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Conference Paper

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Beiträge zur Jahrestagung des Vereins für Socialpolitik 2014: Evidenzbasierte
Wirtschaftspolitik - Session: Empirical Industrial Organization I, No. D09-V2

Provided in Cooperation with:

Verein für Socialpolitik / German Economic Association

Suggested Citation: Sorgner, Alina; Fritsch, Michael; Kritikos, Alexander (2014) : Do
Entrepreneurs Really Earn Less?, Beiträge zur Jahrestagung des Vereins für Socialpolitik 2014:
Evidenzbasierte Wirtschaftspolitik - Session: Empirical Industrial Organization I, No. D09-V2,
ZBW - Deutsche Zentralbibliothek für Wirtschaftswissenschaften, Leibniz-Informationszentrum
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Do Entrepreneurs really earn less?

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February, 2014

Abstract

We compare, based on German data, the income of self-employed individuals with and without employees with the income of dependently employed individuals. Our results show that self-employed with employees tend to earn significantly higher incomes than their salaried counterparts, while – with the exception of solo-entrepreneurs without vocational degree - the income of solo self-employed tends to be significantly lower than that of comparable employees. We also observe that self-employed people are able to improve their earnings within the first three years after start-up, when we compare their actual earnings to their income before the start-up.

Keywords: Income, Entrepreneurship, Self-Employment, Start-ups,
Germany

JEL classification: L26, D22

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1. Introduction

Setting up an own business is often associated with the most promising way to become rich or at least richer than from earning when remaining in dependent employment. Empirical studies state the opposite: in several comparisons of incomes of self-employed with those of paid employees it is observed that the average entrepreneur gains less than an employee, while there is a small minority that becomes exceptionally rich (for recent evidence see Henrekson and Sanandaji, 2013 or Åstebro and Chen, 2014). Assuming that people select their employment status according to the expected utility and start to pursue an own venture when this appears more rewarding to them than being dependently employed or unemployed (e.g., Knight, 1921; Lucas, 1978; Jovanovic, 1994); the overall observations allow for the conclusion that individuals are either biased in their expectations about the probability of making huge profits as an entrepreneur (Koellinger, Minniti, Schade, 2007) or there must be other important benefits of being self-employed. In this sense, it is often argued that non-pecuniary gains from entrepreneurship such as self-determination of work and being one's own boss, flexibility, or freedom to work creatively, are of similar importance for people's entrepreneurial choice (Hamilton, 2000; Benz and Frey, 2008). This justification is used to explain why people remain self-employed even if they might be able to earn higher incomes in dependent employment.

The income puzzle becomes even more interesting as in the last decades the level of self-employment has increased considerably in many European countries, including Germany, a country that has not been associated with being particularly entrepreneurial (Audretsch, 2007; Audretsch, Thurik and Stam, 2011). The pronounced rise of self-employment, and in particular of solo self-employment, may have a number of reasons (Fritsch, Kritikos and Sorgner, 2013). It could be regarded as success of various promoting programs by the government that contributed to establishing a pro-entrepreneurial attitude among the population (Caliendo, Kritikos, 2010). It could also be that there was an ongoing shift towards small-scale service sector activity, the knowledge-

based economy, and technological change, or more flexible labor markets (Audretsch, Thurik and Stam, 2011) that contributed to the increase in entrepreneurship in Germany. Against this background of social and technological change, the question about returns from self-employment gains new and increasing relevance. Has recent technological progress led to the emergence of new profitable entrepreneurial opportunities that are economically worthwhile to pursue? Or have the attitudes of the population changed in that many people put higher values on flexibility, creativity, and self-realization so that pecuniary incomes are only one important factor among many when occupational choices are done?⁴

The main question of this paper, thus, is: do entrepreneurs really earn less than their dependently employed counterparts and to whom should their income be exactly compared when answering this question? A number of studies, most of them concentrating on the USA and the UK, have investigated the income of self-employed people as compared to the dependently employed. Hamilton (2000) finds that self-employed earn lower mean and median hourly earnings than their salaried counterparts, while the spread of entrepreneurial earnings is higher. He also pointed out that the tendency of self-employed people to earn lower incomes cannot be explained by selection of less able people into entrepreneurship. In line with this finding, Hartog, van Praag and van der Sluis (2010) observe that for an individual with average abilities the expected returns from paid employment are higher than from self-employment. They conclude that the choice to be an entrepreneur is not primarily driven by the prospect of gaining higher incomes. In their analysis of returns from academic entrepreneurship Åstebro, Braunerhjelm and Broström (2013) also observe a significant and negative earnings differential which, however, disappears after controlling for covariates. Moreover, there might be pronounced heterogeneity in earnings premium depending on the type of entrepreneurship. For instance, Braguinsky et al. (2012) show that the

⁴ Such a change of individual's attitude is regarded as key element of the development from a materialistic to a post-materialistic society. See, van Gelderen and Jansen (2006) for a detailed explanation.

average returns to high-tech entrepreneurship is positive, in particular for younger entrepreneurs.

It has also been emphasized that a switch to entrepreneurship is associated with a substantial increase in income risk, a higher workload and higher levels of responsibility (Hyytinen, Ilmakunnas and Toivanen, 2013, Åstebro, Braunerhjelm and Broström, 2013). Hence, it is often argued that non-pecuniary benefits such as autonomy, control over one's work and flexibility (Benz and Frey, 2004; 2008) as well as personality traits such as willingness to take risks (Caliendo, Fossen and Kritikos, 2009) or high scores in 'openness to experience' (Caliendo, Fossen and Kritikos, 2013) seem to guide an individual's decision to become self-employed. Recently, Åstebro and Chen (2014) shed more light on the "returns to entrepreneurship puzzle". They claim that entrepreneurs tend to underreport their earnings, and that, after a correction for such underreporting, the evidence (for the USA) suggests that entrepreneurship is likely to pay, also in financial terms.

Our study contributes to this state of knowledge in several ways. We focus on Germany currently having the largest population and the strongest economy in the European Union. Studies on returns from entrepreneurship are rare for Germany. The evidence suggests that in this country the distribution of entrepreneurial earnings has a higher standard deviation than the wage distribution due to higher incomes in upper percentiles (Merz, 2006). Kneiding and Kritikos (2013) based on data from the German 'Survey of Income and Consumption' as well as Martin (2013) based on data of the German Socio-economic panel (GSOEP), both show that mean and median earnings of self-employed are higher than those of paid employees and the latter research further reveals that a switch from paid employment to self-employment is sometimes associated with an increase in earnings.

Our analysis is based on the Micro-Census data, which is a representative survey of more than 800,000 individuals which corresponds to about 1 percent of German population and which allows an in-depth

study of entrepreneurial earnings. We perform our analysis separately for different types of self-employed, for solo self-employed who run a firm on their own and self-employed who have employees, the employers. A distinction between the solo self-employed and employers is important because the largest part of the increase of self-employment in Germany over the last decades was due to solo self-employment (Fritsch, Kritikos and Sorgner, 2013). Based on the four-wave panel data of the German Micro-Census we follow the development of entrepreneurial earnings over the first three years after setting up an own business that can be regarded as a decisive period for a successful start-up. Such an analysis allows revealing whether entrepreneurs improved their financial situation by becoming self-employed even if they may earn less in comparison to other paid employees.

A main result of our study is that whether entrepreneurship pays or not depends on the type of self-employment and the human capital level of self-employed. The findings suggest that solo self-employed if completely aggregated are less likely to earn more than paid employees. Disaggregating this group, we observe that solo self-employment appears to be a profitable career option for people without vocational qualification. Also, in the upper percentiles of the income distribution solo self-employed earn significantly more than paid employees. Self-employed with employees are likely to have higher earnings than paid employees. Moreover, there is incidence that already within the first three years after starting their own business many self-employed could improve their financial situation by their transition into self-employment.

