Living the American Dream in Finland: The Social Mobility of Innovators

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September 2016

Motivation

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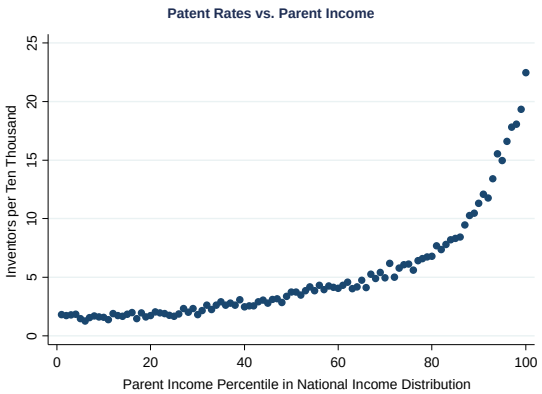

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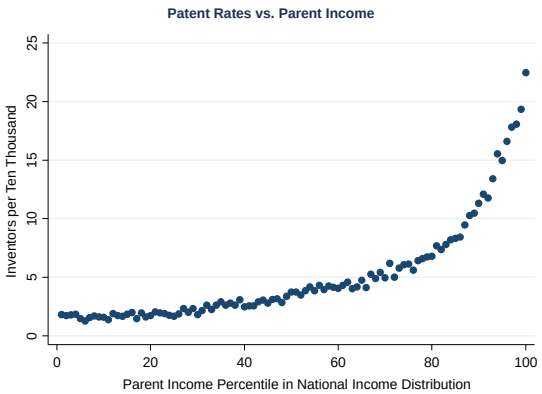

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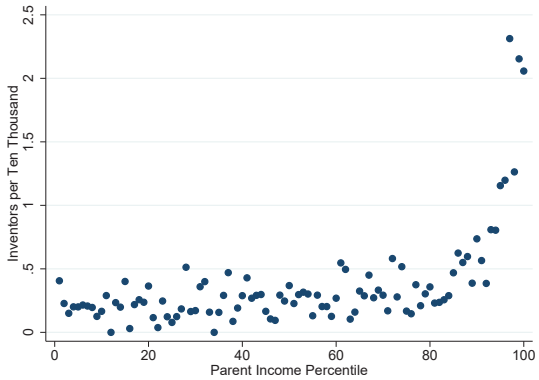

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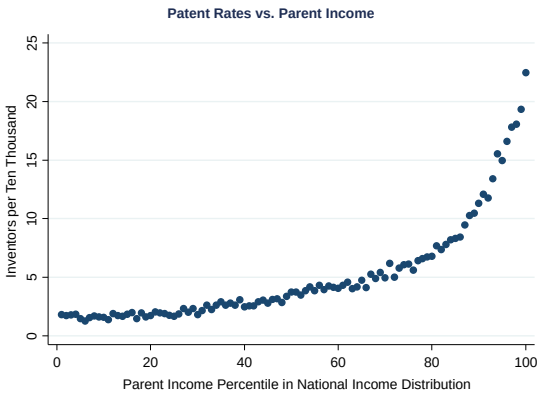

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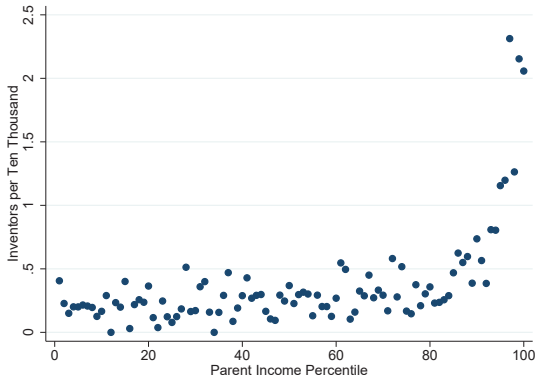

