Introduction

Philipp Eisenhauer

Human capital is defined as:

> *The knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being.*

> \- OECD (2001)

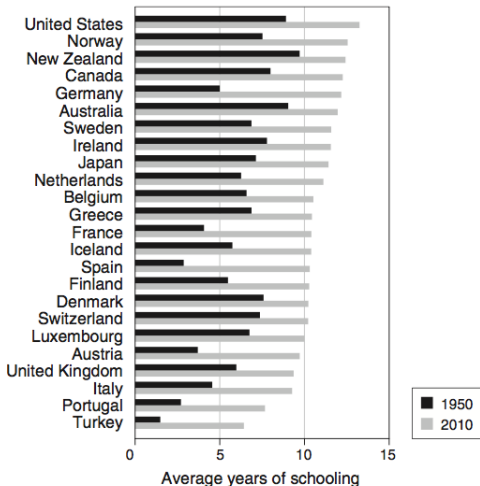*Some Facts*

Figure: Years of schooling

FIGURE 4.4

Years of schooling of the total population aged 25 and older.

Source: Barro and Lee (2010, education data set, available at www.barrolee.com/data).
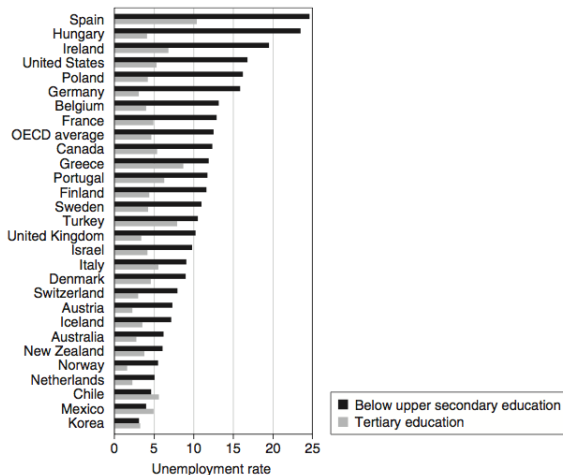
Figure: Unemployment rates

FIGURE 4.6

Unemployment rates by level of educational attainment for 25- to 64-year-olds, 2010. The OECD average is the nonweighted average of the 34 OECD countries, including those not represented on this figure. Data missing for non-OECD countries.

Source: OECD (2012, table A7.4a, p. 133).
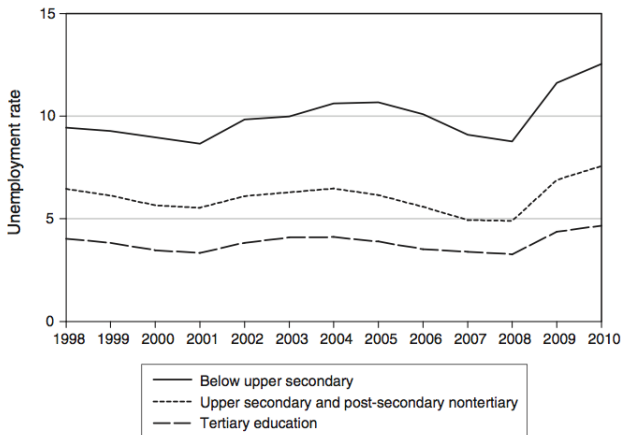
Figure: Unemployment rates

FIGURE 4.7

Unemployment rates by level of educational attainment for 25- to 64-year-olds, 2010. The OECD average is the nonweighted average of the 34 OECD countries.

Source: OECD (2012, table A7.4a, p. 133).
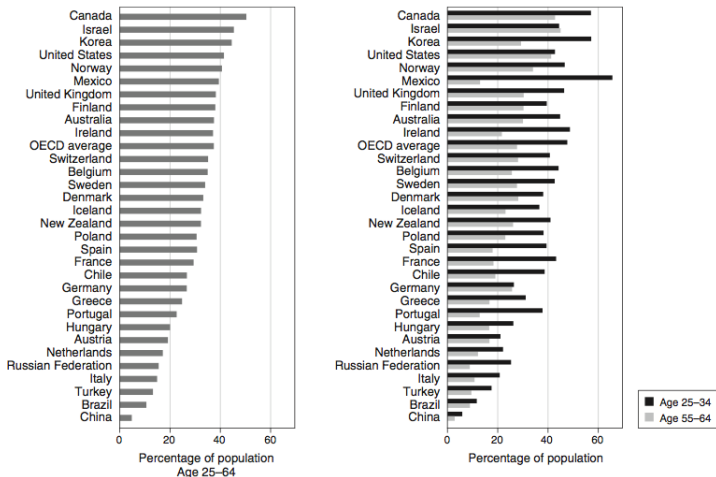
Figure: Tertiary education

FIGURE 4.3

Percentage of the population that has attained at least tertiary education or advanced research programs, by age group, 2010. The OECD average is the nonweighted average of the 34 OECD countries, including those not represented in this figure. Brazil, China, and the Russian Federation are not part of the OECD.

