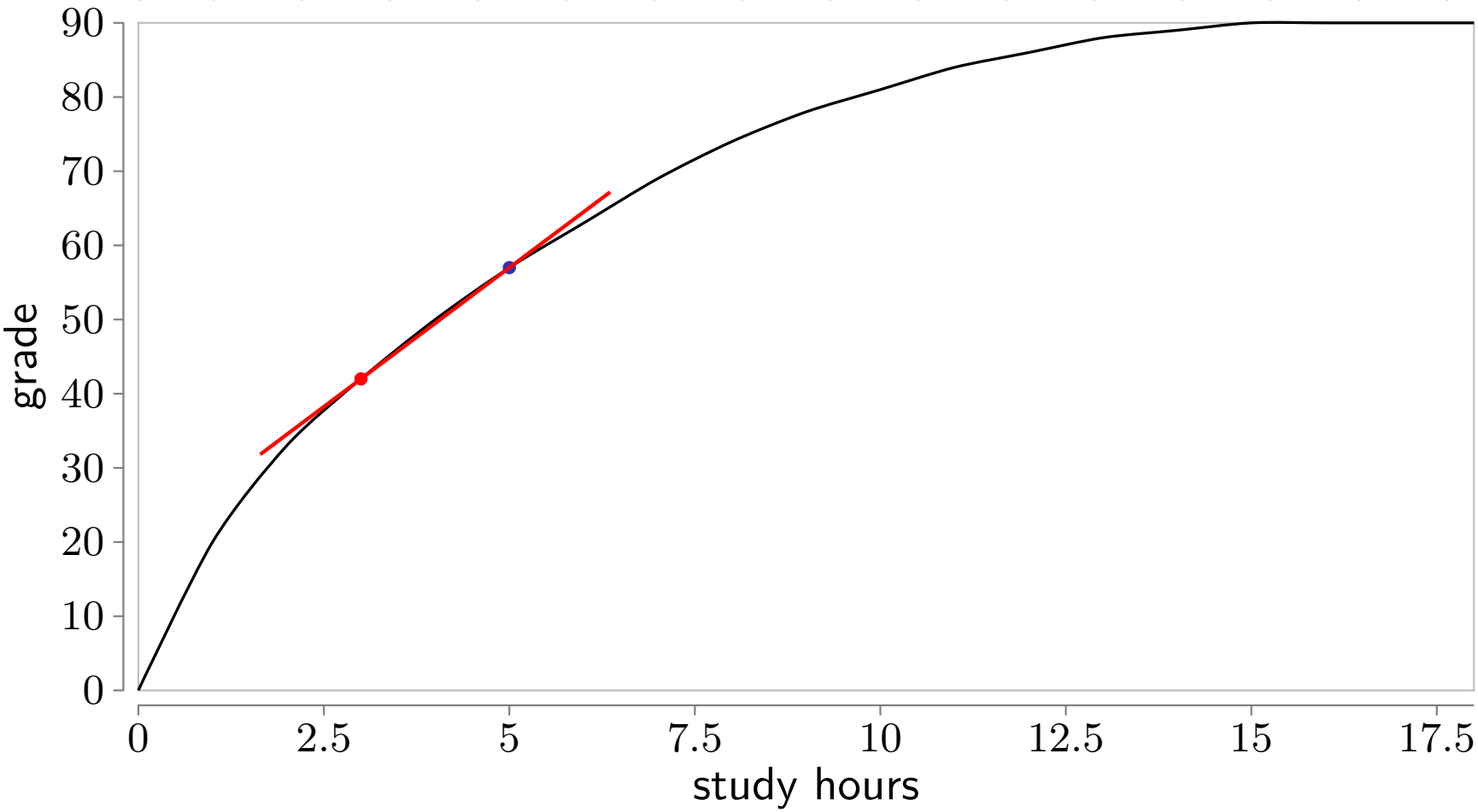
Study hours	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+
Grade	0	20	33	42	50	57	63	69	74	78	81	84	86	88	89	90



Production Function for Study

What if I want to know the average grade from 3hr to 5hr?

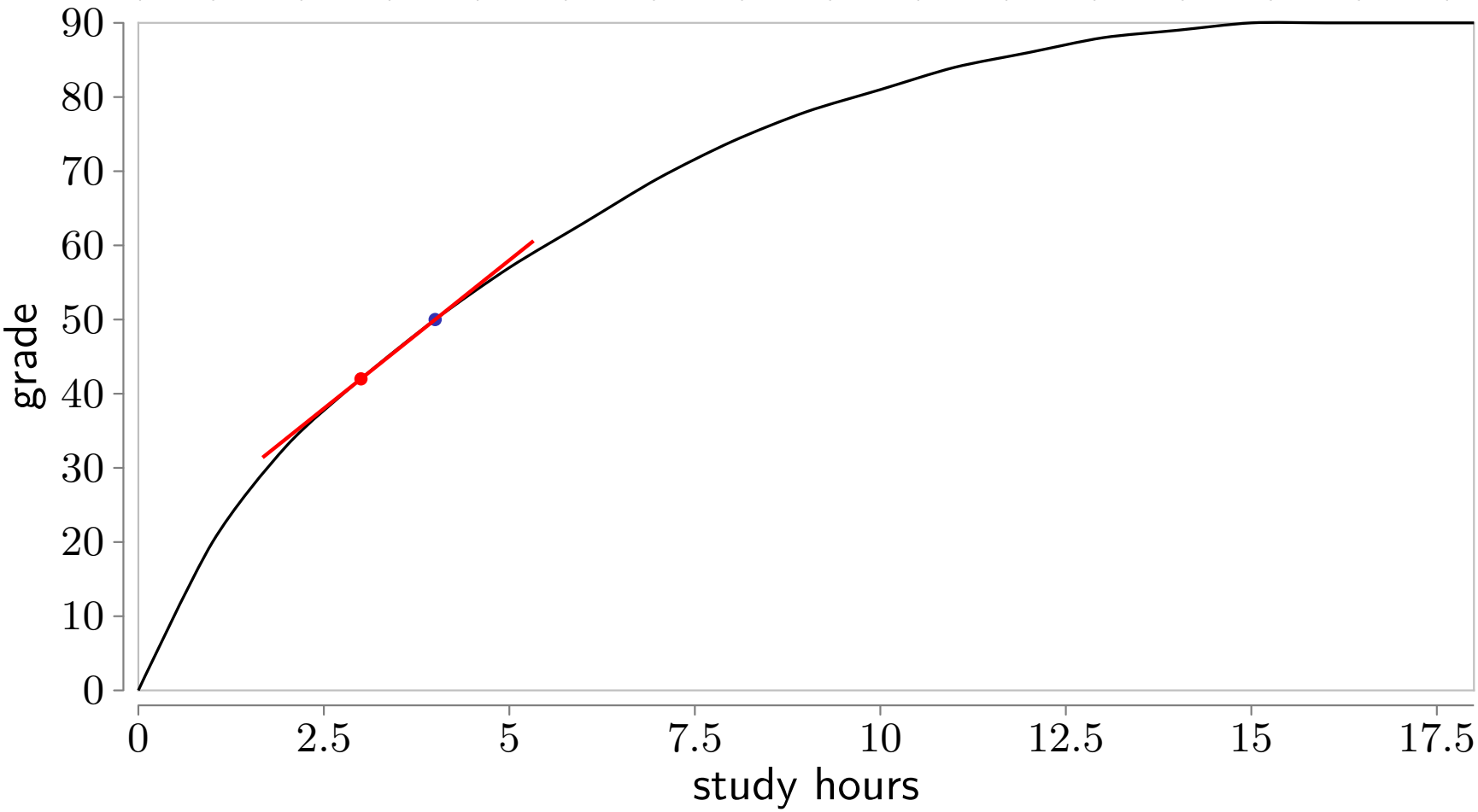
Study hours	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+
Grade	0	20	33	42	50	57	63	69	74	78	81	84	86	88	89	90



Production Function for Study

What if I want to know the average grade from 3hr to 4hr?