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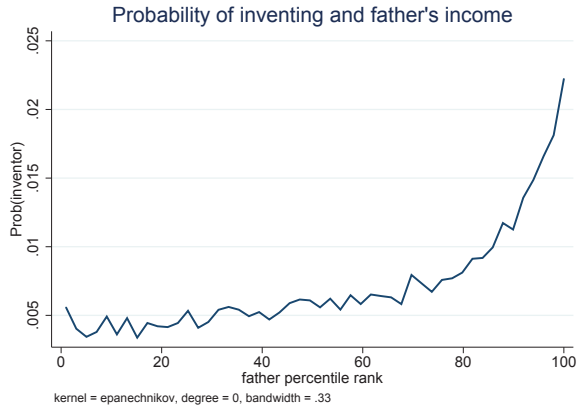

This Paper
Finnish Census

Research Questions & Outline

1. Does becoming an inventor depend on **socio-economic background**, **education**, or **innate ability**?
2. Who benefits from innovation?
3. What are the implications of innovation on income and social mobility?

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2. Who benefits from innovation?
3. What are the implications of innovation on income and social mobility?

To answer these questions one needs extensive data on:

- inventor characteristics (income, education, ability),
- parents (income, education, wealth),
- firms, and co-workers.

Data

- We merge four Finnish datasets, 1988-2012:
  1. **Individual data** on income, education and other characteristics, from Statistics Finland (SF)
  2. **Firm-level data** (inventors' co-workers, senior/junior managers, entrepreneurs), from Statistics Finland (SF)
  3. **Patent data** from European Patent Office (EPO)
  4. **IQ data** from the Finnish Defence Force (FDF)

Summary Statistics

- Our initial sample covers 1988-2012 and consists of
  - 700,000 individuals,
  - 12 575 inventors,
  - 6 395 inventors in the IQ sample.

Section 1:

Who Becomes an Inventor?

Who Becomes an Inventor? Regression Analysis

Table 1: Who Becomes Regressions

Group	Par Income
w(father)_90-94	0.0127***
w(father)_95-99	0.0167***
w(father)_100	0.0184***
w(mother)_90-94	0.00418***
w(mother)_95-99	0.00782***
w(mother)_100	0.0137***
Master(father)	
PhD(father)	
Master(mother)	
PhD(mother)	
IQ_95-99	
IQ_100	
Sci_College(own)	
Sci_Master(own)	
Sci_PhD(own)	
wealth(father)_90-94	
wealth(father)_95-99	
wealth(father)_100	
wealth(mother)_90-94	
wealth(mother)_95-99	
wealth(mother)_100	
Observations	696,348