Source: OECD (2012, table A1.3a, p. 36).
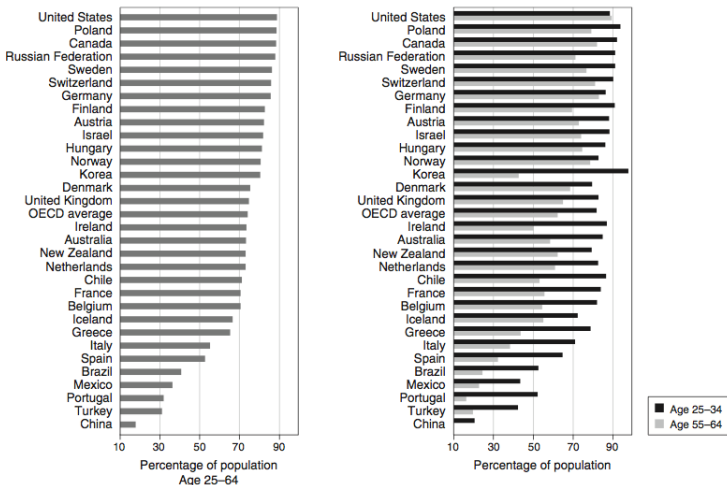
Figure: Secondary education

FIGURE 4.2

Percentage of the population that has attained at least upper secondary education, by age group, 2010. The OECD average is the nonweighted average of the 34 OECD countries, including those not represented in this figure. Brazil, China, and the Russian Federation are not part of the OECD.

Source: OECD (2012, table A1.2a, p. 35).
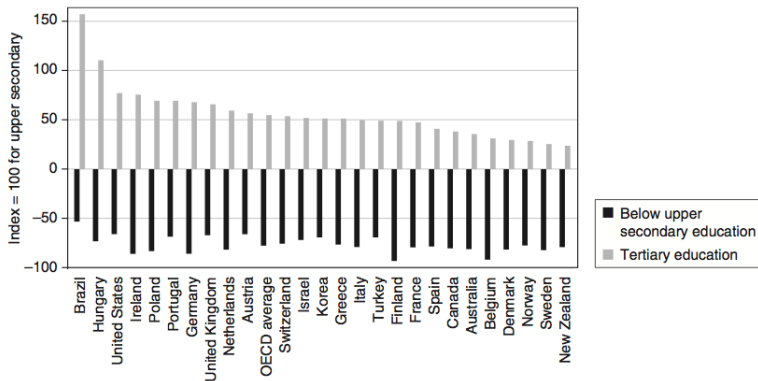
Figure: Relative earnings

FIGURE 4.5

Relative earnings from employment among 25- to 64-year-olds, by level of educational attainment (2010 or latest available year). Upper secondary and post-secondary nontertiary education = 100. The OECD average is the nonweighted average of the 34 OECD countries, including those not represented in this figure. Brazil is not part of the OECD. Data missing for Chile, China, Iceland, Mexico, and the Russian Federation.

Source: OECD (2012, chart A8.1, p. 140).

Figure: Expenditures

FIGURE 4.1

Expenditure on educational institutions as a percentage of GDP, 2009. The OECD average is the nonweighted average of the 34 OECD countries, including those not represented in this figure. Brazil and the Russian Federation are not part of the OECD. Private expenditure is missing for Brazil, Hungary, Norway, and Switzerland. Data are missing for China, Greece and Turkey.

Source: OECD (2012, table B2.3, p. 246).

Economic models

All models are wrong, but some are useful.

- Box (1987)

Economic models are learning opportunities.

- ▶ What question are they designed to address?

- ▶ What are the underlying economic mechanisms?

- ▶ How robust are the conclusions?

- ▶ What is missing?

- ▶ *. . .*

Famous examples

- **Lemons model (Akerlof, 1970)**, market unraveling in presence of asymmetric information

- **Roy model (Roy, 1951)**, static model of self-selection and comparative advantage

- . . .