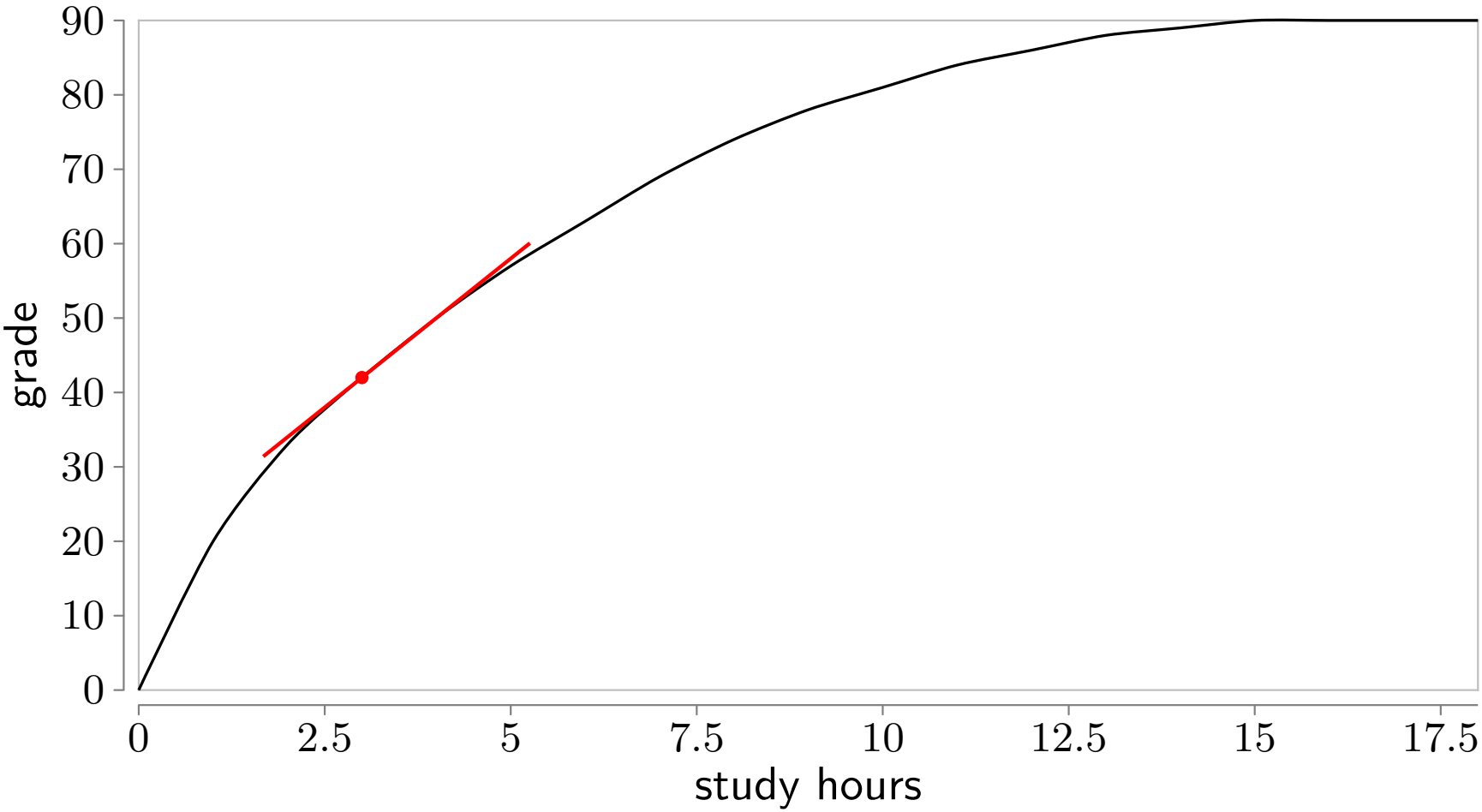
Study hours	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+
Grade	0	20	33	42	50	57	63	69	74	78	81	84	86	88	89	90



Production Function for Study

Marginal product: ceteris paribus, change in output per **arbitrary small change** in input

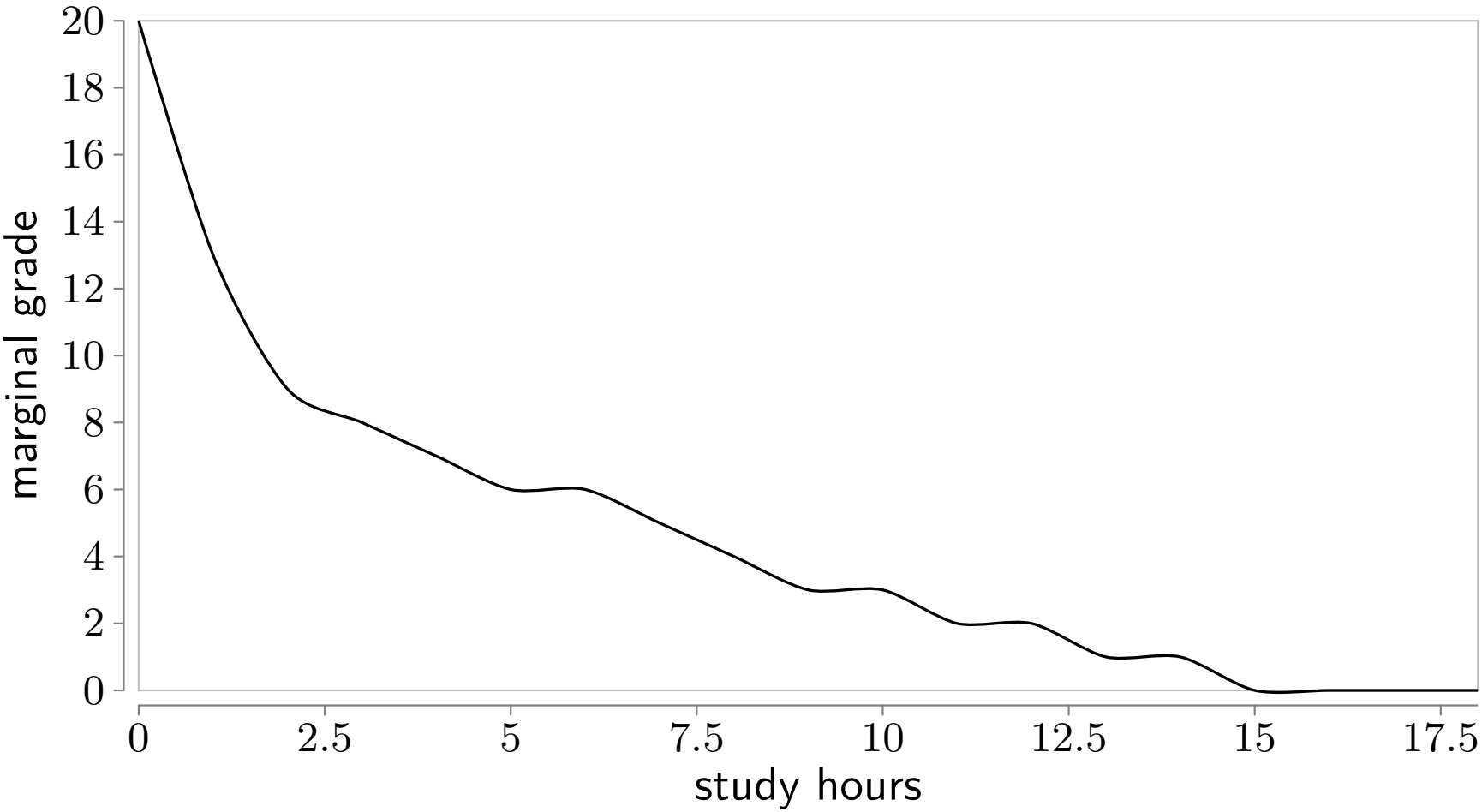
Study hours	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+
Grade	0	20	33	42	50	57	63	69	74	78	81	84	86	88	89	90



Diminishing Marginal Product of Study

Study become less productive the more you study! $\Rightarrow$ Scarcity in nature

Study hours	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+
Grade	0	20	33	42	50	57	63	69	74	78	81	84	86	88	89	90
mar. grade	20	13	9	8	7	6	6	5	4	3	3	2	2	1	1	0