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w(mother)_100	0.0137***	0.00436**
Master(father)		0.0105***
PhD(father)		0.0291***
Master(mother)		0.0104***
PhD(mother)		0.0121*
IQ_95-99		
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w(father)_95-99	0.0167***	0.00866***	0.00699***
w(father)_100	0.0184***	0.00698***	0.00538***
w(mother)_90-94	0.00418***	0.00140**	0.000582
w(mother)_95-99	0.00782***	0.00206**	0.00111
w(mother)_100	0.0137***	0.00436**	0.00309
Master(father)		0.0105***	0.00758***
PhD(father)		0.0291***	0.0256***
Master(mother)		0.0104***	0.00814***
PhD(mother)		0.0121*	0.00923
IQ_95-99			0.0200***
IQ_100			0.0388***
Sci_College(own)			
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wealth(father)_90-94			
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Group	Par Income	+Par Edu	+IQ	+Own Edu
w(father)_90-94	0.0127***	0.00727***	0.00587***	0.00250***
w(father)_95-99	0.0167***	0.00866***	0.00699***	0.00302***
w(father)_100	0.0184***	0.00698***	0.00538***	-0.000527
w(mother)_90-94	0.00418***	0.00140**	0.000582	-1.69e-05
w(mother)_95-99	0.00782***	0.00206**	0.00111	-0.000447
w(mother)_100	0.0137***	0.00436**	0.00309	-0.000584
Master(father)		0.0105***	0.00758***	0.000798
PhD(father)		0.0291***	0.0256***	0.0104***
Master(mother)		0.0104***	0.00814***	0.00223*
PhD(mother)		0.0121*	0.00923	-0.00114
IQ_95-99			0.0200***	0.00904***
IQ_100			0.0388***	0.0193***
Sci_College(own)				0.0135***
Sci_Master(own)				0.0918***
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Group	Par Income	+Par Edu	+IQ	+Own Edu	+Par Wealth
w(father)_90-94	0.0127***	0.00727***	0.00587***	0.00250***	0.00295***
w(father)_95-99	0.0167***	0.00866***	0.00699***	0.00302***	0.00370***
w(father)_100	0.0184***	0.00698***	0.00538***	-0.000527	-0.000262
w(mother)_90-94	0.00418***	0.00140**	0.000582	-1.69e-05	-0.000166
w(mother)_95-99	0.00782***	0.00206**	0.00111	-0.000447	-0.000642
w(mother)_100	0.0137***	0.00436**	0.00309	-0.000584	-0.00204
Master(father)		0.0105***	0.00758***	0.000798	0.000768
PhD(father)		0.0291***	0.0256***	0.0104***	0.0113***
Master(mother)		0.0104***	0.00814***	0.00223*	0.00242**
PhD(mother)		0.0121*	0.00923	-0.00114	-0.00197
IQ_95-99			0.0200***	0.00904***	0.00896***
IQ_100			0.0388***	0.0193***	0.0196***
Sci_College(own)				0.0135***	0.0121***
Sci_Master(own)				0.0918***	0.0911***
Sci_PhD(own)				0.209***	0.204***
wealth(father)_90-94					0.000110
wealth(father)_95-99					-0.000103
wealth(father)_100					0.00141
wealth(mother)_90-94					0.000616
wealth(mother)_95-99					-0.000303
wealth(mother)_100					0.000773
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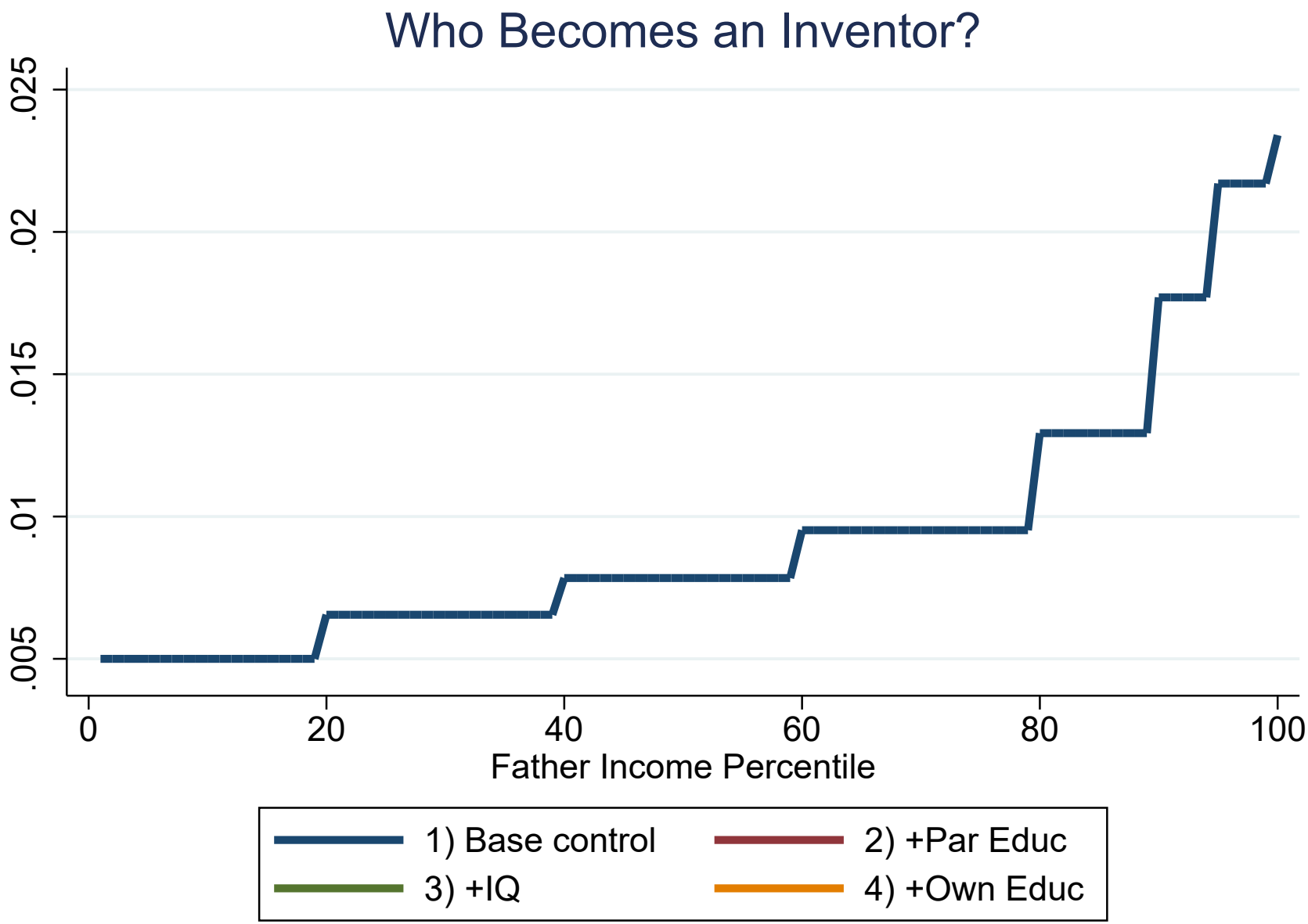
Who Becomes an Inventor? Visual Representation



