Determinants of Self-Employment with and without Employees: Empirical Findings from Europe

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Abstract. Although the determinants of self-employment are widely studied, the distinction between self-employed workers with and without employees is not often applied. We study determinants of self-employment in Europe by utilising three waves of the European Survey on Working Conditions (2005, 2010 and 2015) and estimating the individual odds of being self-employed with and without employees. We show that there are considerable differences concerning variables such as age, education, and household situation, where we found different patterns for solo self-employed workers and employer entrepreneurs. Among other findings, we show that jobs are created by middle-aged individuals who on average work more hours, have more experience in their own firm and who attained higher levels of education (bachelor, master and doctoral level). Our study contributes to replication of earlier research in the relatively underexplored area of the determinants of self-employment with and without employees.

1. Introduction

Entrepreneurship as a field is still growing, and that means there are still many research challenges that are important for both policymakers and researchers (Parker, 2009; Dale, 2015). One of the important topics is the research on determinants of entrepreneurship and self-employment at country, regional and individual levels. Recent empirical studies show that it is important to distinguish between various forms of entrepreneurial activity (Stam and Van Stel, 2011; Van

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Stel et al., 2014; Cieslik, 2015; Sevä et al., 2016; Jansen, 2017; Dilli et al., 2018; Szaban and Skrzek-Lubasiska, 2018; Hessels et al., 2018), because they may differently affect regional economic development. In the economy, there are self-employed/entrepreneurs[2] with and without employees who might have different motivations and goals. We may observe high-growth entrepreneurs, own-account workers and freelancers, necessity entrepreneurs or even social entrepreneurs (e.g. Audretsch et al., 2015; Fritsch and Storey, 2017; Dvouletý, 2017; 2018). Moreover, an ongoing research agenda on freelancing and self-employment finds that not all entrepreneurs and self-employed want to hire employees (Stanworth and Stanworth, 1995; Burke, 2015a; 2015b; Bögenhold and Klinglmair, 2016) and thus, it is very relevant to study factors that affect the decision of own-account workers to hire employees (Cowling et al., 2004; Millán et al., 2014a; 2014b; Kraaij and Elbers, 2016; Petrescu, 2016; Caliendo et al., 2017; Fairlie and Miranda, 2017).

In this study, we aim for diving deeper into individual characteristics determining the choice of being an employer. Previously obtained empirical evidence is rather scarce. Besides the one-country based studies (e.g. Cowling et al., 2004 for the UK), research was driven mainly by the data from two large European surveys, the European Community Household Panel (ECHP) and the European Social Survey (ESS). Millán et al. (2014a) utilised in their work data from the ECHP, and they focused mainly on the demographic and individual-related characteristics of the self-employed with and without employees. Petrescu (2016) concentrated in her work mainly on psychological factors. For this purpose, she utilised data from the ESS. The present study aims to contribute to the current state of knowledge from the angle of the third large European survey - the European Survey on Working Conditions (EWCS). We utilise three waves of EWCS (2005, 2010 and 2015) and we aim to identify the differences between those self-employed having employees and those without them. We analyse the established determinants of entrepreneurship (Simoes et al., 2016) with a focus on available demographic characteristics and personal attributes, such as age, gender, education, experience, migration status and family/household situation. Nevertheless, we also contribute to the literature by providing an insight into occupational differences between both groups. Finally, our research contributes to replication of earlier found determinants of self-employment with and without employees by using more recent data for a broader range of countries (Davidsson, 2015).

The structure of the paper is conventional. In the following section, we review the previous literature dedicated to the individual determinants of self-employment and differences concerning having employees or staying solo. Then we describe the collected dataset and present several initial comparisons. The following part is focused on the empirical analysis, where we estimate the

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2.   Please note that in line with Blanchflower and Oswald (1998) and Burke et al. (2008), we use the terms self-employment and entrepreneurship interchangeably

individual likelihood of being self-employed with and without employees, and in the final section of the paper, we discuss the obtained evidence and present recommendations for future research.

2. Literature Review

As Cowling et al. (2004), Millán et al. (2014b) and Petrescu (2016) point out, the empirical evidence on the differences between self-employed with and without employees is still scarce, and therefore we might get some inspiration on the potential variables of interest in the classical entrepreneurship literature first. Then we report the findings of scholars studying the differences between job creators and solo-self-employed.