The remainder of the paper is organized as follows. Section 2 describes data and measurement issues. Section 3 provides multivariate analyses of determinants of income. Section 4 investigates the development of earnings from self-employment over time after a start-up. Section 5 concerns relevant issues of underreporting and overestimation of entrepreneurial earnings. Finally, Section 6 discusses the limitations of our approach, section 7 concludes.

2. Data and measurement issues

2.1 Data source and the identification of self-employment

Our investigation is based on one wave (from the year 2009) and on one panel data set of the German Micro-Census data⁵ provided by the German Statistical Office. The Micro-Census is a representative survey containing information about the socio-economic situation of approximately 820,000 persons living in 380,000 households across Germany.⁶ These data have a number of advantages over other available data sources with regard to the analysis of self-employment in Germany (see Fritsch, Kritikos, and Rusakova, 2012). As each member of a randomly selected household in the Micro-Census is obliged to provide information for most of the questions, the non-response rate is low so that problems caused by missing values are largely irrelevant in this statistics. For instance, the non-response rate for the earnings question is – for this and for other reasons - only about 4 percent which is much lower and more reliable than the item-nonresponse in other surveys (Schimml-Neimanns, 1998). Moreover, due to the representative nature of the Micro-Census, distinguishing different types of self-employment activities according to a number of characteristics such as demographics, industrial and occupational sector, regional distribution, and others is meaningful.

Second, we also use a panel data set covering four years the Micro-Census which provides the possibility to follow individuals over time.

⁵ The Micro-Census was started in 1957 as an annual survey of private households and persons in West Germany. In 1991 it was expanded to include the former East German states. The central aim of the survey is to collect nationally representative micro-data about the population structure, economic and social situation of individuals and households, labor activity, education, as well as living conditions and health. The Micro-Census includes the most of the attributes of the European Union Labor Force Survey (EU-LFS), thus making it possible to compare the data on employment activity across EU member states. A stable set of core questions appears every year, covering the most essential areas, such as population and demography; education, training, and qualification; labor market and occupational dynamics; earnings, income. For more information on the current Micro-Census program, see Micro-Census Law 2005 of 24 June 2004 (Federal Law Gazette I, p. 1350).

⁶ In comparison, the German Socio-Economic Panel (SOEP), which is another representative household survey of German population, contains information on about 11,000 households with little more than 20,000 individuals.

The generation of this panel data set is possible because the selection of respondents follows a partial rotation procedure according to which all households in the sample are surveyed over a period of four consecutive years. Each year, about 25 percent of the households are substituted by new respondents. Hence, it is possible to generate four year panel data sets, which contain approximately 25 percent of the respondents in each wave. For the purposes of the present study we employ the latest available panel data set covering the time period between 2001 and 2004. In particular, the Micro-Census panel data includes most of the variables from the original survey program and allows us to follow the development of start-ups up to three years. Moreover, panel data may provide insights into the possible selection issues related to self-employment.

Self-employed people are identified on the basis of a question about the respondent's current employment status, and can be distinguished between two groups, solo self-employed (without employees) and self-employed with employees. Those persons who report their current employment status as an employee, a (home-)worker, or an apprentice are subsumed under the notion of 'paid employees'. Helping family members, civil servants and those in military or civilian service are not considered in the analysis. Moreover, self-employed farmers are excluded from the analysis because this group is not obliged to report their earnings in the Micro-Census. After all restrictions, the panel data sample consists of 262,249 individuals 15,165 of whom are solo self-employed (5.8 percent) and 11,963 of whom are self-employed with employees (4.6 percent).

2.2 Measurement of earnings in the Micro-Census

The Micro-Census includes information about the *net* monthly individual income⁷ which is available in form of 24 narrowly defined income groups that range from 0-150 Euros (€) to more than 18,000 Euros (see Table 1).

⁷ The corresponding question asks for the income level achieved in the month prior to the survey.

The Micro-Census respondents are explicitly advised of declaring net income values after taxes and different kinds of social insurance contributions.

Table 1: Income variable from the German Micro-Census

| Income group from Micro-Census | Income value, € | Income group from Micro-Census | 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 |

For the purposes of our empirical analysis two earnings measures have been constructed. The first one is an ordinal variable which assumes 24 values that correspond to the income groups shown in Table 1. The second measure contains the hourly earnings which correspond to the midpoints of the income intervals divided by the number of working hours per month. Furthermore, a wide set of control variables is used that may affect a personal earnings level, such as age, gender, marital status, children in household, levels of formal education, nationality, tenure, usual number of working hours per week, industry, as well as region of residence⁸. Table A1 in Appendix provides descriptive statistics of variables used in the analysis.

Figures 1.1 and 1.2 show the distribution of earnings measures by employment status. Remarkably, the distribution of monthly earnings of

⁸ Despite of a rapid catch-up of new federal states' economic system after the fall of the Berlin Wall to the levels of West Germany, the wage differentials between the regions still persist (see e.g., Smolny and Kirbach, 2011).

self-employed reveals two peaks that can apparently be explained by the existence of two underlying distribution functions for self-employed with and without employees (Figure 1.1). Since this observation suggests substantial differences in the distribution of earnings of solo self-employed and employers, we explicitly distinguish between these two types of self-employment in the analysis. The earnings distribution of solo self-employed is more skewed to the left, and that of employers is more skewed to the right when compared to the income distribution of paid employees. The distribution of both monthly and hourly earnings of self-employed exhibits a greater dispersion than the earnings of paid employees, which is partly due to higher shares of respondents in the upper percentiles of the distribution.

