

# Course on the Economics of Human Capital

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)

Figure: Foundational work

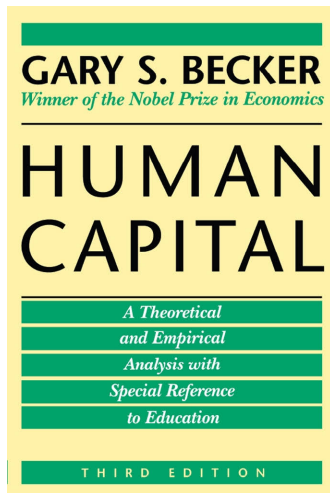



Table: Lecture plan



Date	Topic
05/09/18	Introduction to the economics of human capital
05/16/18	Returns to schooling
05/30/18	Multidimensionality of skills
06/06/18	Static model of educational choice
06/13/18	Dynamic model of human capital accumulation
06/20/18	Human capital policy
06/27/18	Intergenerational transmission of human capital

Figure: Guest lecture by Benedikt Kauf


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## Welcome to grmpy's documentation!

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**grmpy** is an open-source Python package for the simulation and estimation of generalized Roy Model (Heckman & Vytlaçil, 2005 [11]). It's main purpose is to serve as a teaching tool to promote the conceptual framework provided by the generalized Roy model which allows to illustrate a variety of issues in the econometrics of policy evaluation.

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## Figure: Guest lecture by Janos Gabler

The screenshot displays the 'respy' documentation website. On the left is a dark sidebar with a blue header containing the 'respy' logo and 'latest' version indicator. Below the header is a search bar labeled 'Search docs'. The sidebar lists navigation links: Background, Installation, Setup, Tutorial, Numerical Methods, Reliability, Scalability, Software Engineering, Contributing, Additional Details, Contact and Credits, Changes, and Bibliography. At the bottom of the sidebar are links to 'Read the Docs' and 'v: latest'. The main content area has a light gray background. It features a breadcrumb trail 'Docs » Welcome to respy's documentation!' and a link to 'Edit on GitHub'. The main heading is 'Welcome to respy's documentation!'. Below this is a link to 'PyPI | GitHub | Issues'. A paragraph describes 'respy' as an open-source Python package for simulating and estimating a prototypical finite-horizon discrete choice dynamic programming model, building on a baseline model. It references a 1994 paper by Keane and Wolpin. A 'license: MIT' badge is shown. A 'Contents:' section lists links to all the sidebar categories. A 'Next' button with a right arrow is at the bottom right.

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### Welcome to respy's documentation!

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**respy** is an open-source Python package for the simulation and estimation of a prototypical finite-horizon discrete choice dynamic programming model. We build on the baseline model presented in:

Keane, M. P. and Wolpin, K. I. (1994). The Solution and Estimation of Discrete Choice Dynamic Programming Models by Simulation and Interpolation: Monte Carlo Evidence. *The Review of Economics and Statistics*, 76(4): 648-672.

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## Course Website

You find all information about the course on our website.

[https://github.com/eisenhauerIO/  
economics\\_of\\_human\\_capital](https://github.com/eisenhauerIO/economics_of_human_capital)

This includes the lecture dates, topics, reading list, and the slides.

If you have further questions, please feel free to contact us using .

# **Appendix**



# *References*

Becker, G. S. (1964). *Human capital* (1st ed.). New York City, NY: Columbia University Press.

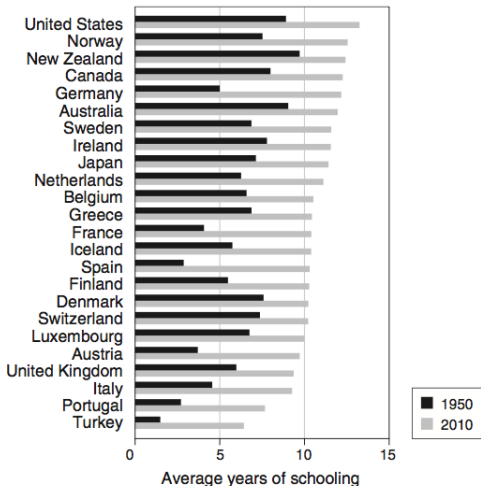
OECD. (2001). *The well-being of nations: The role of human and social capital*. Paris, France: OECD Publication Service.

