Chapter 6, part I

Po-Chun Huang
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Road map

Chapter 2 – Chapter 4: The basics

- Labor supply, labor demand, and equilibrium
- It gives us the basics for what determines the wage

The rest of the course mainly focuses on further reasons why wages differ across people

- Chapter 5: Compensating differentials
  - Differential job attributes can lead to wage differences
- Chapter 6: Human capital
  - Differential skill can lead to wage differences
  - Human capital is the general stock of skill we possess
  - Sources of human capital: education, training, and experience

Outline

1. The schooling decision
2. Estimating the returns to schooling
3. Application: does school quality matter?

1. The schooling decision

Educational attainment is different

TABLE 6-1 Educational Attainment of U.S. Population, 2013 (Persons Aged 25 and Over)

Source: U.S. Bureau of Labor Statistics, *Annual Demographic Supplement of the Current Population Surveys*, March 2013.

	Highest Grade Completed (Percentage of Population in Education Category)					
Group:	Less Than High School	High School Graduates	Some College	Associate Degree	Bachelor's Degree	Advanced Degree
All Persons	10.6%	31.1%	16.8%	9.8%	20.1%	11.6%
Gender:						
Male	11.0	31.6	16.6	8.8	20.0	12.0
Female	10.2	30.6	17.0	10.8	20.2	11.2
Race/ethnicity:						
White	6.3	30.6	17.3	10.6	22.3	12.9
Black	12.0	35.9	20.4	9.7	14.2	7.8
Hispanic	31.0	33.2	13.6	7.1	10.7	4.3
Asian	8.7	20.4	9.9	7.2	30.9	23.0

Overall Bachelor+ is 31.7%

Women more likely >HS, but less likely Advanced (for now)

Bachelor+: Hispanic << Black << White << Asian

TABLE 6-2 Labor Market Characteristics, by Education Group, 2013 (Persons Aged 25 to 64)

Source: U.S. Bureau of Labor Statistics, *Annual Demographic Supplement of the Current Population Surveys*, March 2013.

		Less Than High School	High School Graduates	Some College	College Graduates
All workers:	Labor force participation rate	60.2	72.8	78.3	85.2
	Unemployment rate	12.5	8.9	6.4	3.7
	Annual earnings (in $1,000)	23.3	35.3	41.9	73.0
Gender:					
Men	Labor force participation rate	72.3	80.4	84.0	91.5
	Unemployment rate	11.8	9.3	6.4	3.7
	Annual earnings (in $1,000)	26.4	41.6	50.6	89.1
Women	Labor force participation rate	46.4	64.6	73.3	79.7
	Unemployment rate	14.0	8.3	6.4	3.8
	Annual earnings (in $1,000)	17.9	27.0	33.4	57.0
Race/ethnicity:					
White	Labor force participation rate	52.1	73.3	78.6	85.8
	Unemployment rate	12.8	7.8	5.6	3.3
	Annual earnings (in $1,000)	26.3	38.5	44.2	75.7
Black	Labor force participation rate	47.0	68.1	77.8	84.4
	Unemployment rate	25.2	14.7	19.7	6.2
	Annual earnings (in $1,000)	21.1	28.1	35.7	57.5
Hispanic	Labor force participation rate	68.9	75.7	79.3	84.9
	Unemployment rate	10.4	8.3	6.5	5.3
	Annual earnings (in $1,000)	22.2	30.5	36.6	60.3
Asian	Labor force participation rate	62.0	72.6	75.7	82.1
	Unemployment rate	8.3	5.0	5.8	3.8
	Annual earnings (in $1,000)	23.1	30.9	40.1	76.5

A short aside: present value

Timing will be important

- The nature of an educational investment is that the cost is experienced early in life and the benefit accrues later
- The basic idea: $1000 today is worth more than $1000 a year from now. Why? If you give me $1000 today, I will invest it at interest rate r and have (1+*r*) x $1000 one year from now

Present value

- The value of an amount *y* received *t* years from now when the annual interest rate or discount rate is *r*

$$PV = \frac{y}{(1+r)^t}$$

- It allows us to convert everything into "today's dollars"
- Interest rate: the rate of interest the market pays
- Discount rate: the rate at which an individual discounts future dollars

The basic schooling decision

How much education should one obtain?

