Searching for Fortune – When Does Entrepreneurship Pay?

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Aim of the study

- Main research question: to what extent does an “entrepreneurial income puzzle” exist?
- To provide answers to this question we analyze the income of different types of self-employed persons as compared to dependently employed, thereby accounting for
  - individual characteristics, educational effects,
  - Industry characteristics, firm size and firm age,
  - selection issues.

Empirical evidence on incomes from entrepreneurship – What we know

- Self-employed earn lower median hourly earnings than paid employees (Hamilton 2000, Åstebro and Chen 2014).
- The spread of entrepreneurial incomes is larger than the spread of wages (Parker 1997, Hamilton 2000).
- A small fraction of individuals earns a fortune as an entrepreneur (Henrekson and Sanandaji 2013).
- The monetary returns to entrepreneurship differ according to
  - occupational structure (Parker 1999),
  - ability, labor market experience, tenure in entrepreneurship (Braguinsky, Klepper & Ohyama 2012),
  - gender (Fairlie 2005),
  - legal status of the business (Levine & Rubinstein 2013).

Empirical evidence on incomes from entrepreneurship – Things we don't know

- Heterogeneity of incomes depending on firm size and employment status.
- Special characteristics of solo entrepreneurs. Particularly, explaining different incomes of solo-entrepreneurs as compared to employers.
- Comparison of employers with dependently employed managers and of solo-entrepreneurs with employees in non-managerial positions (better matching).
- Returns to education for different types of self-employed.
- Share of entrepreneurs who earn significantly more than comparable dependent employees.

Data

- German Micro-Census data, wave 2009; on-site access to the full dataset:
  - Representative survey of about 1 percent of the German population (820,000 individuals) ⇨ allows analyzing subgroups.
  - Obligatory for all respondents ⇨ missing values are less relevant than in other surveys.
  - No incidence for under- and over-reporting of income in self-employment.
- For further analysis we partly use the (only available) Micro-Census panel data for the periods 2001-2004 that contains about 25 percent of the cases of the cross-section.

Data (*continued*)

- Employment status is self-reported :
  - self-employed (with or without employees) vs.
  - paid employee (employee, homeworker, apprentice).
- The final sample consists of 262,249 individuals; 15,165 are solo self-employed (5.8 percent) and 11,963 are self-employed with employees (4.6 percent).

Measurement of income in the Micro-Census

Net monthly individual income (after taxes and social insurance contributions) is available in form of 24 narrowly defined income groups that range from 0-150 Euros to more than 18,000 Euros.