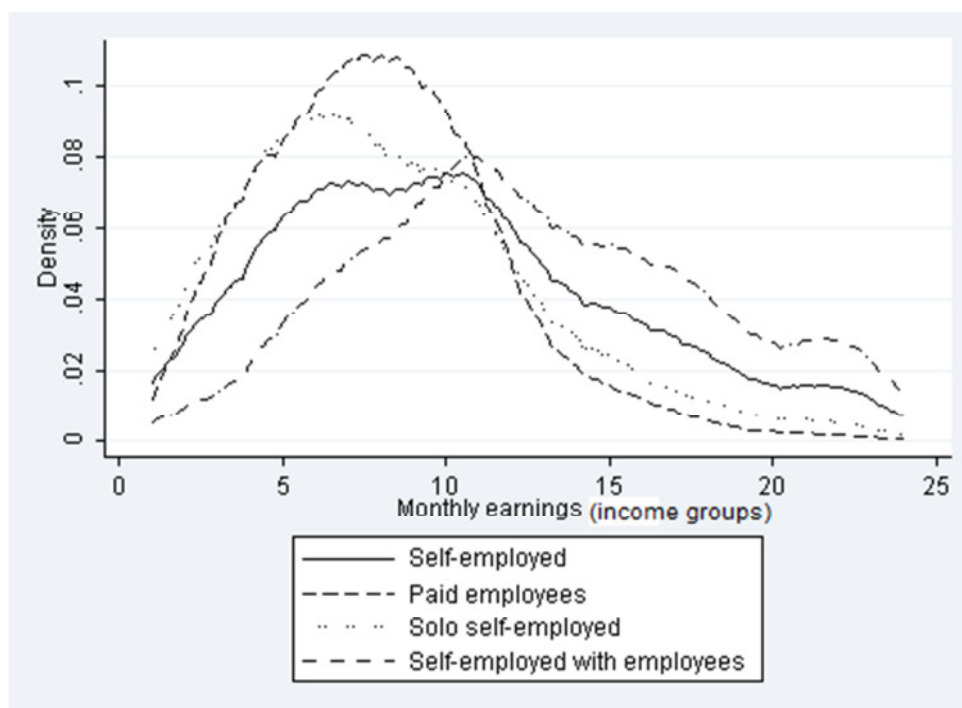


Figure 1.1: Distribution of monthly earnings by employment status

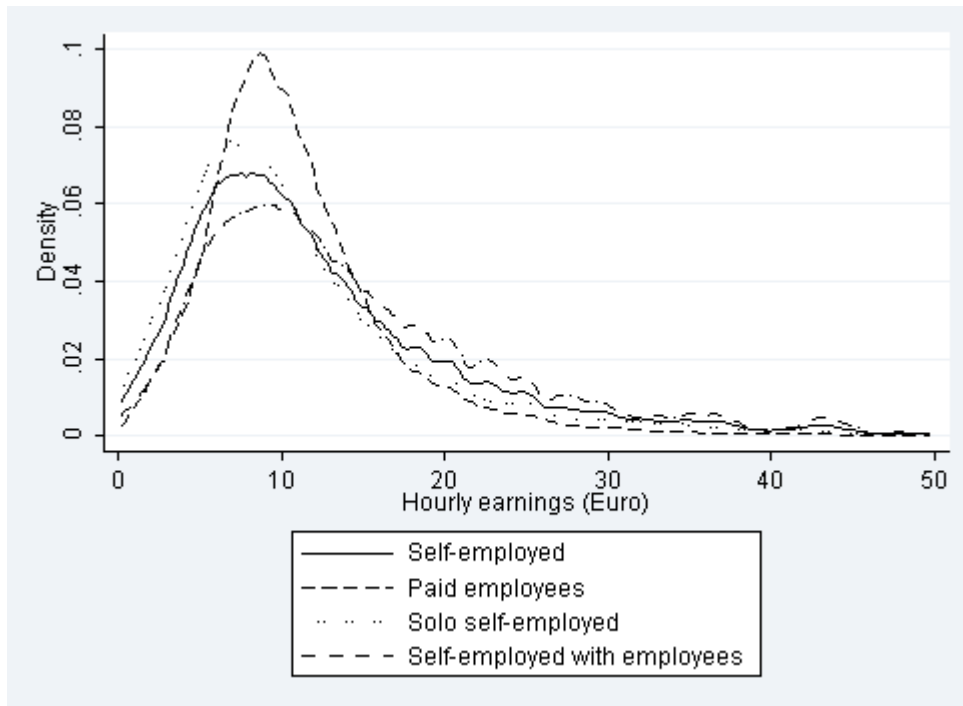


Figure 1.2: Distribution of hourly earnings by employment status

Table 2: Monthly and hourly earnings by employment status, in €

| | Paid employees | Self-employed | Solo self-employed | Self-employed with employees |
|------------------------|-------------------|---------------|--------------------|------------------------------|
| | Monthly earnings* | | | |
| Mean value | 1,534.16 | 2,424.44 | 1,703.99 | 3,337.73 |
| Standard deviation | 1,136.24 | 2,563.67 | 1,675.03 | 3,139.38 |
| 1st percentile | 175 | 75 | 75 | 175 |
| 5th percentile | 400 | 400 | 175 | 800 |
| 10th percentile | 400 | 600 | 400 | 1,000 |
| 25th percentile | 800 | 1,000 | 800 | 1,600 |
| 50th percentile | 1,400 | 1,850 | 1,400 | 2,450 |
| 75th percentile | 1,850 | 3,050 | 2,150 | 3,800 |
| 90th percentile | 2,450 | 4,750 | 3,050 | 6,750 |
| 95th percentile | 3,400 | 6,750 | 4,250 | 8,750 |
| 99th percentile | 5,250 | 14,000 | 8,750 | 20,000 |
| | Hourly earnings | | | |
| 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 |

* Monthly earnings correspond to the midpoints of income intervals, as reported in Table 1.

Further evidence about the distribution of earnings by employment status is provided in Table 2. Self-employed earn on average about 4 Euros more per working hour than dependent employees, whereas there are considerable differences in mean earnings of solo self-employed and self-employed with employees. The spread of income levels is higher for self-employed than for dependently employed with the highest standard deviation for solo entrepreneurs. Overall, dependent employment seems to pay in the lower percentiles of the income distribution, whereas both types of self-employment appear to pay more in the upper percentiles. In

addition, self-employed with employees earn equal or higher hourly earnings than paid employees from the 5th percentile upwards.

3. The determinants of income – multivariate analyses

This section identifies the relationship between employment status and earnings by means of multivariate analysis. To account for the nature of the dependent variables, five different models are estimated (Table 3). Model I is estimated by ordered logit regression to account for the categorical character of the dependent variable. The dependent variable in model II that was estimated with OLS regression is the natural logarithm of hourly earnings. Finally, models III to V estimate quantile regressions at the 25th, 50th, and 75th percentiles, respectively, in order to capture the skewness of the income distribution. The variable of interest is employment status which can have three realizations: paid employment (reference category), solo self-employment, and self-employment with employees.

The results for individual determinants of income in Table 3 are comparable across models. There is an inverse u-shaped relationship between the person's age and his or her income. A similar type of relationship is observed for the number of years that have been spent in the current job. Income of persons with a vocational degree is significantly higher than for persons without such a degree and persons with a tertiary degree tend to have the highest income. Males and those with children tend to receive higher earnings. Finally, there are significant industry- and region-specific effects on the level of earnings.

Coming to the employment status, the parameter estimates from models I and II indicate that solo self-employed are less likely than paid employees to earn higher incomes, whereas self-employed with employees tend to earn significantly more, as compared to paid

Table 3: Parameter estimates from earnings regressions

| | I | II | III | IV | V |
|---|------------------------|----------------------------|---------------------------|---------------------------|---------------------------|
| | Ordered logit | OLS | Quantile regressions | | |
| | | Means | 25th percentile | 50th percentile | 75th percentile |
| Paid employee | | | Reference | | |
| Solo self-employed | -0.722*** (0.0237) | -0.169*** (0.00714) | -0.313*** (0.00483) | -0.124*** (0.00404) | 0.0492*** (0.00482) |
| Self-employed with employees | 0.342*** (0.027) | 0.0435*** (0.00697) | -0.101*** (0.00541) | 0.0807*** (0.00453) | 0.229*** (0.00540) |
| Age (years) | 0.212*** (0.002) | 0.0561*** (0.000792) | 0.0616*** (0.000736) | 0.0491*** (0.000616) | 0.0396*** (0.000735) |
| Age, squared | -0.002*** (0.000) | -0.00056*** (0.000) | -0.00068*** (0.000) | -0.00052*** (0.000) | -0.00038*** (0.000) |
| Years in current job | 0.0677*** (0.001) | 0.00805*** (0.000327) | 0.0153*** (0.000355) | 0.0115*** (0.000297) | 0.00617*** (0.000354) |
| Years in current job, squared | -0.0008*** (0.000) | -7.37e-05*** (8.83e-06) | -0.00018*** (1.01e-05) | -0.00012*** (8.47e-06) | -0.00004*** (1.01e-05) |
| Without vocational degree | | | Reference | | |
| Vocational degree | 1.166*** (0.011) | 0.267*** (0.004) | 0.382*** (0.003) | 0.269*** (0.003) | 0.176*** (0.003) |
| Tertiary degree | 2.806*** (0.016) | 0.598*** (0.004) | 0.696*** (0.004) | 0.610*** (0.004) | 0.545*** (0.004) |
| Married (1=yes, 0=no) | -0.0495*** (0.008) | -0.00579** (0.002) | 0.0137*** (0.003) | 0.0265*** (0.002) | 0.0236*** (0.003) |
| Children in household (1=yes, 0=no) | 0.408*** (0.00858) | 0.130*** (0.00251) | 0.0871*** (0.00267) | 0.121*** (0.00223) | 0.161*** (0.00266) |
| German (1=yes, 0=no) | 0.0548*** (0.0145) | 0.00606 (0.00444) | 0.000263 (0.00445) | -0.000727 (0.00372) | 0.0172*** (0.00444) |
| Male (1=yes, 0=no) | 0.954*** (0.00826) | 0.128*** (0.00227) | 0.153*** (0.00240) | 0.123*** (0.00201) | 0.102*** (0.00239) |
| Working hours per week | 0.104*** (0.000524) | - | - | - | - |
| Industry dummies | | | Yes*** | | |
| Dummies for Federal States | | | Yes*** | | |
| Number of observations | 262,249 | 262,249 | 262,249 | 262,249 | 262,249 |
| R-squared | | 0.282 | 0.2106 | 0.1826 | 0.1718 |
| Pseudo R2 | 0.161 | | | | |
| Log Likelihood | -592,847 | | | | |
| Chi2 | 146,595*** | | | | |
| F statistic | | 2,463 | | | |

Notes: Dependent variable in model I is an OLS ordinal variable which consists of 24 income groups. Dependent variable in models II-V is the natural logarithm of hourly earnings defined as the midpoints of income intervals divided by the number of working hours per month. *** p<0.01; ** p<0.05; * p<0.1.

employees. Results of the quantile regressions (models III-V) additionally reveal important further details, in particular a significantly positive

relationship between solo self-employment and hourly earnings in the 75th percentile. At the lower end of the distribution, both solo self-employed and self-employed with employees earn in turn significantly less than paid employees in the 25th percentile.