We can think about education as an investment

- Our approach: consider school strictly a financial investment
- It is straightforward to instead consider the utility that flows from school, both due to increased earnings capacity and potentially enjoying school and its other rewards

The cost of an education

- Tuition, room and board
- Forgone earnings

The benefit of an education

- Higher future earnings

The decision: Pick the educational decision that delivers the higher PV

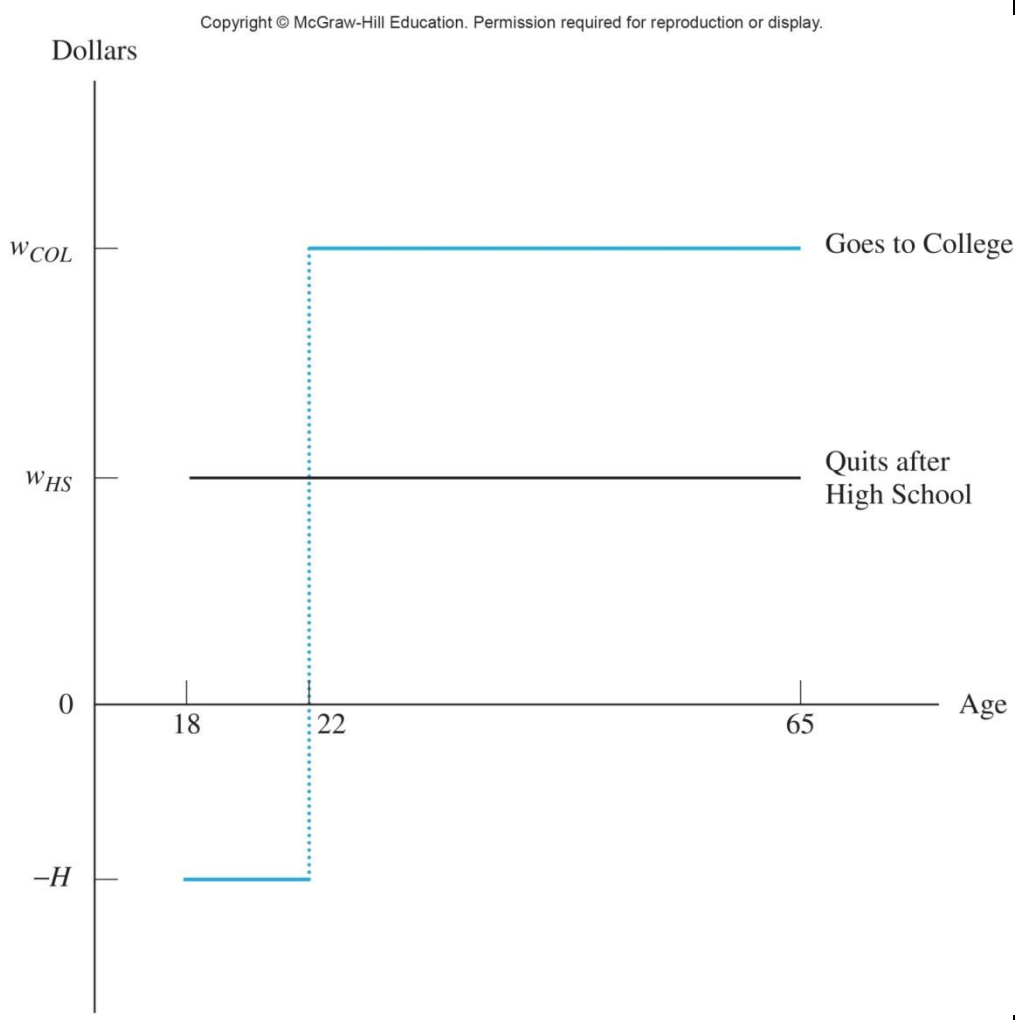
The picture

The opportunity cost of going to college

- Direct cost: H
- Opp cost: w_{hs}

Present value

- Must be used because the financial flows occur over time
- Another central parameter: discount rate r



The calculation

Suppose you are choosing between going to college or stopping after high school

The decision: Go to college if $PV_{COL} > PV_{HS}$

$$PV_{HS} = W_{HS} + \frac{W_{HS}}{1+r} + \frac{W_{HS}}{(1+r)^2} + \ldots + \frac{W_{HS}}{(1+r)^{46}}$$

$$PV_{COL} = -H - \frac{H}{1+r} - \frac{H}{(1+r)^2} - \frac{H}{(1+r)^3} + \frac{W_{COL}}{(1+r)^4} + \ldots + \frac{W_{COL}}{(1+r)^{46}}$$

What leads to a higher PV_{COL}?