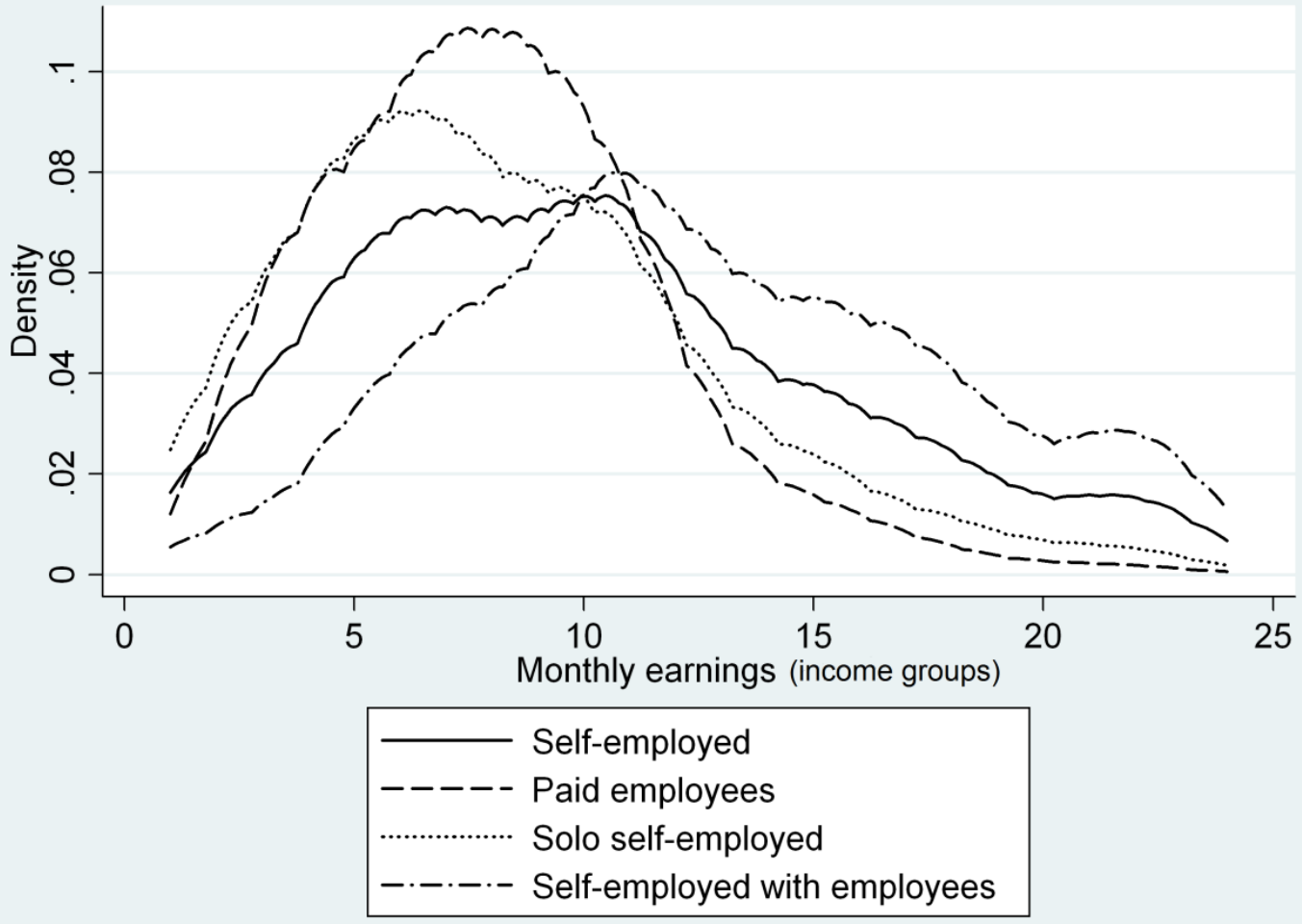
Income group	Income value, €	Income group	Income value, €
1	0-150	13	2,600-2,900
2	150-300	14	2,900-3,200
3	300-500	15	3,200-3,600
4	500-700	16	3,600-4,000
5	700-900	17	4,000-4,500
6	900-1,100	18	4,500-5,000
7	1,100-1,300	19	5,000-5,500
8	1,300-1,500	20	5,500-6,000
9	1,500-1,700	21	6,000-7,500
10	1,700-2,000	22	7,500-10,000
11	2,000-2,300	23	10,000-18,000
12	2,300-2,600	24	more than 18,000