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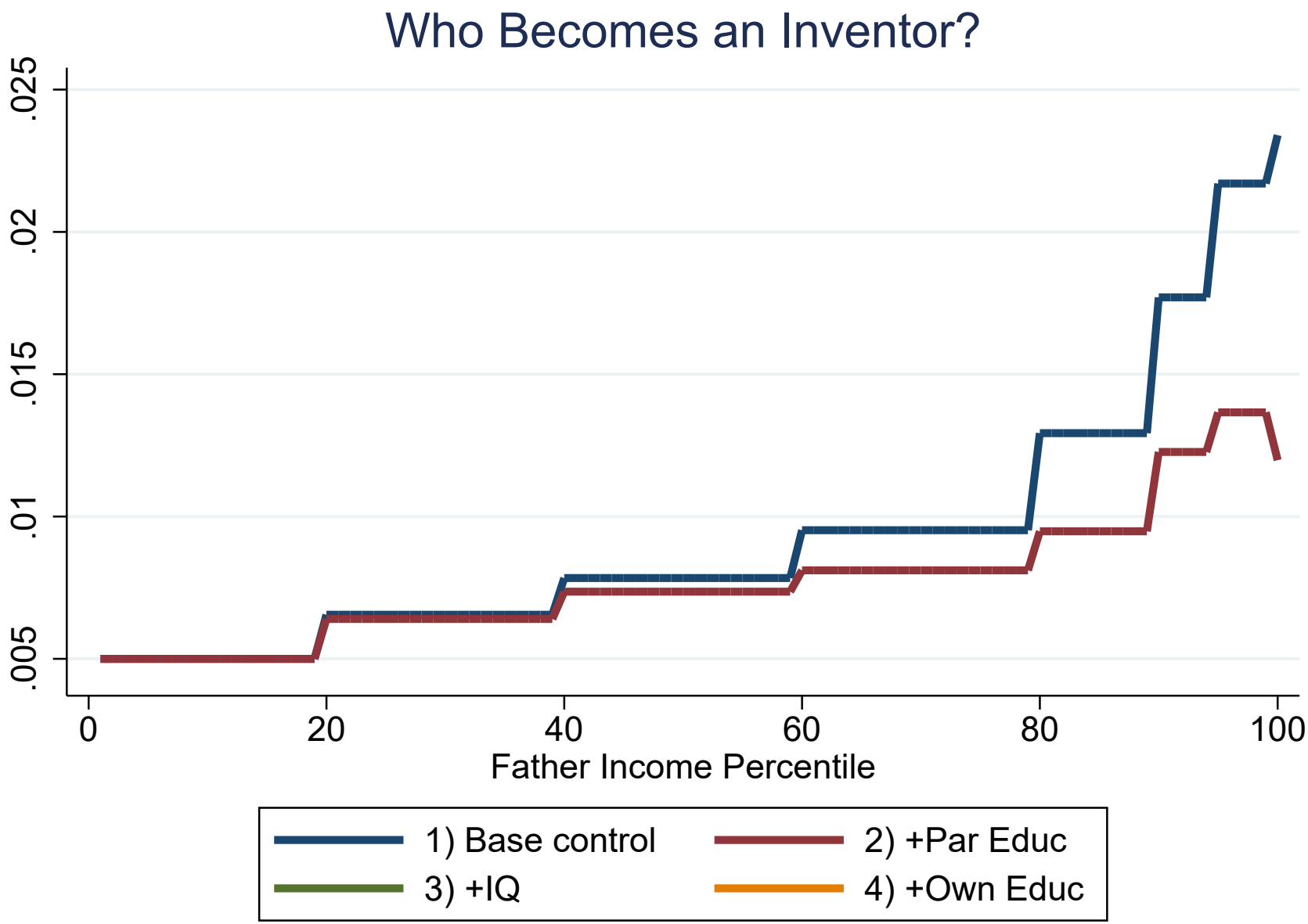