2.1. Individual Determinants of Self-employment

Numerous studies aiming to explore the various patterns behind the decision of becoming self-employed have been written in the past years (e.g. Brockhaus, 1980; Evans and Leighton, 1989; Blanchflower and Meyer, 1994; Le, 1999; Dunn and Holtz-Eakin, 2000; Brandstätter, 2011; Bosma et al. 2012; Lukeš and Zouhar, 2013; 2016; Wu, 2015; Szarucki et al., 2016; Holienka et al., 2016; Santos et al., 2017; Bernat et al., 2017; Criaco et al., 2017; Zhang and Acs, 2018; Woronkowicz and Noonan, 2018; Dvouletý et al., 2018). Simoes et al. (2016) have reviewed the obtained empirical evidence and categorised individual determinants of self-employment into several categories. These include basic individual characteristics, family background, personality characteristics, human capital, health condition, nationality, ethnicity and access to financial resources. As Simoes et al.'s (2016) review covers the most recent empirical evidence and findings of scholars systematically, we utilise it as a baseline for our study.

2.1.1. Basic Individual Characteristics

Simoes et al. (2016) include in the category of basic individual characteristics variables representing age, gender, marital status and children. They conclude that women have lower propensity to enter self-employment than men, which may be explained by higher risk aversion of females, different sectoral preferences or the theory of discrimination. When it comes to age, Simoes et al. (2016, p. 786) support the existing evidence for the inverse U-shaped relationship between age and self-employment, with a threshold dependent on the country and year of analysis (which often ranges between 35 and 44). This decreasing relationship for age above the threshold is often explained by the lower physical

and mental availability associated with ageing. According to Simoes et al. (2016, p. 787) the propensity of becoming self-employed is higher for married individuals and for those having children, because a husband/wife/partner might serve as a source of financial, material and emotional support and having children is associated with higher family costs, requiring higher earnings.

2.1.2. Family Background

Simoes et al. (2016, pp. 788-789) further discuss the role of intergenerational transmission. According to their summary of empirical studies, having at least one parent with self-employment experience is positively associated with a higher chance to become self-employed, because the children tend to follow the similar career pathways as their parents did. Moreover, the authors indicate that this positive association might also hold for a partner/spouse because individuals tend to match with others with similar characteristics and labour market pathways.

2.1.3. Personality Characteristics

Simoes et al. (2016, pp. 789-790) then discuss the role of personality traits and characteristics, where they highlight the individual (entrepreneurial) characteristics and traits which are positively associated with the self-employment engagement. These include higher willingness to take risks, overconfidence, overoptimism, need for achievement and autonomy, self-efficacy and internal locus of control.

2.1.4. Human Capital

When it comes to the role of human capital, previous empirical evidence relies mostly on the variables representing formal education and obtained experience (Simoes et al., 2016, pp. 790-792). Previously published studies cannot agree on the role of formal education, which appears to be in empirical studies both positive and negative, because of multiple effects acting against each other. In particular, formal education not only increases skills that are useful in entrepreneurship but also skills that are useful in wage-employment (Parker, 2009). On the other hand, self-employment is clearly positively linked with higher years of experience (self-employment, managerial and industry-specific) and with the diversity of obtained experience reflecting the accumulation of human capital over time.

2.1.5. Health Condition

Inconclusive is also the question of health condition and particularly, the role of poor health, illness or disability (Simoes et al., 2016, pp. 792-793). Some scholars find a positive impact of good health status on self-employment and argue that self-employment is linked with higher levels of stress and working hours and thus, a good health condition is needed. Others support an argument that individuals having poor health might find in self-employment flexibility in working hours/volume of work and an opportunity to escape potentially from employer discrimination.

2.1.6. Nationality and Ethnicity

A positive relationship between self-employment and migration is usually found by previous scholars, explained by the enclave hypothesis or theories of discrimination and human capital, allowing individuals to actively integrate themselves in the economy (Simoes et al., 2016, pp. 793-794).

2.1.7. Access to Financial Resources

Finally, previous empirical evidence clearly shows that individuals (and households) with more wealth and those with lower financial constraints tend to become more likely self-employed (Simoes et al., 2016, pp. 794-795).

2.2. Previous Evidence on the Differences between Solo-Self-employed and Job Creators

A pioneering work distinguishing between factors determining the choice of self-employed workers to take on employees or to stay solo has been written by Cowling et al. (2004), who assume that these two categories of entrepreneurs distinguish from each other in the way "they are managed, the constraints they face at start-up and the way public policy should accommodate them." (p. 602).