Income variable

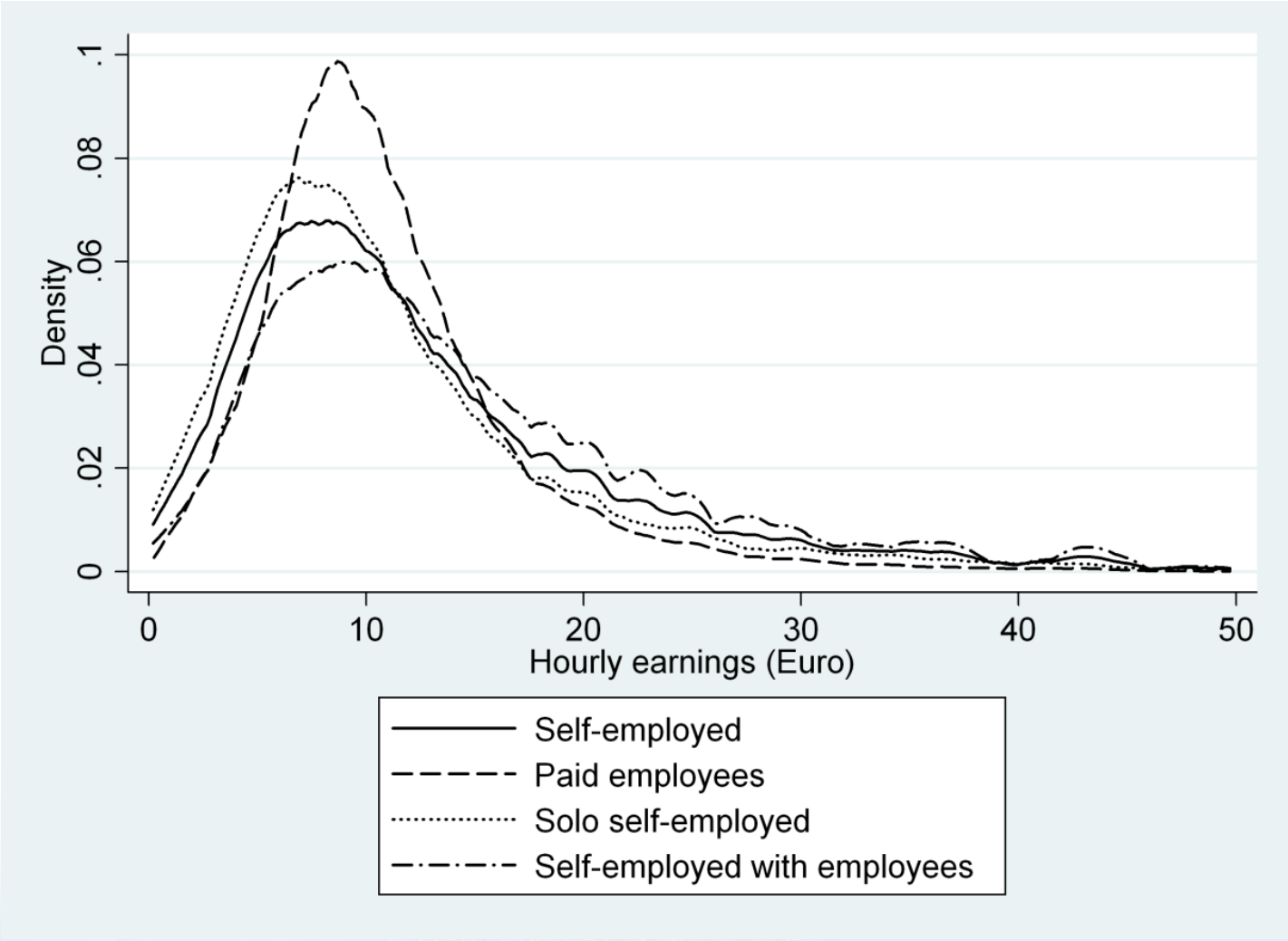
We construct two income measures:

- 24 intervals of log net monthly income
- Log of net hourly income – midpoints of the income intervals divided by the number of working hours per month.

Distribution of monthly net income by employment status



Distribution of hourly net income by employment status



Distribution of hourly net income by employment status (in €)

	Paid employees	Self-employed	Solo self-employed	Self-employed with employees
Mean value	*11.51*	*15.59*	*14.28*	*17.25*
Standard deviation	*12.35*	*40.54*	*47.64*	*29.06*
1st percentile	2.19	0.47	0.47	0.94
5th percentile	3.75	2.68	2.38	3.70
10th percentile	5	4.17	3.75	5
25th percentile	7.5	6.67	6.25	7.71
50th percentile	10	10.28	*9.38*	*12.25*
75th percentile	13.44	17	15	19.79
90th percentile	18.56	28.13	23.75	31.94
95th percentile	23.53	40	35	43.75
99th percentile	42.19	89.29	100	87.5
Number of observations	235,121	27,128	15,165	11,963

Estimation approach

- We apply
  - Interval regression,
  - OLS regression,
  - Quantile regression.
- Models include
  - Dummy variable for employment status
  - Individual characteristics: age, age squared, years in current job, years in current job squared, formal qualification level, marital status, children in household, nationality (German yes / no), gender, industry & occupational fixed effects.
  - Working hours per month (only in interval regressions).