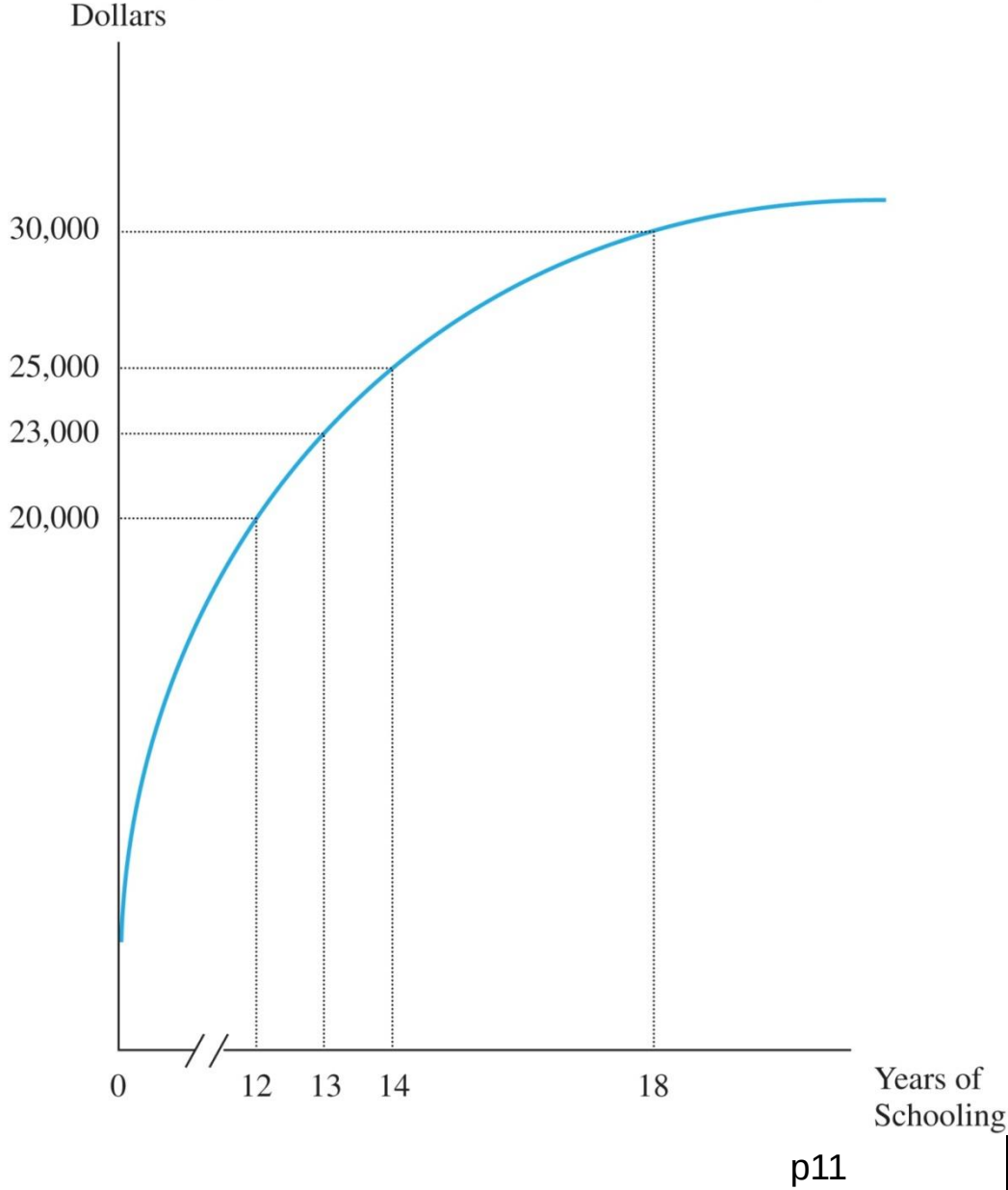
- Lower H
- Higher W_{COL}
- Lower r (the more weight that is given to the higher later earnings)
  - Poor individuals might face a higher r (borrow, rather than forego interest in a savings account)
  - Impatient people might have a higher r

But schooling isn't yes or no…

We can pick S years of schooling, where S takes on values 9 to 18

Wage-schooling locus

- The amount of earnings an individual would receive for each year of school S
- Varies by ability and interests and other factors