Cowling et al. (2004) have based their analysis on the data from the British Household Panel Survey (BHPS) in 1999, and they have estimated probit regressions with the dependent variables relating to being a job creator (versus solo self-employed) and being self-employed (versus wage-employment). Models were estimated separately for males and females, and some gender differences were observed in the results. The conducted empirical analysis covered a range of individual and household characteristics. For both categories of self-employment, the authors find the inverse U-shaped relationship for age

(with turning points of 59 years for solo-self-employed and 41 for job creators). This finding was however confirmed only for males. In female models, no U-shaped relationship was proved. Mixed and insignificant results were found for the role of family (partners) and children. Regarding children, Cowling et al. (2004) only found a positive impact of having the youngest child of age below five in models for females determining the decision of being self-employed. The authors find a positive impact of having self-employed parents only in the models determining the choice of being self-employed (versus wage-employment), but not for being a job creator (versus solo self-employment). The empirical findings for the role of formal education were also quite mixed. Use of initiative was found to be positively related with the choice of being self-employed, however surprisingly not with the decision to become a job creator. When it comes to the role of human capital, experience in current occupation was positively related with being a job creator. However, mixed results have been obtained for the role of formal education. Cowling et al. (2004) found that men with a university education are less likely to be self-employed (and hence more likely wage-employed), compared to those with no education. A non-significant result was obtained for females. On the contrary, a positive relationship between higher education and job creation was found for males, however, again, non-significant results were obtained for females. The authors do not find any impact of work-related health limits on the decision to become self-employed with or without employees. Interestingly, being a female born outside of UK was associated positively with self-employment. No significant results were found for males. Finally, wealth measures were not found to be important determinants in Cowling et al.'s (2004) models, and only some evidence was obtained for variables representing receiving windfall payments.

Millán et al. (2014b) reviewed several studies related to the choice of becoming a job creator (also known as employer-entrepreneur) based on the European Community Household Panel (ECHP) from 1994 to 2001. They conclude that being self-employed with employees is positively associated with higher levels of education and years of experience (especially with previous self-employment experience). They also acknowledge the role of intergenerational transmission indicating that the presence of relatives working as self-employed positively influences the likelihood of becoming a job creator. Millán et al. (2014b) also mention the influence of liquidity constraints, operationalised through earnings and household income, indicating a positive impact on being self-employed with employees.

The most recent study was published by Petrescu (2016) who exploited data from the seventh wave (2016) of the European Social Survey (ESS). She aimed to observe the differences between self-employed with and without employees concerning psychological and social values and traits, such as happiness, need for power and satisfaction. Using MANOVA, Petrescu (2016) found that self-employed with employees, are happier, have a higher need for power and are

more satisfied with income. When she estimated a logistic regression with the dependent variable probability of being a job creator, she confirmed the results of MANOVA. Moreover, she found that being self-employed with employees was positively associated with being a male, age (but she did not test for inversed U-shaped pattern) and household income. On the other hand, she failed to prove any impact of formal education. Other psychological variables (need for achievement, need for self-direction, community well-being and satisfaction with the state of the economy) included in her regression model remained statistically insignificant.

While reviewing the previous literature on the individual determinants of entrepreneurship, we have found that there are still variables (e.g. family, education, health) whose impact on the choice of being self-employed is not conclusive. We were even more surprised to see that there are only a few studies that addressed the differences in these determinants concerning the different forms of self-employment (having employees vs. solo). Therefore, we aim to contribute to the debate on these differences from the European perspective in the following part of the article, and we focus our analysis mainly on the role of basic individual characteristics, family/household relations and the impact of human capital.

3. Data and Comparisons

For the purpose of this study, *analysis of the differences between self-employed with and without employees in Europe*, we utilize three harmonized waves of the European Survey on Working Conditions (2005, 2010 and 2015), that is being in operation since 1991 by the European Foundation for the Improvement of Living and Working Conditions (2018) in 35 European countries (for questionnaires, details, sampling and data collection procedures, see Eurofound, 2017). The selection of the waves was driven by the availability of the occupational distinction between self-employed with and without employees (included in the survey series from 2005 onwards). This section aims to provide readers with an initial empirical comparison between both groups and with summary statistics for the obtained sample.