Multivariate analysis: determinants of income

	Interval regression	OLS means	25th percentile	50th percentile	75th percentile
A: *All self-employed vs. all employees*					
Self-employed	-0.104***	-0.0830***	-0.221***	-0.0347***	0.131***
	(0.00474)	(0.00513)	(0.00373)	(0.00318)	(0.00362)
B: *Solo self-employed vs. employers vs. all employees*					
Solo self-employed	-0.214***	-0.177***	-0.314***	-0.128***	0.0381***
	(0.00614)	(0.00709)	(0.00486)	(0.00402)	(0.00460)
Self-employed with employees	0.0495***	0.0384***	-0.0995***	0.0789***	0.225***
	(0.00685)	(0.00694)	(0.00545)	(0.00451)	(0.00515)
C: *Solo self-employed vs. employers vs. employees with managerial function vs. employees without managerial function*					
Paid employees with managerial function	0.271***	0.190***	0.174***	0.165***	0.161***
	(0.00861)	(0.00871)	(0.0150)	(0.0123)	(0.0144)
Solo self-employed	-0.153***	-0.153***	-0.289***	-0.112***	0.0499***
	(0.00761)	(0.00850)	(0.00918)	(0.00755)	(0.00880)
Self-employed with employees	0.212***	0.0864***	-0.0670***	0.102***	0.252***
	(0.00896)	(0.00858)	(0.00991)	(0.00815)	(0.00950)

Selectivity issues

- People with higher abilities may be more likely to become self-employed and to achieve higher incomes in their occupations.

  ⇨ Having accounted for a number of indicators for abilities, the results still may only indicate a correlation between people's unobserved abilities and their incomes.

- Possible solution: Approximate abilities by wages in paid employment prior to becoming self-employed (Hamilton 2000).

- Our tests based on the Micro Census panel (2001-2004) show a weakly significant positive effect for becoming self-employed with employees, and *no* significant effect for a transition into solo self-employment

Selectivity issues (*continued*)

Our suggestion: A two stage approach

- *Stage 1:* We estimate probabilities for selection into different employment types and use these probabilities in the income regressions instead of dummies for the employment status.
- *Stage 2:* Regressions account for level of formal education, years in current job, years in current job squared, age, age squared, marital status, children in household, nationality, gender, industry and occupational fixed effects.
- Results suggest that the higher the level of formal education the higher the probability of being self-employed (both with and without employees).