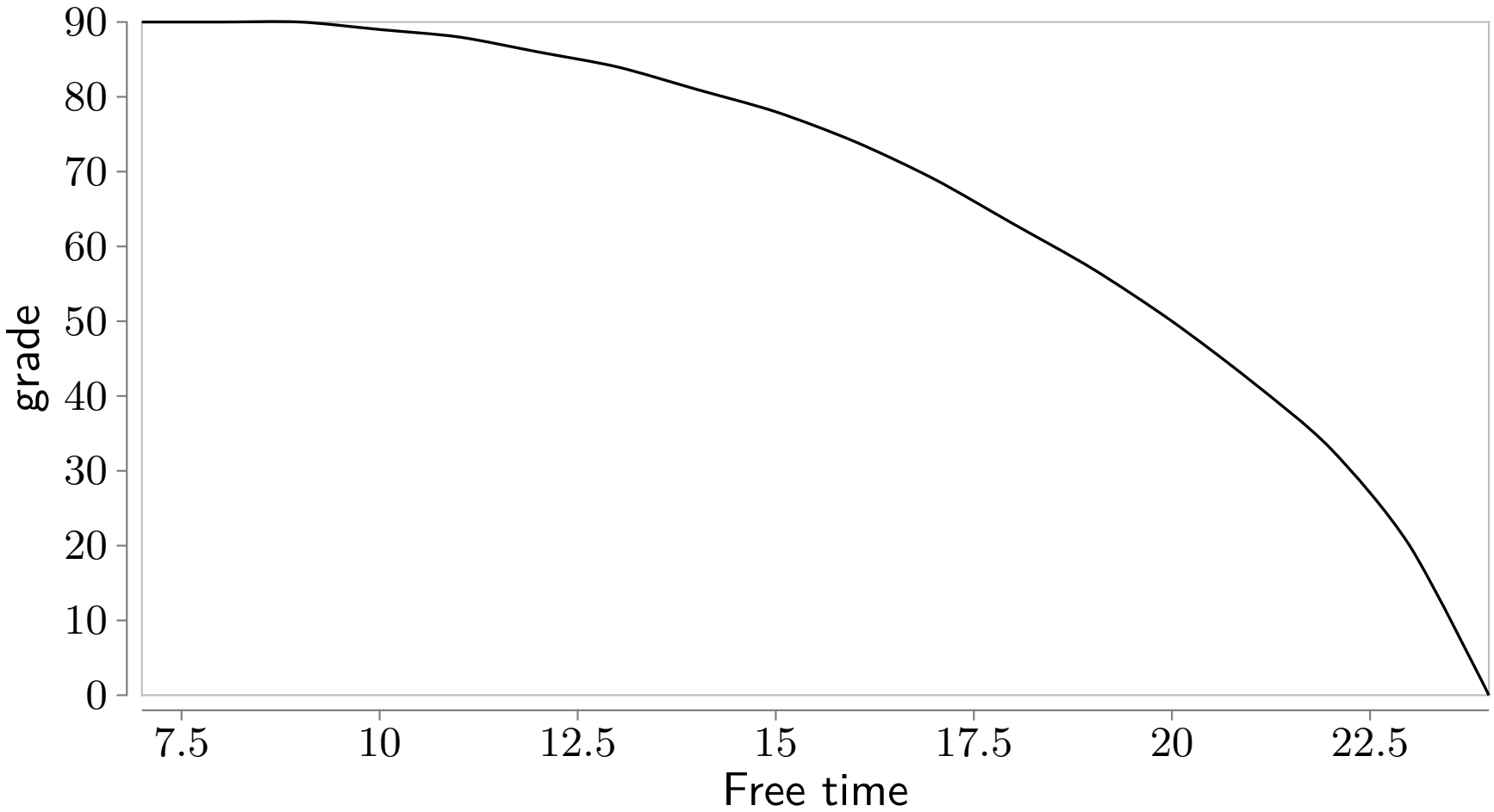


The Production Possibility Frontier

Looks like a cave => concave
Concave

Do you want to study all day? Probably not!

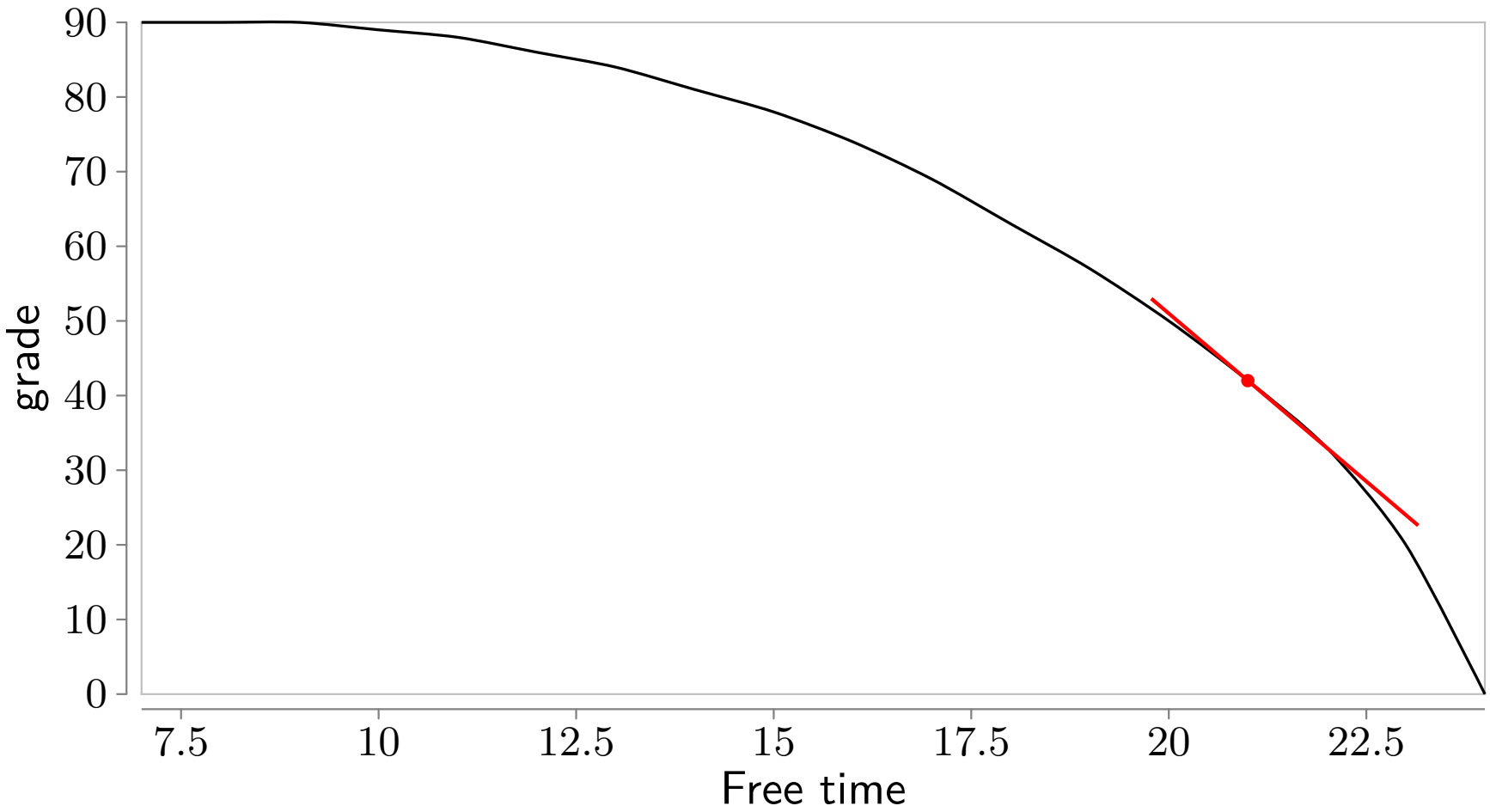
Study hours	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+
Free time	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9−
Grade	0	20	33	42	50	57	63	69	74	78	81	84	86	88	89	90
MRT (=MP)	20	13	9	8	7	6	6	5	4	3	3	2	2	1	1	0



The Production Possibility Frontier

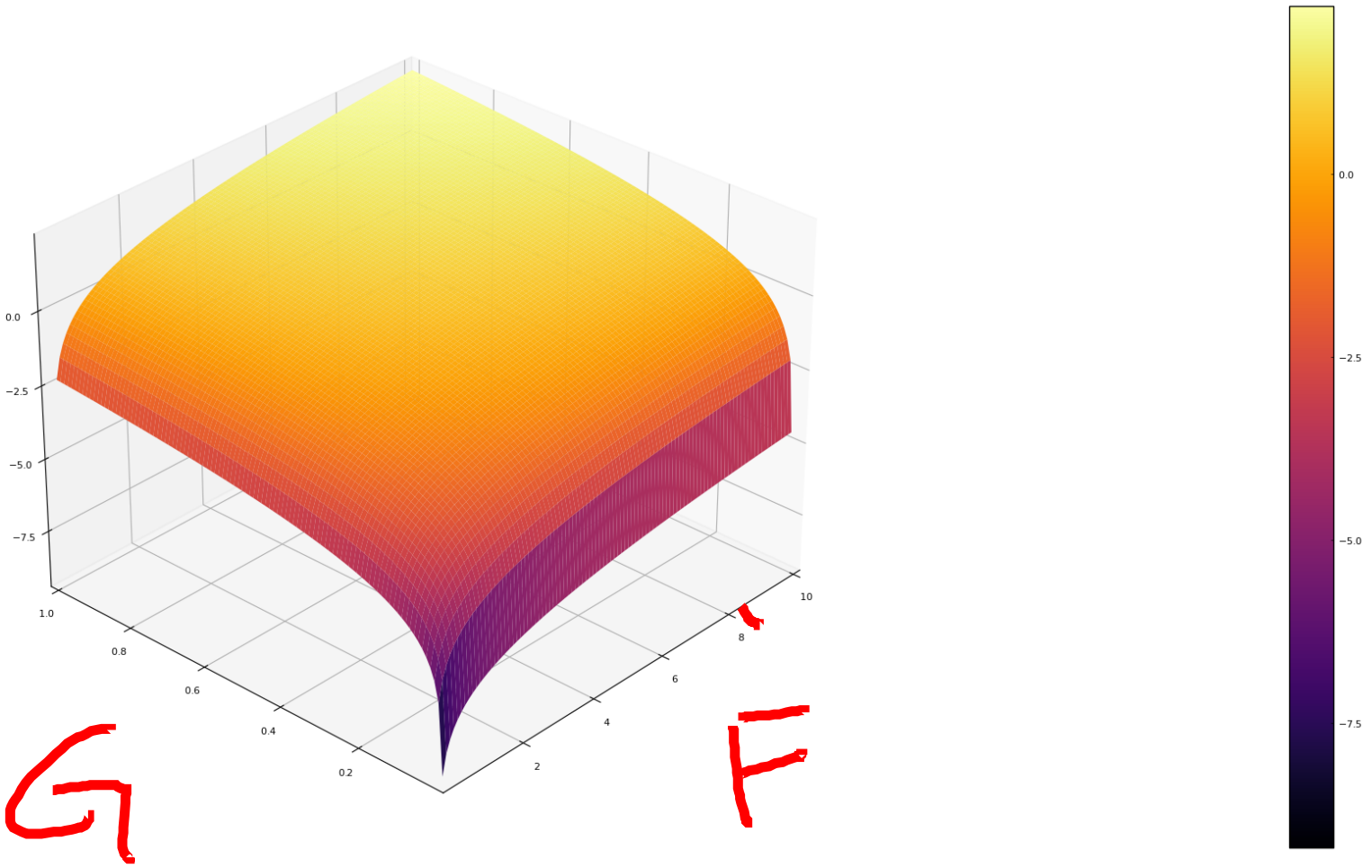
Supply side trade off between free time and grade $\Rightarrow$ Marginal Rate of Transformation