According to survey data, the rates of self-employed are in Europe at around 17% of the economically active population (consisting of 12% solo-entrepreneurs/own-account workers and 5% entrepreneurs having employees). These numbers roughly correspond with the recent empirical reports by Masso (2015), Sheehan and McNamara (2015) and Dvouletý and Lukeš (2017), who range self-employment engagement in Europe between 14-15% depending on the data availability and survey used.

First, we observe the differences between the groups of self-employed with and without employees concerning the motivation for business start-up and then

we explore the occupational differences. Given the data availability of the EWCS, we observe the differences in the most frequently reported motive to establish an enterprise – enjoyment of being one's own boss (e.g. Brandstätter, 2011; Lukeš and Zouhar, 2013; Masso, 2015). Table 1 shows that those having employees more likely enjoy being their own bosses, compared to those without employees, however, this relationship is relatively weak (Chi-Square's p-value < 0.000; Cramer's V = 0.08).

Table 1: Motivation for becoming Self-employed for Self-employed with and without Employees (relative frequency in %; N=13,272)

Cross Tab	Self-employed with and without Employees	
I Enjoy Being my Own Boss	**With employees**	**Without Employees**
No	8.57	13.38
Yes	91.43	86.62
Test of association, Chi-Square = 58.43, p-value < 0.000, Cramer's V = 0.08		

Note: Post-stratification weights applied.[3]

We also explore the distribution of self-employed concerning the industry in Table 2. We find several statistically significant differences (Chi-Square's p-value < 0.000; Cramer's V = 0.25). For instance, the most of the self-employed without employees are involved in agriculture, hunting and forestry (26.8%), whereas the self-employed with employees are most frequently represented in wholesale and retail trade (23.8%).

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3.   Results are weighted across the relative size of the workforce in each of the countries.

Table 2: Industry Distribution for Self-employed with and without Employees (relative frequency in %; N=17,978)

Cross Tab	Self-employed with and without Employees	
Industry Classification - NACE Codes (Weighted %)	**Self-employed without Employees**	**Self-employed with Employees**
Agriculture, hunting and forestry	26.79	10.66
Fishing	0.25	0.15
Mining and quarrying	0.19	0.21
Manufacturing	8.02	11.53
Electricity, gas, and water supply	0.35	0.64
Construction	8.13	10.89
Wholesale and retail trade	19.20	23.82
Hotels and restaurants	3.41	10.29
Transport, storage and communication	4.37	3.99
Financial intermediation	1.50	1.53
Real estate activities	9.38	11.20
Public administration and defence	0.44	0.66
Education	1.65	1.30
Health and social work	4.12	4.72
Other service activities	9.73	7.97
Activities of households	2.41	0.41
Activities of extraterritorial organizations	0.04	0.02
Test of association, Chi-Square = 48.83, p-value < 0.000, Cramer's V = 0.25.		

Note: Post-stratification weights applied

More interesting insights can be found in the occupational structure of self-employed according to ISCO-1 classification that is reported in Figure 1. Several statistically significant differences are observed (Chi-Square's p-value < 0.000; Cramer's V = 0.30). It is not surprising that most of the self-employed with employees describe themselves as managers (41%) contrary to only 16% of self-employed without employees. It is worth mentioning, that solo-self-employed are represented more in the following three occupational groups: Technicians and Associate Professionals; Skilled Agricultural Forestry and Fishery Workers and Elementary Occupations.

We have also found (t-test's p-value < 0.000) that self-employed with employees work on average more hours weekly (mean 48.8, median 50), compared to self-employed without employees (mean 43.2, median 42).