Multivariate analysis: determinants of income

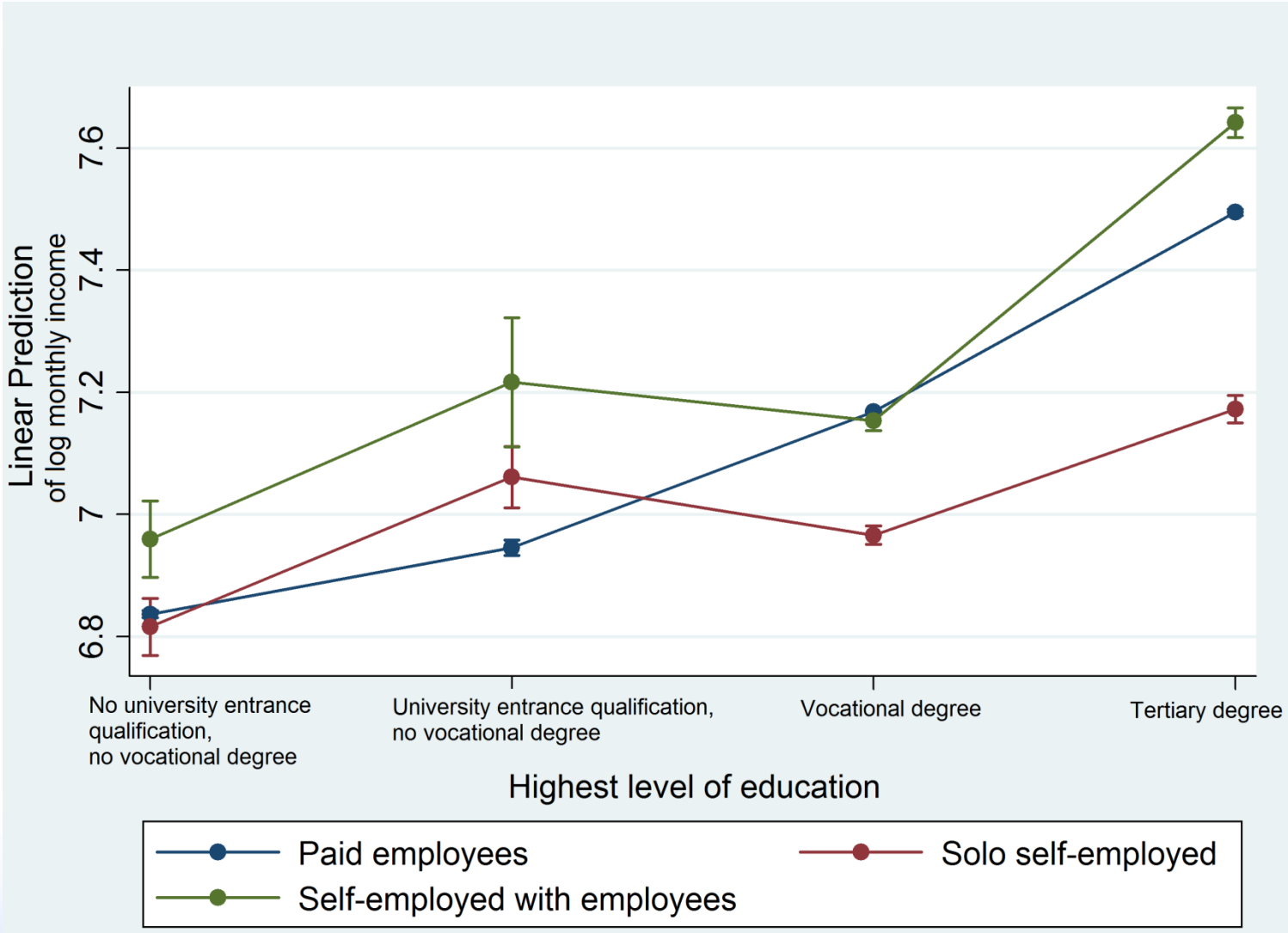
	Interval regression	OLS means	25th percentile	50th percentile	75th percentile
D (selectivity-corrected): *Solo self-employed vs. employers vs. all employees*					
Pr(Solo self-employed)	-0.270***	-0.223***	-0.492***	-0.188***	0.209***
	(0.0462)	(0.0531)	(0.0463)	(0.0392)	(0.0457)
Pr(Self-employed with employees)	0.504***	0.116***	0.0542	0.206***	0.394***
	(0.0396)	(0.0425)	(0.0385)	(0.0326)	(0.0380)

Who has higher returns to education ?

- Interaction terms between
  - dummy variable for employment status and
  - highest level of formal education in the income regressions.

  Interaction terms capture differences in returns to education according to the employment status.
- The basic results of multivariate regressions are confirmed.
- However: solo self-employed holding a university entrance qualification (*Abitur*) but no further vocational degree earn significantly higher incomes than comparable paid employees.

Average returns to formal education by employment status



Explaining income variation between solo self-employed and employers – interval regressions

- Interval income regressions for self-employed respondents.
- Stepwise addition of further variables to assess their contributions to the overall explanatory power.

	No control variables	+ Working hours per month	+ Age & age², tenure & tenure², marital status, children in hh, nationality, gender, regional fixed effects	+ level of formal education	+ industry fixed effects	+occupational fixed effects
Solo self-employed			Reference group			
Employer	0.691***	0.457***	0.392***	0.389***	0.419***	0.416***
	(0.0102)	(0.0105)	(0.0104)	(0.0101)	(0.0100)	(0.0100)
Constant	7.109***	6.415***	5.470***	5.417***	5.494***	5.263***
	(0.00703)	(0.0157)	(0.0870)	(0.0862)	(0.124)	(0.133)
Number of observations	27,128	27,128	27,128	27,128	27,128	27,128
Log pseudolikelihood	-80,773	-79,194	-77,944	-77,128	-76,775	-76,719
Chi2	4,633***	7,209***	11,286***	13,604***	14,630***	14,771***

Summary of results

- High variation of monetary returns from self-employment. Considerable share of low earners as well as of income ‘superstars’ can be found in both categories of self-employed (above the 75th percentile). Thus, there is no *general* income puzzle!