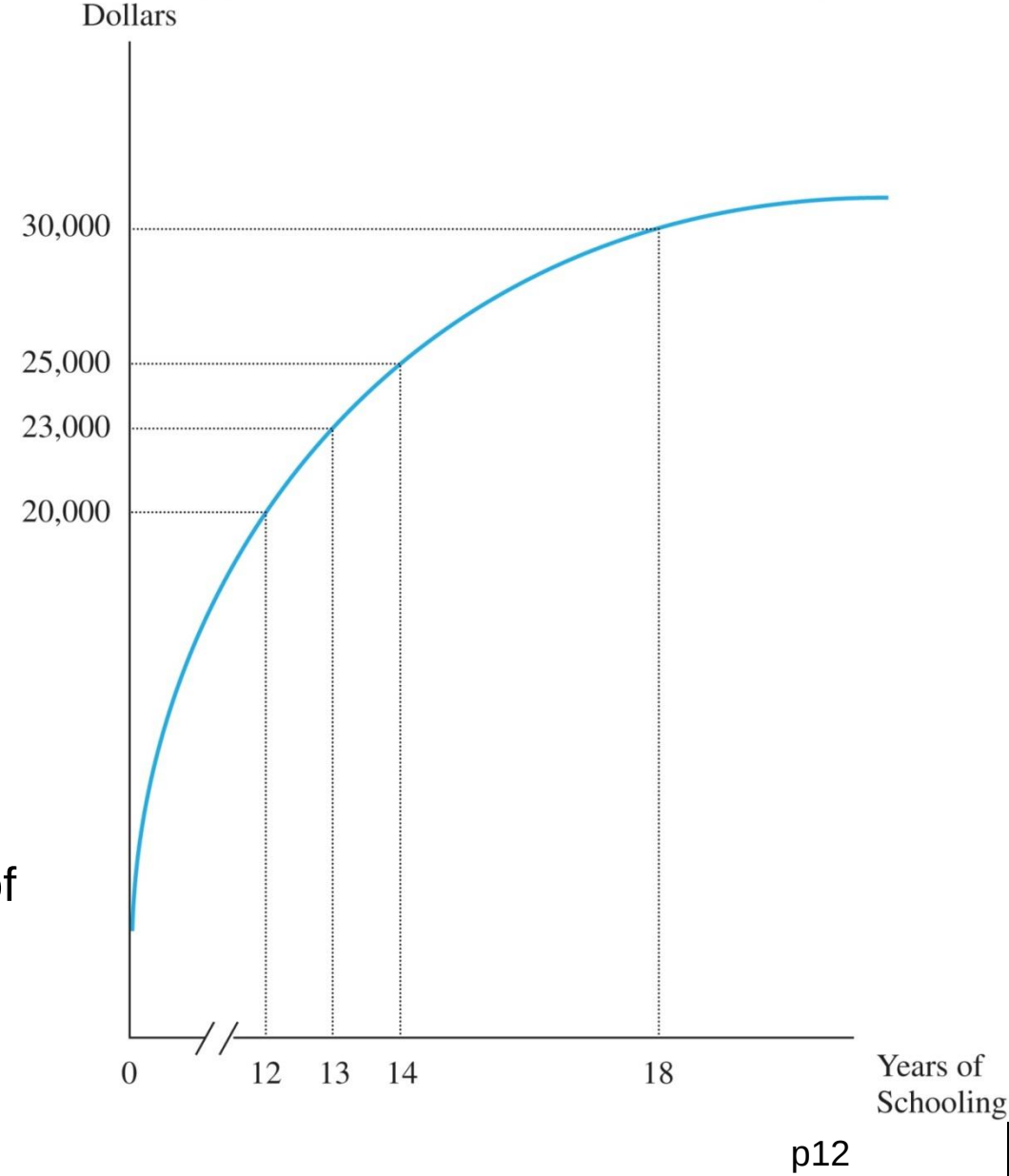


Properties of wage-schooling locus

1. upward sloping
   - More schooling delivers more income
2. concave
   - Diminishing marginal returns to investment

The slope tells us the marginal benefit or the marginal rate of return for more schooling

- The workers gives up 20K for 3K additional earnings
- MRR for 13th year is 3K/20K=15%
- Concave means the rate of return is declining
- MRR for 14th year is 2K/23K=8.7%