Since differences in the income distribution of self-employed and employees may vary depending on the level of formal education, gender, as well as industrial sector and region in which the entrepreneur operates we additionally run the ordered logit regression for these subgroups. The basic pattern of the results that we find for the different subsamples is only to a certain extent comparable to those for the full sample. However, there are several differences with regard to marital status and nationality (Table A2 in Appendix). A crucial result is a highly significant positive effect of solo self-employment on income among those persons who do *not* hold any vocational qualification. A possible explanation for this finding is that formal education is an important determinant of earnings in dependent employment and that people with only low levels of formal education have a particular chance of gaining a higher income by becoming solo self-employed.

Overall, the results of the multivariate analysis suggest that solo self-employment is - with two important exceptions at the lower and the upper part of the income distribution - more likely to be associated with lower earnings than paid employment while self-employment with employees realize on average higher incomes.

4. Income performance of entrepreneurs

This section seeks to answer the question whether both groups of self-employed people are better or worse off in comparison to those who remain in paid employment. To this end, we investigate the development of earnings after switching into self-employment dependent on the background of business founders. For this analysis we employ the most recent available Micro-Census Panel Data of the years 2001 to 2004 (see section 2.1 for data description).

In more detail, we start analyzing the financial situation of entrepreneurs prior to start-up, in order to understand from which percentiles of the income distribution the transitions into self-employment are more likely to occur. In the next step, we investigate the development of entrepreneurial earnings in the first three years after start-up, as compared to incomes of those who remained dependently employed during the observation period and also in comparison to their own previous earnings.

Table 4: Distributions of hourly earnings (in Euro) according to employment status in period t+1 by income from paid employment in period t

| Paid employee in t | Paid employee in t+1 | Solo self-employed in t+1 | Self-employed with employees in t+1 |
|------------------------|----------------------|---------------------------|-------------------------------------|
| Mean | 10.77 | 15.93 | 14.99 |
| Standard deviation | 8.45 | 21.07 | 12.59 |
| 1st percentile | 1.15 | 0.88 | 1.09 |
| 5th percentile | 3.37 | 2.63 | 3.75 |
| 10th percentile | 5 | 4.69 | 5.11 |
| 25th percentile | 6.73 | 7.02 | 7.67 |
| 50th percentile | 9.25 | 10.32 | 11.33 |
| 75th percentile | 12.5 | 15.79 | 18.04 |
| 95th percentile | 21.28 | 51.125 | 37.28 |
| 99th percentile | 37.5 | 122.5 | 58.33 |
| Number of observations | 61,677 | 424 | 328 |

The distributions of hourly earnings from paid employment for people with a different employment status in the subsequent time period are contrasted in Table 4. Those who switch into either solo self-employment or become self-employed with employees have on average higher wages in previous salaried employment, as compared to non-switchers. The switchers from the lower percentiles of the wage distribution seem to have earned rather lower wages than those remaining in paid employment. Most interesting are the observations of entries from the higher percentiles of the wage distribution into self-employment: First of all, these high-earners are particularly likely to switch to *solo* self-employment. Hence, it appears that transition into self-employment occurs

both from lower and upper percentiles of the distribution of earnings from paid employment, whereas a transition from lower percentiles is more pronounced for solo self-employed than for employers. In order to investigate the financial situation of self-employed prior to start-up by accounting for other factors that may affect earnings we conduct a multivariate analysis (Table 5).

Table 5: Selection into self-employment based on differentials in earnings from 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 | 0.120 (0.118) | 0.0798** (0.0391) | 0.0120 (0.0239) | 0.0345* (0.0208) | 0.133*** (0.0253) |
| Self-employed with employees in t+1 | 0.442*** (0.152) | 0.103*** (0.0386) | -0.00142 (0.0271) | 0.103*** (0.0237) | 0.287*** (0.0287) |
| Age (years) | 0.247*** (0.00754) | 0.0692*** (0.002) | 0.0746*** (0.00152) | 0.0546*** (0.00130) | 0.0400*** (0.002) |
| Age, squared | -0.003*** (0.000) | -0.001*** (0.000) | -0.001*** (0.000) | -0.0006*** (0.000) | -0.0004*** (0.000) |
| Male (1=yes, 0=no) | 1.474*** (0.0263) | 0.281*** (0.0064) | 0.295*** (0.00449) | 0.227*** (0.00385) | 0.190*** (0.005) |
| Married (1=yes, 0=no) | -0.0261 (0.0290) | -0.028*** (0.008) | 0.00305 (0.0055) | 0.0183*** (0.005) | 0.0127** (0.006) |
| Children in household (1=yes, 0=no) | 0.361*** (0.0221) | 0.0836*** (0.0059) | 0.0660*** (0.00458) | 0.0927*** (0.00398) | 0.134*** (0.00478) |
| German (1=yes, 0=no) | 0.0387 (0.0413) | 0.00322 (0.011) | -0.0124 (0.0089) | 0.00055 (0.008) | 0.0343*** (0.009) |
| Years in current job | 0.0575*** (0.003) | 0.0049*** (0.001) | 0.0133*** (0.0006) | 0.0105*** (0.0006) | 0.0067*** (0.0007) |
| Years in current job, squared | -0.0007*** (0.000) | -0.00001 (0.000) | -0.0002*** (0.000) | -0.0001*** (0.000) | -0.0001*** (0.000) |
| Without vocational qualification | | | Reference | | |
| Vocational degree | 1.133*** (0.029) | 0.283*** (0.009) | 0.338*** (0.006) | 0.268*** (0.005) | 0.196*** (0.007) |
| Tertiary degree | 2.960*** (0.0467) | 0.641*** (0.0124) | 0.669*** (0.008) | 0.643*** (0.007) | 0.611*** (0.009) |
| Working hours per week | 0.121*** (0.0017) | - | - | - | - |
| Industry dummies | Yes*** | Yes*** | Yes*** | Yes*** | Yes*** |
| Dummies for Federal States | Yes*** | Yes*** | Yes*** | Yes*** | Yes*** |
| Year dummies | Yes*** | Yes*** | Yes*** | Yes*** | Yes*** |

| | | | | | |
|------------------------|-----------|---------|--------|--------|--------|
| Number of observations | 62,429 | 62,429 | 62,429 | 62,429 | 62,429 |
| R-squared | | 0.320 | | | |
| Log likelihood | -136,653 | -45,268 | | | |
| Chi2 | 23,948*** | | | | |
| Pseudo R2 | 0.178 | | | | |

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 earnings in t .

The results of the ordered logistic regression (Table 5) suggest that people who switch from paid employment into self-employment with employees are more likely to have earned higher net incomes during their time in paid employment. However, this effect is not statistically significant for those who switch into solo self-employment. Moreover, there is a positive and significant effect of a transition into solo self-employment in period $(t+1)$ for the 50th percentile estimate (at a 10-percent level) and the 75th percentile estimate (at a 1-percent level). Finally, the results show a similar pattern for those who switch into self-employment with employees; here the estimated effect is highly significant already from the 50th percentile of the wage distribution onward. Thus, the analysis of financial situation of entrepreneurs prior to start-up suggests that a switch from paid employment into self-employment is particularly likely for those who earn higher incomes in paid employment, which is in line with the findings of Hamilton (2000, 624). Those who become self-employed out of lower percentiles of the wage distribution have not earned significantly different incomes in comparison to those who remained paid employee.

