Returns to Skills in Entrepreneurship: Entrepreneurs as "Jacks-of-all-Trades"

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Idea – Motivated by Lazear (2005)

- Entrepreneurs are generalists or ”Jacks-of-all-trades”.
  - Implying that the skill set of the successful entrepreneur should be balanced
- Wage workers are specialists.
  - Implying that the skill set of the successful wage worker should be unbalanced

Idea – Motivated by Lazear (2005)

- Builds a framework for analyzing the *occupational choice* between entrepreneurship and wage work.
- Income depends on skill type 1 (x_1) and 2 (x_2):
  - Entrepreneurs: y depends on min[x_1,x_2]
  - Wage workers: y depends on max[x_1,x_2]
- Occupational choice is determined by the relative productivity of the two alternatives.

Idea – Present paper

- Present paper:
  - Focus on *income functions* - No focus on educational choice:
    - Are income functions $\min[x_1,x_2]$ and $\max[x_1,x_2]$ reasonable descriptions of reality?
    - To answer this question we estimate income functions

Outline

- Implementation
- Main result
- Other Issues
  - Measurement
  - Sampling
  - Robustness check

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Implementation

> Skill types

> Entrepreneurs

> Income functions

Implementation - Skill types

- x_1 – ”formal education”:
  - Measured by years of schooling
- x_2 – ”learning-by-doing”:
  - Measured by years of labor market experience
  - Actual experience; not potential experience

Implementation - Entrepreneurs

- Entrepreneurs:
  - Self-employed
    - can be group after employers and non-employers and other characteristics
  - Managers

