

On the job training

EE471

On the Job Training

- Skill acquired on the job
- General human capital vs. specific human capital
- General training is the type of training that enhances productivity equally in all firms.
- Specific training is the type of training that enhances productivity only in the firm where it is acquired and the productivity gains are lost once the worker leaves the firm

Consider a simple framework where the employment relationship between a competitive firm and the worker lasts two periods.

Suppose that in the first period, the total labor costs equal TC_1 dollars, and in the second period the, the costs equal TC_2 dollars.

The values of marginal product of each of the two periods are VMP_1 and VMP_2 , respectively.

Finally, let r be the rate of discount. The profit-maximizing condition giving the optimal level of employment for the firm over the two periods is

$$TC_1 + \frac{TC_2}{1+r} = VMP_1 + \frac{VMP_2}{1+r}$$

Suppose OJT takes place only in the first period. It costs the firm H dollars to put a worker through the training.

$$w_1 + H + \frac{w_2}{1+r} = VMP_1 + \frac{VMP_2}{1+r}$$

Who pays for General Training?

- The type of training that enhances productivity equally in all firms
- General skills such as typing, learning how to drive, etc.
- Competitive firms provide general training only if they do not pay any of the costs
- Workers pay for general training

In the posttraining period, the worker's value of marginal product increases to VMP_2 in all firms. The firm that provided the training must either follow suit and increase the wage to VMP_2 or lose the worker.

Therefore, the second period wage, w_2 will equal VMP_2

As a result

$$w_1 = VMP_1 - H$$

Who pays for specific training?

- A labor contract in which the worker's posttraining wage, w_2 , is set such that

$$\bar{w} < w_2 < VMP_2$$

- where $\bar{w}$ is the alternative wage
- This contract implies that the worker and the firm share the returns from specific training

Implications

- Firms only provide general training if they do not pay the costs.
- In order for the firm to willingly pay some of the costs of specific training, the firm must share in the returns to specific training. Engaging in specific training eliminates the possibility of the worker separating from the job in the post-training period.

On the Job Training and the Age-Earnings Profile

Efficiency units

- Are standardized units of human capital
- Can be rented out in the labor market, and the rental rate per efficiency unit is R dollars
- The market for efficiency units is competitive, so the per-unit rental price is R dollars regardless of how many efficiency units a worker has

Assume that all training is general and that there is no depreciation of the human capital stock over time.

Therefore, an efficiency unit of human capital generates R dollars per year from the date when it is acquired until retirement, which occurs at age 65.

Suppose that the worker enters the labor market at age 20 and plans to retire at age 65.

The marginal revenue of acquiring once efficiency unit of human capital at age 20 is

$$MR_{20} = R + \frac{R}{(1+r)} + \frac{R}{(1+r)^2} + \frac{R}{(1+r)^3} + \dots + \frac{R}{(1+r)^{45}}$$

where r is the discount rate.

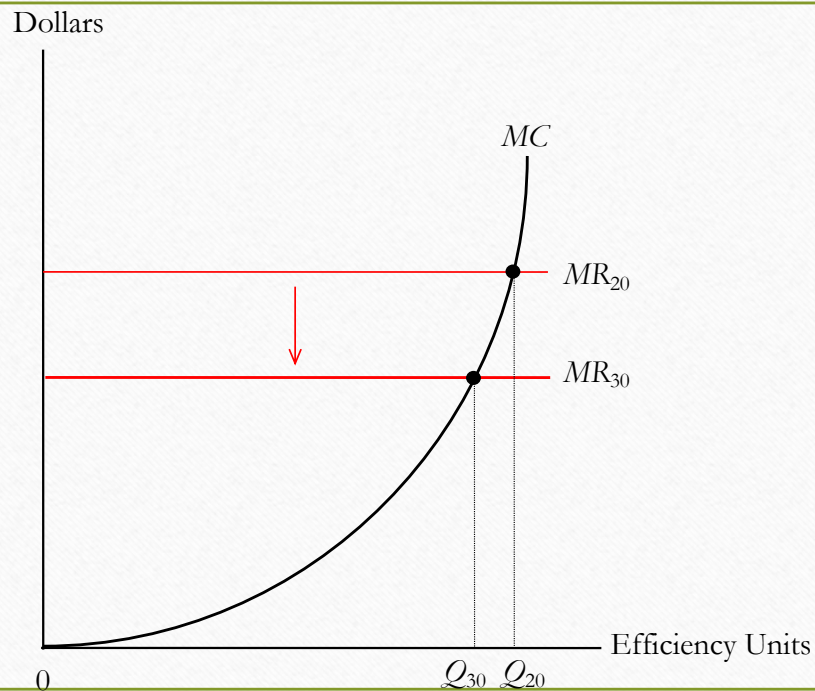
Suppose that the worker enters the labor market at age 30 and plans to retire at age 65.