Life-cycle of earnings

Figure: Wage gains

FIGURE 4.8

Average wage gains for college and high school graduates in the United States in 1996.

Source: Ashenfelter and Rouse (1999).

We study the seminal Ben-Porath Model (Ben-Porath, 1967).

$s(t)$ fraction devoted to training

$h(t)$ stock of human capital

$w(t)$ income

δ depreciation of knowledge

The individual's objective is to maximize the discounted sum of wages over their life-cycle income.

$$\Omega = \int_0^T w(t)\, e^{-rt} dt$$

Their economic environment is characterized by the production functions for income and human capital.

$$w(t) = A[1 - s(t)]h(t)dt$$
$$\dot{h} = \theta g[s(t)h(t)] - \delta h(t) \qquad g' > 0, g'' < 0$$

Model Specification

We study the implementation in Cahuc and Zylberberg (2004).

$$g(h(t), s(t)) = (h(t)s(t))^{0.71}$$

$$A = 0.75 \qquad \delta = 0.06 \qquad r = 0.05$$

$$h_0 = 5 \qquad T = 60 \qquad \theta = 0.5$$

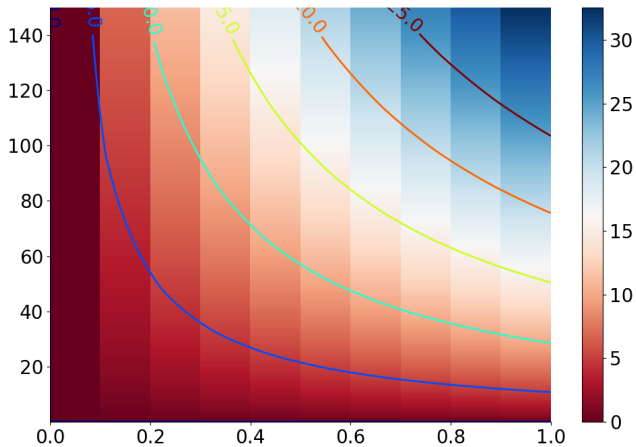# Figure: Human capital production I
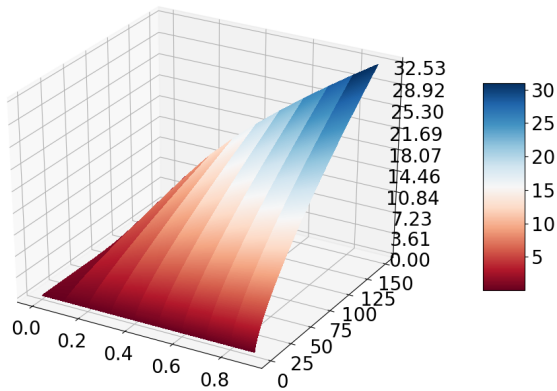
Figure: Human capital production II
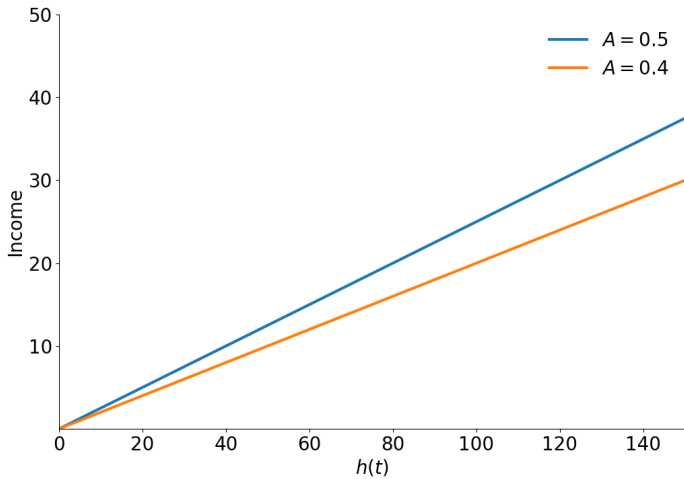
Figure: Income production
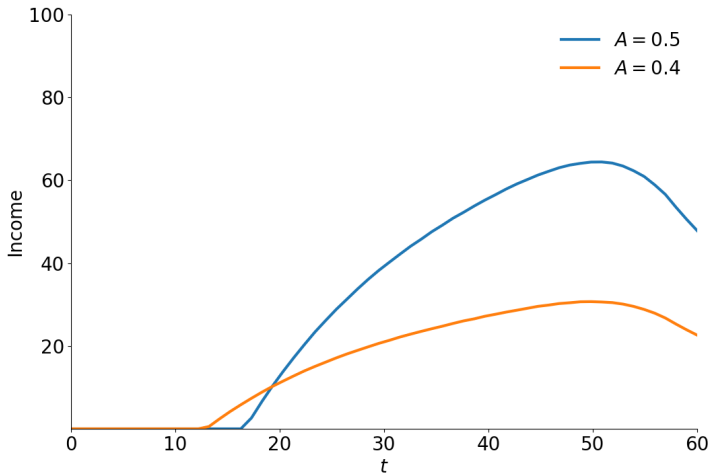
Figure: Income over the life-cycle