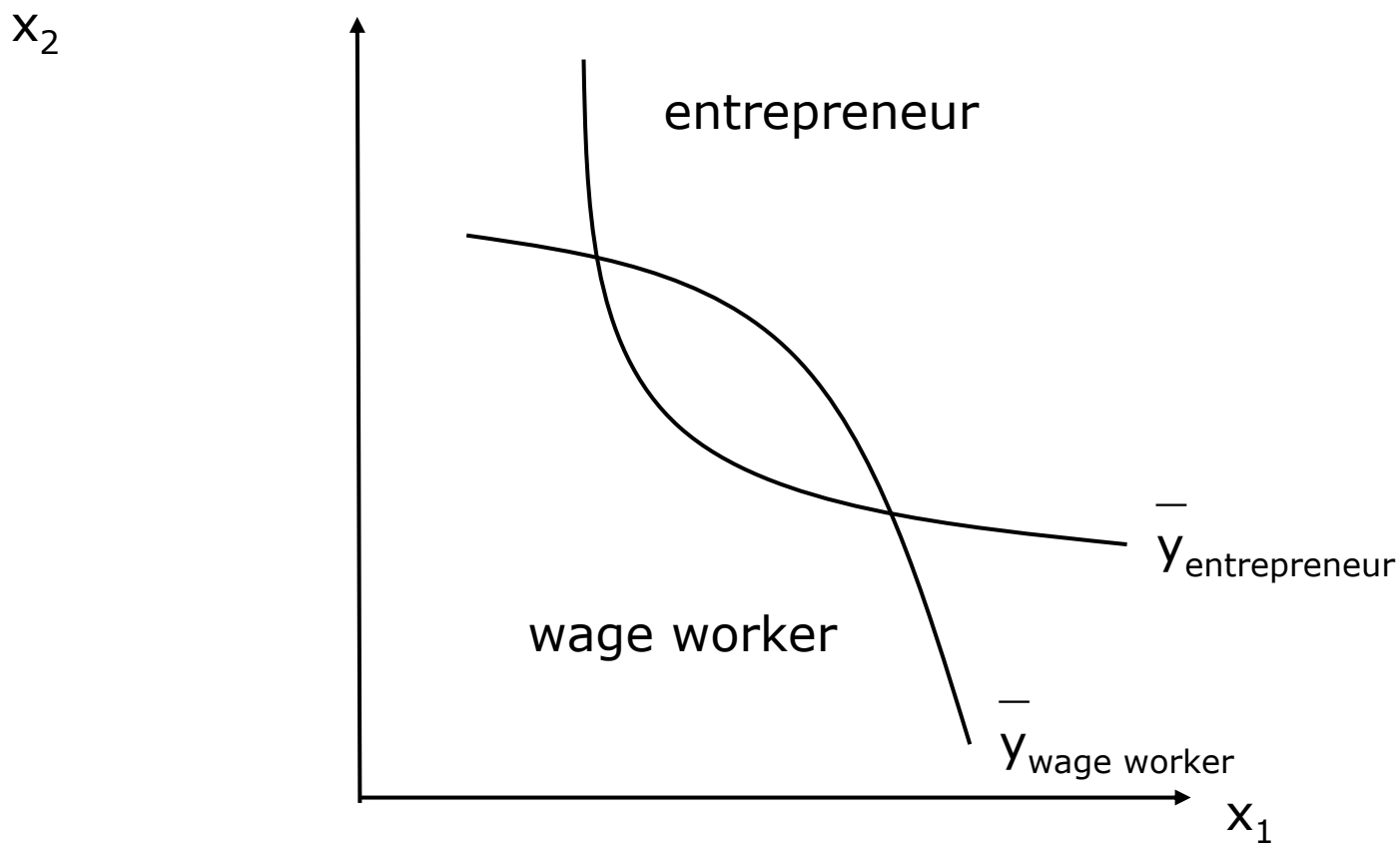
Implementation – Income functions

> Income functions $\min[x_1,x_2]$ and $\max[x_1,x_2]$ are theoretically appealing..

> .. but difficult to implement empirically

> We use more flexible forms for the income functions

Implementation – Income functions



Implementation – Income functions

SIMPLE

$$y = \beta_0 + \beta_1 x_1 + \beta_3 x_2 + \beta_5 x_1 x_2 + other\ controls$$

"*STANDARD*"

$$y = \beta_0 + \beta_1 x_1 + \beta_3 x_2 + \beta_4 x_2^{\,2} + \beta_5 x_1 x_2 + other\ controls$$

TRANSLOG

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_1^{\,2} + \beta_3 x_2 + \beta_4 x_2^{\,2} + \beta_5 x_1 x_2 + other\ controls$$

Implementation – Income functions

$$STANDARD$$

$$y = \beta_0 + \beta_1 x_1 + \beta_3 x_2 + \beta_4 x_2^{\,2} + \beta_5 x_1 x_2 + other\ controls$$

- Hypotheses
  - Entrepreneurs: $\beta_5 > 0$ - x_1 and x_2 are complements => Generalists or "Jacks-of-all-trades"
  - Wage workers: $\beta_5 \leq 0$ - x_1 and x_2 are competing inputs => Specialists

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Results – Estimates for entrepreneurs (Self-employed and managers)

Table 3: Returns to Qualifications, Actual Experience

	Self-employed		Managers	
Years of Education				
Experience				
Experience squared				
(Years of Education) *(Experience)				
N R^2				

Notes: Parameter estimates for additional explanatory variables are excluded. The list of explanatory variables also includes age, gender, married, dummy for address in city, immigrant, and assisting spouse.

Results – Estimates for entrepreneurs (Self-employed and managers)

Table 3: Returns to Qualifications, Actual Experience

	Self-employed		Managers	
Years of Education	**0.019** (0.003)	*-0.012* *(0.007)*		
Experience	**0.128** (0.005)	**0.091** (0.008)		
Experience squared	**-0.003** (0.000)	**-0.003** (0.000)		
(Years of Education) *(Experience)		**0.003** (0.001)		
N R^2	34485 0.1899	34485 0.1908		

Notes: Parameter estimates for additional explanatory variables are excluded. The list of explanatory variables also includes age, gender, married, dummy for address in city, immigrant, and assisting spouse.

