Introduction

Education is one of the largest sectors in the economy, and thus can be studied from a large amount of angles.

- Early Childhood Education (beyond just "being watched")

- Elementary/Secondary School

- Postsecondary Education

Education can be studied from a lot of angles:

Micro: Applying theories of labor economics and consumer theory to education.

Econometrics: Use data to analyze educational policies.

Macro: Investigate global demand for education-as-a-commodity.

Education System Basics

Returns to Education: There is a large return to education; those with a high school education tend to make far less than those with a bachelor's degree and up. Perceived value of being more education in private or public market.

Labor Market Outcomes: The more educated you are, the more likely to have a job; unemployment rates for high school graduates are higher than unemployment rates for college graduates.

Public Spending: Approximately 5–6% of GDP is spent on education in most OECD countries.

Funding Structure: Public schools are primarily funded through state and local governments — property taxes the largest source of funding for education, but federal government has started to fund more schools in recent years.

Growth of Education over Time: Claudia Goldin's 1993 paper "The Human-Capital Century and American Leadership" shows that the 20th century was really the century of greater and greater access and attainment in education.

Why Do We Get Educated?

Human Capital

What is human capital?

- Labor.
- Complexity or efficiency of work.

How does human capital differ from capital?

- Less static.
- Differential depreciation — potential for appreciation (people can skill up).
- Higher variance.
- Unionization/collective bargaining.
- Idea generation.
- Potentially greater mobility.
- Returns to human capital come in the form of wages — human capital is owned by the human that holds it.
- Cannot be collateralized.
- Divisibility (or lack thereof).

Education: how much?

Discrete Model: To college or not?

- Direct costs: tuition, room and board.
- Indirect costs: foregone earnings.
- Returns: expected future earnings (requires college degree or not).

We will assume that "college" is period 1, and college grads earn more post-college, and there is a discount rate r.
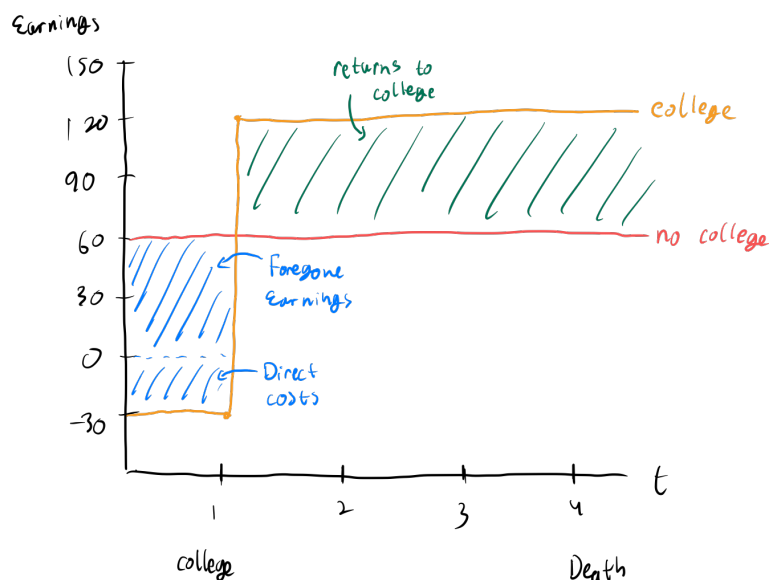
The discount rate of \$100 in $t > 0$ periods is worth $\frac{100}{(1+r)^t}$ in period 0 (aka today).

We generally think about r in terms of the interest rate — money today is worth more than money in the future due to the ability to invest.

The *present value* of a stream of money is found as follows:

$$\text{PV} = \frac{100}{(1+r)} + \frac{100}{(1+r)^2} + \cdots + \frac{100}{(1+r)^n}$$

$$= \sum_{t=1}^{n} \frac{100}{(1+r)^t} \tag{1}$$

$$(1+r)\text{PV} = 100 + \frac{100}{(1+r)} + \cdots + \frac{100}{(1+r)^{n-1}}$$

$$= 100 + \sum_{t=1}^{n-1} \frac{100}{(1+r)^t} \tag{2}$$

$$(1+r)\text{PV} - \text{PV} = 100 + \sum_{t=1}^{n-1} \frac{100}{(1+r)^t} - \sum_{t=1}^{n-1} \frac{100}{(1+r)^t} - \frac{100}{(1+r)^n} \tag{2} - \tag{1}$$

$$r\text{PV} = 100 - \frac{100}{(1+r)^n}$$

$$\text{PV} = \frac{100}{r}\left(1 - \frac{100}{(1+r)^n}\right)$$

As n becomes larger, then the PV of the asset is larger. For example, if $n = 40$, $Y = 60,000$, and $r = 0.05$, then the PV of this revenue stream is approximately \$1 million.

