

Vocational Education and Local Industrial Development

KID Summer School 2017

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The Economics of Education in Denmark

- The structure of the education system and economic outcomes
- Effects at *individual* and *industry* level

Topics

- Industrial effects of changes to the system (today)
- Intergenerational Mobility - Inequality
- ???

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The Research Proposal

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Research Question:

- What happens to local firms and industries when a vocational education is removed?

The Research Proposal

Research Question:

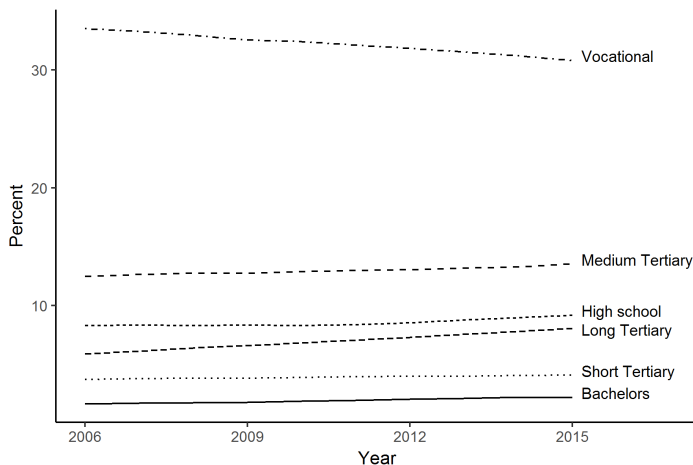
- What happens to local firms and industries when a vocational education is removed?

Why should we care?

- Centralization in Vocational Education (Kraft, 2016)
- Industry and Voc Edu interrelations under-researched

Vocational Education in Denmark

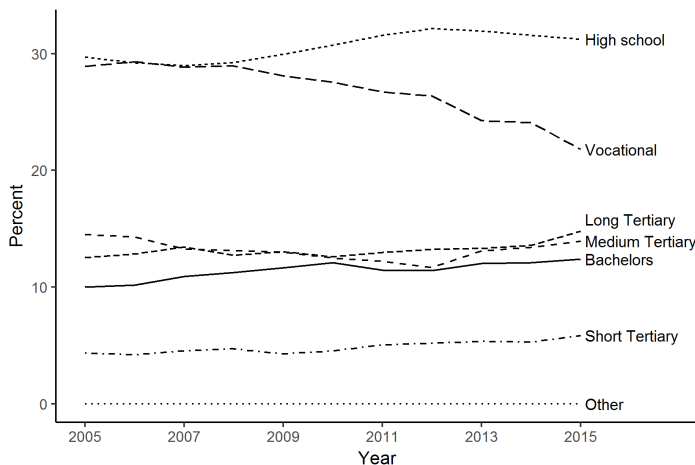
Figure: Highest level of education, percentage share of total population between the age of 15-69, 2006-2015¹



¹ Note: Based on data from www.statbank.dk.

Vocational Education in Denmark

Figure: Percentage of graduating students above primary school by level of education, 2005-2015²



² Note: Based on data from www.statbank.dk.

The Research Proposal

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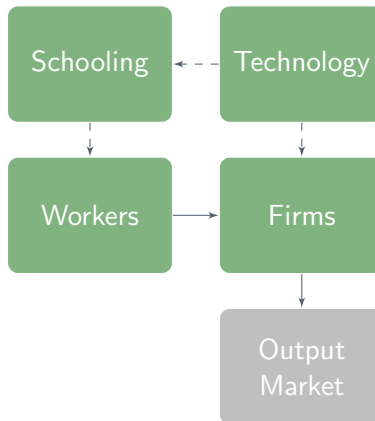
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Theoretical Framework

Relevant Actors and Developments

- The Firms
- Vocational Education
- Students/Graduates
- Technological Development



Some background information

- Vocational education is a secondary education
- ... typically 4.5 years long
- ... with a 1 year intro
- ... and 3.5 years of apprenticeship and schooling

Vocational Schooling Theory

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Theory of Knowledge and Learning (Lundvall and Johnson, 1994;
Lundvall, 2004)

- Students accumulate knowledge through learning

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Theory of Knowledge and Learning (Lundvall and Johnson, 1994; Lundvall, 2004)

- Students accumulate knowledge through learning
- Apprenticeship
 - Learning By Doing (Arrow, 1962)
 - Know-how
 - Particular to firm

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Theory of Knowledge and Learning (Lundvall and Johnson, 1994; Lundvall, 2004)

- Students accumulate knowledge through learning
- Apprenticeship
 - Learning By Doing (Arrow, 1962)
 - Know-how
 - Particular to firm
- Schooling
 - Also Learning By Doing
 - Latest technology
 - Increase learning capacity!