Results – Estimates for entrepreneurs (Self-employed and managers)

Table 3: Returns to Qualifications, Actual Experience

	Self-employed		Managers	
Years of Education	**0.019** (0.003)	*-0.012* *(0.007)*	**0.0521** (0.002)	
Experience	**0.128** (0.005)	**0.091** (0.008)	**0.0835** (0.007)	
Experience squared	**-0.003** (0.000)	**-0.003** (0.000)	**-0.002** (0.000)	
(Years of Education) *(Experience)		**0.003** (0.001)		
N R^2	34485 0.1899	34485 0.1908	13088 0.3763	

Notes: Parameter estimates for additional explanatory variables are excluded. The list of explanatory variables also includes age, gender, married, dummy for address in city, immigrant, and assisting spouse.

Results – Estimates for entrepreneurs (Self-employed and managers)

Table 3: Returns to Qualifications, Actual Experience

	Self-employed		Managers	
Years of Education	**0.019** (0.003)	*-0.012* *(0.007)*	**0.0521** (0.002)	0.005 (0.008)
Experience	**0.128** (0.005)	**0.091** (0.008)	**0.0835** (0.007)	**0.048** (0.009)
Experience squared	**-0.003** (0.000)	**-0.003** (0.000)	**-0.002** (0.000)	**-0.002** (0.000)
(Years of Education) *(Experience)		**0.003** (0.001)		**0.003** (0.000)
N R^2	34485 0.1899	34485 0.1908	13088 0.3763	13088 0.3797

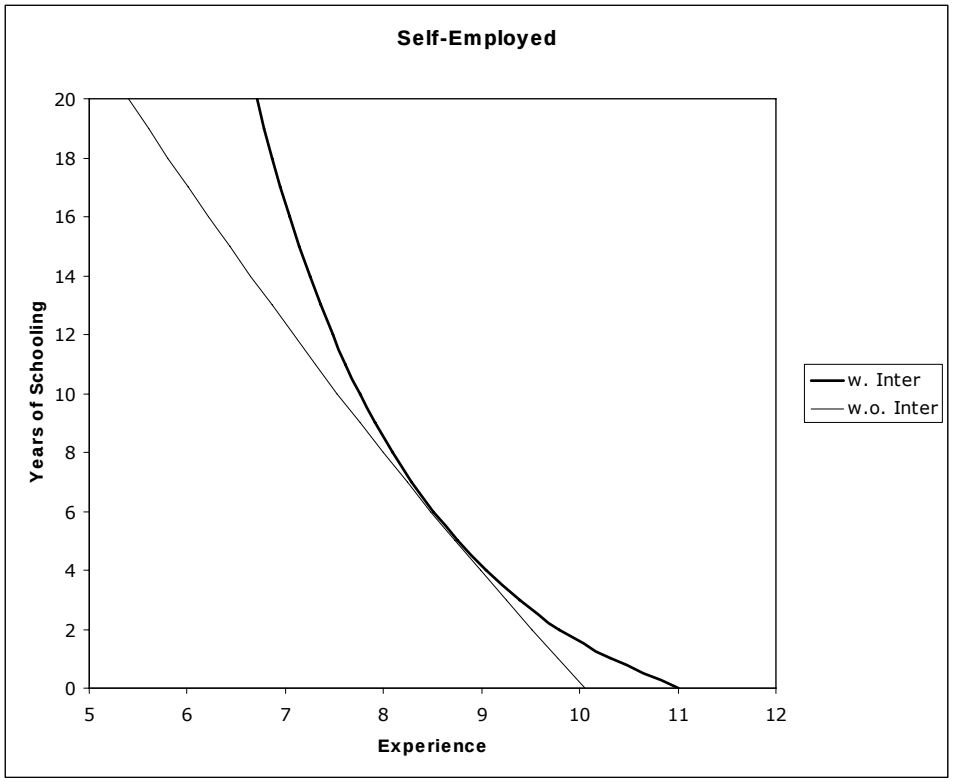
Notes: Parameter estimates for additional explanatory variables are excluded. The list of explanatory variables also includes age, gender, married, dummy for address in city, immigrant, and assisting spouse.