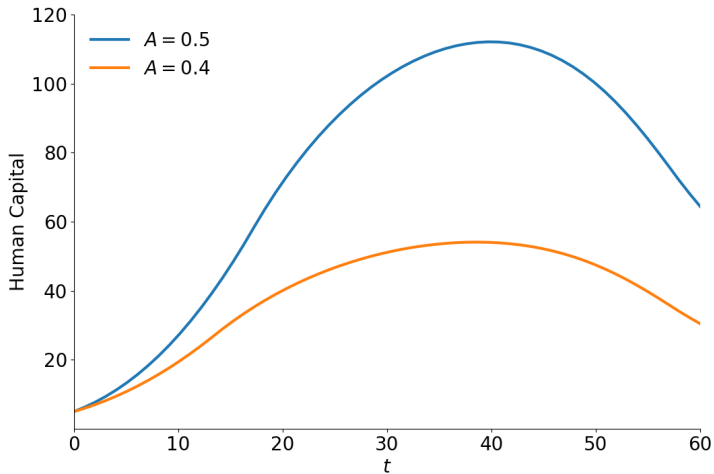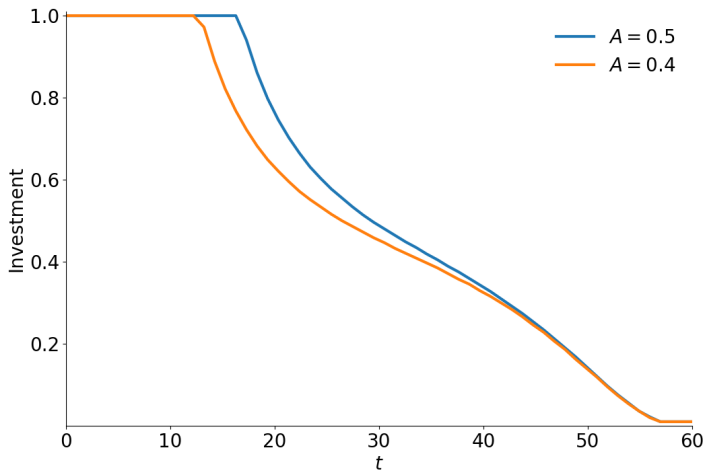Figure: Stock of human capital over the life-cycle

Figure: Human capital investment over the life-cycle

Extensions

Weiss (1986) reviews a host of alternative extensions to the basic model.

- general versus specific training

- hours worked

- uncertainty

- borrowing-constraints

- . . .

Job market signaling

We study the seminal model presented in Spence (1973).

- ▶ There are two groups $j \in \{H, L\}$ in the population facing one employer, where $h_{i \in \{L, H\}}$ denotes the respective level of productivity.

- ▶ Group H is a proportion q_H in the population.

- ▶ Education y is measured by an index y of level and achievement and is subject to individual choice.

- ▶ Education costs are both monetary and psychic and differ by group $c_{i \in \{L, H\}}$.

Figure: Informational feedback
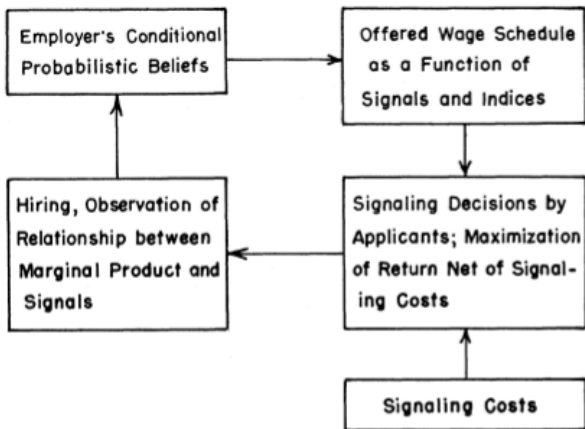
We explore the following parameterized version.