Study hours	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+
Free time	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9−
Grade	0	20	33	42	50	57	63	69	74	78	81	84	86	88	89	90
MRT (=MP)	20	13	9	8	7	6	6	5	4	3	3	2	2	1	1	0



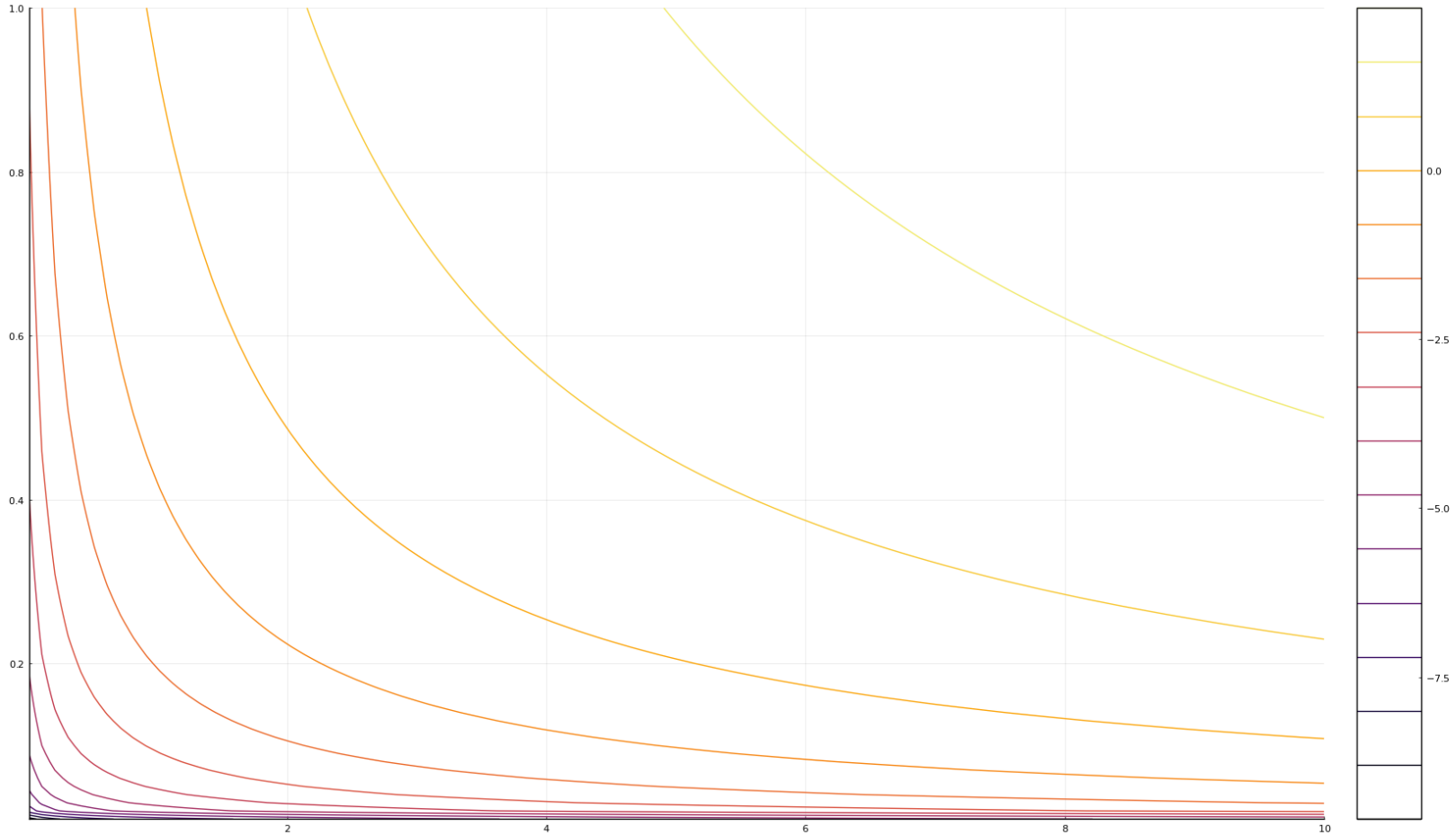
Utility Function

- As a student you value two things: free time and grade
- However, higher grade $\Rightarrow$ sacrifice your free time!



Visualizing 3-D Function on 2-D plane

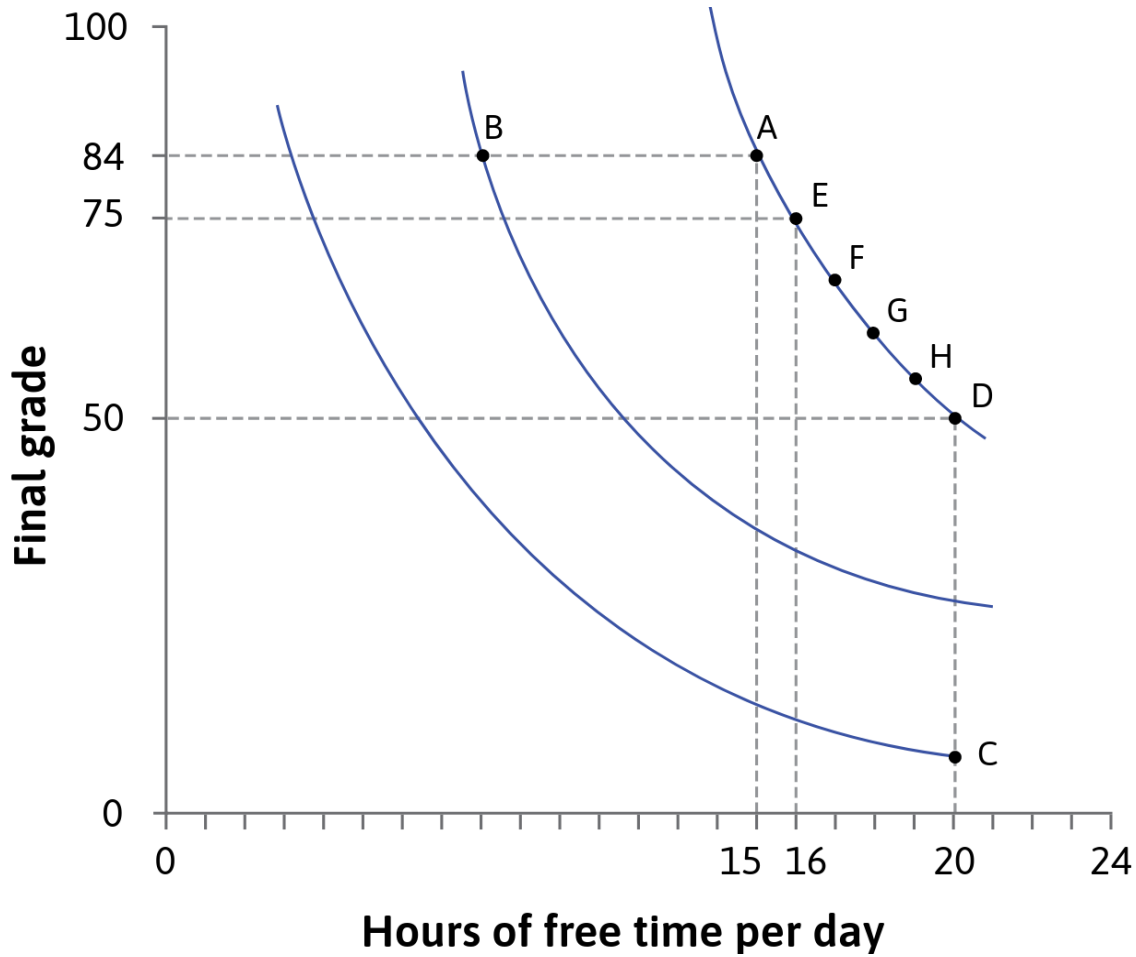
- It is hard for me to process 3D figure ☹... What should I do?
- **Contours**:"standing" at the peak and look down
  - e.g. map on Alltrails



Indifference Curve

The contour figure on utility function is indifference curve!