Results - Iso-income lines with and without interaction

Self-employed

Results - Iso-income lines with and without interaction

Self-employed

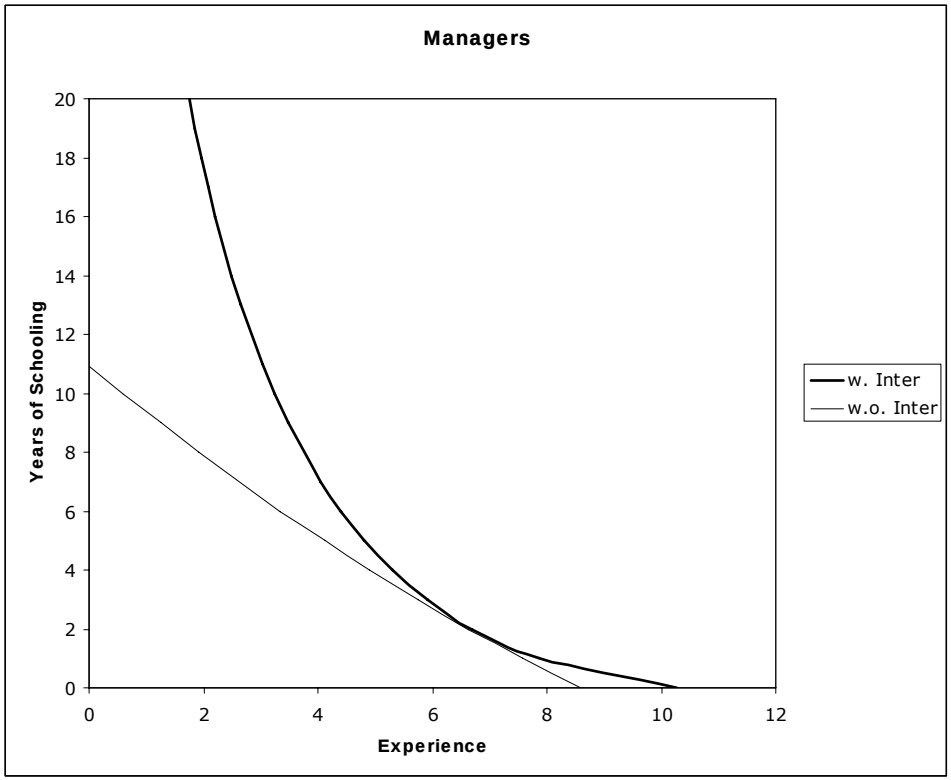


Results - Iso-income lines with and without interaction

Managers

Results - Iso-income lines with and without interaction

Managers

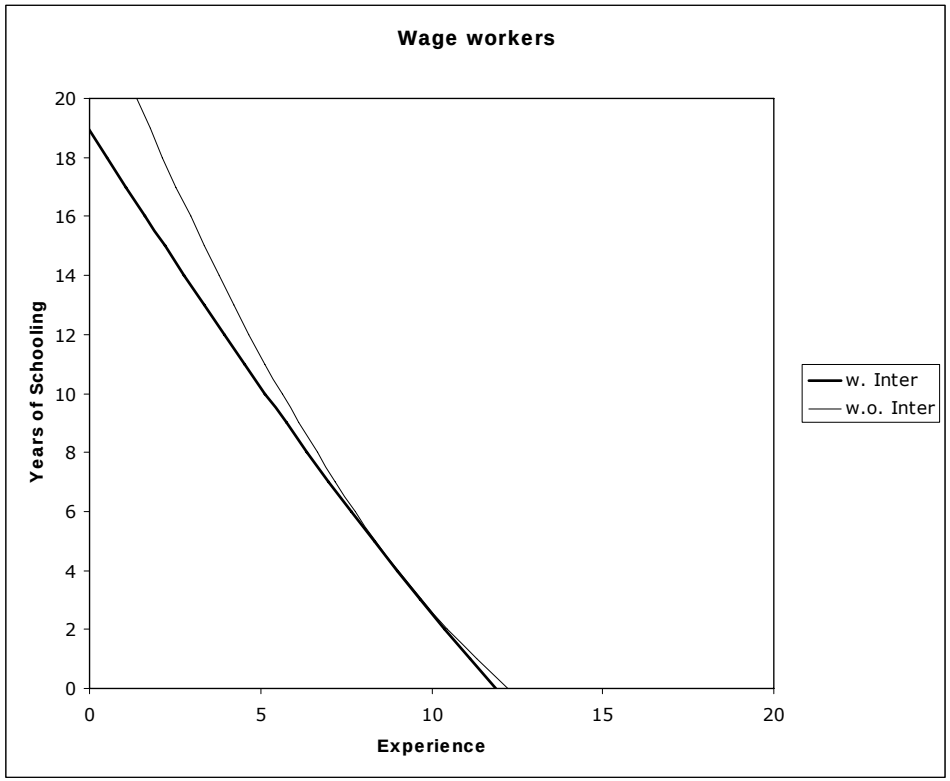


Results – Estimates for wage-workers (White/blue-collar; not managers)

Table 3: Returns to Qualifications, Actual Experience

	Wage-employment	
Years of Education	**0.064** (0.000)	**0.094** (0.001)
Experience	**0.186** (0.001)	**0.209** (0.001)
Experience squared	**-0.005** (0.000)	**-0.005** (0.000)