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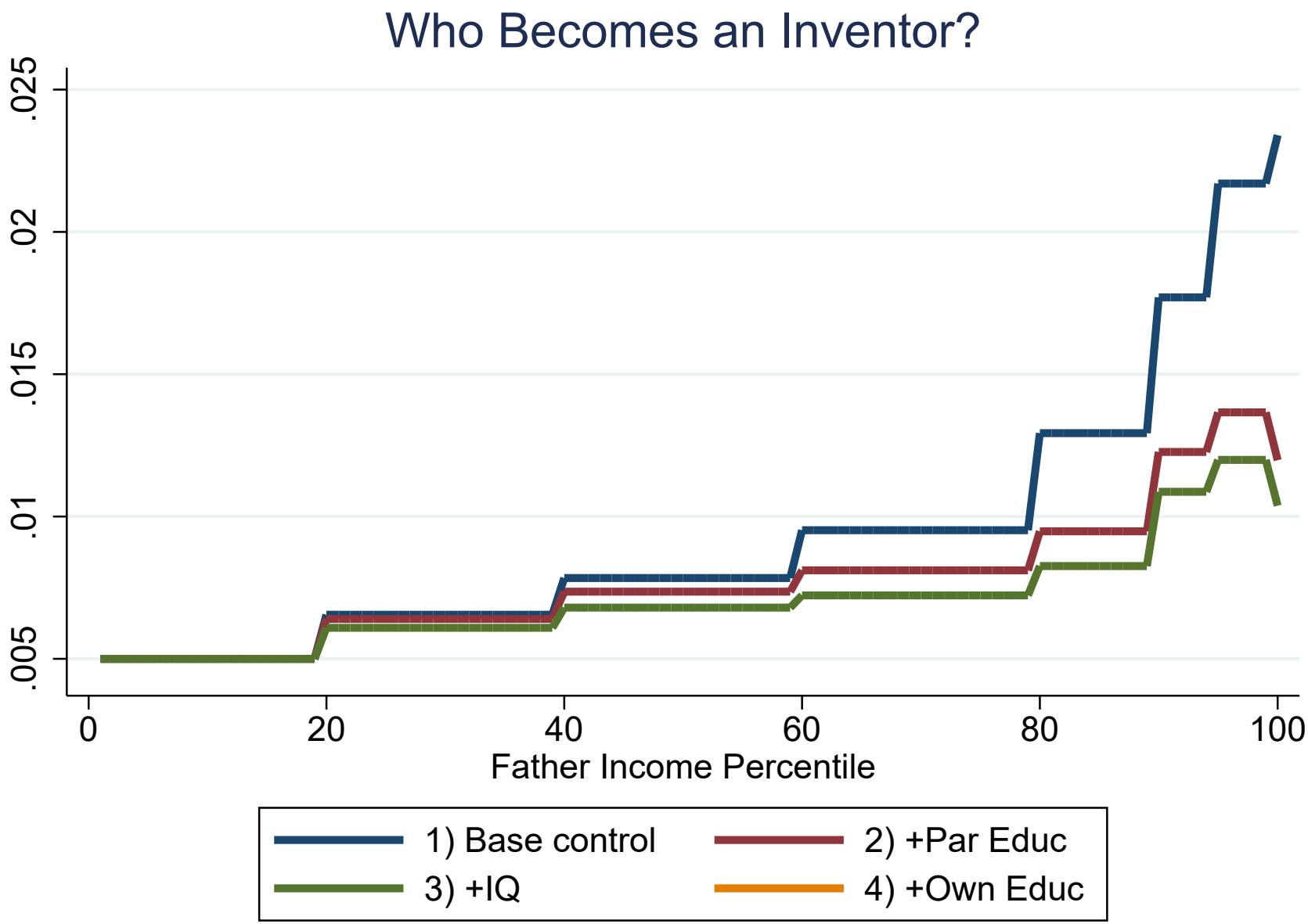