- **Def**: Combination of goods that gives same level of utility
- Marginal Rate of Substitution: **Demand side** trade off between free time and grade
  - Graphical representation is the tangent line on indifference curve, similar to MRT

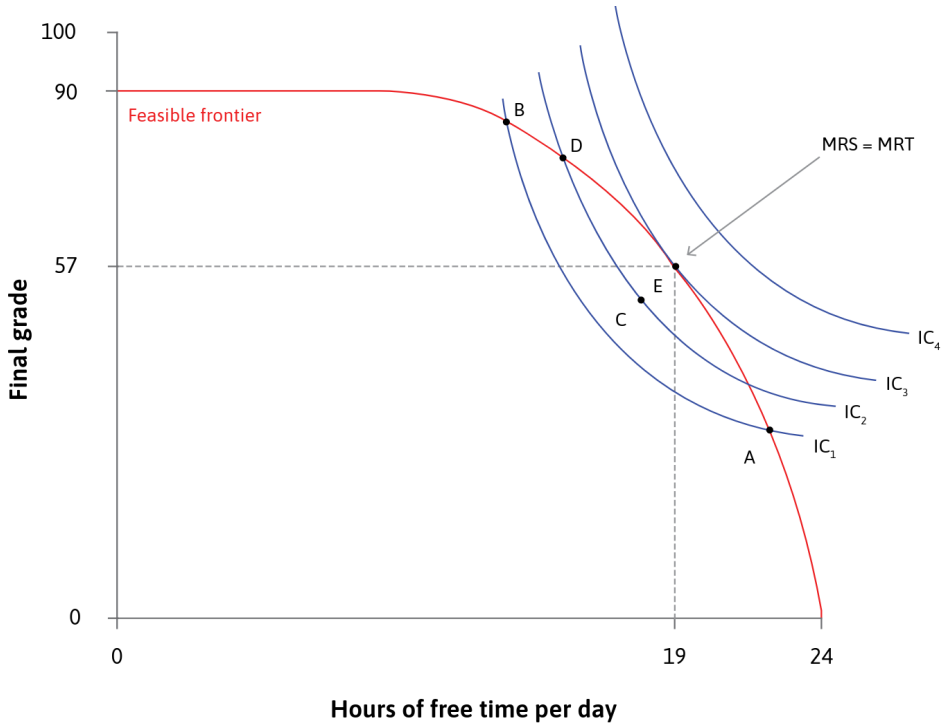


Decision-making under Scarcity

Optimal Social Resource Distrbution

In the grade example, you are both the consumer and producer of grade and free time

- What you as a social planner want to do is to accord the demand side trade off in **MRS** with the supply side trade in **MRT**
- Recall that on the figure, both MRS and MRT are tangent lines, and thus the optimal social resource distribution must allow utility function and production possibility frontier **tangent at the same point**!



Prices & Market Structure

- What real world things make $MRT = MRS$? $\Rightarrow$ Prices!
- **Competitive** price determines the market trade off between two goods

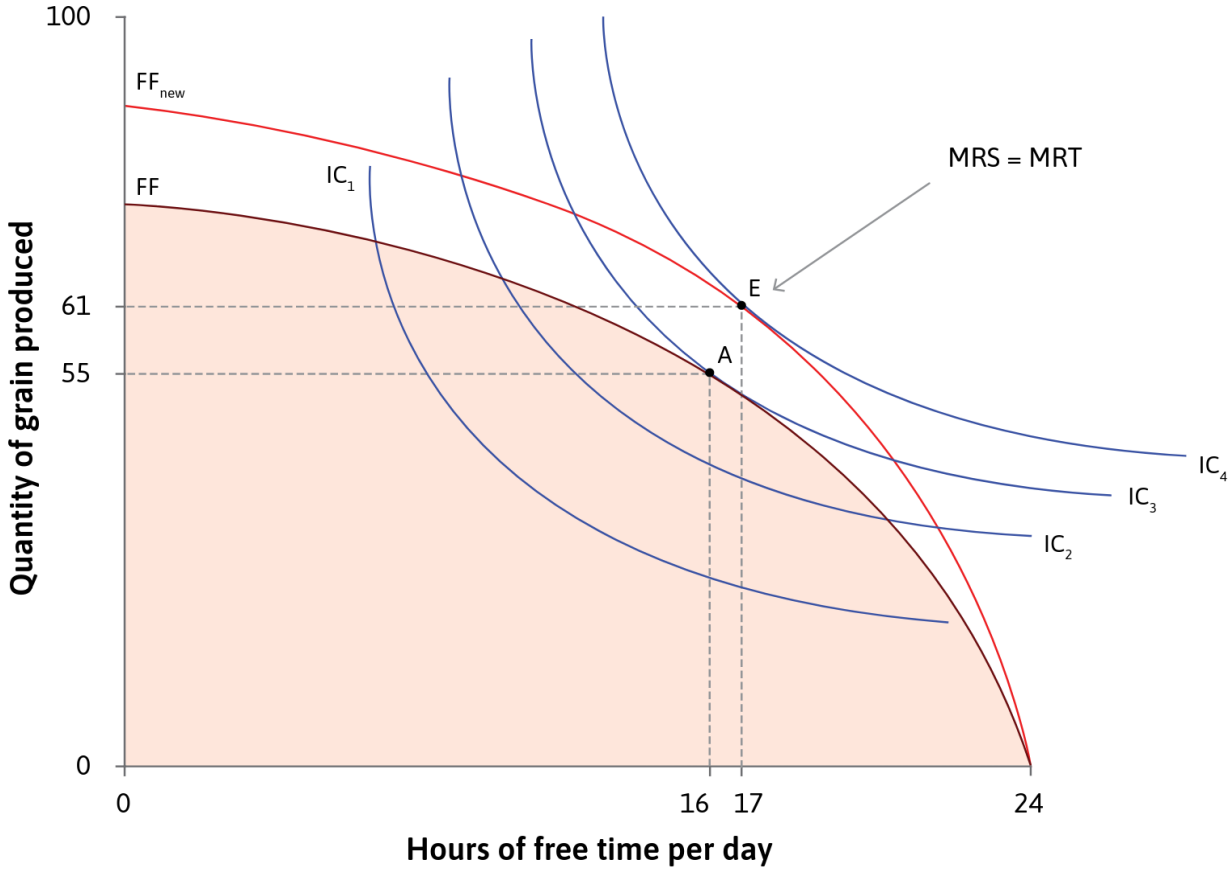
market	labor	credit	bond	capital
price	wage	interest rate	bond price	rental / purchase price

- Prices are not necessary be competitive $\Rightarrow$ market structure
  - Perfect competition
  - Monopolistic competition
  - Monopoly
  - Oligopoly

Better Technology

What happens when the feasible frontier changes?

- PPF expands only on grain production $\Rightarrow$ why?
- Better tech $\Rightarrow$ more grain production and more free time!

