Economics 623  
Human Capital: Lecture 3  
Spring 2012

There is a large literature that attempts to estimate the “return to education.” However, it does not attempt to calculate the internal rate of return. That calculation requires more information than is usually available, importantly the direct cost of college, net of financial aid and the length of schooling. The common approach is to estimate a regression with earnings or log earnings as the dependent variable and years of schooling and other demographic characteristics \( x_i \) (age, sex, race, region of country) as controls:

\[
\ln(y_i) = \beta s_i + (x_{i1}\gamma_1 + x_{i2}\gamma_2 + \cdots + x_{iK}\gamma_K) + u_i
\]

\[
\ln(y_i) = \beta s_i + x_i'\gamma + u_i
\]

Where \( s \) is years of schooling, \( x_i \) is the vector of demographic or other personal characteristics, and \( u_i \) is the disturbance term and represents the influence on log earnings of all other factors.

Interest centers on \( \beta \) as it is the percent increase in earnings for each additional year of schooling. The best available evidence suggests that \( \beta \) equals about 0.1, or 10%. Is this an IRR? No! It says only that earnings increased by \( \beta \) percent for each year of schooling.

Put data problems aside, and assume we have unbiased measures of \( y_i, s_i, x_i \). Why might estimating the casual relationship between years of schooling and education be difficult? Remember, OLS will yield causal interpretation only if schooling is randomly assigned, or that \( E[s_i u_i] = 0 \).

What might be in \( u_i \) that we may not have controlled for (as I have not said much about what’s in \( x_i \)) but should?

Two important factors come immediately to mind: ability of the individual and quality of school inputs. Recall that we think of earnings as the product of the level of human capital times the market rental rate of human capital, \( y_i = w_i H_i \). Human capital depends schooling, experience and initial endowments. We are not created equal, some are more able than others (but others of us are beautiful). Those who are more able should have a lower cost of schooling (either they learn faster and thus take less time to achieve a given degree or they receive more financial aid) and thus should acquire more schooling. Without some kind of control for ability the OLS regression above gives a biased estimate of the returns to schooling.

What about experience? I mentioned that we have age in the regression and if everyone works full-time, by including age we have mostly controlled for experience, as age = 6 + years of schools + experience. For men, arguably we have controlled for experience (by controlling for age and years of schooling), but for women with dual responsibilities for families and work, the association between age and market experience is weak.

Another factor is school quality. As written there is no controls for the level and quality of school inputs. Thus, would like to add a control for teacher salaries, or expenditures per pupil within the school district. But this highlights the data demands—information on inputs while young (school expenditures) and outputs or payoffs when adults (earnings).
I like to think the studies of return to schooling are “dense” if I can think of a factor that should be controlled there is a study that does so. Many, many studies. But with no final answers.

A final criticism of the regression is that it assumes that there is a single return to schooling: single in terms of all years of schooling, and single in terms of people. The first is easily fixed, by adding higher terms of years of schooling $s^2, s^3$ to allow for nonlinearities between years of schooling and log earnings. And the most flexible way, is to have an indicator for each year or level of schooling.

The second criticism is harder to deal with, having $\beta_i$ and not $\beta$, that individuals perceive their distinct returns. Yet the latter is closer to the truth, we differ in our abilities and make choices based on our expected payoffs, not necessarily the average payoff.

Once again, the problem is to find variation in years of schooling not related to ability, school quality or other confounding factors. Great use of twin studies.

But estimates are stable in the log equation. Consensus answer is that return (as measured by the regression coefficient) appears to be in the neighborhood of 7 to 10%.

Have talked about human capital as a theory of earnings distribution — people’s earnings vary over time depending on the decisions they make that increases or decreases their human capital. This is sometimes used to explain lower earnings by women. The idea is that women (at least in the past) left the labor market, in part or completely, to raise a family. This departure from the labor market means (a) they do not accumulate more experience and presumably additional human capital and (b) their stock of human capital may decline with absence from the market. Moreover, you will work out for your problem set, the incentives to invest in human capital declines with lower anticipated labor market participation rates.

**General and Specific Human Capital**

I mentioned the other day that we think of different forms of human capital. Going to school or any activity that increases the worker’s productivity for all firms or organization, is considered general human capital. General in the sense that it yields a return or is productive everywhere. Alternatively, there is specific human capital, which is productive in a particular firm or organization (called firm–specific) human capital, or within an industry or occupation (called industry–specific or occupation–specific). The basic insight of the different types (to the extent they exist) is on who pays and turnover. The idea is that workers with high firm–specific human capital are less likely to leave, because doing so will entail a capital loss. And because of that reduced turnover firms and workers have an incentive to invest in firm specific human capital. How they split the rents (i.e., the added earnings at this firm than in the next best alternative) is indeterminate without some assumptions on bargaining power. The typical assumption is that the costs and benefits are shared evenly by the worker and firm.

Firms have no incentive to invest in general forms of human capital because the worker can leave the firm and work else where at the same wage ($= R \cdot H$). Thus, worker will self-finance their acquisition of general human capital.
Examples of firm–specific human capital — knowledge of the organization, how makes decisions, etc. I know who to call to get my lights fixed or my computer fixed, or how to find money for an outside speaker etc.

An example of industry specific human capital, knowing how universities operate doesn’t give much insight on how government agencies work or for–profit firms. Worked as an accountant in the paper industry, and while I didn’t have to deal with it, I understood there were particular depreciation, and accounting rules dealing with the extraction of the forests. Arcane stuff that made the local forestry accountants valuable, but not the kind of knowledge you could sell easily elsewhere, except to another paper or pulp manufacturer.

**Productivity or Signaling?**

Why does education lead to higher earnings? The human capital perspective is that education raises the productivity of the individual. Alternatively, one can see education as a *screening* device.

At hiring firms are uncertain about the applicants, level of productivity. Education serves as a screening mechanism of the applicant’s underlying productivity. It is not that schooling makes the worker more productive but more productive workers are more likely to acquire more schooling. So schooling is correlated with ability, and firms can use the level of schooling to select the most able workers (on average).