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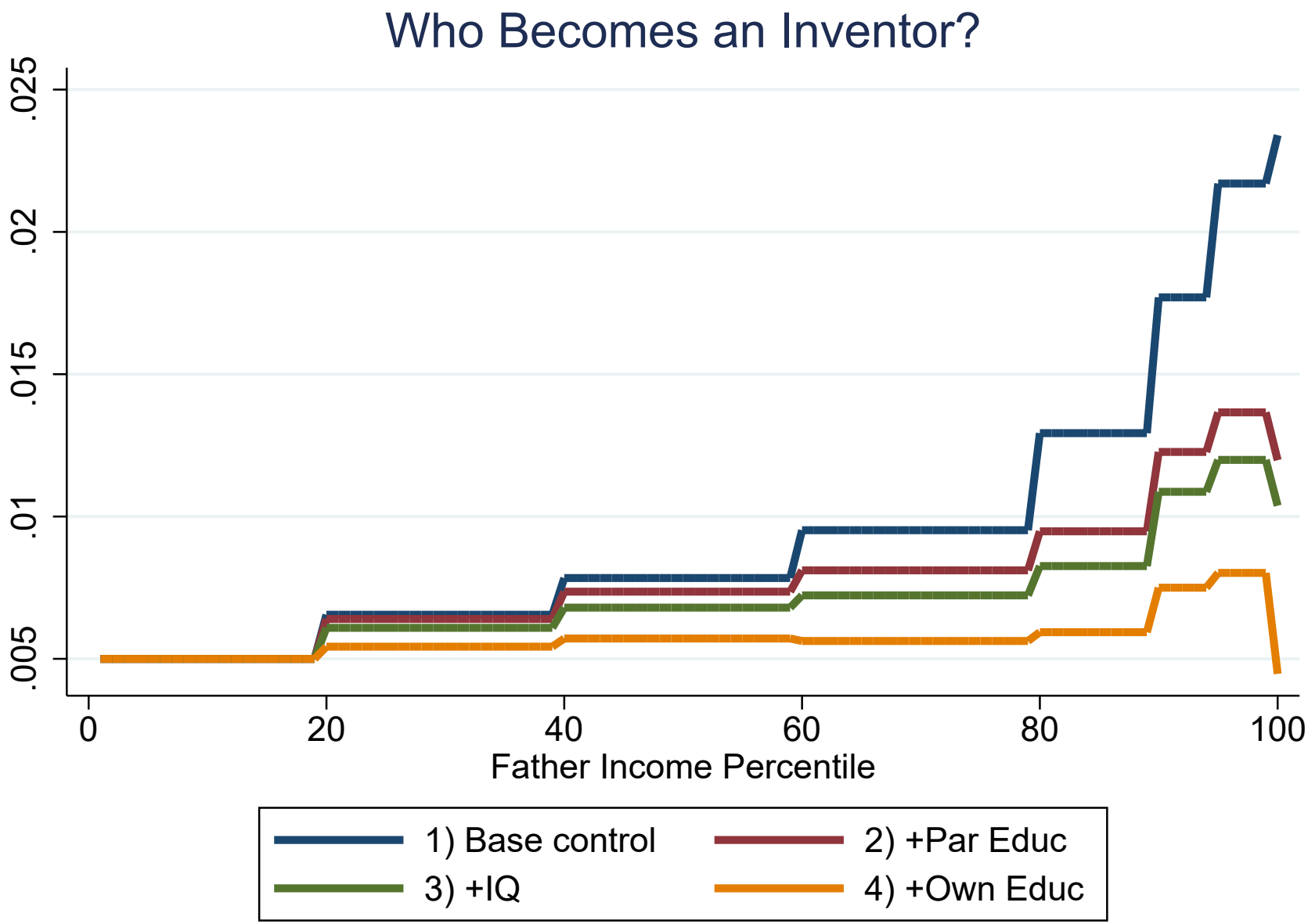