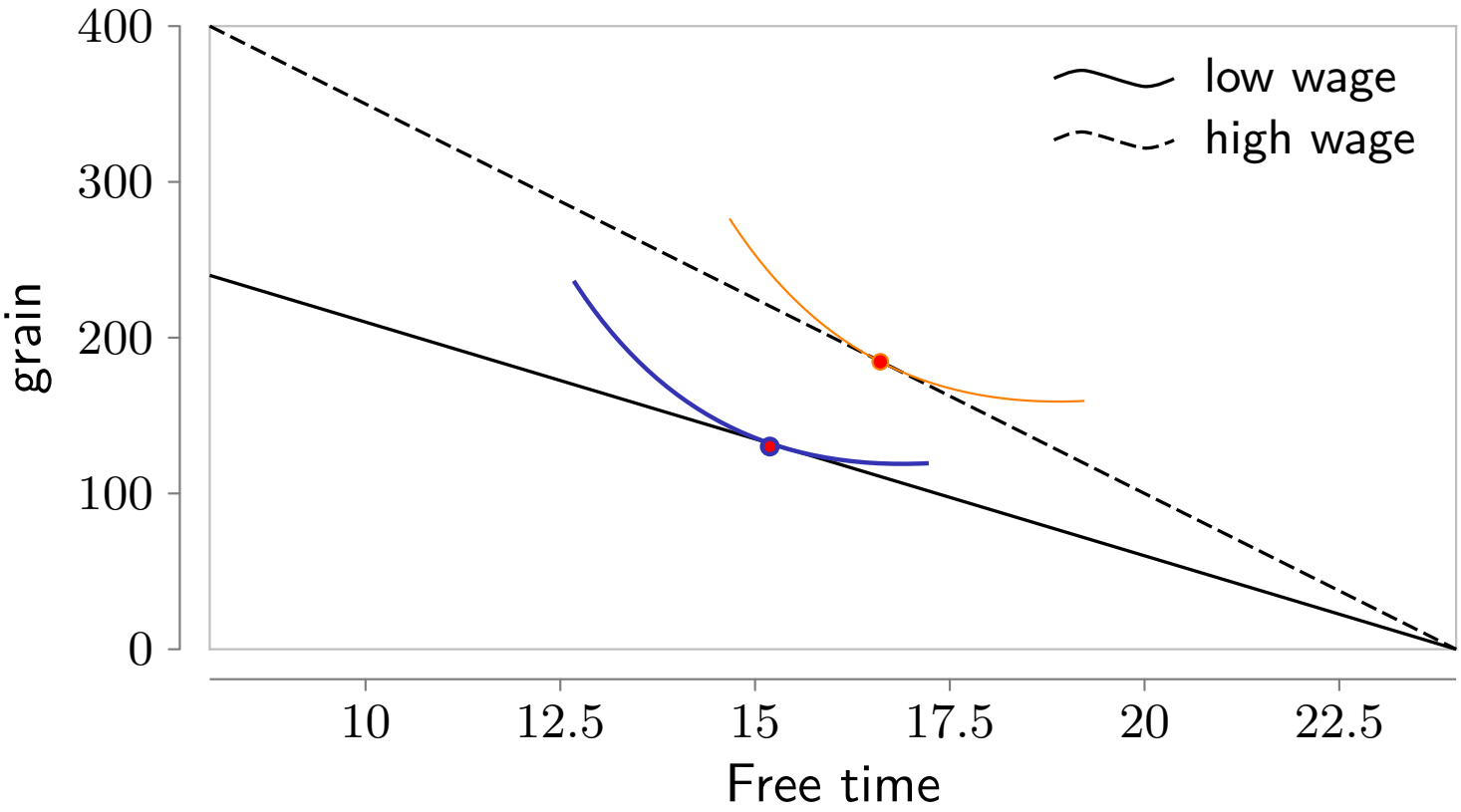


Income and Substitution Effects

Working Hours

Budget constraint is $c = w \times (24 - t)$, represented by the triangle area

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



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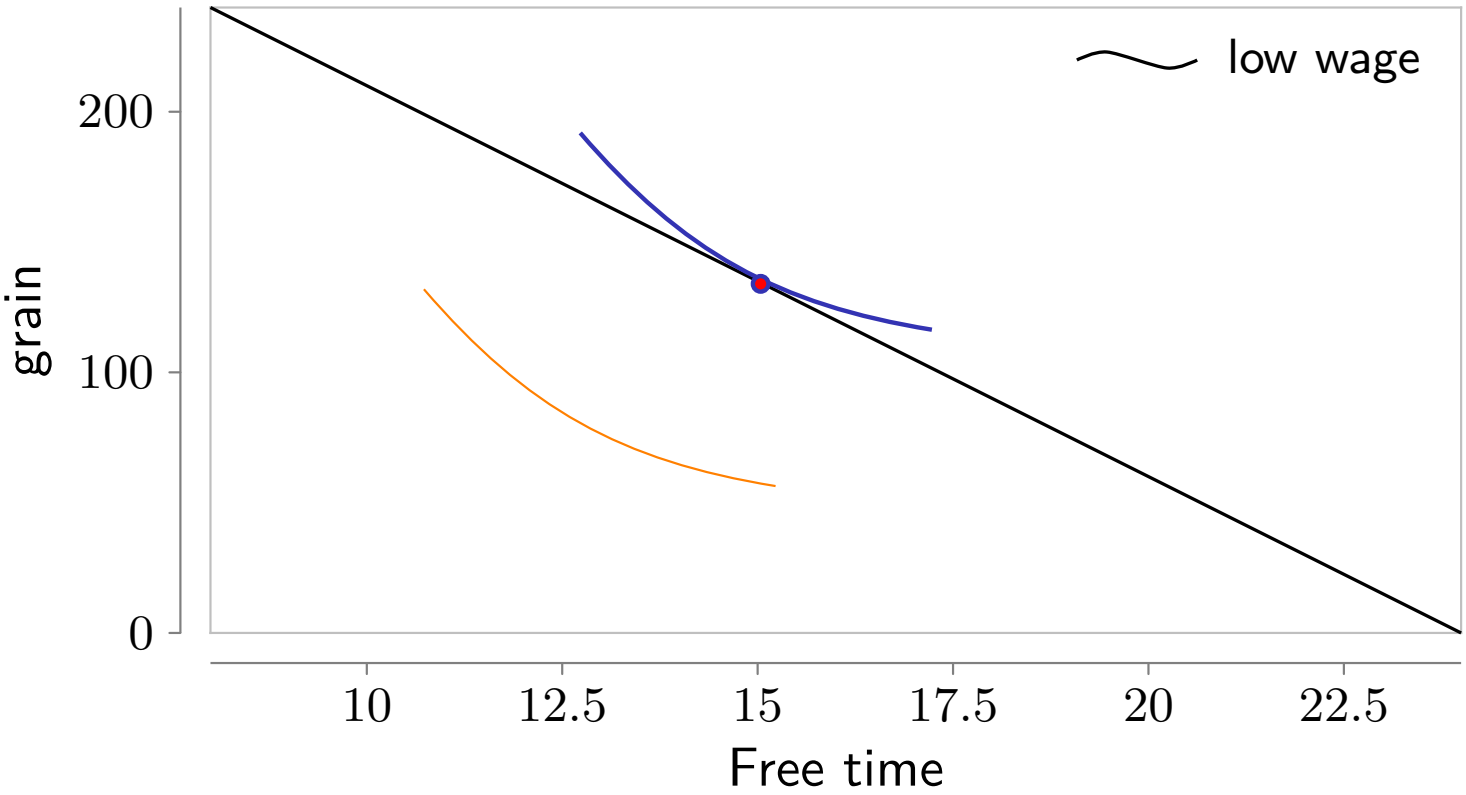


Two Important Effects

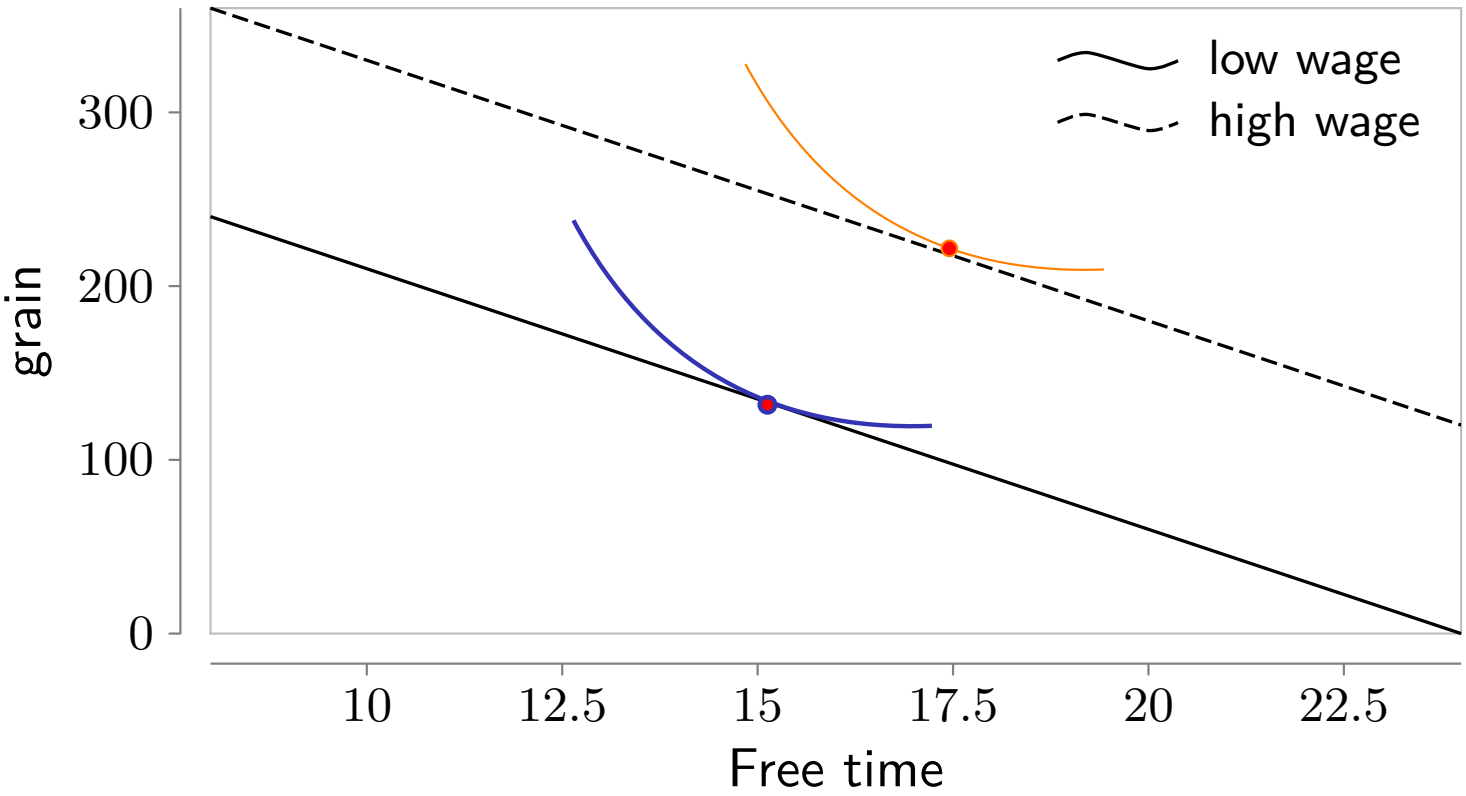
Wage change will affect the slope of budget constraint.