Figure 1: Occupational Structure of Self-employed with and without Employees according to ISCO-1 Classification (relative frequency in % N=18,032)
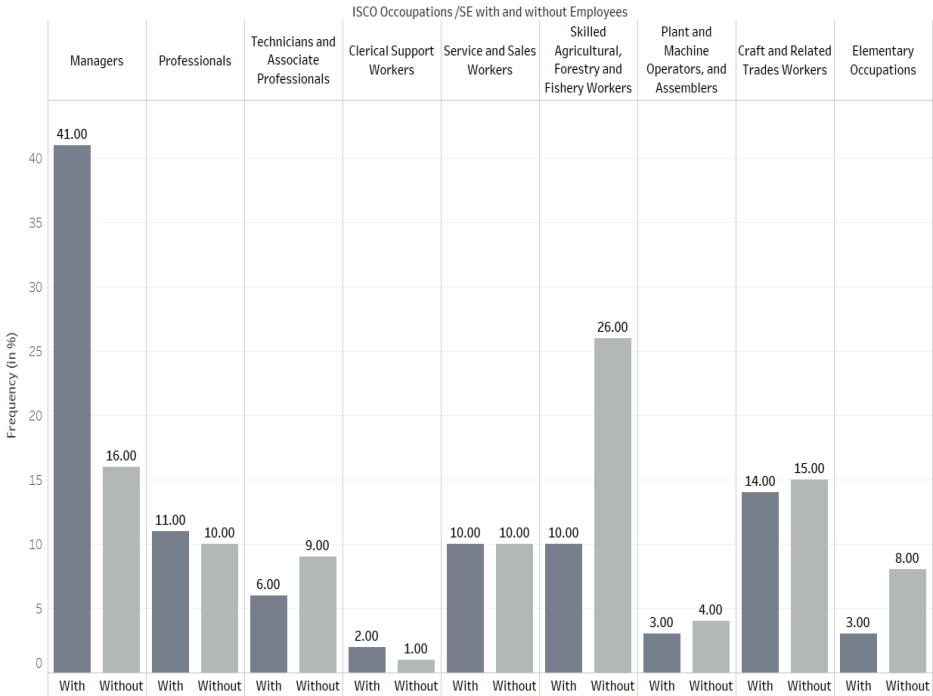
Notes: Test of association, Chi-Square = 135.28, p-value < 0.000, Cramer's V = 0.30. Post-stratification weights applied.

Given these differences, we may support our assumptions and findings of other scholars in the field (e.g. Cowling et al., 2004; Millán et al., 2014b; Petrescu, 2016) that there are significant differences between both groups and thus, we employ other available personal characteristics to dive deeper into these. Due to the limited data availability of EWCS (in terms of characteristics of the self-employed), we focus our empirical analysis mainly on the demographic characteristics and personal attributes, such as age, gender, education, migration status and household situation.

We keep in our sample only individuals having as main occupation self-employment or wage-employment activity who are younger than 65 years. That allows us to conduct a relatively straightforward empirical analysis without the presence of other confounding effects as it is discussed by several scholars in the field (e.g. Caliendo et al., 2014; Simoes et al., 2016; Georgellis and Yusuf, 2016). The description of all variables is presented in Table 3 below, while Table 4 provides summary statistics for these variables as they enter the regression analysis.

Table 3: List of Variables

Variable	Definition
Employment status	Employment status as one of three categories: Self-employed with employees (having at least one employee excluding the owner of the business), self-employed without employees or in paid employment.
Age	Respondent's age.
Female	Dummy variable which equals 1 if the respondent is female.
Education	Set of dummy variables according to ISCED (International Standard Classification of Education, 1997) 1997 classification.
Years of Experience	Respondent's years of experience in the current company or organisation.
Worked Hours	Respondent's working hours per week.
Migrated	Dummy variable which equals 1 if the respondent was not born in the country of the survey.
Subject of Discrimination (Race, Ethnic)	Dummy variable which equals 1 if the respondent has been personally subject of discrimination linked to race, ethnic background or colour over the last 12 months.
Subject of Discrimination (Disability)	Dummy variable which equals 1 if the respondent has been personally subject of discrimination because of his/her disability over the last 12 months.
Number of People in Household	Number of people living in a respondent's household.
Living with a Partner/ Spouse	Dummy variable which equals 1 if the respondent lives together with his/her spouse/partner.
Partner/Spouse Works Full-time/Part-time	A set of dummy variables which equal 1 if the respondent's spouse/partner works full-time/part-time (is wage-employed or self-employed).
Having One/Two/Three and more Children under 15	A set of dummy variables which equal 1 if the respondent has one/two/three and more children under 15 years old in his/her household.
Year of Survey	Year when the survey was conducted.
Country	Respondent's country of residence.
Industry (NACE Codes)	Respondent's work industry classification according to NACE codes.
Occupation (ISCO-1 Codes)	Respondent's occupation according to ISCO-1 classification.