Next, we analyze the development of income in the first three years after the start-up. This investigation appears relevant, since the first years of self-employment may be regarded as a decisive period for a start-up's success.

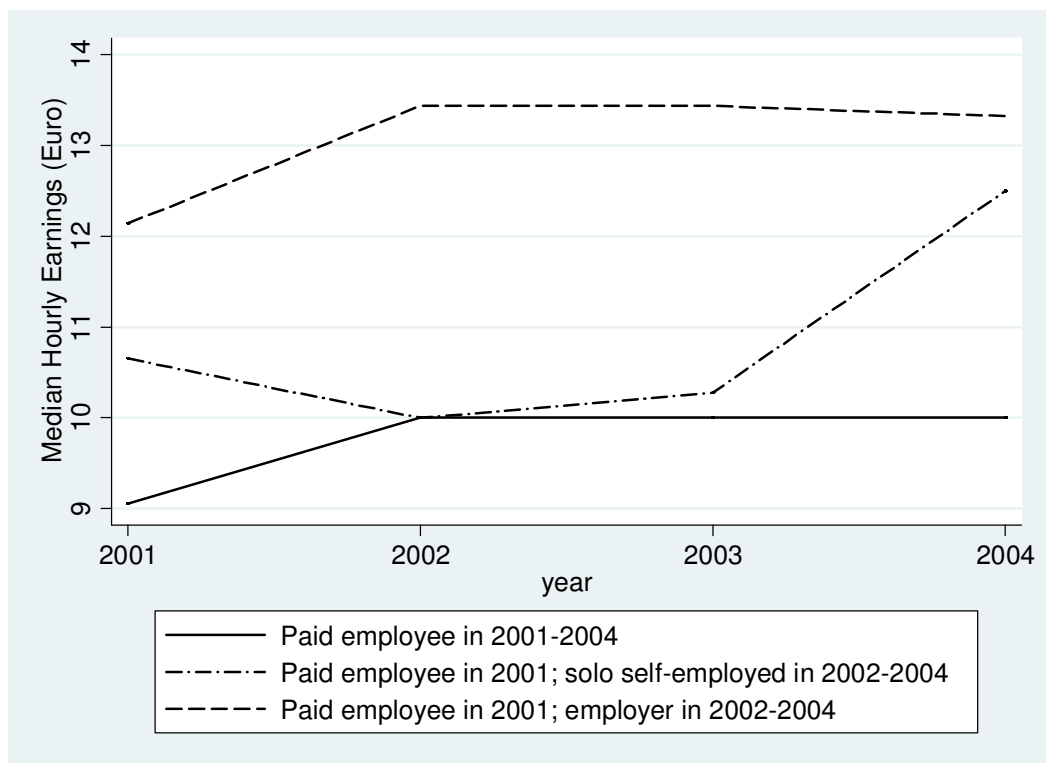


Figure 2: Development of median hourly earnings – Full sample

We find that a transition from paid-employment into self-employment can be associated with an improvement of earnings within the first three years after start-up (Figure 2). While median hourly earnings of those who continuously remain in paid employment increase from 9.05 Euro in 2001 to 10 Euro in 2004, the median hourly earnings of persons who switch into solo self-employment increase from 10.6 Euro to 12.5 Euro in the observation period, and earnings of those becoming employer increase from 12.1 Euro to 13.3 Euro. Of course, earnings of entrepreneurs are considerably more volatile over time than that of dependent employees indicating a higher income risk.

While the overall development of earnings after a start-up can be regarded as positive, it is worth to have a look at those who become self-employed out of low-income employment or unemployment. For this purpose, we first analyze the development of earnings of those people who earned less than 1,100 Euro per month and worked more than 38 hours per week in 2001 (Figure 3).

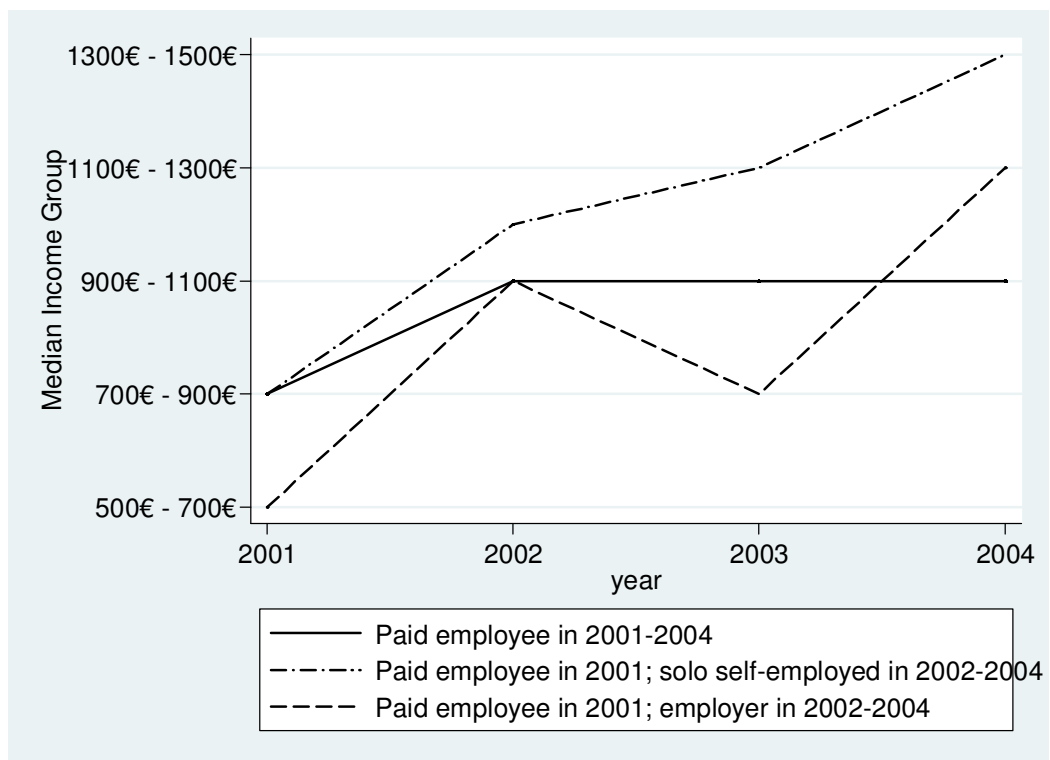


Figure 3: Development of earnings over time for those who have been dependently employed in 2001 with net wages less than 1,100 Euro per month and more than 38 working hours per week