Bringing this to the model, where F denotes direct tuition cost, Y_0 denotes earnings with no schooling, and Y_S denotes earnings with schooling (where school occurs in period 1).

$$\text{PV}_0 = \frac{Y_0}{(1+r)} + \frac{Y_0}{(1+r)^2} + \cdots + \frac{Y_0}{(1+r)^n}$$

$$\text{PV}_S = -F + \frac{Y_S}{(1+r)^2} + \cdots + \frac{Y_S}{(1+r)^n}$$

$$\text{NPV}_S = \text{PV}_S - \text{PV}_0$$

$$= \underbrace{-F - \frac{Y_0}{(1+r)}}_{\text{Cost}} + \underbrace{\sum_{t=2}^{n} \frac{Y_S - Y_0}{(1+r)^t}}_{\text{Benefit}}$$

$$= -F - \frac{Y_0}{1+r} + \frac{Y_S - Y_0}{r} \left(1 - \frac{1}{(1+r)} \right) \frac{1}{1+r}$$

To find if education is worth it, we calculate if $\text{NPV}_S > 0$.

Continuous Model (or Mincer Model): To take an extra year of education or not?

- S is a discrete, integer choice (denoting a year of education).
- Y_S is salary after schooling for S years.
- There are zero direct costs of school.
- Years in labor force, K, are equivalent regardless of S.

We choose S where marginal benefit is equal to marginal cost.

$$\text{PV}_S = \text{PV}_{S+1}$$

$$\sum_{t=1}^{K} \frac{Y_S}{(1+r)^t} = \sum_{t=2}^{K+1} \frac{Y_{S+1}}{(1+r)^t}$$

$$\frac{Y_S}{r} \left(1 - \frac{1}{(1+r)^K} \right) = \frac{Y_{S+1}}{r} \left(1 - \frac{1}{(1+r)^K} \right) \frac{1}{1+r}$$

$$Y_S = Y_{S+1} \frac{1}{1+r}$$

$$1 + r = \frac{Y_{S+1}}{Y_S}$$

We choose school until the marginal rate of return is equal to the discount rate.

Housekeeping, January 30: Schedule for discussion and presentation is located at this link, and the guidelines for classroom activities are located at this link.

Educational Landscape

The human capital system consists of a number of components.

- Trade, technical, and vocational education (generally falls under post-secondary education)
- Early childhood education — Ages 6 weeks–5, includes day care and pre-K
- Primary education — Ages 5–12, Grades K–5/6

- Secondary education — Ages 12–18, Grades 6–12

- Post-secondary education — two year/community college, four year college

- Graduate education — profession-oriented (MBA, JD), research-oriented (master's, PhD), certification (CPA, CFA, actuarial credentialing)

- Adult education (GED, college)

In primary and secondary education, primary choice facing consumers of education is between public and private education.

Human Capital Model: Choice of Schooling Quantity

The human capital model indicates that consumers of education choose their amount of schooling, S, based on the following factors:

- Discrete: Y_S (income from having been schooled) vs Y_0 (income without schooling)

- Continuous: $\frac{Y_{S+1}}{Y_S}$ (marginal rate of return from schooling)

- F (the cost of schooling)

- r (discount rate)

However, this leads us to ask an important question — why might S differ?

- Differing (marginal) rates of return — job-specific factors, overqualification, ability, quality of education

- Different cost of education — borrowing, aid, credit constraints

    Comment: Credit constraints increase exponentially as quantity of schooling increases.