The marginal revenue of acquiring once efficiency unit of human capital at age 30 is

$$MR_{30} = R + \frac{R}{(1+r)} + \frac{R}{(1+r)^2} + \frac{R}{(1+r)^3} + \dots + \frac{R}{(1+r)^{35}}$$

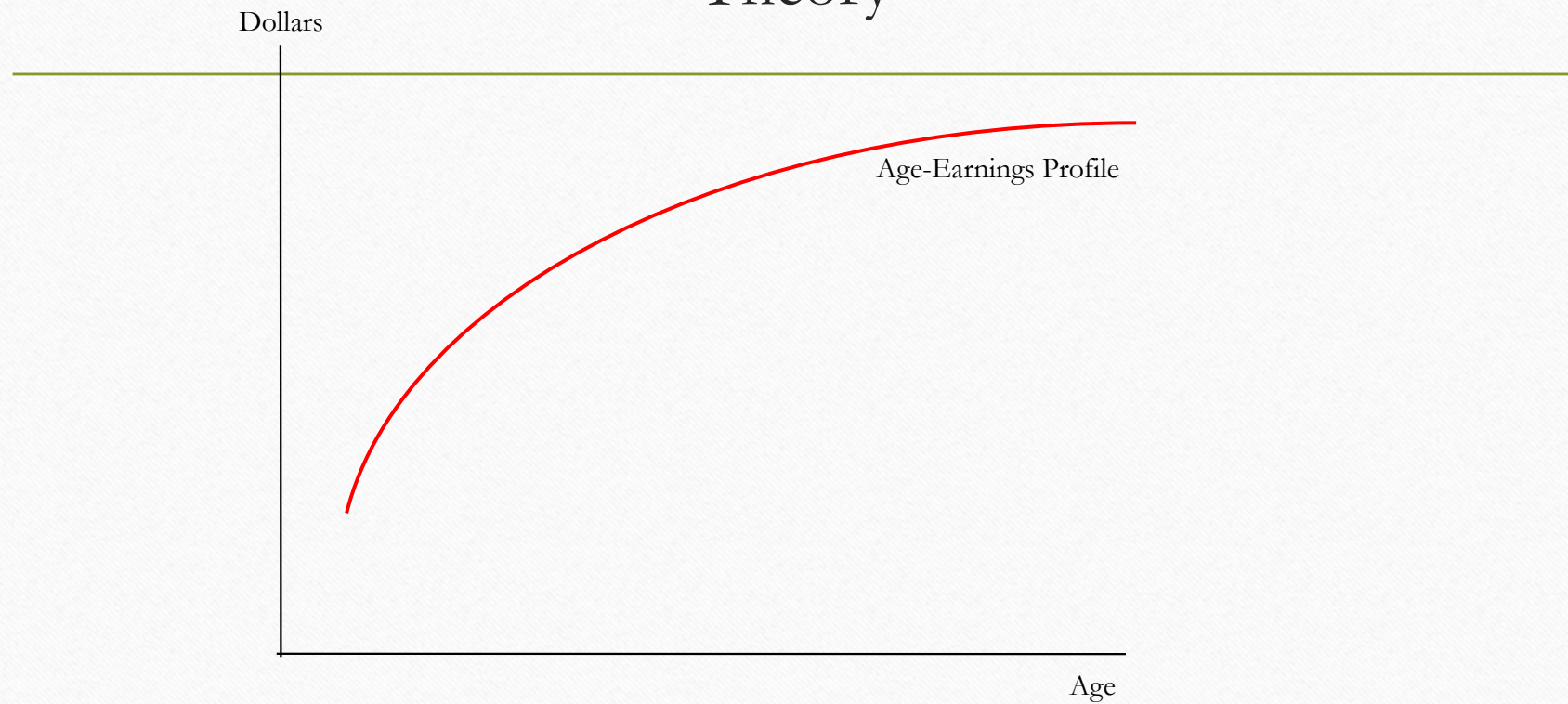
where r is the discount rate.

The Acquisition of Human Capital Over the Life Cycle



The marginal revenue of an efficiency unit of human capital declines as the worker ages (so that MR_{20} , the marginal revenue of a unit acquired at age 20, lies above MR_{30}). At each age, the worker equates the marginal revenue with the marginal cost, so that more units are acquired when the worker is younger.

The Age-Earnings Profile Implied by Human Capital Theory



The Mincer Earnings Function

$$\log w = \beta S_i + \alpha t - \gamma t^2 + \textit{Other Variables}$$

w – the worker's wage rate

S – the number of years of schooling

t – the number of years of labor market experience

t^2 – a quadratic on experience that captures the concavity of the age-earnings profile

Age-Earnings Profile

- Upward sloping and concave
- Older workers earn more because they invest less in human capital and because they are collecting the returns from earlier investments
- The rate of growth of earnings slows down over time because workers accumulate less human capital as they get older
- The age-earnings profile is concave so that the earnings increase over time but at a decreasing rate

Policy Application: Evaluating Government Training Programs

- The National Supported Work Demonstration (NSW) provides a good example of such a randomization scheme.
- The key objective of the NSW was to ease the transition of disadvantaged workers into the labor market by exposing them to a work environment where experience and counseling could be provided.

- In this experiment, eligible applicants were assigned randomly to one of two tracks
 - The lucky workers who were treated by the program received all the benefits by the NSW
 - Those assigned to the control groups received none of the benefits and were left on their own
 - The NSW guaranteed persons in the treatment group a job for 9-18 months, at which time they had to find regular employment
 - The program cost about \$12,500 per participant (in 1998 dollars)

TABLE 6-4 The Impact of the NSW Program on the Earnings of Trainees (in 1998 dollars)

Source: Robert J. LaLonde, "Evaluating the Econometric Evaluations of Training Programs with Experimental Data," *American Economic Review* 76 (September 1986): 604–20, Table 2.

Group	Pretraining Annual Earnings (1975)	Posttraining Annual Earnings (1979)	Difference
Treatment group	1,512	7,888	6,376
Control group	1,481	6,450	4,969
Difference-in-differences	—	—	1,407

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- The NSW program cost about \$12,500 per participant
 - It would take longer than a decade (if future earnings gains are discounted) for the program to reach the breakeven point, the point at which the per-worker training costs equal the present value of the benefits accrued by the worker
 - The rate of return to the investment is on the order of 10 percent

Source

Borjas, G. (2019). Labor Economics. 6th ed. McGraw-Hill, USA.