Decomposing the "Who Becomes" Regression

Decomposing the Explained Variation

Parental Income	Parental Education	Parental Wealth	Own Education	Own IQ
0.1%	0.4%	0.9%	81.7%	16.8%

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Answer: It cannot be because education is completely free in Finland!

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Answer: It cannot be because education is completely free in Finland!

New Question: **Why do kids of rich parents get more education?**

Comparison of Inventors to MDs and Lawyers

Decomposing the Explained Variation

	Inventor	MD	Lawyers
parental income	0.018	0.084	0.127
parental educ	0.159	0.379	0.400
IQ	0.478	0.074	0.036
parental wealth	0.027	0.032	0.036
base controls	0.319	0.432	0.400

Counterfactuals

COUNTERFACTUAL ANALYSIS

	Data	Father Income	IQ
inventor	0.009	0.015	0.032
MD	0.004	0.011	0.009
lawyer	0.004	0.011	0.004

Decomposing the Education Regression

Decomposing the Explained Variation

Parental Income	Parental Education	Parental Wealth	Own IQ
7.4%	24.6%	15.7%	52.2%

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Conclusion: Children of high income parents are more educated (and hence more innovative) mostly due to high IQ + educated parents!

Section 2:

Who Gains from Innovation?

Returns to Innovation

Table: Returns to Innovations

			FIXED EFFECT REGRESSION		
time	**inventor**	**b.c. coworker**	**senior manager**	**senior w-c**	**entrepreneur**
t=0	0.0187***	0.0089***	-0.0037*	-0.0019*	0.0763
t=1	0.0116***	0.0080***	0.0077***	0.0030***	0.1695***
t=2	0.0071***	0.0027***	-0.0011	0.0015	0.0630**
t=3	0.0063***	0.0008*	0.0012	0.0020**	-0.0276
t=4	0.0059**	-0.0023***	0.0037**	0.0030***	0.0438
t=5	0.0099***	-0.0012***	0.0051***	0.0022**	0.0256
t=6	0.0072***	-0.0012***	0.0076***	0.0042***	0.0535***
t=7	0.0089***	-0.0004	0.0137***	0.0023**	0.0395**
t=8	0.0073***	-0.0014***	0.0093***	0.0053***	0.0639***
t=9	0.0049	0.0057***	0.0002	0.0007	0.0562***
t=10	0.0060**	0.0010**	-0.0056**	0.0019*	0.0404***
Observations			7,285,011		

Returns to Innovation

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Fact: Inventor gains around **1%** for 10 years.

Returns to Innovation

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Fact: Coworkers gain in the short run.

Returns to Innovation

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Fact: Coworkers lose in the long run.

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Fact: Entrepreneur gains almost **10 times** in the long-run.

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t=8	0.0073***	-0.0014***	0.0093***	0.0053***	0.0639***
t=9	0.0049	0.0057***	0.0002	0.0007	0.0562***
t=10	0.0060**	0.0010**	-0.0056**	0.0019*	0.0404***
Observations			7,285,011		

entrepreneur > senior manager > inventor > coworker

Section 3:

Income and Social Mobility

Additional Analysis

- **Income Mobility:** For non-inventors the wage at age 35 is a main determinant of wage at age 45, but conditional on inventing by age 33, initial wage at age 35 matters very little for wage at age 45 (inventor dummy is paramount)

- **Social Mobility:** For non-inventors, father's income percentile has a determinant effect on individual's income percentile (at age 35), but this correlation between father income and son income disappears for inventors (inventor dummy is paramount)

Conclusion

- Credit constraints are not an impediment to become an inventor.
  $\rightarrow$ What matters is education and IQ.
- Inventing is a social elevator for both the inventor and her co-workers.
- Return is much higher for the entrepreneur than the inventor.
  $\rightarrow$ Important implications for tax policy.