A model of credit constraints' effects on choices of education can be seen as follows:
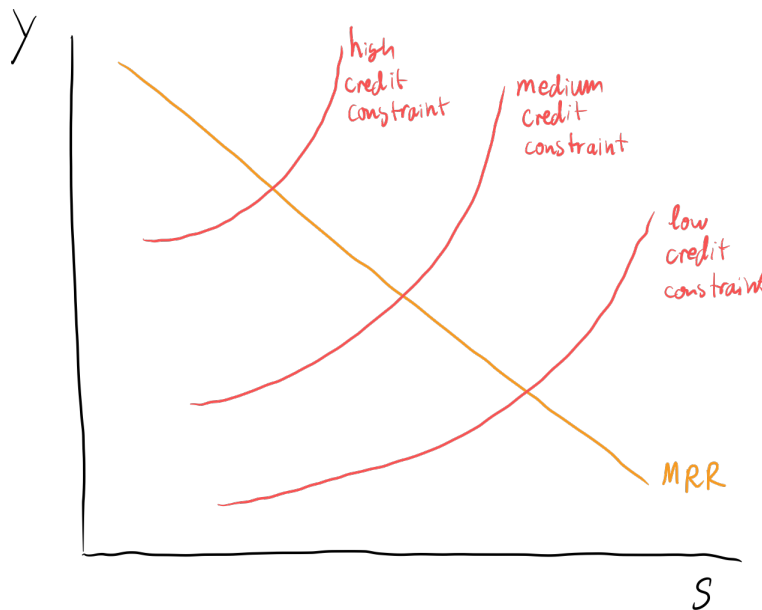
Broadly speaking, if S differs because of marginal rate of return, then subsidies may be inefficient — subsidies will cause inefficient excess schooling.

However, if S differs because of cost, then subsidies improve overall output and efficiency.

Signaling

The basic idea behind the human capital model is that by getting more educated, you become smarter and have a higher rate of return — regardless of whether or not you get a degree. Now, we will discuss a model where schooling does not indicate one's level of smartness.

Assumptions:

(1) No human capital accrued at school.

(2) Two types of workers: low ability (L) of proportion p with productivity 1 and high ability (H) of $1 - p$ with productivity 2.

(3) Cost of education is lower for type H. For type L, the cost of education is c, and for type H the cost of education is $c/2$.

(4) Generic employer who, if they distinguish H and L, pay marginal benefit — wage to L is 1, wage to H is 2.

(5) If the employer cannot distinguish between H and L, then they pay the expected marginal benefit, $(1 - p)(2) + (p)(1) = 2 - p$.

Game Play:

- Employer forms belief $w(S)$ about the worker productivity
- Employer sets $w(S)$
- Workers observe $w(S)$ and decide on S
- Workers are hired and firms observe their productivity

Types of Equilibria:

- Separating equilibrium: a situation where H chooses education and L does not choose education. In this case, education serves as a pure signal of high productivity — there is no separating equilibrium where H chooses no education and L chooses education.

- Pooling equilibrium: all workers choose education, and the employer cannot differentiate, meaning the employer pays $2 - p$ to all workers.

Finding a Separating Equilibrium: We assume that there is a separating equilibrium — H chooses $S = 1$ and L chooses $S = 0$. Then, the employer forms beliefs to set a wage structure as follows:

$$w(S) = \begin{cases} 2 & S = 1 \\ 1 & S = 0 \end{cases}.$$

In order to be an equilibrium, both H and L types need to have an incentive not to deviate.

- H Type Equilibrium Condition: Return to education is higher than return to non-education.

$$2 - \frac{c}{2} > 1$$
$$c < 2$$

- L Type Equilibrium Condition: Return to non-education is higher than return to education.

$$1 > 2 - c$$
$$c > 1$$

Therefore, if $c \in (1, 2)$, we can find a separating equilibrium.

Finding a Pooling Equilibrium: We assume that there is a pooling equilibrium where all players are educated — H chooses $S = 1$ and L chooses $S = 1$. Then, the employer forms beliefs to set a wage structure as follows:

$$w(S) = \begin{cases} 2 - p & S = 1 \\ 1 & S = 0 \end{cases}$$

In order to be an equilibrium, both H and L types need to have an incentive not to deviate.

- H type equilibrium Condition: Return to education is higher than return to non-education.

$$(2 - p) - \frac{c}{2} > 1$$
$$c < 2 - 2p$$

- L type equilibrium condition: Return to education is higher than return to non-education.

$$(2 - p) - c > 1$$
$$c < 1 - p$$

Therefore, so long as $c < 1 - p$, both types of employees will choose education over non-education. Essentially, if the cost of education is very low, then everyone will choose education.

Working through a similar set of logic, we can also find a sufficient c such that everyone chooses no education.

$$w(S) = \begin{cases} 2 - p & S = 0 \\ 2 & S = 1 \end{cases},$$

if $c > 2p$. Notice that both of these pooling equilibria are more likely to exist the higher proportion of H types.

