Why and How Should the Government Subsidize Education?

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Human Capital Model

To keep things simple and flexible, lets use the following version of the human capital model

2 periods

- everyone goes to school in the first
- works in the second

Can buy school quality

Lets call this q as a shorthand for $\psi(I_0)$

We will also ignore initial human capital

Then human in period 2 are just $h(q)$

where as before

$$\begin{aligned} \frac{\partial h(q)}{\partial q} &> 0 \\ \frac{\partial^2 h(q)}{\partial q^2} &< 0 \end{aligned}$$

Thus we can write the problem as

Max

$$u(C_0) + \delta u(C_1)$$

subject to budget constraint

$$C_0 + \frac{1}{1+r} C_1 \leq -q + \frac{1}{1+r} R_1 h(q)$$

Solving for first order conditions we get

$$1 + r = R_1 \frac{\partial h(q)}{\partial q}$$

Government Involvement

Think about this human capital model.

- People got a personal benefit from investing in human capital
- They choose to invest to maximize their present value of earnings

So why should the government get involved in education?

In the simple model there is no real reason

People will make the “right choice” to maximize their own earnings.

If we want to argue that the state should intervene, then there must be something wrong about the model (or at least we are abstracting from other important components)

I am not going to argue that governments shouldn't be involved

Quite the opposite-I want to go through reasons why they should

Clearly governments are very involved in education but why?

I will go through a number of reasons. They are definitely not mutually exclusive.

To some extent the reason I want to take you through this thought exercise is because as a policy issue the way we deliver education should depend on why we subsidize it.

Policy Options

Here are different policy options that are available:

- Public Provision of Education
- Public Funded (but not provided)
- Truancy Laws
- Subsidized Loans
- Higher subsidies for low income families
- Higher subsidies for smartest kids

Borrowing Constraints

In the human capital model of schooling people maximize the present value of earnings

However suppose they couldn't borrow at all

Recall that the budget constraint is

$$C_0 + \frac{1}{1+r} C_1 \leq -q + \frac{1}{1+r} R_1 h(q)$$

We would have quite a problem in period 1

More generally we could allow individuals face personal borrowing rates that are higher than the market rate

The higher is the interest rate that they face, the lower quality school they chose

$$1 + r = R_1 \frac{\partial h(q)}{\partial q}$$

Why might interest rates be higher than the market rate for some people in the population?

- The problem is that human capital is not collaterizable
- If you borrow money for a house or car, but then default on the loan, they take your house or car
- How would you do that with human capital?

- In particular, could kids from low income families borrow money for private schools?
- Government might be able to do a better job of keeping people from defaulting
- Might not mind if a few people default because there is great benefit to those that don't

Should this lead to public provision of education or subsidized loans?

Non-optimal Choices

We have essentially assumed in the model that people choose the level of education that best suit them.

There are a number of different reasons why students might not do what is best for themselves

Agency

- We are assuming that a child maximizes the present value of his/her earnings
- However, it is often the parents that make the schooling decision rather than the child
- Parent doesn't necessarily have their children's best interest in mind
- In some ways this is a borrowing constraint-if parents could borrow against their kids future income, they would and this would solve the problem

- However, it may be hard to get them to pay it back
- This may be a relatively more important factor in developing agricultural cultures than in the present day developed countries
- Might also be true for a small number of kids in developed countries; but we don't want to punish them for their parent's mistakes

Irrationality

Simply put we have assumed that people put their own best interests first, but that may not be the case

In this case we might think students do not think into the future as much as they should

This is obviously the case for little kids

Lack of Full Information

Could be the case that students and their parents would act in their best interests if they knew the value of “return to education”

However, they do not realize how large it is. That is they don’t know $h(q)$.

Its not clear that public provision of education is really the right thing-more like an information campaign

Insurance

College is a “Risky” investment

By publicly providing it we are helping pool the risk

Example

Lets take an extreme example

As before assume a two period model

To keep things simple assume that

$$\begin{aligned} w &= 1 \\ r &= 0 \\ q &\in \{0, 1\} \end{aligned}$$

Think of $q = 0$ as high school graduate and $q = 1$ as college.