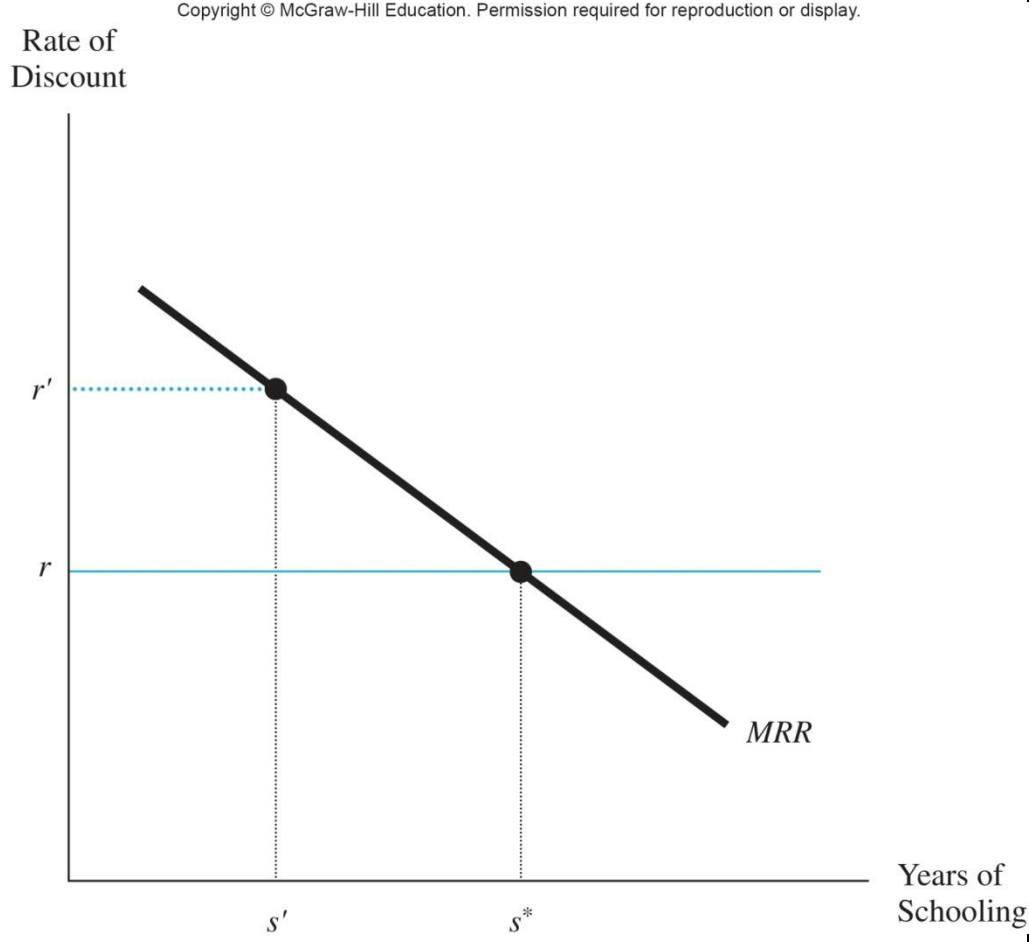


MRR can be graphed directly

Concave wage-schooling means MRR is downward sloping

We can use the MRR to define the "optimal stopping rule" for S

- How many years of education should one obtain?
- Financial benefit of going to school: MRR
- Answer: go to school until MRR hits r
- Why? Investing in schooling returns MRR. If it drops below r, just invest at the bank



Remember…

This analysis treating schooling ONLY as a financial investment

Schooling may deliver other value

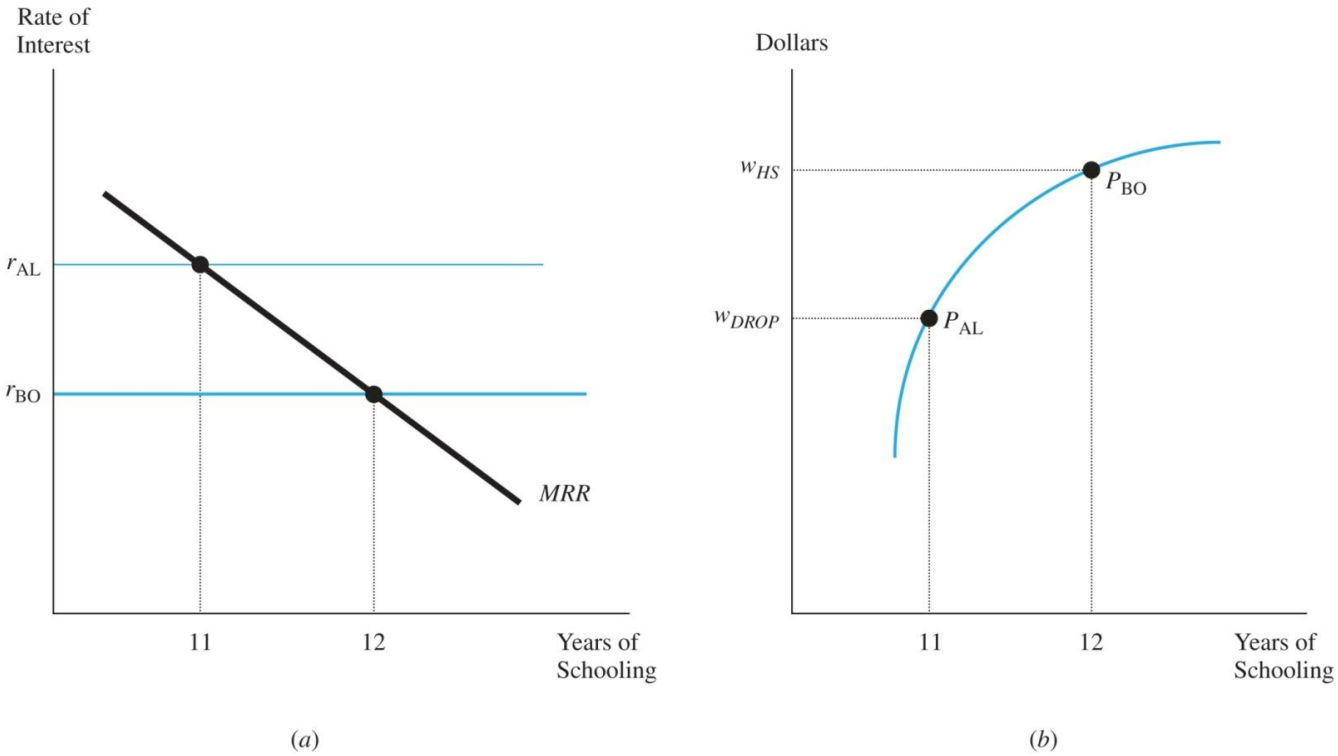
- Consumption value: do you enjoy going to college? Might learning about music and history provide more valuable experiences later in life?
- Insurance value: might college education be more flexible in the future?
- Network value: might you meet a spouse? Or future colleagues and clients?
- Societal value: might an educated citizenry benefit a country or democracy?