Signal vs Index

- Signal: implicit assurance of skill or quality, chosen by worker, not readily apparent. Examples include education levels.

- Index: worker cannot control said assurance of skill or quality, but predetermined, generally a source of discrimination. Examples include disability, race, gender, and age.

The signaling model starts with employers offering different wages based on a signal — the signal is something a worker has some level of control.

However, the signaling model could also be thought of as an indexing model (by varying parameters p and c while equalizing productivity). Essentially, the signaling model is about a legal form of discrimination (education-based discrimination), but we can apply it to illegal forms of discrimination.

Human Capital and Signaling Model: Features

Human Capital	Both Models	Signaling Model
positive externalities	inequality	pure private returns
education is efficient		education is inefficient

Claudia Goldin: The Human-Capital Century

- The 20th century was the century where people became educated — early on, few people even had a primary education, but now, the vast majority of people obtain secondary school.

- Education is democratic.

    - Democracy is a government by the people, for the people.
    - Power is not vested by God or inherent in blood, but governance comes from the consent of the governed.
    - Public demand for education leads to more education being delivered.
    - Education provides both skills and time to create better citizens.

- Virtues: egalitarianism, forgiveness (possibly changing), separation of church and state.

- Primary education was very common across the rich world, but secondary education was far more common in the United States than other countries.

- Specifically, American secondary education was about *general* education (algebra, writing, reading comprehension, etc.), not merely vocational or technical training. The European system is much more heavily tracked.

- Idea that one would spend years 10–18 in education began in the United States. Adults were better able to establish themselves in the new economy, and the underlying structures were exported to the rest of the United States.

- European systems developed out of monarchy/aristocracy, leading to deterministic ideas of the demands of the economy.

- Decentralized American education system — curriculum followed the economy, rather than determined for the economy.

- The standards for general education developed around a pure method of approach towards problems.

- Rise of large corporations generated large need for management, idea generation, communication — had to do HR, accounting, etc. at a scale never seen before. Skills were meant to be portable and transferable, which the decentralized American education system satisfied the demand for.

Understanding Causality

When discussing questions in economics, there are two basic approaches:

- Theory: models (as discussed in our model of human capital and the signaling model).

- Empirics: using data to understand the dynamics of the world.

For example, we may want to understand the impact of a good teacher in the role of educational success through different measures:

- Pass rates or graduation rates.

- College entrance rates.

- Test scores.

- Earnings.

We can think of each of these as our Y_i, our outcome variable of interest. At the same time, we have to measure the quality of a teacher, X_i, through different mechanisms:

- Education

- Course Evaluations (with adequate controls for race and gender)

- Subject

Defining Causality

The impact of variable A *causally* affects variable B as the change in B if A, and only A, is altered. Causality is usually defined using a counterfactual.

In the case of education, for Y_i, student i's outcome, with Y_{1i} for an outcome for a student with a good teacher and Y_{0i} for a student with a bad teacher. We define D_i, our dummy variable, as 1 if the teacher is good and 0 if the teacher is bad.

$$Y_i = Y_{0i} + D_i \underbrace{(Y_{1i} - Y_{0i})}_{\text{treatment effect}}.$$

Potential Outcomes Framework

- What does a researcher observe? We assume $N > 1$. In this case,

$$E(Y_{1i}|D_i = 1) - E(Y_{0i}|D_i = 0) = \text{ observed difference of } D_i = 1$$

$$= \overbrace{E(Y_{1i}|D_i = 1) - \underbrace{E(Y_{0i}|D_i = 1)}_{\text{counterfactual}}}^{\text{Average Treatment Effect (impact of good teacher)}}$$

$$+ \overbrace{\underbrace{E(Y_{0i}|D_i = 1)}_{\text{counterfactual}} - E(Y_{0i}|D_i = 0)}^{\text{selection bias}}$$

Therefore, we can see that the observed difference is a function of treatment and selection bias. The most difficult part of empirical research is finding situations where selection bias is as close to zero as possible.