$$h_L = 1 \qquad h_H = 2$$

$$c_L = y \qquad c_H = \tfrac{1}{2} y$$

Figure: Benefit of education
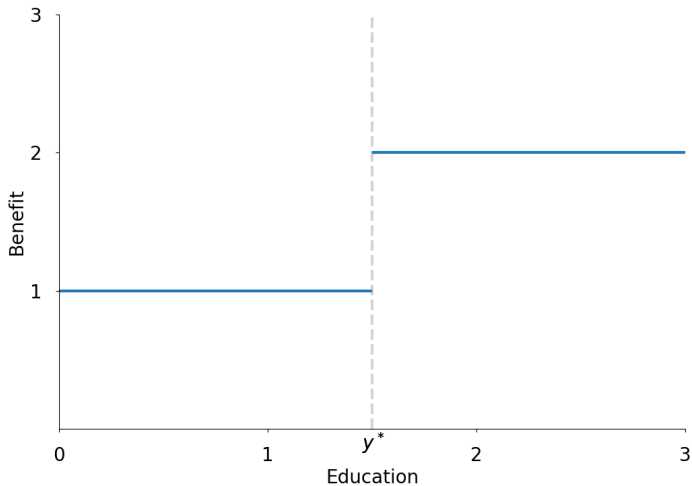
Figure: Cost of education
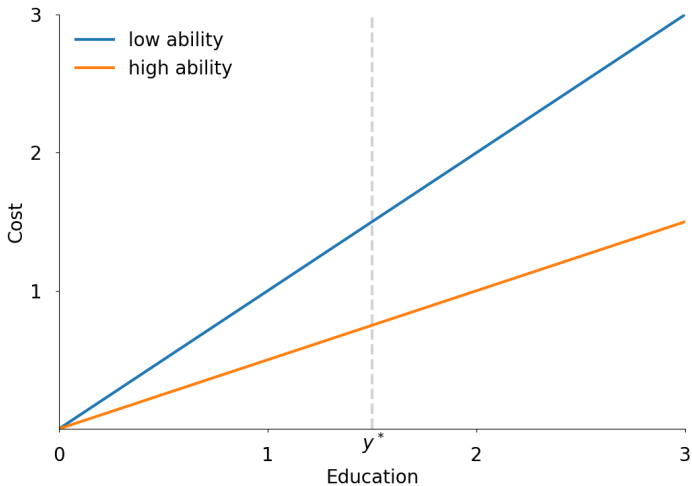
Figure: Surplus of education I
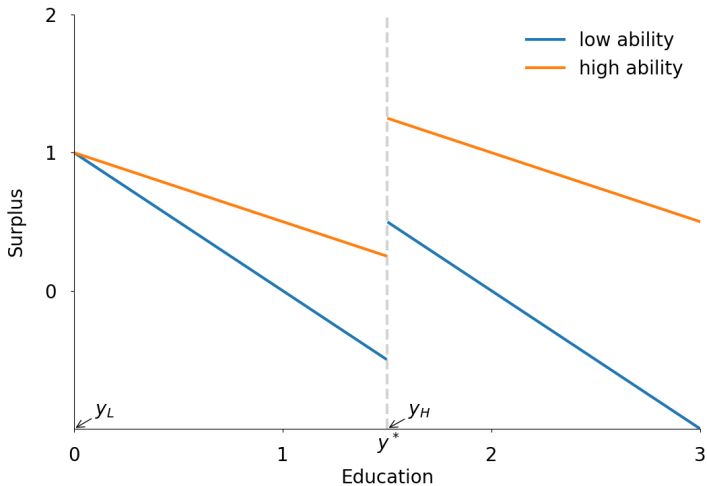
- For $y^* = 1.5$ the employer's beliefs are confirmed. More generally, L chooses $y_L = 0$ if $1 > 2 - y^*$ and H acquires $y_H = y^*$ provided that $2 - 0.5\,y^* > 1$.