Suppose that

$$h(0) = 1$$

Then the present value of earnings you would get as a high school graduates is

$$-0 + \frac{1}{(1+r)} R_1 1 = 1$$

Now lets complicate college by assuming that people do not know the value of $h(1)$ when they decide whether to go to college

With a 50% chance they don't learn anything so that

$$h(1) = 1$$

but with a 50% chance they learn a lot so that

$$h(1) = 6$$

Notice then that with a 50% chance the present value of earnings is

$$-1 + \frac{1}{(1+r)} R_1 1 = 0$$

and with a 50% chance it is

$$-1 + \frac{1}{(1+r)} R_1 6 = 5$$

In this case (without insurance markets) people would probably never choose to go to college because the bad draw is disastrous

However society would be better off if everyone went to college because average productivity of workers would be 3.5 rather than 1

The government providing public education would provide a way of pooling the risk

The easiest way to think of implementing this is to allow repayment of loans to depend on income. There is a lot of discussion of this. Another idea is for people to buy equity in students.

Could a private firm do the same thing?

Externalities

It well might be that the “social return to education” is higher than the “private return to education.”

It is important to point out that not all interactions are externalities

- I got a lot of education in economics
- Presumably that makes me better at teaching economics
- Hopefully, my students benefit from this
- However, this is not an externality because they pay tuition to get educated faculty and Wisconsin pays me to be educated
- Whether something is an externality or not depends on whether their is a market to compensate them for all of the benefits

To formalize why you get inefficiency suppose that R_1^p is the individual private value of human capital but R_w^s is the societal value.

Optimal case is:

$$1 + r = R_1^s \frac{\partial h(q)}{\partial q}$$

However solution is:

$$1 + r = R_1^p \frac{\partial h(q)}{\partial q}$$

Thus we will get underprovision of human capital.

We will go through a number of differently types of externalities

Functioning in Society

Society will work better if everyone has a certain level of education

- Sign on my lawn saying “KEEP OUT”
- Men’s Room Sign in a restaurant
- People can read Tax Forms
- Guy in front of you in the grocery line knows how much money he has in his wallet and how much he will have to pay

Without some basic skills, people would not function well in our society

How big a deal do you think this is?

Voting

Quite simply: we live in a democracy

You don’t want the people voting for your representative to be stupid

We could require people to achieve a certain level of education before voting.

What are the issues with that?

Innovation

This is quite important and you really heard about it earlier

Think about the inventions of

- The telephone
- The light bulb
- The atom bomb
- The microchip
- The mouse
- The Ipod
- Instrumental Variables

These things clearly make people off (well maybe not the atom bomb-but it is certainly better if your country has it then if everyone else does)

However, are they externalities?

Certainly the inventors got something monetarily out of this

But almost certainly not nearly enough as the value of this to society

Crime

Crime is clearly an externality :

The actions of others affect you and they are not negatively compensated

If you look at the raw data there is an extremely strong relationship between crime and education

At least three reasons:

1. **Pure Human Capital Motive:** Education related to income, and people with higher income have less incentive to commit crime
2. **Direct Schooling Effect:** Schools makes kids smarter so the realize that “Crime Doesn’t Pay”
3. **Opportunity cost of time:** Kids are busy in school so actually have less time to commit crime.

Clearly this effect is here, but is this really all that important an effect?

Social Responsibility/Common Values

People talk about civic duty here

When U.S. was founded we had a whole bunch of immigrants with different backgrounds and cultures

Public education was a way of getting people to have “common values”

Not so clear that this is important today

I am not sure if there are equivalents of this in other countries

Redistribution/Equity

Clearly redistribution is an important component of the government

There is a feeling in society that all people should start from an equal footing

But, why should we redistribute through education?