- There are *substantial differences* in returns from entrepreneurship for different types of self-employed:

  - The median *self-employed with employees* earns 22 percent more per hour than the median wage worker. In comparison to wage workers the standard deviation in incomes is 2.3 times larger for this group of entrepreneurs.

  - The median *solo-entrepreneur* earns a 7 percent lower hourly income than the median employee, and in comparison to wage workers the standard deviation of their earnings is 4 times larger.

Summary of results *(continued)*

- Controlling for a large set of individual characteristics, we find that:
  - The vast majority of employers have a higher probability to earn higher net incomes than dependent employees.
  - However, the incomes of employers is not higher as compared to employed managers.
  - Only a minority of solo self-employed earns higher incomes than comparable paid employees.
- Income superstars are also among solo self-employed, thus the group solo-entrepreneurs does not only consist of low income earners (necessity entrepreneurs).
- Basis results are confirmed by two stage model that accounts for selectivity issues.

Summary of results *(continued)*

- While solo self-employed earn on average lower incomes than paid employees, solo self-employed with a university entrance qualification (*Abitur*) as the highest level of education earn significantly more.
- The fact that the upper 25 percent of all entrepreneurs earn more than employees could be interpreted in the sense that these incomes may attract others into this occupational choice even if many of them end up with lower incomes.

Further issues to be addressed

- Further analysis of two stage approach for subgroups (managers etc.)
- Self-employed with employees in different size classes.
- Make use of information about voluntary part-time employment.
- Analysis of male solo self-employed to further understand why they stay in self-employment despite lower incomes.
- What drives entrepreneurial exit: mainly low incomes?

Thank you for your attention !

Estimates from the income regression, Panel B

	I	II	III		
	Interval regression	OLS means	25th percentile	50th percentile	75th percentile
Paid employee			Reference group		
Solo self-employed	-0.214***	-0.177***	-0.314***	-0.128***	0.0381***
	(0.00614)	(0.00709)	(0.00486)	(0.00402)	(0.00460)
Self-employed with employees	0.0495***	0.0384***	-0.0995***	0.0789***	0.225***
	(0.00685)	(0.00694)	(0.00545)	(0.00451)	(0.00515)
Age	0.0542***	0.0564***	0.0617***	0.0493***	0.0385***
	(0.000660)	(0.000784)	(0.000740)	(0.000612)	(0.000700)
Age, squared	-0.000577***	-0.000559***	-0.000681***	-0.000527***	-0.000368***
	(8.11e-06)	(9.71e-06)	(8.96e-06)	(7.41e-06)	(8.47e-06)
Years in current job	0.0162***	0.00843***	0.0155***	0.0116***	0.00657***
	(0.000290)	(0.000324)	(0.000357)	(0.000295)	(0.000338)
Years in current job, squared	-0.000200***	-8.28e-05***	-0.000189***	-0.000127***	-5.25e-05***
	(7.90e-06)	(8.75e-06)	(1.02e-05)	(8.41e-06)	(9.61e-06)
School attendance without university-entrance qualification			Reference group		
University-entrance qualification	0.140***	0.221***	0.0593***	0.131***	0.276***
	(0.00713)	(0.00897)	(0.00707)	(0.00585)	(0.00668)
Vocational degree	0.321***	0.302***	0.381***	0.278***	0.213***
	(0.00319)	(0.00373)	(0.00365)	(0.00302)	(0.00346)
Tertiary degree	0.645***	0.598***	0.658***	0.579***	0.541***
	(0.00418)	(0.00470)	(0.00460)	(0.00381)	(0.00436)
married	-0.0392***	-0.00706***	0.0113***	0.0263***	0.0278***
	(0.00216)	(0.00245)	(0.00270)	(0.00224)	(0.00256)
Children in household (1=yes)	0.0834***	0.132***	0.0881***	0.120***	0.161***
	(0.00225)	(0.00249)	(0.00268)	(0.00222)	(0.00253)

to be continued…

Cont.