A wage increase will have two effects:

1. **Income effect**: Total earnings $\uparrow$, if you work the same hour
   - parallel shift of the budget constraint
2. **Substitution effect**: the opportunity cost of leisure is higher
   - rotation of the budget constraint

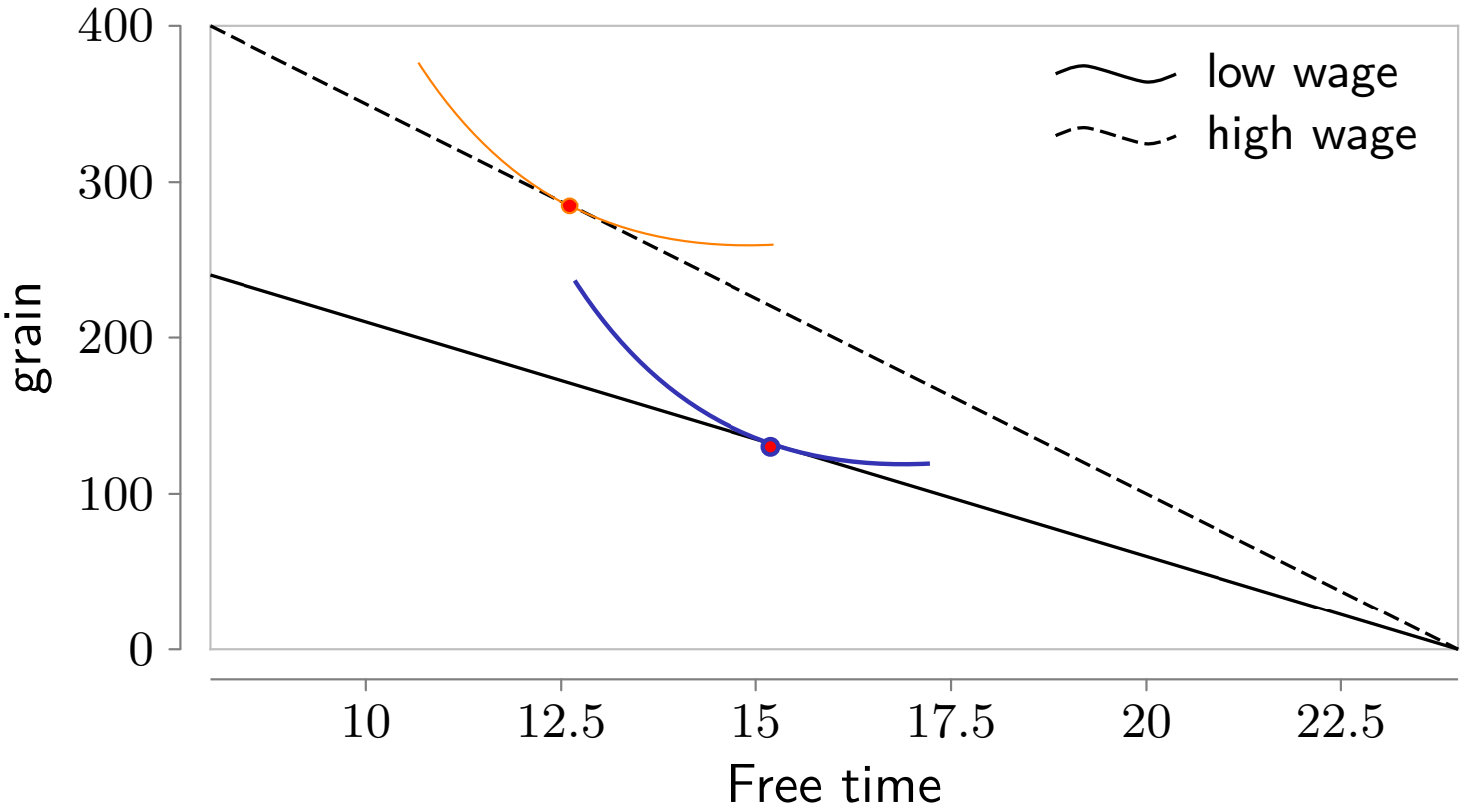
Income Effect

Both free time and grain ↑ ⇒ Both goods are normal goods



Substitution Effect

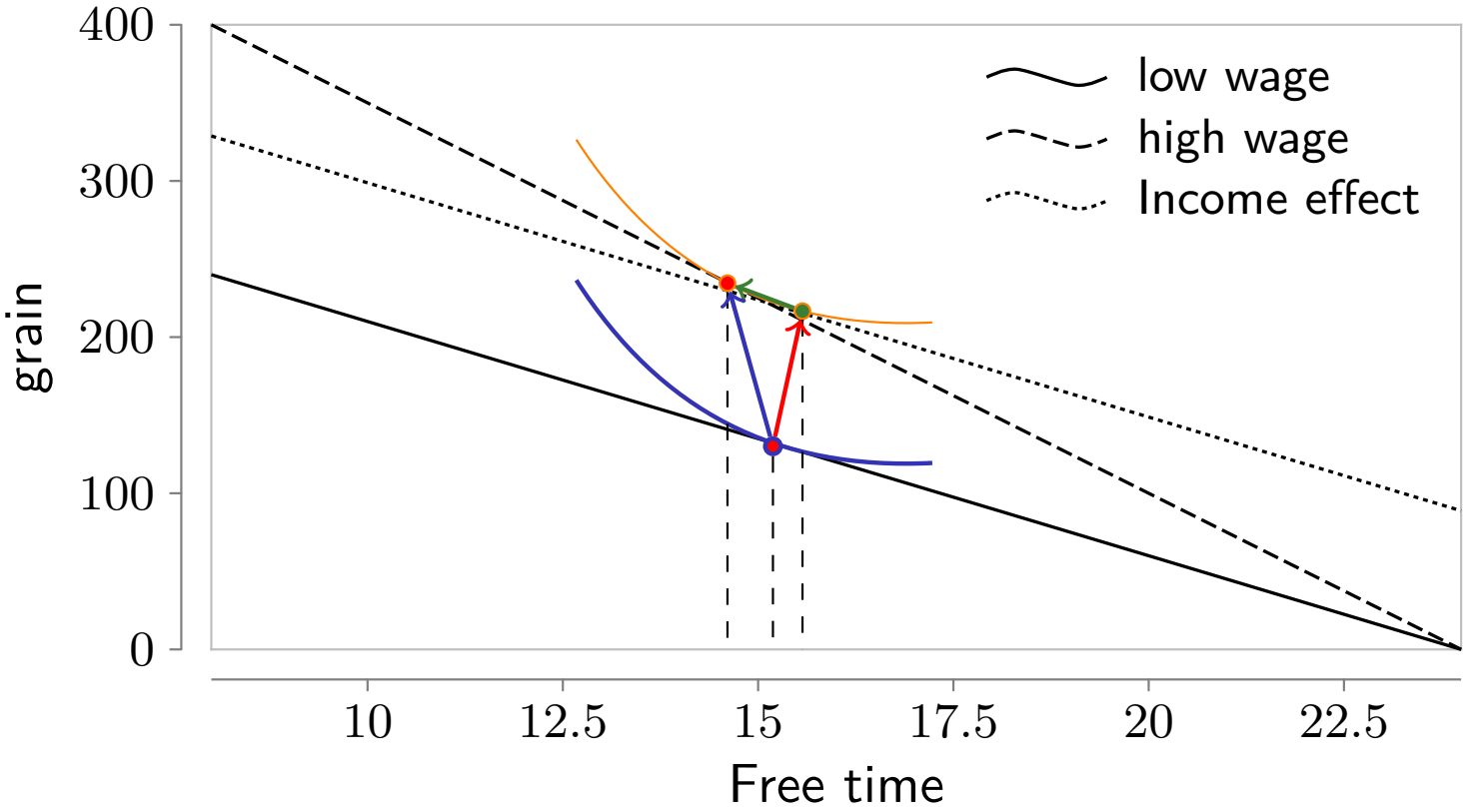
Cost of free time $\uparrow \Rightarrow$ Leisure $\downarrow$ and grain $\uparrow$