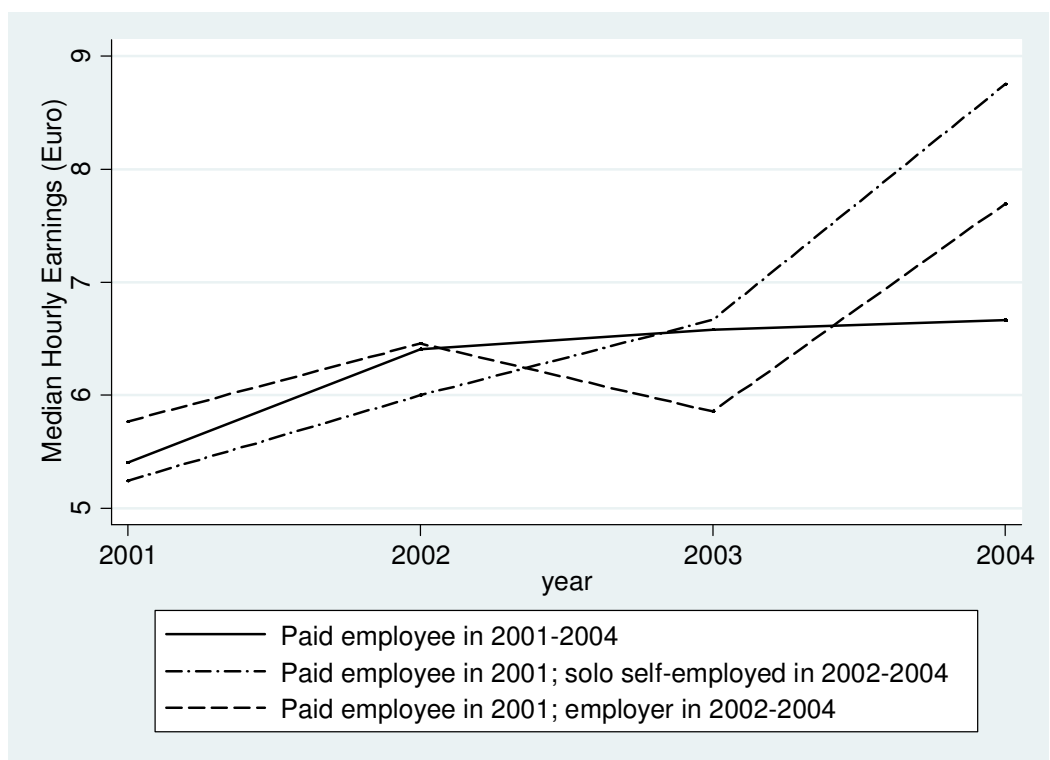


Figure 4: Development of earnings over time for those who have been dependently employed in 2001 with net wages less than 7 Euro per hour

The results are quite intriguing since they indicate that in contrast to non-switchers whose net earnings over the observation period oscillate between 700 Euros and 1,100 Euros per month, those who decided to switch into solo self-employment upgraded their monthly income from 700-900 Euro to 1,300-1,500 Euro. Those who became employer entrepreneurs have advanced their monthly income from 500 – 700 Euro to 1,100 – 1,300 Euro. Additional evidence is provided in Figure 4 that depicts income development of those who earned less than 7 Euro net per hour in 2001. While median hourly earnings of non-switchers increased from 5.4 Euro in 2001 to 6.6 Euro in 2004, the earnings of those who have become solo self-employed increased from 5.2 Euro in 2001 to 8.7 Euro in 2004. The earnings of those who have become employers increased from 5.8 Euro in 2001 to 7.7 Euro in 2004.

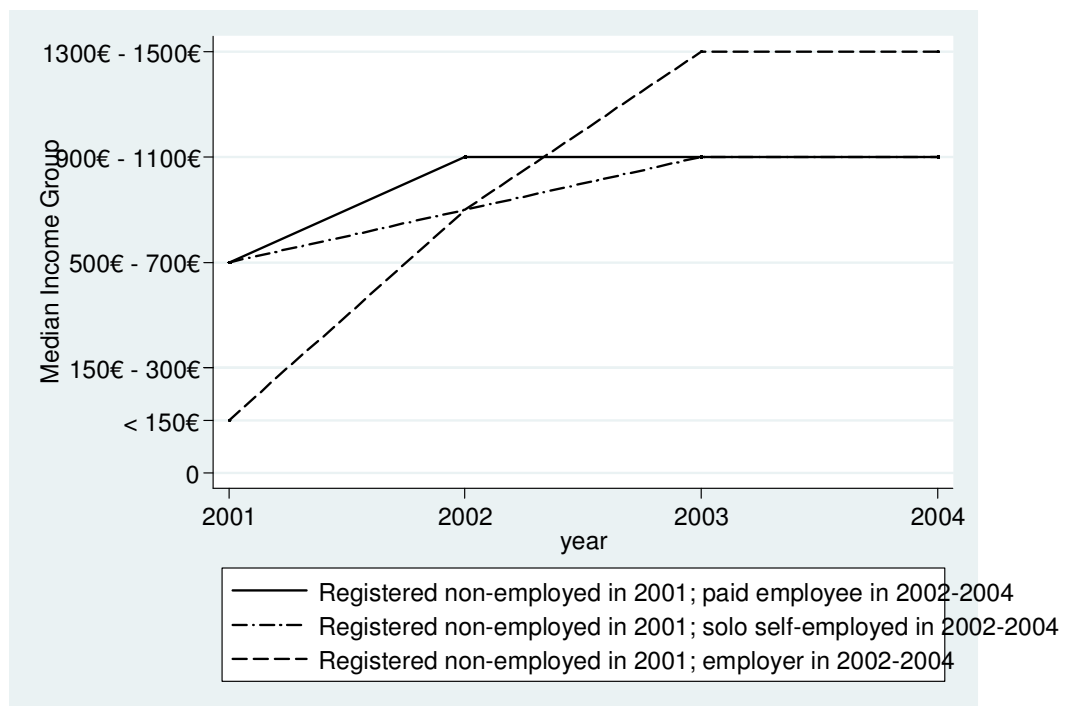


Figure 5: Earnings development for employees/self-employed/solo self-employed who have been in registered non-employment (“Erwerbslose, sofort für den Markt verfügbar”) in 2001

Also, positive developments are observed for the group of registered non-employed people (Figure 5). While those who switched to paid employment in the subsequent year achieved net incomes between

900 Euro and 1,100 Euro, those who became solo self-employed have achieved this level only one year later. Three years after non-employment both groups – paid employees and solo self-employed – are on average in the same income category. Those who have become self-employed with employers have on average achieved a monthly income between 1,300 and 1,500 Euro one year after start-up.

Table 6: Determinants of change in hourly earnings in the first three years after transition from paid employment to self-employment

| | Quantile regression | | | |
|---|----------------------|-------------------------|-----------------------|-----------------------|
| | OLS | 25th percentile | 50th percentile | 75th percentile |
| Paid employee in 2001 - 2004 | | Reference | | |
| Paid employee in 2001; solo self-employed in 2002, 2003, and 2004 | -0.196* (0.116) | -0.261*** (0.0542) | -0.0597 (0.0472) | 0.170*** (0.0654) |
| Paid employee in 2001; employer in 2002, 2003, and 2004 | 0.0599 (0.128) | -0.0987* (0.0528) | 0.0616 (0.0460) | 0.219*** (0.0640) |
| Age (years) | -0.06*** (0.004) | -0.0159*** (0.00248) | -0.046*** (0.002) | -0.093*** (0.003) |
| Age, squared | 0.001*** (0.000) | 0.0001*** (0.000) | 0.001*** (0.000) | 0.001*** (0.000) |
| Male (1=yes, 0=no) | -0.00986 (0.009) | 0.0220*** (0.007) | -0.00223 (0.006) | -0.079*** (0.008) |
| Married (1=yes, 0=no) | 0.00514 (0.0106) | 0.0135 (0.00906) | 0.0174** (0.008) | 0.035*** (0.0102) |
| Children in household (1=yes, 0=no) | 0.00437 (0.008) | -0.0236*** (0.00712) | 0.0225*** (0.006) | 0.0403*** (0.009) |
| German (1=yes, 0=no) | 7.98e-05 (0.0180) | -0.0163 (0.0142) | 0.00433 (0.0122) | 0.0196 (0.0170) |
| Years in current job | -0.0028** (0.001) | 0.004*** (0.001) | -0.001 (0.001) | -0.006*** (0.001) |
| Years in current job, squared | 4.24e-05 (0.000) | -0.0001*** (0.000) | 0.000 (0.000) | 0.0001*** (0.000) |
| Without vocational qualification | | Reference | | |
| Vocational degree | 0.052*** (0.0139) | 0.0729*** (0.0104) | 0.0360*** (0.009) | 0.00637 (0.0126) |
| Tertiary degree | 0.069*** (0.0173) | 0.0824*** (0.0134) | 0.0694*** (0.0116) | 0.0438*** (0.0160) |
| Industry dummies | Yes*** | Yes*** | Yes*** | Yes*** |
| Dummies for Federal States | Yes*** | Yes*** | Yes*** | Yes*** |
| Constant | 1.408*** (0.0853) | 0.187*** (0.0583) | 1.030*** (0.0514) | 2.411*** (0.0751) |
| Observations | 17,512 | 17,512 | 17,512 | 17,512 |

| | |
|----------------|---------|
| R-squared | 0.045 |
| Log likelihood | -12,211 |

Notes: Results of OLS with robust standard errors (in parentheses); *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Dependent variable is logarithm of change in hourly earnings between 2001 and 2004.