(Years of Education) *(Experience)		**-0.002** (0.000)
N R^2	708,160 0.5565	708,160 0.5576

Results - Iso-income lines with and without interaction



Results – sum up

> The hypothesis that entrepreneurs are ”Jacks-of-all-Trades” cannot be rejected.

> The hypothesis that wage-workers are specialists cannot be rejected.

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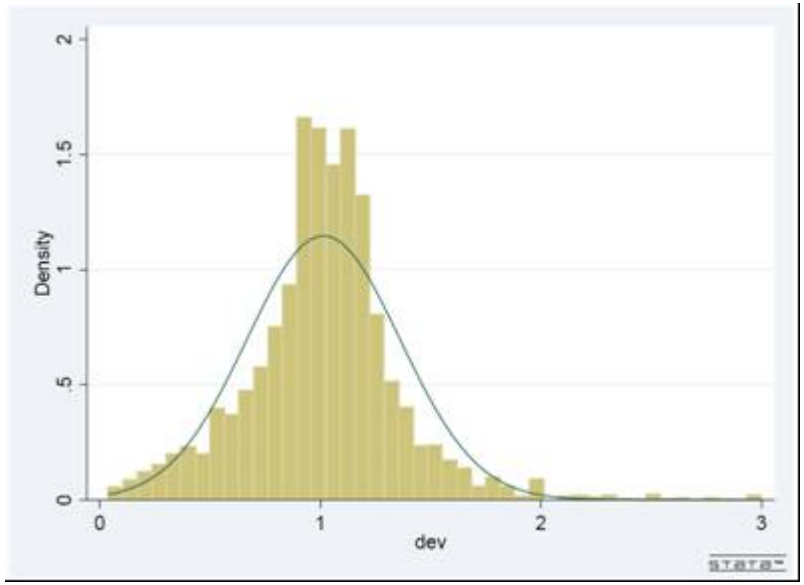
Measurement Issues

- x_2 – ”learning-by-doing”:
  - labor market experience: actual not potential
  - focus on experience in wage-employment

Measurement Issues

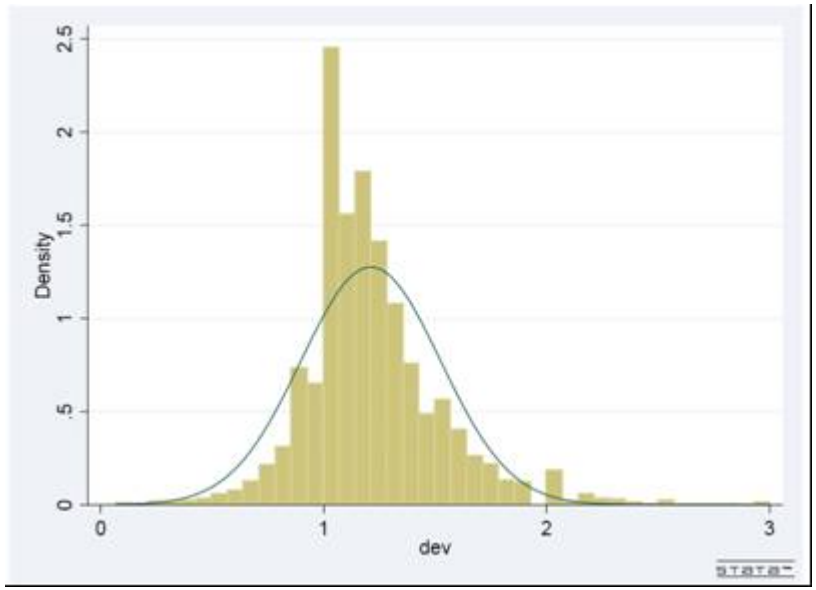
Histogram for
dev=(actual experience)/(potential experience)