In regression analysis, we might have the model that states

$$\text{score}_i = \beta_0 + \beta_1 \text{TeacherQuality}_i + \varepsilon_i.$$
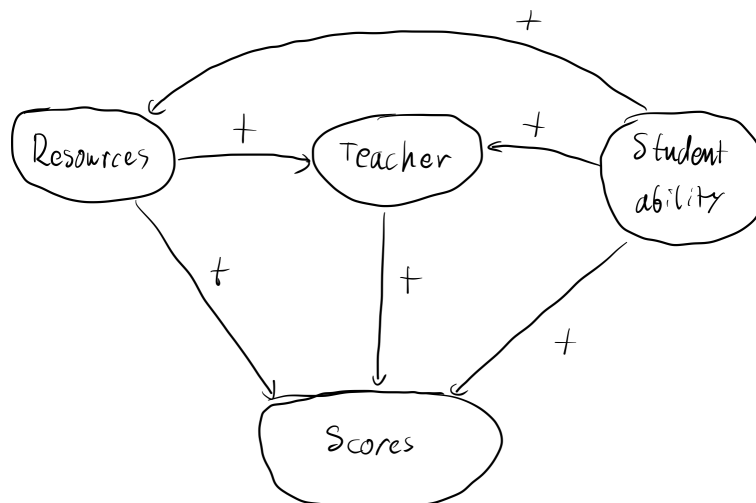
Suppose that teachers matter — even then, there are other variables, such as resources or intrinsic ability. The diagram depicts the various ways that selection bias can create positive correlation.

In this case, $\hat{\beta}_1$ will be biased by selection. This is known as omitted variable bias, and violates the principle that $\text{Cov}(X, \varepsilon) = 0$.

To resolve this, we may update our regression model to control for the omitted variable of resources, denoted Z.

$$\text{score}_i = \beta_0 + \beta_1 \text{TeacherQuality}_i + \beta_2 \text{Resources}_i + \varepsilon_i$$
$$\text{observed effect} = E(Y_{1i}|D_i = 1, Z) - E(Y_{0i}|D_i = 1, Z) + \underbrace{E(Y_{0i}|D_i = 1, Z) - E(Y_{0i}|D_i = 0, Z)}_{\text{selection bias}}.$$

However this still leaves out other omitted variables (such as parental involvement). As we add more control variables, selection bias should reduce. All these control variables exist to mitigate selection bias and make a non-experimental setting as close to an experiment as possible.

There are a few major ways to identify causality:

(1) Experiments

(2) Instrumental Variables

(3) Difference-in-difference

(4) Regression discontinuity

(5) Panel data

Experiments

The "cleanest" way to

- Identify a Target Population.

- Randomize Population.

    – Treatment group experiences condition.
    – Control group does not experience condition.

- Experiments have the following desirable properties:

    – Internal Validity: $E(\varepsilon|X) = 0$ (error is uncorrelated with independent variable)
    – Randomness

- However, true randomness is difficult to attain. The ABCs of experiments also threaten internal validity.

    – Attrition: individuals drop out of experiments.
    – Balance: distribution of covariates may not be the same across groups.
    – Compliance: not everyone assigned to a treatment may experience it.

- There are also other limits:

    – Feasibility: expense, time, or even full impossibility.
    – Ethics: some experiments may pose ethical issues
    – External validity: experiments may only provide insights to specific situations.

- Threats to internal validity:

  - Poor randomization
  - Experimental contamination
  - Response rate, compliance
  - Attrition

- Threats to external validity:

  - Non-representative sample
  - Treatment depends on experiment
  - Excessive controls, Hawthorne effect
  - Scalability

Many experiments in the economic literature occur through lotteries.

- Project Star: randomly assigned students to teachers and class sizes.

- Perry Preschool: balanced lottery for access to early childhood education.

- Expanding Opportunities Project: lottery for access to mentoring for high school students and college resources.

Carrell et al.: A's from Zzzz's? The Causal Effect of School Start Time on the Academic Achievement of Adolescents

- Why might we be skeptical of a paper without the controlled environment inherent at USAFA?

  - Student choice.
  - Grading style.
  - Teacher quality, teaching style, teacher tiredness, experience based on time period.
  - Student selection into teachers.
  - Commutes.
  - Extracurriculars and physical fitness.
  - Food and energy.
  - Study habits.
  - Circadian rhythm.
  - Cheating.
  - Day of week.

- What is special about the USAFA?

  - Common exam timings.
  - Course difficulty held constant.
  - Mandatory breakfast.
  - Grading styles held constant.
  - No choice in schedule.
  - No commutes.
  - Physical fitness requirements.

- No zero period classes.

- Teachers are randomized.