Table 4: Sample Descriptive Statistics

Variable	Frequency (%)	N			
Self-employed with Employees (=1)	5.0	103,496			
Self-employed without Employees (=1)	11.7	103,496			
Female (=1)	45.5	103,488			
Pre-Primary education (=1)	1.0	101,309			
Primary education or first stage of basic education (=1)	5.3	101,309			
Lower secondary or second stage of basic education (=1)	14.5	101,309			
(Upper) secondary education (=1)	42.5	101,309			
Post-secondary non-tertiary education (=1)	7.1	101,309			
First stage of tertiary education (BSc./MSc./MBA) (=1)	28.7	101,309			
Second stage of tertiary education (Ph.D.) (=1)	1.2	101,309			
Migrated (=1)	9.0	100,152			
Subject of Discrimination (Race, Ethnic) (=1)	1.4	103,496			
Subject of Discrimination (Disability) (=1)	1.0	103,496			
Living with a Partner/Spouse (=1)	74.4	103,496			
Partner/Spouse Works Full-time (=1)	21.0	103,319			
Partner/Spouse Works Part-time (=1)	2.8	103,319			
Having One Child under 15 (=1)	19.7	103,496			
Having Two Children under 15 (=1)	13.1	103,496			
Having Three and More Children under 15 (=1)	3.7	103,496			
Variable	**Mean**	**SD**	**Min**	**Max**	**N**
Age	41.5	11.6	15	65	103,147
Working Hours per Week	39.3	12.7	1	120	100,698
Years of Experience in Current Company	10.1	9.7	1	50	101,503
Number of People in Household	3.0	1.3	1	6	103,319

Note: Self-employed and wage-employed only. Post-stratification weights applied.

4. Empirical Approach and Results

The objective of the paper is to study self-employed with and without employees in Europe. Methodologically, we estimate several multivariate logistic regressions with the dependent variable being self-employed at the time of the survey. To observe the differences between both groups, we combine two empirical approaches. In the first two econometric models (Models 1 and 2), we separately compare *Self-employed without Employees* and *Self-employed with Employees* with those being wage-employed and then, in the third model (Model 3), we just work with a sample of self-employed only, and we estimate the

individual likelihood of being *Self-employed with Employees* (cf. Cowling et al., 2004).

We estimate our logistic regressions with robust standard errors. We have also inspected the level of collinearity among the estimated parameters with the help of correlation matrices and Variance Inflation Factors (VIF) test, and we conclude, that no multicollinearity is present in our estimates (Wooldridge, 2002). We also control for country and year effects by a set of dummy variables, and we also use dummies to adjust for industry specifics (NACE codes) and occupational variation (ISCO-1 codes). Moreover, the models are estimated with post-stratification weights, adjusting estimates for the relative size of the workforce in each of the countries, to ensure balanced results in the pooled sample. As a robustness check, we tried to estimate our models on the sample of the EU-12 countries[4] only and compare these results with the later entrants to the European Union. The results for most of the variables were roughly similar, and thus, we report the final estimates for the whole pooled sample. Presented models were found to be statistically significant and can be found in Table 5.

The obtained estimates support an assumption of differences concerning demographic characteristics and personal attributes of both self-employment groups. It is not surprising that both groups are different from employees as it is shown in the first two sets of econometric models (Models 1 and 2). However, as suggested by previous research, job creators differ from solo-self-employed as well (Model 3).

We begin the interpretation of the findings based on the results obtained from the first two econometric models (Models 1 and 2). The results show that both categories of self-employed are less likely represented among females (*Female*). The first difference occurs for the variable age (*Age, Age Squared*). For the group of self-employed with employees, the age variable indicated the traditional inverted U-shape with the likelihood of being self-employed (with a turning point at the age of 56), however for the group of those without employees, we were unable to find a non-linear pattern.[5] The impact of family and household characteristics was tested by several variables (*Number of People in Household, Living with a Partner/Spouse, Partner/Spouse Works Full-time/Part-time, Having One/Two/Three and more Children under 15*). The number of people living in a common household and living with a partner/spouse were positively associated only with the probability of being self-employed with employees. Similarly, having a partner working part-time or full-time positively distinguished job creators from employees. On the contrary, living in a common household with children aged under fifteen was positively associated with both forms of self-employment. Furthermore, the models show a positive relationship

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4. Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, Luxembourg, Netherlands, Portugal, United Kingdom.
5. When running a model which also included a squared age term (not reported in Table 5), the p-value for the quadratic term was 0.224 and the sign of the coefficient was positive.

of self-employment with the variables measuring years of experience in the current company (*Years of Experience in Current Company*) and the number of working hours per week (*Working Hours per Week*).