All of that could be included, but would greatly complicate the analysis

Estimating the wage-school locus

Differences in r, but same MRR

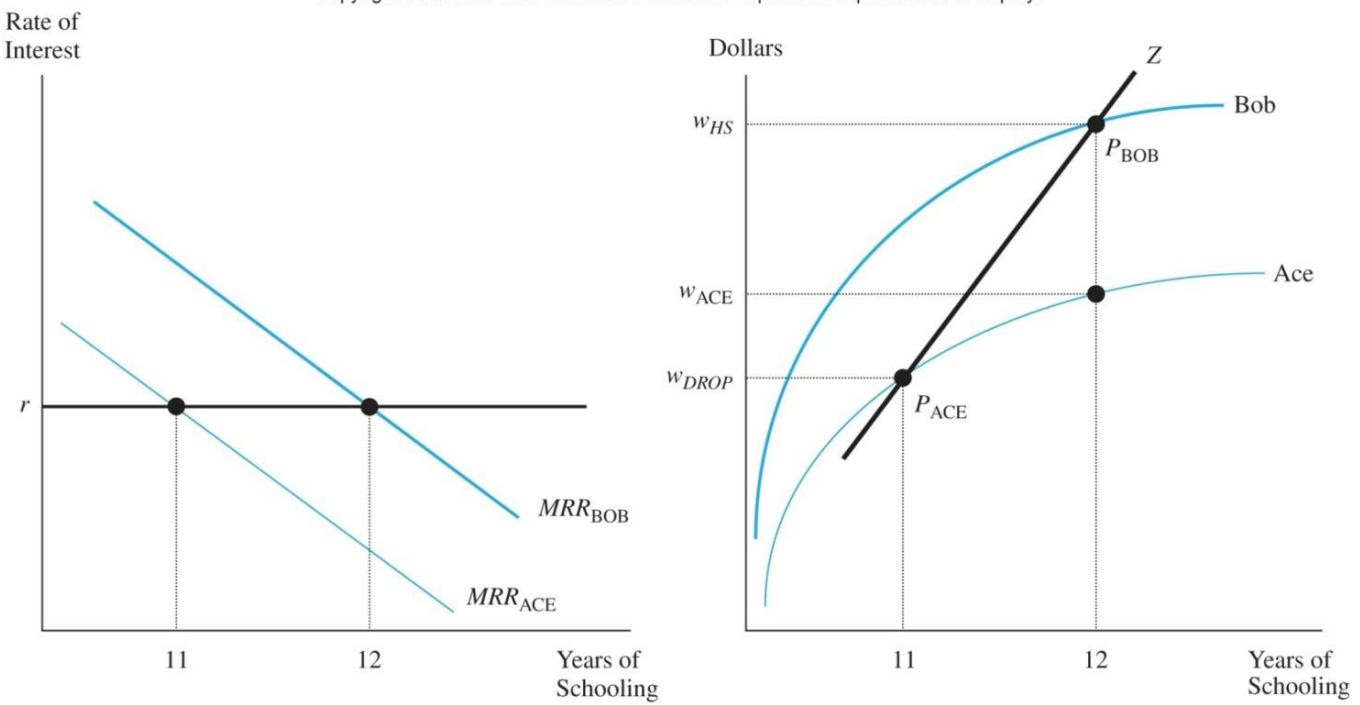
- Same MRR implies same wage-school locus
- Suppose Al has a higher r than Bo, but all else is equal
- Comparing Al and Bo in the data delivers the locus



Estimating the wage-school locus

Same r, but differences in MRR

- Differences in MRR can be thought of as differences in ability. Why? High ability students may get more out of school than low ability students
- Comparing Ace and Bob delivers too high of an estimate: it includes the effects of 12th year of schooling AND ability



What have we learned?