# Introduction to the Economics of Human Capital

Philipp Eisenhauer

## *Some Facts*

Figure: Years of schooling

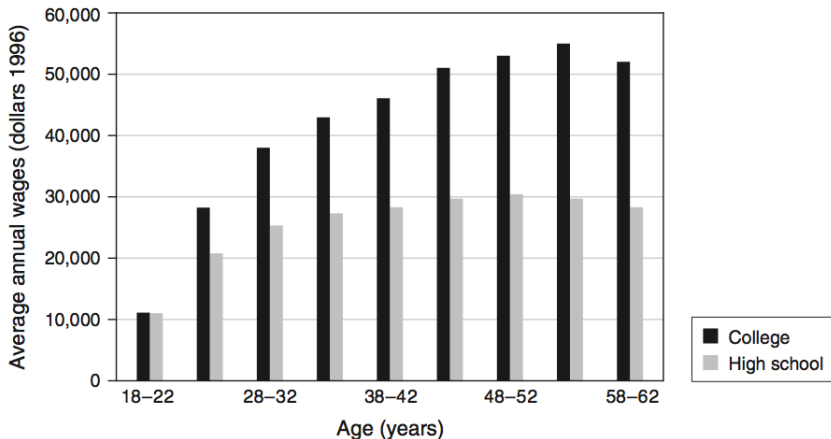


**FIGURE 4.4**

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](http://www.barrolee.com/data)).

Figure: Wage gains

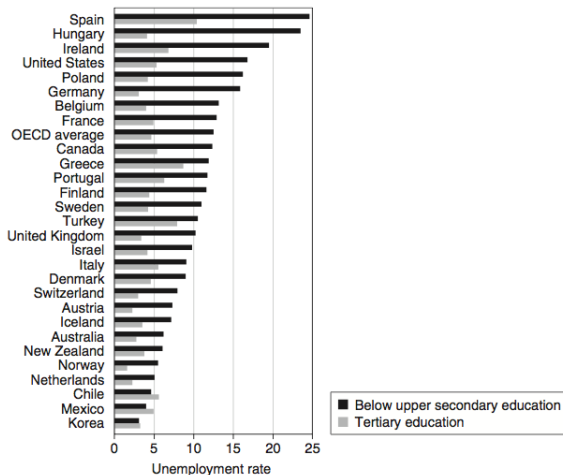


**FIGURE 4.8**

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

Source: Ashenfelter and Rouse (1999).

# Figure: Unemployment rates

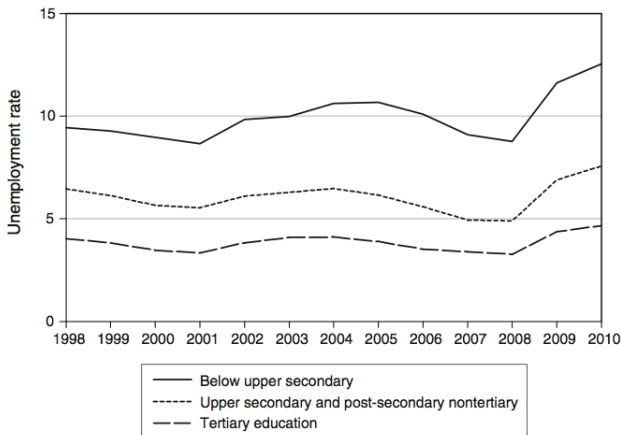


**FIGURE 4.6**

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

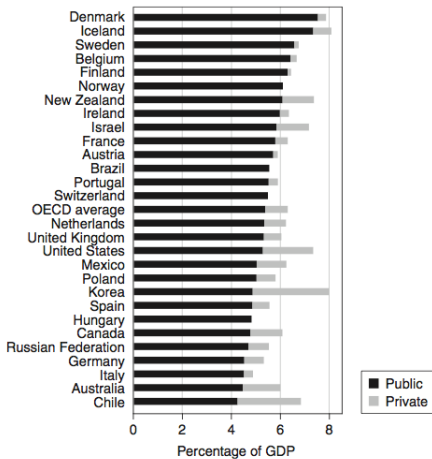


**FIGURE 4.5**

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).