Different patterns were observed for the role of formal education. For the self-employed without employees, the results indicated a negative relationship with the increased attained level of formal education, statistically significant especially for *(Upper) secondary education* and *First stage of tertiary education (BSc./MSc./ MBA)*. However, the opposite pattern was observed for the self-employed with employees. The likelihood of being a job creator was increasing with the attained level of formal education, and the effect was the highest for university graduates completing *First stage of tertiary education (BSc./MSc./MBA)* and *Second stage of tertiary education (Ph.D.)*. We were unable to empirically observe any significant impact of the disability in both models. Finally, we see differences concerning discrimination due to race or ethnicity (*Subject of Discrimination (Race/Ethnic)*) and migration (*Migrated*). The signs for these two variables do not differ in both models, but their significance does. We find a negative statistically significant impact of migration on being an employer-entrepreneur and a positive influence of suffering from discrimination due to race or ethnicity for being solo-self-employed.

Looking at the third model (Model 3) estimated on the sample of self-employed only, we may even more clearly see the differences mentioned above. Our model indicates that having employees is more the domain of males, compared to females. The results also support an argument of an inverted U-shape pattern of age (with a turning point at the age of 40). Family background is important for job creators. Compared with solo-self-employed, they seem to live with a partner/spouse more likely. They are also more likely to live with a partner engaged on the labour market, working part-time or full-time. Working more hours per week and having more years of experience in their own firm is also positively associated with being self-employed with employees. Employer-entrepreneurs are also more likely people with a higher level of education, where the highest likelihood of being self-employed with employees was observed for the individuals, having a doctoral degree (Ph.D.). This is an interesting observation. According to Appendix 1, 10.4% of those who have attained a doctoral degree are self-employed with employees and 11.4% are self-employed without employees. Job creators with a doctoral degree are on average elder, work more hours a week, and have more years of experience (compared to solo self-employed workers and wage-workers with a doctoral degree).

Table 5: Estimation results self-employment regressions

Model	Model (1)	Model (2)	Model (3)
	Self-employed without Employees	Self-employed with Employees	Self-employed with Employees
Age	0.0268***	0.118***	0.0579***
	(0.00166)	(0.0156)	(0.0167)
Age Squared		-0.00106***	-0.000722***
		(0.000182)	(0.000192)
Female	-0.155***	-0.456***	-0.381***
	(0.0313)	(0.0479)	(0.0540)
Pre-Primary education	(.)	(.)	(.)
	(.)	(.)	(.)
Primary education or first stage of basic education	0.000431	0.662+	0.367
	(0.165)	(0.386)	(0.317)
Lower secondary or second stage of basic education	-0.248	0.898*	0.848**
	(0.162)	(0.380)	(0.315)
(Upper) secondary education	-0.363*	1.004**	1.110***
	(0.161)	(0.379)	(0.313)
Post-secondary non-tertiary education	-0.267	1.245**	1.296***
	(0.169)	(0.384)	(0.326)
First stage of tertiary education (BSc./MSc./MBA)	-0.377*	1.365***	1.505***
	(0.163)	(0.380)	(0.316)
Second stage of tertiary education (Ph.D.)	-0.0349	2.033***	2.027***
	(0.203)	(0.399)	(0.349)
Working Hours per Week	0.0282***	0.0710***	0.0143***
	(0.00144)	(0.00236)	(0.00147)
Years of Experience in Current Company	0.0128***	0.0329***	0.0222***
	(0.00162)	(0.00225)	(0.00298)
Migrated	-0.0733	-0.211**	-0.141
	(0.0594)	(0.0806)	(0.0976)
Subject of Discrimination (Race/Ethnic)	0.220+	0.132	0.0465
	(0.124)	(0.168)	(0.216)
Subject of Discrimination (Disability)	0.227	-0.0143	-0.103
	(0.171)	(0.275)	(0.338)
Number of People in Household	0.0133	0.0413+	0.0259
	(0.0147)	(0.0227)	(0.0250)
Living with a Partner/Spouse	-0.00274	0.179**	0.208**
	(0.0379)	(0.0593)	(0.0679)
Partner/Spouse Works Full-time	-0.0443	0.201**	0.261**
	(0.0496)	(0.0718)	(0.0851)