Important economic question: What is the return to years of schooling?

Our theoretical discussion suggests:

- If people differ by r, than we can compare earnings across people to infer the rate of return
- If people differ by ability, than comparing earnings across people tells us about the return and differential ability
- This is a formalization of the standard example of causation vs. correlation: The observed earnings correlation with education may be causal (education is productive) or may not be (people who get more education have higher ability)

Signaling

Our focus on why the relationship between earnings and schooling may not be causal has been ability bias thus far

Another threat: Signaling

- This is covered in Section 6-9
- If there was asymmetric information (individuals knew if there productivity type but employers did not) and it more costly for low productivity workers to obtain the signal (education), it is possible to use educational requirements to induce workers to sort
- Bottom line: high productivity workers are induced to go to college to signal their type even if college is not productive

2. Estimating the returns to schooling

Estimating the returns

Standard "Mincerian" wage equation

Jacob Mincer was one of the pioneers in studying education as an investment decision—treating education as "human capital"

$$\log w = \beta_0 + \beta_1 S + \beta_2 \exp + \beta_3 \exp^2 + \beta_4 X + \varepsilon$$

Log w: we are looking at the percent increase in wages

S is schooling

Coefficient: "each year of schooling increases log wage by .07, which approximately means increasing wages by 7%"

Exp is experience—another big part of human capital. We will come to this later in this chapter

X are other variables that need to be controlled for

The issue: X should probably include "ability", but that is difficult, or perhaps impossible, to observe

Results

Many studies simply ignore the ability issue

- 1970s: 7%
- By 1990s through present: 9%
- This is a substantial rate of return!

Fancier methods 1: include something like ability

- Test scores? Probably not. We're not looking at educational ability per se, but general ability that is rewarded in the labor market and makes school easier.
- IQ? Not widely available, and not clear what it measures.
- AFQT (Armed Forces Qualifying Test)
  - Ability measure used by AF—available in NLSY
  - Finding: returns decline by about a quarter (9% to 7%)
- Bottom line: not clear it solves the problem

Results

Fancier methods 2: twin studies

- Suppose we could find two individuals with identical ability, but have different levels of education—we could compare the two…
- What about twins?
  - Early twin study: 3% return to schooling
  - Later twin study: 15% return to schooling
- Real problem: WHY do twins have different schooling?
  - Is it really “random”?
  - Or, are the differences related to current ability/aptitude?
- My view: twins have identical innate (i.e., genetic) ability, not actual current ability. The differences can start to arise immediately following the embryo splitting

Results

- Fancier methods 3: “Instrumental Variables”
  - When well-done, these studies can be thought about like a natural experiment—comparing two groups that should otherwise be identical
  - Example 1: compulsory schooling laws
    - Individuals must go to schooling until 16 & schooling policy (used to) qualify for starting school based on a January 1st deadline
    - Effect: A child born during the last week of December would complete 1 more year of schooling by age 16, then someone born during the last week of January
    - Result: 7.5%
  - Example 2: strikes and the baccalaureat, France May 1968
    - A strike in France affected the exam that determines college entrance, increasing the credential in 1968 by 30% relative to the adjacent years
    - Result: 14%

Results

My view

- Using all sorts of methods, we generally get the returns to schooling to be 7 to 10%
- The answer need not be one number
  - The wage-earning schooling locus doesn't suggest that there is one number—it can vary by S
  - The profile can change over time depending on supply shocks (Vietnam caused a blip up in educational attainment) and demand shocks (Technological change? International trade?)
  - The fancy methods tend to focus in part of the return—Example 1 nudged individuals from 9 to 10 years of schooling during the 1930s in the US, and Example 2 nudged individuals into college in 1968 in France

3. Application: does school quality matter?

School quality

Up to this point, we were considering schooling as a very homogenous thing: one year of schooling

- But, schooling can vary dramatically
- What is the course of study? College preparatory high school vs “shop” high school
- What is the average class size?
- How much are teachers paid?
- What is the qualification of teachers?

Does school quality matter?