German	-0.00475	-0.0126***	-0.0114**	-0.0141***	-0.00648
	(0.00391)	(0.00443)	(0.00448)	(0.00371)	(0.00424)
Male	0.240***	0.150***	0.166***	0.142***	0.128***
	(0.00228)	(0.00239)	(0.00252)	(0.00209)	(0.00239)
Working hours per month	0.0248***	-	-	-	-
	(0.000125)	-	-	-	-
Constant	4.194***	0.111***	-0.183***	0.371***	.795***
	(0.0177)	(0.020)	(0.020)	(0.016)	(0.019)
Number of observations	262,249	262,249	262,249	262,249	262,249
R2		0.294			
Pseudo R2			0.2163	0.1934	0.1825
Log pseudolikelihood	-613,774				
F statistic		2,404.59***			
Chi2	243,720***				

Notes: Robust standard errors in parentheses. *** statistically significant at the 1 percent level; ** statistically significant at the 5 percent level. Regional dummies (at the level of Federal States), industry- and occupational dummies are included in all model specifications.

Appendix: descriptive statistics of the independent variables

	Full sample		Paid employees		Self-employed		Self-employed without employees		Self-employed with employees	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Age	41.565	11.617	41.088	11.705	45.692	9.905	44.747	10.336	46.891	9.191
Years in current job	10.366	9.903	10.307	10.001	10.870	8.989	9.023	8.445	13.211	9.113
Without university-entrance qualification & without vocational degree	0.123	0.328	0.031	0.174	0.037	0.190	0.059	0.235	0.051	0.220
University-entrance qualification without further degree	0.032	0.175	0-131	0.337	0.056	0.229	0.052	0.221	0.019	0.138
Vocational degree	0.684	0.465	0.695	0.460	0.590	0.492	0.575	0.494	0.610	0.488
Tertiary degree	0.161	0.368	0.143	0.351	0.317	0.465	0.315	0.464	0.319	0.466
Married	0.563	0.496	0.555	0.497	0.632	0.482	0.561	0.496	0.722	0.448
Children in household	0.342	0.474	0.339	0.473	0.367	0.482	0.332	0.471	0.412	0.492
German	0.929	0.256	0.930	0.255	0.923	0.267	0.910	0.286	0.939	0.239
Male	0.528	0.499	0.513	0.500	0.662	0.473	0.597	0.491	0.745	0.436
Working hours per week	35.800	12.093	34.844	11.063	44.079	16.626	38.359	16.992	51.329	12.917
Number of observations	262,249		235,121		27,128		15,165		11,963	

Appendix: income regressions with controls for overestimation of entrepreneurial incomes

	I	II
Main effects:		
Paid employee	Reference	
Solo self-employed	-0.754*** (0.0348)	-1.050*** (0.0362)
Self-employed with employees	0.149*** (0.0530)	0.0362 (0.0381)
Obligatory pension insurance (1=yes, 0=no)	-	-0.365*** (0.0255)
Private life insurance (including private pension insurance) (1=yes, 0=no)	0.408*** (0.008)	-
Interaction effects:		
Solo self-employed with obligatory pension insurance	-	0.231*** (0.0667)
Self-employed with employees with obligatory pension insurance	-	-0.0967 (0.0850)
Solo self-employed with private life insurance	0.168*** (0.0516)	-
Self-employed with employees with private life insurance	0.257*** (0.0626)	-
Control variables	Yes***	Yes***
Number of observations	216,521	262,239
Log Likelihood	-485,513	-592,623
Chi2	126,471***	147,509***
Pseudo R2	0.166	0.161

Notes: Dependent variable is 24 income groups. Results of ordered logit regression with robust standard errors (in parentheses). Control variables are age, age squared, years at current job and its squared value, educational level, marital status, children in household, nationality, gender, number of working hours per week, regional dummies, industrial sector dummies. The number of observations in model I is lower than in model II because responses to the question about private insurances are not obligatory in the Micro-Census. *** statistically significant at the 1 percent level; ** statistically significant at the 5 percent level; * statistically significant at the 10 percent level.