- Beliefs are confirmed provided that the following holds:

$$1 < y^* < 2$$

Figure: Surplus of education II
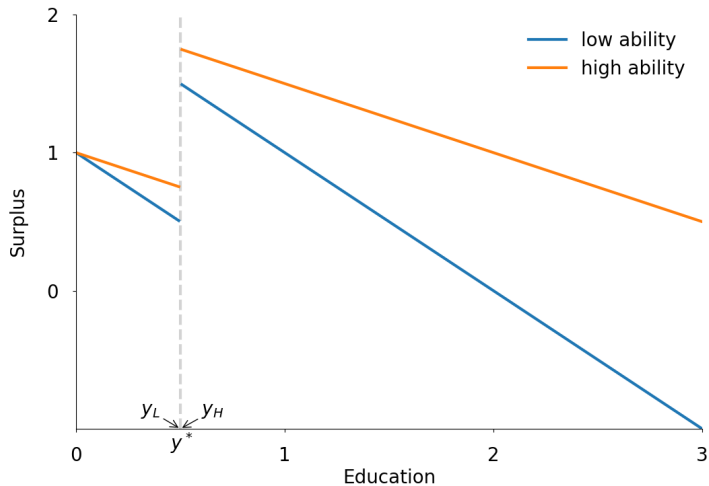
Figure: Surplus of education III
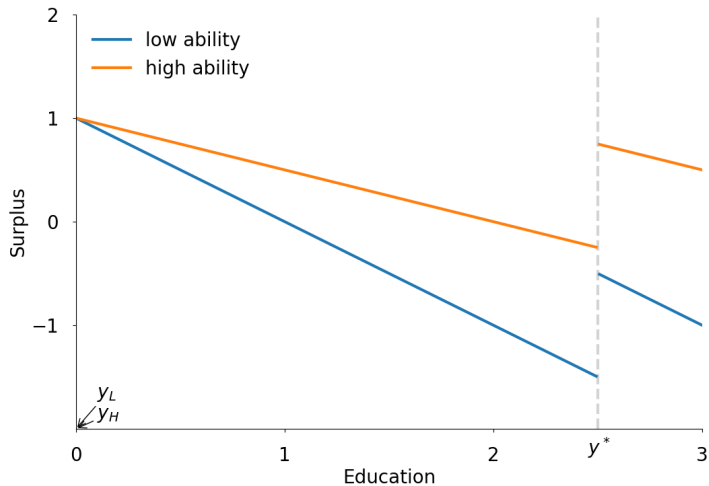
▶ From the outside, education appears to be productive and is for the individual. However, there is no real effect on the marginal product.

- In the absence of signaling, both groups are paid the unconditional expected marginal product.

$$1 \times q_L + (1 - q_L) \times 2$$

- It depends on the share of low ability individuals whether high ability individuals actually prefer a no-signaling case. The surplus is determined as follows:

$$\text{signaling} \qquad 2 - \tfrac{1}{2}y^*$$

$$\text{no-signaling} \quad 2 - q_L$$

- High ability individual prefer the signaling case as long as $y^* \geq 2q_L$.

Figure: Market structure
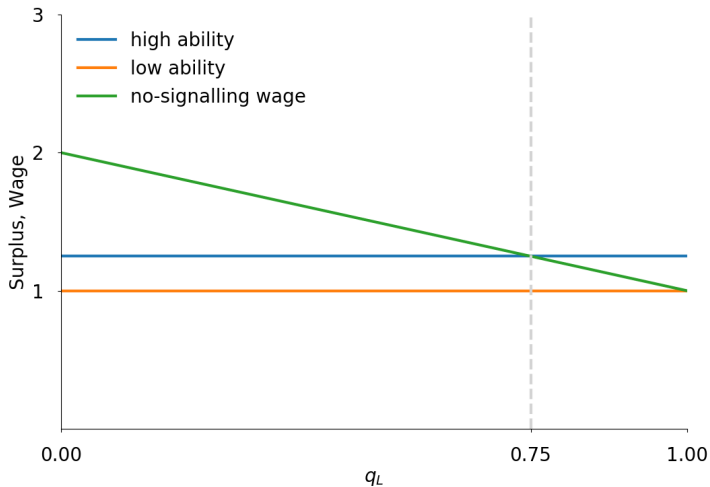
- The ability to signal has a detrimental effect on low ability workers, while the consequences are ambiguous for high ability workers.

- High ability workers benefit from their ability to send a signal if their proportion is sufficiently small with respect to the ability gap to low ability individuals.

Appendix

References

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Returns to schooling

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Appendix

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Multidimensionality of skills

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Appendix

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Static model of educational choice

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Dynamic model of human capital accumulation

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Intergenerational transmission of skills

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Appendix

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Human capital policy

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Appendix

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