Overall Effect on Labor Choice

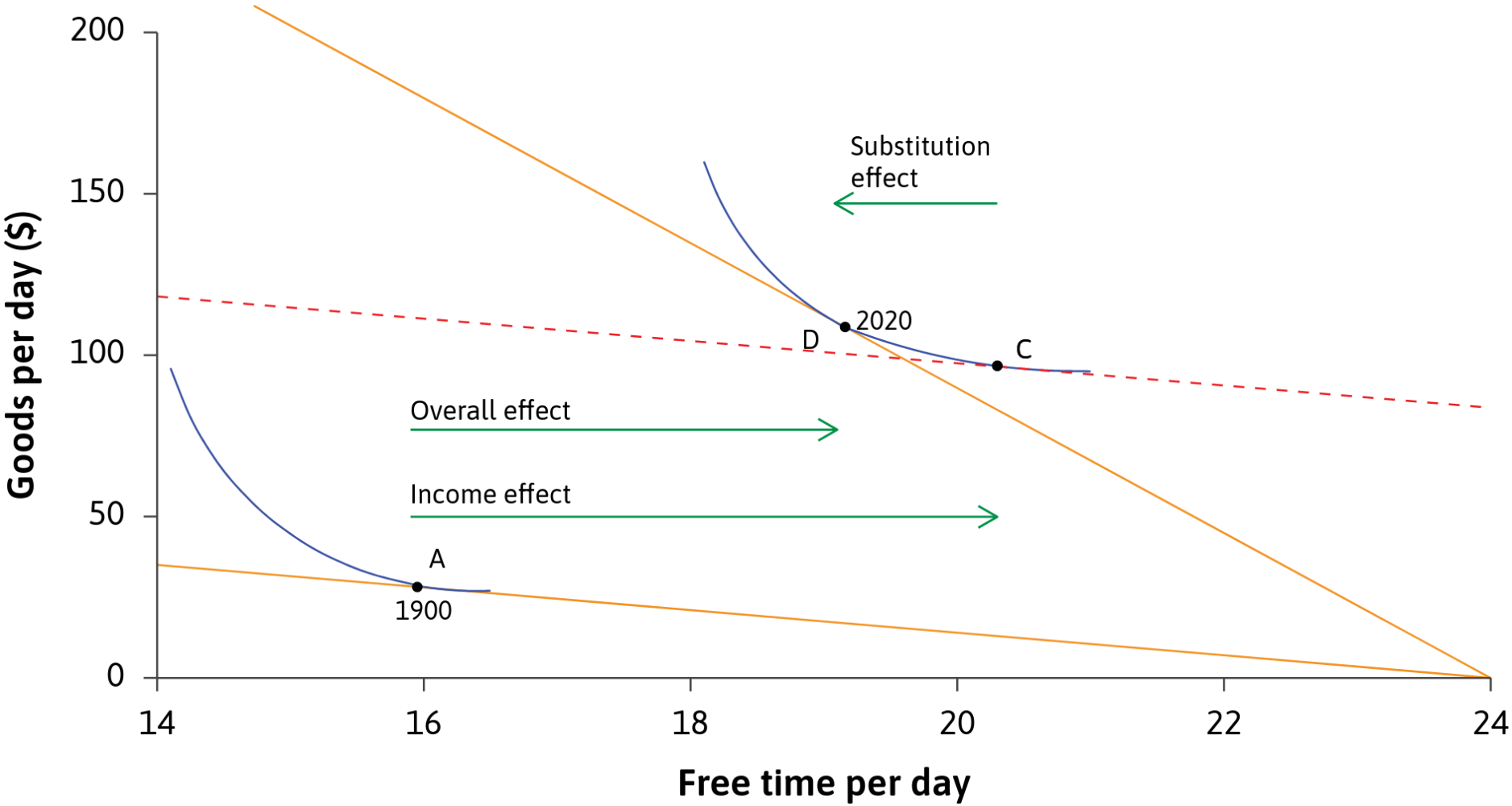
Overall effect = Income effect + Substitution effect

→: Income effect; →: Substitution effect; →: Overall effect

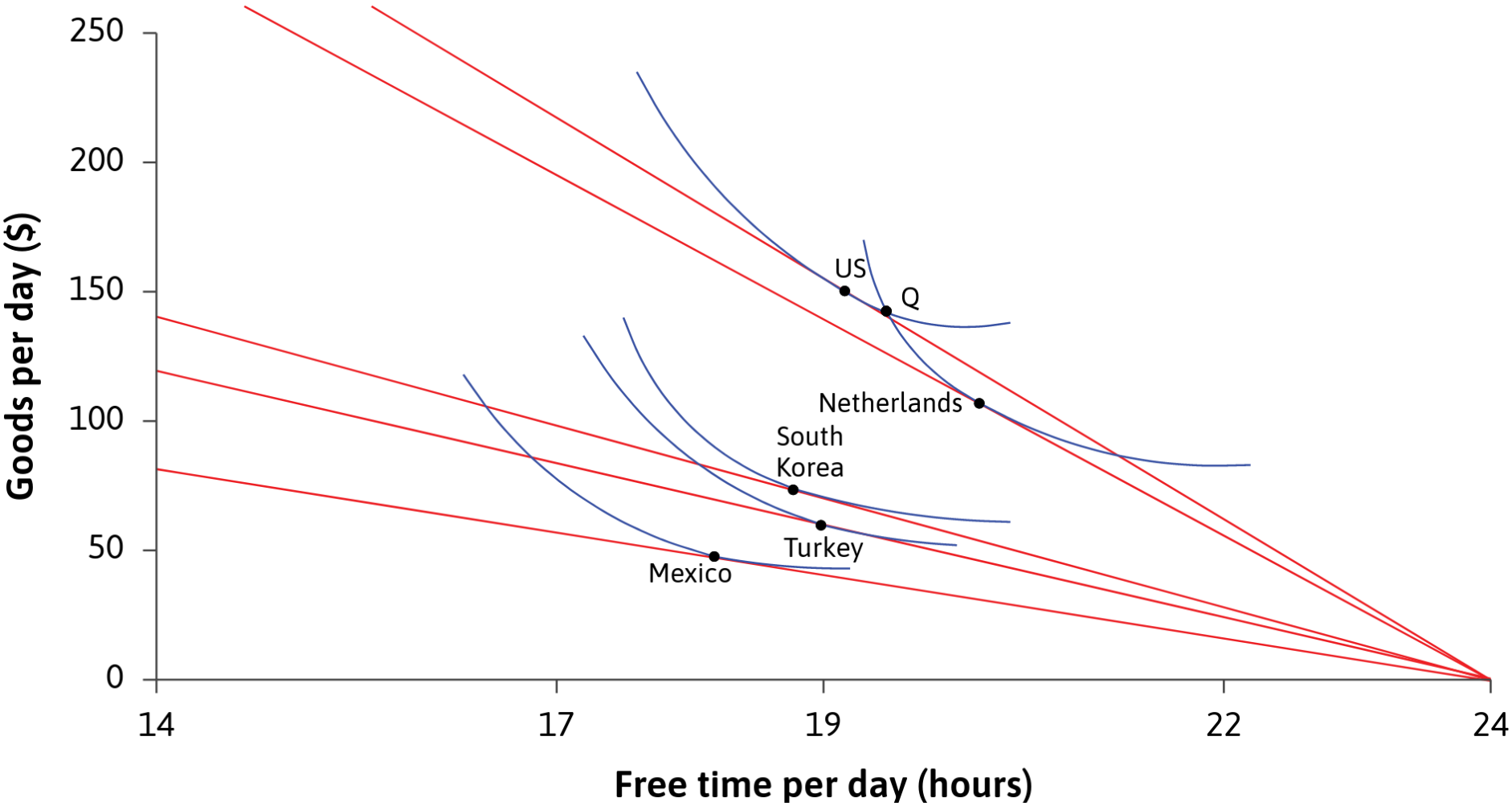


Application to Technological Change

Difference over time



Difference in Countries



Good Model?

Disadvantage:

1. Most people cannot change their working hour in the short term
2. blame the victim: poor countries are poor because their indifference curve

Advantage:

1. Good approximation: Over time, people learn what combination of working hours and free time suits them best.