Self-employed

Measurement Issues

Histogram for
dev=(actual experience)/(potential experience)



Managers

Measurement Issues – "potential" experience=Age-years of education-6

Table 2: Returns to Qualifications, Potential Experience

	Self-employed	Managers
Years of Education	**0.041** (0.012)	**0.032** (0.006)
Experience	**0.193** (0.014)	**0.135** (0.010)
Experience squared	**-0.005** (0.000)	**-0.003** (0.000)
(Years of Education) *(Experience)	0.000 (0.001)	**-0.001** (0.000)
N R^2	34485 0.1288	13088 0.3714

Notes: Parameter estimates for additional explanatory variables are excluded. The list of explanatory variables also includes age, gender, married, dummy for address in city, immigrant, and assisting spouse.

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Sampling Issues

- Unique Danish data on experience:
  - Data sample 1980-2002
    - We use individuals that are younger than 20 years in 1980
    - Results are robust to other threshold levels, e.g., 15 and 30 years

Sampling Issues - Data sample

Table 1: Years of Education and Experience for Self-employed and Managers, 2002

Self-employed

Education		Experience		
Years of education:	Individuals	Years of experience	Wage-work	Self-employed
9	14.6%	13.9	8.5	5.4
10	9.8%	14.5	9.2	5.4
12	59.7%	16.6	11.2	5.4
14	5.6%	15.5	10.9	4.6
16	6.6%	13.9	9.7	4.2
18	3.6%	14.6	10.2	4.4
All	34,485	15.7	10.5	5.2

Managers

Education		Experience		
Years of education:	Individuals	Years of experience	Wage-work	Self-employed
9	2.7%	17.1	17.1	0
10	3.8%	16.6	16.6	0
12	52.2%	17.4	17.4	0
14	9%	17	17	0
16	17.8%	18	18	0
18	14.6%	16.7	16.7	0
All	13,088	17.3	17.3	0

Notes: The sample includes all self-employed and managers that were younger than 20 years in 1980 and active in the private sector excluding primary industries.

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Robustness - Additional results

- The main results are robust to
  - More flexible functional forms – include cubic and interaction terms btw wage work experience, self-employment experience and years of education
  - Taking information on part-time employment into account when constructing experience variables
  - Group self-employment sample after employers and non-employers
  - (Distinguish ”roles” of wage employment)

Conclusion

- Entrepreneurs are generalists or ”Jacks-of-all-trades”
  - Skills are complements – at least the two skill types that we investigated.
  - No direct return to education. The return shows up in the interaction term only.
  - The higher is ”experience in wage employment” the higher is the average return to skills.

Measurement Issues

- *Definitions of entrepreneurs*:
  - Business owners - Self-employed
  - Managers

- *Income*:
  - Annual surplus for self-employed
  - Wage income for managers

- *Return*:
  - Mincer-like estimations.
  - Percentage change in income of one extra year of education

Results – Returns to Education..
.. and interaction term

$$STANDARD$$

$$\frac{\partial y}{\partial x_1} = \beta_1 + \beta_5 x_2 \approx 3\% \; for \; x_2 = 10$$

- Problem:
  - Have we measured all relevant skills?
  - Probably not
    - Hard to evaluate return to education
    - Can only conclude that skills are complements

Results - Returns to Education ..
.. and interaction term

Self-employed Manager