Table 6 contains results of multivariate analysis of the determinants of change in hourly earnings over observation period. The dependent variable is constructed as logarithm of change in hourly earnings in 2004, as compared to 2001. The variables of interest are dummy variables that indicate whether a respondent was in paid employment during the period under observation (reference group), or he or she switched from paid employment into solo self-employment or has become self-employed with employees in 2002. While the estimations from the OLS regression suggest that switching from paid employment to solo self-employment and remaining solo self-employed are negatively associated with an increase in hourly earnings, the results from the quantile regressions provide further details. Having changed an employment status is negatively associated with a positive change in hourly earnings in the 25th percentile; however, this effect is not significant anymore in the 50th percentile and even significant and positive in the 75th percentile. Hence, the results suggest that although transition into self-employment may lead to a decrease in one's earnings, for many people there is either no significant income change in the first three years of self-employment or even a substantial increase in earnings, as compared to previous paid employment.

5. Earnings underreporting and overestimation issues

Åstebro und Chen (2014) in a study based on data for the USA present some evidence that self-employed have a pronounced tendency to underreport their incomes. They argue that the common finding of self-employed persons earning less is reversed when accounting for this underreporting. Their evidence is based on the data for expenditures for food, which is not available in the German Micro-Census. For this reason, it is not possible to test for the presence of an underreporting bias in a

comparable way. If such a bias should be present, it would even strengthen our basic findings.

One could, however, also argue that entrepreneurial net earnings are overestimated in the data. While paid employees in Germany are subject to obligatory social insurance and employers discharge contributions to pension, unemployment, health and long-term care insurances, self-employed people in general have to pay compulsory contributions only for health and long-term care insurance but may voluntarily choose to pay contributions for other insurances. There are, however, several exceptions from this rule. Particularly, self-employed craftsmen, teachers, artists, writers, those in care services, medical doctors, tax consultants and several other occupational groups are subject to further compulsory social insurance. If self-employed people who are not obliged to pay for social insurance tend not to have voluntary insurance, for instance due to very low incomes or due to a lower risk aversion, then their reported net incomes may be overestimated. It is possible to test for overestimation of entrepreneurial earnings due to the differences in social insurance contributions by means of information about the type of social insurance a respondent in the Micro-Census has. If overestimation of entrepreneurial earnings is a relevant issue, then self-employed who pay for social insurance should report lower earnings than self-employed without such an insurance. In the earnings regression this overestimation would be reflected in a negative sign of an interaction term between being self-employed and paying social insurance.

Table 7: Earnings regressions with controls for overestimation of entrepreneurial earnings

| | I | II |
|------------------------------|-----------------------|-----------------------|
| <i>Main effects:</i> | | |
| Paid employee | Reference | |
| Solo self-employed | -1.050*** (0.0362) | -0.754*** (0.0348) |
| Self-employed with employees | 0.0362 (0.0381) | 0.149*** (0.0530) |

| | | |
|---|-----------------------|----------------------|
| 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) |
| <i>Interaction effects:</i> | | |
| Solo self-employed with obligatory rent 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 | 262,239 | 216,521 |
| Log Likelihood | -592,623 | -485,513 |
| Chi2 | 147,509*** | 126,471*** |
| Pseudo R2 | 0.161 | 0.166 |

Notes: Results of ordered logit regression with robust standard errors (in parentheses); *** p<0.01, ** p<0.05, * p<0.1. Dependent variable is 24 income groups. 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 the model II is lower than in model I due to non-obligatory answers to the question about private insurances.

Table 7 shows interaction effects between employment status (solo self-employed or employer) and a dummy variable that indicates whether a respondent pays for social insurance or not. Since it can be argued that self-employed with high earnings are more likely to pay for private social insurance than self-employed with lower earnings, we distinguish between private and obligatory rent insurances. In the latter case, the results should not be disturbed by an earnings-based selection bias. Obligatory insurance is paid for by about 95.5 percent of paid employees, 16.6 percent of solo self-employed and 10.8 percent of self-employed with employees. In contrast, private life insurance is paid for by about 38 percent of paid employees, 42.5 percent of solo self-employed, and 63 percent of self-employed with employees. The results in Table 6 reveal that interaction effects are significant and have a positive sign with the exception of the interaction between employers and obligatory rent

insurance, thus partly rejecting the overestimation hypothesis. In this case the sign for the effect is negative but non-significant. Hence, self-employed persons with a rent insurance be it obligatory or voluntarily are even more likely to report higher net earnings than self-employed without such an insurance. Therefore, overestimation of entrepreneurial earnings seems not to be a relevant issue at least in occupations in which self-employment is subject to compulsory pension insurance. It appears likely that in those occupations self-employed people achieve higher earnings than in occupations without compulsory pension insurance.

6. Limitations

Our analysis has some limitations that are partly a result of lacking information in the underlying data. One of these limitations is that the data allow following the income of self-employed only over a period of three years after start up so that we have been unable to investigate the development over a longer period of time.

Moreover, our data contains information on personal characteristics which we know from previous research that they are important for entrepreneurs, such as age, gender, marital status, and in particular their level of education, or their employment status. There is, however, no information concerning the individuals' personality traits that may influence both selection into entrepreneurship and the level of earnings. Furthermore, the Micro-Census provides only restricted information about their previous career path and work environment. With respect to the ventured business, our information is restricted to the industry affiliation and the employment of other persons.

Last but not least with respect to the earnings measures in the Micro-census, we need to ask whether income intervals are sufficiently precise in order to analyze income differentials between groups. As kind of a robustness check, we compared the mid-points of income intervals, as reported in the Micro-Census, with the mid-points of the same intervals constructed on the basis of precise income values in the German Socio-

Economic Panel data does. The comparison reveals no significant differences. Therefore, we are confident that the income measures which we employ are exact enough for our analysis.

7. Summary, conclusions, and further research

There is a wide-spread belief that self-employment does not lead to higher incomes than dependent employment. To explain persistence in entrepreneurship, it is often argued therefore, that self-employment must generate additional non-pecuniary benefits, such as higher levels of work-satisfaction, self-realization, autonomy, and flexibility (see, for example, Benz and Frey, 2004, 2008). The present investigation of entrepreneurial earnings as compared to those of paid employees is based on the Micro-Census data, thus allowing a very detailed analysis of this question. The findings suggest that the average and median hourly earnings of self-employed are higher than those of their salaried counterparts. We further reveal that there are substantial differences in returns from entrepreneurship for different types of self-employed, which usually remains hidden behind the aggregated effect of self-employment status. While self-employed with employees tend to earn higher incomes than paid employees, solo entrepreneurs are more likely to earn lower incomes with two exceptions: in higher percentiles of the income distribution solo self-employed earn significantly higher incomes than their dependently employed counterparts. A second, even more remarkable finding is that solo self-employment seems to pay particularly for persons without vocational qualification.

The present study was further able to follow the development of entrepreneurial earnings – as compared to those of employees - in the first three years after start-up. Although a transition to self-employment is associated with an increased income risk, many entrepreneurs do not experience a significant change in their earnings or even achieve higher incomes than paid employees within the first three years after setting up their own business.

Hence, the overall conclusion from the present study is that the common prejudice stating that self-employed generally earn less than dependent employees does not hold, at least for the case of Germany. On the contrary, many self-employed earn more. This increase in their incomes can be regarded as a reward for their entrepreneurial initiative and a compensation for risk bearing. There is, however, a considerable degree of heterogeneity of the effects so that not all entrepreneurs are successful enough to achieve superior incomes – a very plausible observation.