# *Theory of Human Capital*

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

$\delta$           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.

$$w(t) = A[1 - s(t)]h(t)dt$$

$$\dot{h} = \theta g[s(t)h(t)] - \delta h(t) \quad g' > 0, g'' < 0$$



## Model Specification

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

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

$$A = 0.75$$

$$\delta = 0.06$$

$$r = 0.05$$

$$h_0 = 5$$

$$T = 60$$

$$\theta = 0.5$$

The implementation is available [online](#).

Figure: Human capital production I

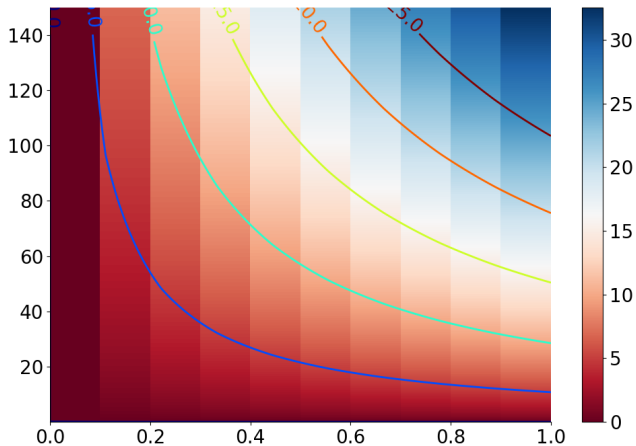


Figure: Human capital production II

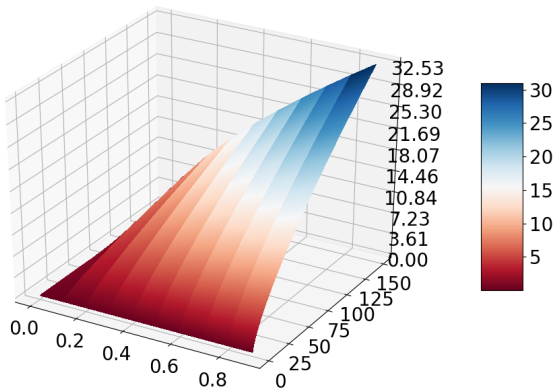


Figure: Income production

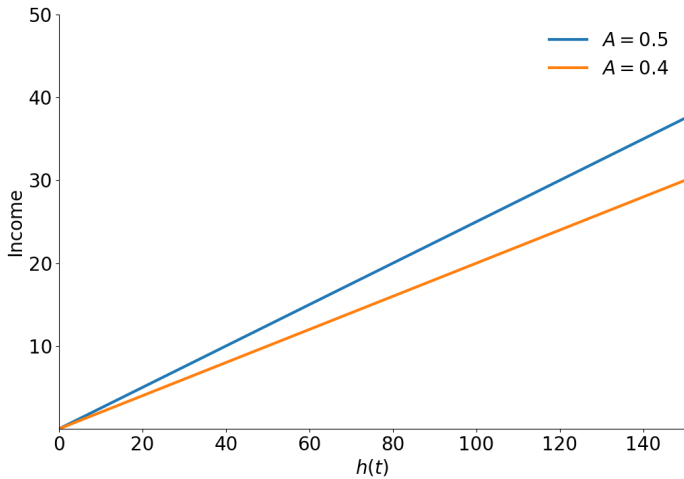


Figure: Income over the life-cycle

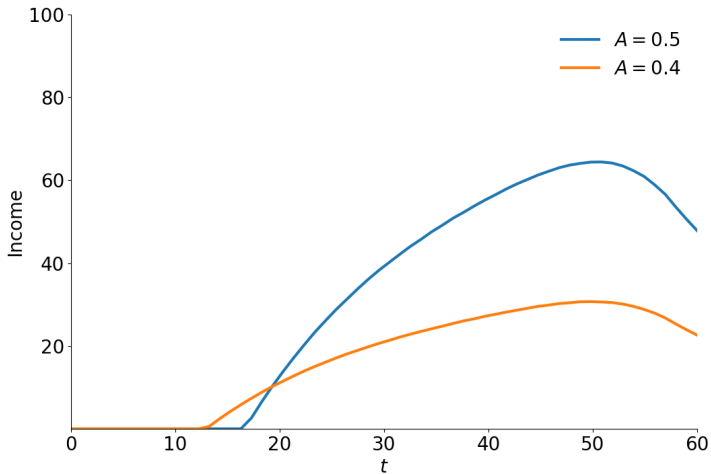


Figure: Stock of human capital over the life-cycle

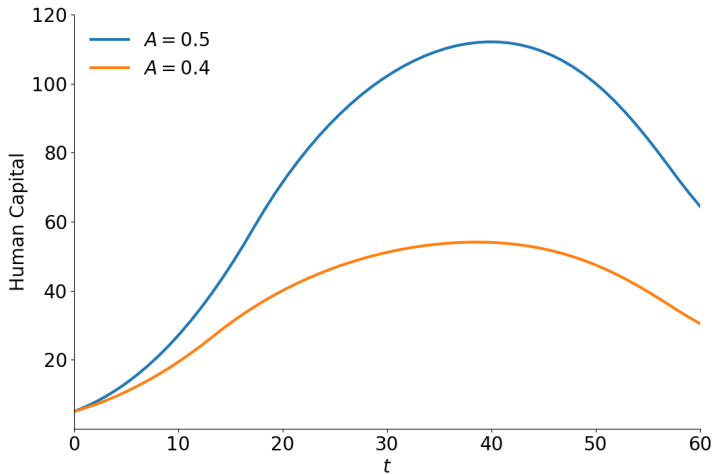
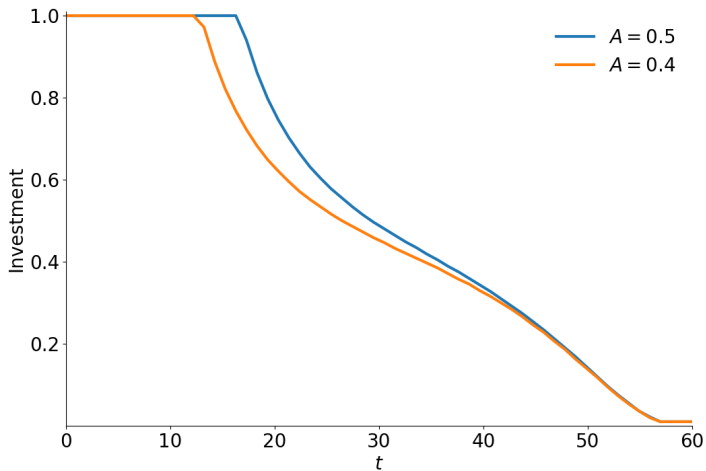


Figure: Human capital investment over the life-cycle



## Extensions

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

- ▶ general versus specific training
- ▶ hours worked
- ▶ uncertainty
- ▶ ...



# *Theory of Signaling*

# Appendix

# *References*

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# Returns to schooling

Philipp Eisenhauer

# **Appendix**

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# Multidimensionality of skills

Philipp Eisenhauer

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# Static model of educational choice

Philipp Eisenhauer

# **Appendix**

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# Dynamic model of human capital accumulation

Philipp Eisenhauer

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# Intergenerational transmission of skills

Philipp Eisenhauer

# **Appendix**

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# Human Capital Policy

Philipp Eisenhauer

# **Appendix**

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