From a policy perspective, if the problem is time of day, then shifting schedules will do a lot of good. However, if the problem is being driven by sleep, then shifting time of day may not increase benefits all that much.

- How do they get to causality? Generally, we need variance in X to find $\hat{\beta}_1$.

  - Shifting of schedules.

  - Block schedule that is not constant on day of week.

- External Validity?

  - The fact that attendees to the academy opt into the particular regimentation, and yet their outcomes for morning classes are so negative, suggests that the effects are actually larger than seen in the paper.

Quasi-Experimental Causality

In the Carrell et al. paper, rather than an experiment, they used a "good" regression (essentially, a substantial set of randomization). However, now, we will examine three different methods of quasi-experimental causality.

Difference-in-difference:

- Used in: analyzing results of natural experiments.

- Need: treatment variable, "pre" and "post" data on the same observations, two dummy variables and an interaction term. Control variable needs to be credible as a counterfactual.

- Can: provide credibly causal estimates that remove omitted variable bias, if used right.

- Example:

  - Rosenwald initiative: some counties received money for school construction, others did not; counties that received money were similar to those that did not. Counties that got schools ended up with higher increase in literacy than those that did not receive schools. The treatment effect accounts for the gain in literacy *relative to counterfactual.*

- Benefit of difference-in-difference is that it's okay for the samples to be unbalanced. All we need is believing both groups were trending in the same direction, which is a weaker assumption, known as the parallel trends assumption.

Instrumental Variables:

- Used in: dealing with omitted variable bias.

- Require: fluke or randomness in source of causality that is not correlated with error.

- Example:

  - Hurricanes in Puerto Rico caused schools to become more crowded close to the path of the hurricane.

  - Use Z_i to isolate part of class size that is only due to storm to obtain unbiased effect of class size on test scores.

Regression Discontinuity:

- Arbitrary cutoff, hard or impossible to manipulate.

- Observations below cutoff do not receive a treatment, observations above cutoff do receive a treatment.

- Jump at the cutoff suggests credibly causal effect of treatment.
- Strong external validity.
- Examples:
  - PSAT: hard to control whether under or over threshold of National Merit Scholarship. Results suggest effect of receiving money is quite positive.
  - Head Start: based on Congress's design, the poverty line cutoff suggests we can examine results based on counties just below or above the cutoff.

The Market for Education

Education productivity: What, in our experience, has increased our education productivity?

- extracurriculars (sports, paper, clubs, etc.)
- peer pressure
- productive procrastination
- siblings
- jobs/internships (skills, selection, etc.)
- literacy
- food, recess
- problem sets and hands-on practice
- "the grind"
- time management

Today is effectively a recap of intermediate microeconomics, applying towards education concepts.

Supply: Schools or teacher labor hours.

Demand: Students.

Externalities: Positive externalities? Negative externalities?

- Positive spillovers from higher education — higher innovation, better functioning (political institutions), higher total factor productivity.

Market Competition: Cases for high vs. low market concentration.

- Some competition (public vs. private school).
- If one does not have the means to afford private school, often have one choice of school to send child to — moving has high costs. Lots face a monopolistic market.
- Paradigm primarily applies toward primary education.

Asymmetric Information: Asymmetric information occurs when the supplier or demander of the education doesn't know the answer.

- Quality of school or teacher is often hard to measure.
- Schools may be terrible but that news may not be available to the students.

Natural Monopolies: Often lend themselves to government regulation.

- Electricity transmission: very high fixed cost, very low marginal cost.

- Education can also be thought of as a natural monopoly. Extremely expensive to develop a new school, but (relatively) low cost to enroll a new student. Transportation costs also increase the cost of switching.

Economies of Scale: Declining costs, increased returns to scale.

- Large public universities tend to spend much less per student than small colleges.

Tracking or Stratifying: different lanes or tracks, ones that aren't obtained early enough are closed off.

- Certain opportunities may be forever closed if you didn't obtain a certain math class in 7th grade.
- Higher education is a bit of a tracking system too.
- Tracking in education increases the older one is.

Suppliers:

- Public: state or local government.
- Private non-profit: parochial school, secular private schools.
- Private for-profit: most common for higher or adult education.

Government Involvement: Education is quite like the electricity or healthcare market — asymmetric information, high costs to switching, extensive public involvement.