- I hope this question strikes you as absurd… ☺
- The real question (like everything else) is <u>how much</u> does school quality matter
- The problem: our empirical measurements for a long time routinely delivered the answer “not much”

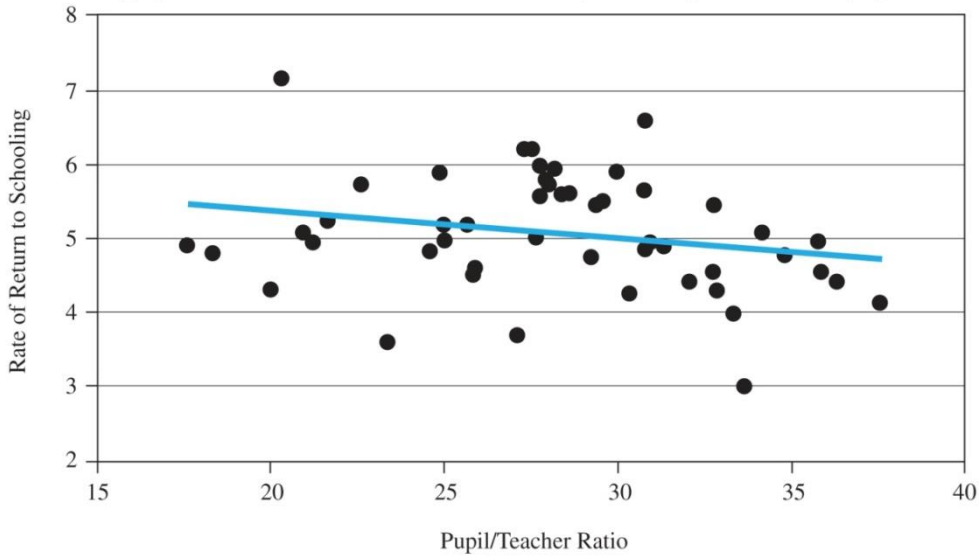
The answer in 1990s

Hanushek review of the literature

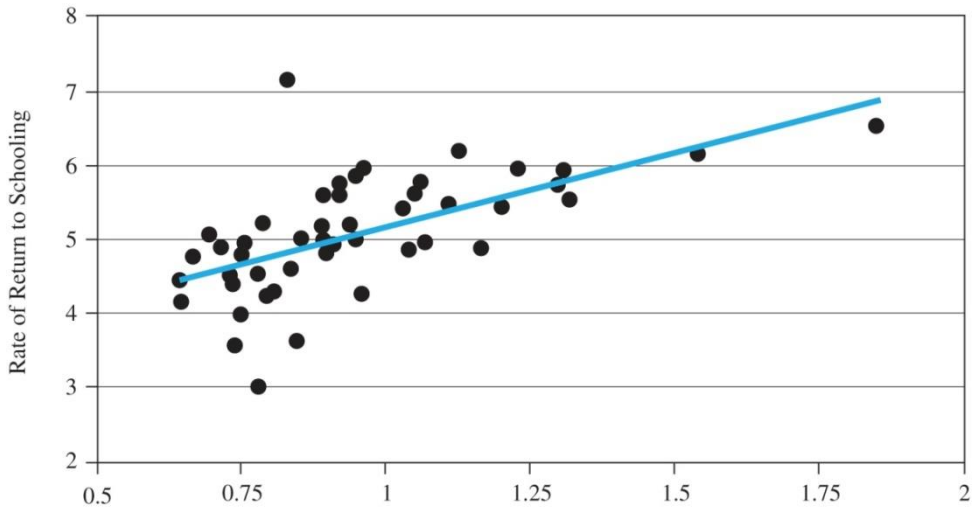
- "There appears to be no strong or systematic relationship between school expenditures and student performance."

Example: Card & Krueger 1992

- State-level schooling returns vs. pupil/teacher ratio
- State-level schooling returns vs. teacher wage
- Typical finding: class size doesn't matter



(*a*) Impact of Pupil/Teacher Ratio



(*b*) Impact of Teacher Salaries

Since the 1990s

The problem with these large-scale studies is that it is hard to convincingly isolate causality

- Areas that are doing poorly may invest more education

Studies have tackled the problem with many more fancy strategies (including an RCT) to try to more convincingly answer the question

- Tennessee STAR
  - A large-scale RCT of class size
  - Result: smaller classes led to better test scores
- “Maimonides’s Rule” study
  - Israeli rule: maximum class size is 40. If 41 students…
  - Result: smaller classes led o better test scores

Bottom line….

The economics of education has been a booming field in economics

There have been tons of RCT studies and plausible observational studies to examine all sorts of aspects of it

> Do school expenditures matter? Class size? Teacher pay? Teacher qualifications? Charter schools? School of choice? Gifted programs?

Common finding: Yes, they can help, but they generally are not sufficient. It depends on the context and how things are implemented