Vocational Schooling Theory

- Student Learning Capacity and Knowledge

$$C = F(A, S)$$

$$A^j = \sum_i a_i^j$$

a_i^j Learning from activity i
at firm j

$$S = \sum_{h=1}^H s_h$$

s_h Learning from activity h
at school

Higher h implies more modern technology

$$\Delta F_{s_{h+1}} > \Delta F_{s_h}$$

Vocational Schooling Theory

- Student Learning Capacity and Knowledge

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 a_i^j

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 s_h

Learning from activity h
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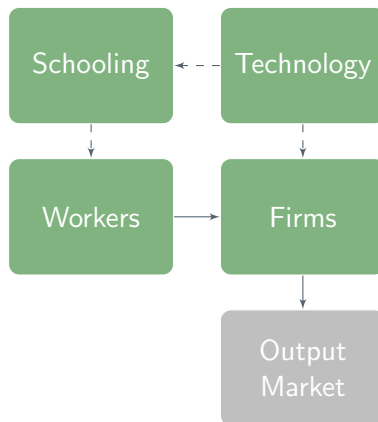
Higher h implies more modern technology

$$\Delta F_{s_{h+1}} > \Delta F_{s_h}$$

We can make a similar argument for the acquired knowledge

Vocational Schooling Theory

Why does it matter?



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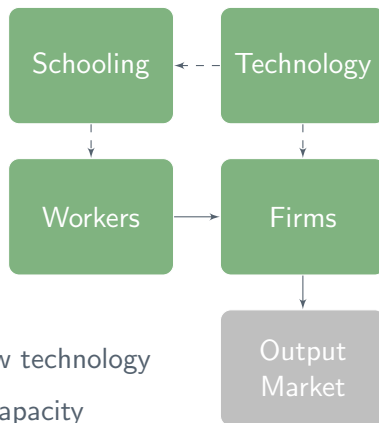
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Why does it matter?



Firms will need capacity to handle new technology

- Worker knowledge and learning capacity
- Firm competitiveness

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The essence of the hypotheses

- 1 Non-local workers + higher wages
- 2 Substitution of worker skills + lower productivity
- 3 Local Industry Decline

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The primary take-away:

- Danish Register data
- PSM and *D-in-D*

Initial Definitions

- Local Area
 - Municipalities (data-driven)
- Relevant industry/firms
 - The type of firms that tend to hire the graduates
- Case
 - A local area where a vocational education closes permanently

Register Data:

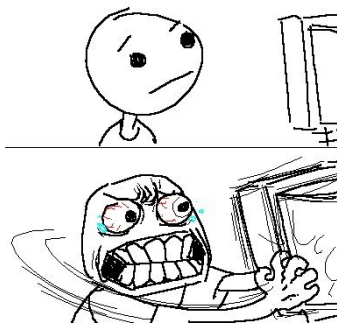
- Individual- and Firm-level information
- 1980-2013

Issue 1: Finding cases

Register Data:

- Individual- and Firm-level information
- 1980-2013

Issue 1: Finding cases



Cases

- 114 cases in the period 1990-2010
 - 55 Municipalities
 - 28 Educations

Data

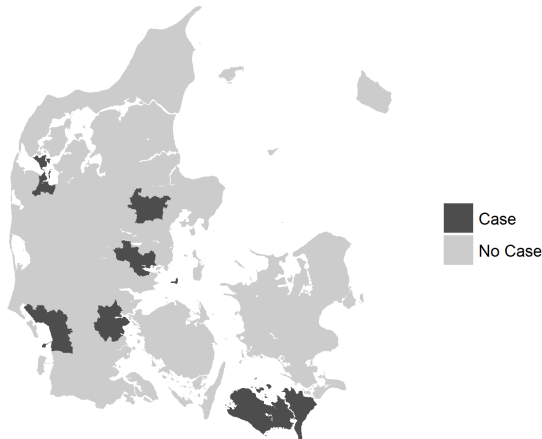
14 test cases³

Municipality	Education
Guldborgsund	Joiner
Kolding	Mechanical Operator
Struer	Mechanical Operator
Sorø	Kitchen Assistant
Struer	Kitchen Assistant
Lolland	Technical Assistant
Køge	Technical Assistant
Horsens	Technical Assistant
Holbæk	Gardener
Halsnæs	Chef
Frederecia	Technical Assistant
Favrskov	Technical Assistant
Esbjerg	Mechanical Operator
Næstved	Mechanical Operator

³Based on Register data

Data

Map of cases⁴



⁴Based on Register data

PSM and *D-in-D*

- Identification through control cases

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PSM and *D-in-D*

- Identification through control cases

Endogeneity

- Administrative documentation on decisions
- Careful investigation of single cases

PSM and *D-in-D*

- Identification through control cases

Endogeneity

- Administrative documentation on decisions
- Careful investigation of single cases

Changing industrial compositions, Business Cycles, etc?

- Higher aggregation level than industry
- Solution: *D-in-D*

Recap

Research Question:

- What happens to local firms and industries when a vocational education is removed?

Theoretical Framework

- Learning and knowledge in Vocational Education

Data

- Danish Register Data - firm level

Methodology

- Differences in Differences

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Thank you for listening

Arrow, K. J. (1962). The Economic Learning Implications of by Doing. *The Review of Economic Studies*, 29(3):155–173.

Kraft, M. S. (2016). Regioner advarer: Det hæmmer væksten når unge har langt til erhvervsskoler.

Lundvall, B. Å. (2004). the Economics of Knowledge and Learning. *Research on Technological Innovation, Management and Policy*, 8:21–42.

Lundvall, B.-Å. and Johnson, B. (1994). The Learning Economy. *Journal of Industry Studies*, 1(2):23–42.