Two groups of founders that we have identified in our analysis are particularly remarkable. One of these groups consists of those solo-entrepreneurs without a vocational degree that are better off in pecuniary terms when being their own boss than when they are dependent employees. For these persons, the payment schemes of firms seem to be too rigidly oriented at formal qualification. Another group are the entrepreneurial “stars” who realize relatively high incomes either as solo self-employed or as employers. It would be interesting to know more about these two groups of entrepreneurs, their former careers, their abilities (skill variety) and motivations as well as about the businesses they are running. Generally, it would also be interesting to know what distinguishes those new businesses that have employees from the solo entrepreneurs.

Our paper also contributes to the evidence on a relatively recent phenomenon of solo self-employment. This group appears to be highly heterogeneous not only with regard to individual characteristics, but also with regard to earnings they achieve. Solo self-employment appears to consist of both “stars” with high incomes and of low-earners. Further research should shed more light on this particular group.

All in all, we could show that the income in self-employment is in several cases significantly higher than in dependent employment. It can pay to run an own business. Thus, it is not only a positive bias about the beliefs what could be earned from entrepreneurial activities or a non-pecuniary payoff, it could also be a pure matter of income justifying the

transition to self-employment, also explaining why more individuals in Germany actually became entrepreneurs.

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Appendix

Table A1: Descriptive statistics for independent variables.

| | Full sample | | Paid employees | | Self-employed | | Self-employed without employees | | Self-employed with employees | |
|----------------------------------|-------------|--------|----------------|--------|---------------|--------|---------------------------------|--------|------------------------------|--------|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| 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 |
| Vocational qualification | 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 |
| Without vocational qualification | 0.155 | 0.362 | 0.162 | 0.368 | 0.093 | 0.290 | 0.111 | 0.314 | 0.071 | 0.256 |
| 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 | |

Table A2: Parameter estimates from earnings regressions.

| | Without vocational qualification | Vocational degree | Tertiary degree | East Germany | West Germany | Primary sector | Secondary sector | Tertiary sector | Males | Females |
|--|--|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|-----------------------|-----------------------|
| Paid employee | | | | | Reference | | | | | |
| Solo self-employed | 0.376*** (0.0673) | -0.686*** (0.0311) | -1.052*** (0.0385) | -0.949*** (0.0453) | -0.621*** (0.0280) | -0.102 (0.192) | -0.993*** (0.0542) | -0.644*** (0.0256) | -0.546*** (0.0315) | -0.647*** (0.0382) |
| Self-employed with employees | 0.915*** (0.105) | 0.0795** (0.0363) | 0.586*** (0.0453) | 0.359*** (0.0610) | 0.374*** (0.0301) | 0.522*** (0.202) | 0.014 (0.0545) | 0.339*** (0.0304) | 0.671*** (0.0305) | 0.574*** (0.0604) |
| Age (years) | 0.377*** (0.00528) | 0.110*** (0.00311) | 0.148*** (0.00834) | 0.184*** (0.00540) | 0.219*** (0.00275) | 0.199*** (0.0180) | 0.251*** (0.00439) | 0.197*** (0.00309) | 0.239*** (0.003) | 0.245*** (0.004) |
| Age, squared | -0.004*** (0.000) | -0.00117*** (3.81e-05) | -0.0015*** (9.84e-05) | -0.00213*** (6.58e-05) | -0.00233*** (3.40e-05) | -0.00216*** (0.000224) | -0.0028*** (5.43e-05) | -0.00212*** (3.82e-05) | -0.003*** (0.000) | -0.003*** (0.000) |
| Years in current job | 0.0586*** (0.00330) | 0.0738*** (0.00132) | 0.0547*** (0.00329) | 0.0905*** (0.00243) | 0.0635*** (0.00126) | 0.0692*** (0.00869) | 0.0703*** (0.00198) | 0.0670*** (0.00144) | 0.077*** (0.002) | 0.06*** (0.002) |
| Years in current job, squared | -0.001*** (0.000) | -0.000851*** (0.000) | -0.0006*** (0.000) | -0.00116*** (0.000) | -0.00074*** (0.000) | -0.00132*** (0.000) | -0.001*** (0.000) | -0.0007*** (0.000) | -0.001*** (0.000) | -0.001*** (0.000) |
| Married (1=yes, 0=no) | -0.114*** (0.0239) | -0.109*** (0.0101) | 0.148*** (0.0206) | -0.0459*** (0.0176) | -0.0205** (0.00966) | 0.290*** (0.0691) | 0.329*** (0.0159) | -0.254*** (0.0104) | 0.774*** (0.0126) | -0.841*** (0.0123) |
| Children in household (1=yes, 0=no) | 0.242*** (0.0207) | 0.547*** (0.0106) | 0.442*** (0.0219) | 0.431*** (0.0193) | 0.402*** (0.00961) | 0.271*** (0.0710) | 0.400*** (0.0154) | 0.367*** (0.0108) | 0.431*** (0.0118) | 0.183*** (0.0130) |
| German (1=yes, 0=no) | -0.092*** (0.0238) | 0.252*** (0.0207) | 0.325*** (0.0367) | 0.108* (0.0581) | 0.0766*** (0.0149) | -0.560*** (0.136) | -0.00404 (0.0247) | 0.169*** (0.0181) | 0.162*** (0.0197) | 0.058*** (0.0221) |
| Male (1=yes, 0=no) | 0.682*** (0.0196) | 1.030*** (0.0104) | 0.916*** (0.0193) | 0.514*** (0.0170) | 1.083*** (0.00965) | 0.964*** (0.0695) | 1.182*** (0.0169) | 0.816*** (0.00974) | - | - |
| Working hours per week | 0.0744*** (0.00108) | 0.120*** (0.0007) | 0.0943*** (0.00117) | 0.0777*** (0.001) | 0.108*** (0.001) | 0.0800*** (0.004) | 0.112*** (0.001) | 0.0976*** (0.0006) | 0.068*** (0.001) | 0.113*** (0.001) |
| Vocational degree | - | - | - | 1.525*** (0.033) | 1.103*** (0.0117) | 1.154*** (0.087) | 1.316*** (0.0195) | 1.105*** (0.0140) | 1.367*** (0.0161) | 1.023*** (0.0155) |

| | | | | | | | | | | |
|----------------------------|----------|----------|----------|----------|-----------|----------|----------|----------|----------|----------|
| Tertiary degree | - | - | - | 3.318*** | 2.728*** | 2.524*** | 3.542*** | 2.637*** | 3.260*** | 2.443*** |
| | | | | (0.0402) | (0.0171) | (0.166) | (0.0294) | (0.0187) | (0.0222) | (0.0229) |
| Industry dummies | Yes*** | Yes*** | Yes*** | Yes*** | Yes*** | No | No | No | Yes*** | Yes*** |
| Dummies for Federal States | Yes*** | Yes*** | Yes*** | Yes*** | Yes*** | Yes*** | Yes*** | Yes*** | Yes*** | Yes*** |
| Number of observations | 40,550 | 179,376 | 42,323 | 55,872 | 206,377 | 3,745 | 82,586 | 162,733 | 138,477 | 123,772 |
| Log Pseudolikelihood | -81737 | -394237 | -109159 | -120115 | -468984 | -7962 | -185544 | -371071 | -321457 | -260025 |
| Wald chi2 | 21037*** | 85523*** | 19746*** | 26469*** | 118285*** | 1673*** | 48160*** | 83265*** | 80698*** | 60643*** |
| Pseudo R2 | 0.148 | 0.142 | 0.114 | 0.132 | 0.167 | 0.131 | 0.157 | 0.152 | 0.149 | 0.150 |

Notes: Results of the ologit regression. Dependent variable is an interval variable, which represents 24 income groups. Robust standard errors in parentheses. *** p<0.000; ** p<0.05; * p<0.1. Dummy control variables for industry sector are based on *Klassifikation der Wirtschaftszweige* (2008)