Why not just give young people money?

I can think of two reasons:

Efficient Redistribution

You may really need to combine redistribution with something else from above

In particular, if you want to redistribute to kids

And-you are worried that parents won't make the best decisions for their kids

Then providing education rather than money might be a good thing

Solution to Moral Hazard Problem

We know that while redistribution is desirable it typically distorts incentives.

It has a clear effect on education: people should want to invest less in education

You can see this even with proportional taxes.

Suppose the tax level is τ and that tuition is not deductable, then wage is essentially $(1-\tau)\,w$ so you get first order condition

$$1 + r = (1-\tau)\,R_1 \frac{\partial h(q)}{\partial q}.$$

This yields under-investment in education.

This problem is actually pretty easy to fix: we could allow one to deduct q from their taxes to get the budget contraint

$$C_0 + \frac{1}{1+r} C_1 \leq -q(1-\tau) + \frac{1}{1+r} R_1 h(q)(1-\tau).$$

In this case τ would not affect the first order condition for educational quality.

However, with progressive taxes the problem becomes much worse: the more you invest in education the higher is your tax rate.

Providing public education (or requiring it by law) is one way to get around this

This is like an externality-if someone chooses to obtain less education they will pay less in taxes and may receive more social benefits

Multiple Equilibrium

This is somewhat like externalities, but not quite.

Suppose I live in a village with two workers (per generation) *a* and *b*

We will consider different production functions using the worker's human capital

Suppose the production function of output in the village in terms of human capital is

$$\theta h(q_a) + \theta h(q_b)$$

where q_a and q_b are the school quality of person a and b respectively and θ is a parameter

In this case the worker will make a human capital decision to maximize productivity.

If markets are efficient we will get

$$R_1 = \theta$$

and

$$1 + r = \theta \frac{\partial h(q)}{\partial q}.$$

The planner would choose q_a and q_b to maximize

$$-q_a - q_b + \frac{1}{1+r}\left[\theta h(q_a) + \theta h(q_b)\right]$$

This gives

$$1 + r = \theta \frac{\partial h(q_a)}{\partial q} = \theta \frac{\partial h(q_a)}{\partial q}.$$

However suppose the production function of the village is Leontief

$$\theta \min \left\{ h\left(q_a\right), h(q_b) \right\}.$$

In this case society maximizes

$$-q_a - q_b + \frac{1}{1+r}\theta \min \left\{ h\left(q_a\right), h(q_b) \right\}$$

which gives the solution

$$1 + r = \frac{\theta}{2}\frac{\partial h\left(q^*\right)}{\partial q}.$$

However consider worker a : his marginal product is

$$\begin{array}{rcl} \theta \text{ when } q_a & < & q_b \\ 0 \text{ when } q_a & > & q_b \end{array}$$

If a and b can not coordinate ex-ante there are many equilibrium with inefficient (social) human capital investment.

To keep things simple suppose that workers are randomly matched and just split the value of the product in half. Then

$$R_1 = \begin{cases} \frac{\theta}{2} & q_a < q_b \\ 0 & q_a > q_b \end{cases} .$$

Thus one can get any equilibrium with underprovision of education.

You will never get overprovision of education. Since q^* is optimal. If $q_b > q^*$, individual a could still choose the optimal value with

$$1 + r = \frac{\theta}{2} \frac{\partial h(q_a)}{\partial q}.$$

Clearly the government can solve this problem and get to the best equilibrium

Could a private firm do the same?

Holdup Problem

Suppose there is a monopsony firm that makes a take it or leave it offers.

Your value of leisure is ω_0 and that does not depend on your level of education

The firm will pay you a wage of ω_0 regardless of your level of education $\Longrightarrow$ **you have no incentive to get educated**

Weaker versions of this might give you no education rather than no education

Final Thoughts

- With Basic Human Capital Model no need for Government
- There are many reasons why government might step in
- The type of policy you pick depends on the main reason for doing it