Income groups in Micro Census 2009	€/month netto (Micro Census 2009)	Midpoints of income intervals, € (Micro Census 2009)	Mean net income values of employed population aged 18-65 in SOEP 2009
1	0-150	75	72.21
2	150-300	175	212.47
3	300-500	400	383.17
4	500-700	600	588.43
5	700-900	800	787.58
6	900-1,100	1,000	985.28
7	1,100-1,300	1,200	1,176.89
8	1,300-1,500	1,400	1,368.28
9	1,500-1,700	1,600	1,563.00
10	1,700-2,000	1,850	1,810.27
11	2,000-2,300	2,150	2,092.29
12	2,300-2,600	2,450	2,415.90
13	2,600-2,900	2,750	2,718.07
14	2,900-3,200	3,050	3,007.06
15	3,200-3,600	3,400	3,372.54
16	3,600-4,000	3,800	3,762.14
17	4,000-4,500	4,250	4,133.27
18	4,500-5,000	4,750	4,640.91
19	5,000-5,500	5,250	5,065.88
20	5,500-6,000	5,750	5,599.10
21	6,000-7,500	6,750	6,510.22
22	7,500-10,000	8,750	8,153.67
23	10,000-18,000	14,000	12,009.38
24	more than 18,000	20,000	21,856.60

Selection into self-employment based on previous income in paid employment

	Ordered logit	OLS	Quantile regression		
			25th percentile	50th percentile	75th percentile
Paid employee in t+1			Reference		
Solo self-employed in t+1	0.138	0.0800**	0.0137	0.0343*	0.140***
	(0.119)	(0.0391)	(0.0235)	(0.0205)	(0.0221)
Self-employed with	0.420***	0.0992***	0.0132	0.0997***	0.274***
employees in t+1	(0.150)	(0.0384)	(0.0267)	0.0233)	(0.0251)
Control variables	Yes***	Yes***	Yes***	Yes***	Yes***
Number of observations	61,728	61,728	61,728	61,728	61,728

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Dependent variable in ordered logit is 24 income groups in t; dependent variable in OLS and quantile regressions is the logarithm of hourly incomes in t. Control variables include age, age squared, tenure and its squared value, educational level, gender, marital status, children, nationality, working hours per week (model I), industry sector, Federal states.

Multivariate analysis: returns to formal education

	Interval regression	OLS	25th percentile	50th percentile	75th percentile
Solo self-employed with university entrance qualification (‘Abitur’) but without further vocational qualification	0.137***	0.232***	0.268***	0.277***	0.239***
	(0.0358)	(0.0450)	(0.0283)	(0.0235)	(0.0269)
Solo self-employed with vocational degree	-0.182***	-0.181***	-0.236***	-0.147***	-0.106***
	(0.0253)	(0.0291)	(0.0199)	(0.0166)	(0.0189)
Solo self-employed with tertiary degree	-0.301***	-0.266***	-0.339***	-0.231***	-0.177***
	(0.0268)	(0.0307)	(0.0208)	(0.0174)	(0.0198)
Employers with university entrance qualification (‘Abitur’) but without further vocational qualification	0.148**	0.142**	0.243***	0.165***	0.0740*
	(0.0632)	(0.0680)	(0.0435)	(0.0363)	(0.0414)
Employers with vocational degree	-0.138***	-0.0912**	-0.148***	-0.0783***	-0.0434*
	(0.0331)	(0.0356)	(0.0237)	(0.0198)	(0.0226)
Employers with tertiary degree	0.0242	0.0936**	0.00491	0.0984***	0.139***
	(0.0344)	(0.0368)	(0.0247)	(0.0206)	(0.0235)
Solo self-employed	-0.0209	-6.36E-05	-0.0698***	0.0222	0.144***
	(0.0241)	(0.0277)	(0.0190)	(0.0158)	(0.0180)
Employers	0.123***	0.0616*	-0.00127	0.0965***	0.216***
	(0.0322)	(0.0346)	(0.0228)	(0.0190)	(0.0217)
University entrance qualification (‘Abitur’) but without further vocational qualification	0.109***	0.183***	0.0282***	0.0898***	0.243***
	(0.00713)	(0.00904)	(0.00737)	(0.00614)	(0.00701)
Vocational degree	0.332***	0.312***	0.391***	0.284***	0.216***
	(0.00315)	(0.00371)	(0.00370)	(0.00308)	(0.00352)
Tertiary degree	0.658***	0.606***	0.669***	0.583***	0.542***