- Argument for public provision: positive externalities tend to be underfunded.
- Feature of public provision: subject to intervention (Brown v. Board, No Child Left Behind, Serrano v. Priest).
- Almost $1 Trillion per year is spent by local and state governments on education, approximately $200 billion per year is spent by the federal government, 50% of which is spent on K–12 education. There has been a trend towards greater centralization of education finance.

Inputs:

- In micro, we have a utility function, $U(X_1, X_2)$.
- Demand for education: student production function.
- Supply for education: school production function.
- We will refer to a general education production function $y = f(x_1, x_2)$.

  We often assume that the production function is linear.

  $$y_i = \beta_0 + \beta_1 x_{1i} + \cdots + \beta_K x_{Ki} + \varepsilon_i$$

  Linearity is not necessarily justifiable — learning new things is hard, and certain skills (such as literacy) are often more valuable than other skills.

  We can also think of education production in a value-added model.

  $$y_{it} - y_{it-1} = \beta_0 + \beta_1 x_{1it} + \cdots + \beta_K x_{Kit} + \varepsilon_{it}$$

  However, the problem with the input model is that we can't really measure or control a lot of these factors (like parental involvement).

Outputs:

- Students with education.

- Research.

Hedonic Approach:

- Price tells all (i.e., the value is what people are willing to pay).
- Valuation of non-market amenities is capitalized into the value of houses.

Broad Trends on Education Spending:

- America has roughly 18K school districts.
- There are approximately 50 million students, with average spending 18K per student, meaning we spend approximately 900 billion per year.
- Education spending per pupil (in today's dollars) has expanded quite a bit since the 1940s.
- Reasons for increased spending:
  - Infrastructure is more expensive.
  - Human labor hours are more expensive.
  - Economical to invest more in educating children.

Local Spending:

- Tradition has been through property tax paid for by homeowners and businesses.
- Trend over time has been towards centralized public spending; federal sources make up approximately 10% (mostly Title I and Free/Reduced Price Lunch). States tend to spend money through income tax, sales tax, excise tax, etc.
- Serrano v. Priest: fully local funding is unconstitutional. Between 1971 and 2010, 47 states adopted some form of finance equalization policy.

Forms of State Aid: States support school funding through using state tax money to shift budget constraints in the locality ($B = X + R$).

- Block grant: unconditional funding for district.
- Matching grant: funding for district proportional to its spending.
- Categorical aid: funding for particular classes of students (low-income, special needs).
- Equalization aid: directly aimed at reducing financial inequities at the district level.

Lori L. Taylor: Government's Role in Primary and Secondary Education

- Migration through high schools — what happens after? Brain drain: people who get educated in a community leave for a different location.
- In-migration of educated people has a tendency to yield *decreased* education spending; while the questions in the paper are still relevant, the paper still deals with data limitations.
- Rationales for government spending:
  - Market failure.
  - Externalities.
  - Altruism.
  - Alternatives: cultivating virtues.
- Paper takes for granted that there is a private return to education. The question is whether or not the government should be involved.

- Second-best externalities as a rationale: higher education leads to higher incomes, which leads to higher tax revenue and amenities. If the marginal tax dollar is a positive return, and education has a positive return on taxes spent, then private returns to education do not reflect social returns.

- First-best externalities: spillovers lead to higher productivity, reduction in crime (since you're preoccupied with school). However, education outside of its role as preoccupation does not indicate that education has benefits.

- Corrective policies:

  - Market failure: ensure that financing options for education are of similar price to other forms of loans.

  - Externalities: the government should subsidize education proportional to the size of the externality. Since the private return to education is high, suggests that most of the payment for education should fall on parents.

  - Altruism: society should transfer resources, but does not imply that the government should operate education.

- Benefit to public education vs. access to education.

  - Currently, education access is based around public school districts.

  - Alternative may include voucherization: every school has a price, give every child a voucher for reimbursement of certain amount of cash. Potentially more efficient.

  - Voucherization leads to the question of how much power should parents have over their children's education.

- Parental involvement in (primary and secondary) education:

  - In favor: it's very hard to make an argument against parental control without it spiraling into a lot of authoritarianism.

  - Implication is not in favor of tax-supported, government-run public education.

  - However, there are a lot of arguments against the idea of near-full parental control over children's education.

- Potential outcomes framework:

  - There's a lot of stuff that we're doing today that is mostly due to path dependence. It's nearly impossible to imagine a world without a lot of public education.

  - This paper brings the argument that core economic arguments do not necessarily lead you to the model of education that we have today.