Partner/Spouse Works Part-time	0.0729	0.272*	0.364**
	(0.0824)	(0.114)	(0.134)
Having One Child under 15	0.0977*	0.174**	0.0969
	(0.0406)	(0.0600)	(0.0677)
Having Two Children under 15	0.220***	0.238**	0.0775
	(0.0490)	(0.0736)	(0.0830)
Having Three and More Children under 15	0.228**	0.412***	0.203
	(0.0833)	(0.122)	(0.131)
Constant	-2.171***	-9.077***	-4.796***
	(0.199)	(0.521)	(0.479)
Year Dummies	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes
Industry Dummies (NACE Codes)	Yes	Yes	Yes
Occupational Dummies (ISCO 1 Codes)	Yes	Yes	Yes
Observations	88,455	82,756	13,965
Pseudo R2	0.219	0.216	0.111
AIC	48804.7	26851.6	15737.2
BIC	49433.9	27485.6	16250.2

Robust SE Logistic Regression Estimates (Self-employed vs. Wage-employed in Models 1 and 2; Self-employed with Employees vs. Self-employed without Employees in Model 3).
Standard errors in parentheses. Stat. significance: $+ p < 0.10$, $* p < 0.05$, $** p < 0.01$, $*** p < 0.001$.
Turning points for *Age, Age Squared:* Model 2 ≈ 56 Years, Model 3 ≈ 40 Years.
Post-stratification weights applied

5. Discussion and Concluding Remarks

The present study empirically contributes to entrepreneurship literature by studying differences between self-employed with and without employees in Europe. We started by summarising the previously obtained empirical evidence on the determinants of employer-entrepreneurship, and we showed that there were only a few studies published on this topic so far. Moreover, most of them are based on elder data sources, and thus, we would like to stimulate the debate, based on more recent empirical evidence. Methodologically, we have estimated a set of logistic regressions based on data from the three recent waves (2005, 2010 and 2015) of the European Survey on Working Conditions (EWCS). The obtained findings show considerable differences between those self-employed having employees and those who have not. This observation corresponds to the recent call for more research on freelancing and solo-entrepreneurship raised by Burke and Cowling (2015) who argue that self-employed without employees are "different animals."

Obtained findings challenge some established patterns in the literature on the determinants of entrepreneurship and self-employment (Simoes et al., 2016). We show that there are considerable differences concerning variables such as age, education, household situation, where we found different patterns for solo-self-employed and self-employed with employees.

Although the classical entrepreneurship literature (Simoes et al., 2016) and the previous research (Cowling et al., 2004 for males only) assumed a U-shaped pattern with age for both forms of self-employment, our results were unable to support this empirically. We find a non-linear pattern for job creators, but not for the solo-self-employed. If we consider other variables approximating human capital, this observation makes sense. The results show that self-employed with employees have on average more years of experience compared to those without employees. That might indicate the accumulation of human capital over time (Marvel et al., 2016; Simoes et al., 2016). Finally, once we add to the whole picture of human capital variables, the findings for formal education, showing that the likelihood of being a job creator increases with the level of obtained education (i.e this likelihood is the highest for university education, i.e., bachelor, master and doctoral level), we may conclude that jobs are created by individuals who have stronger profiles in terms of human capital as already stressed by previous scholars in the field (Congregado et al., 2010; Millán et al., 2014b; Sorgner et al., 2017; Coad et al., 2017).[6] This piece of information may, therefore, answer the ambiguous findings of scholars on the role of formal education in the general literature on the determinants of self-employment (Simoes et al., 2016) and it highlights the importance of distinguishing between these two forms of entrepreneurship.

We also deliver interesting findings on the role of family and household situation. As Parker (2009) and Simoes et al. (2016) suggest, the partner living in a common household may serve as a source of emotional support and as a financial backup helping the self-employed partner to survive any difficulties in the activity and to act riskier in the exposition of the own business activity. Our findings suggest that this might be the case mainly for the job creators. Compared with solo-self-employed workers, self-employed with employees seem to live with a partner/spouse more often and their partners are more likely engaged on the labour market, working part-time or full-time. It is logical that having more employees is associated with an expansion of the business and thus potentially higher risks, and therefore, the financial support of the partner might be very helpful, especially in situations when something goes wrong. This observation expands the findings of Cowling et al. (2004) who were unable to find clear patterns regarding the role of the family, and the partner's engagement on the labour market.

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6. However, this was not found in the most recent study by Petrescu (2016). We believe that it might have been caused by the model specification which reflected only years of formal education.

The obtained estimates also show that self-employed with a migration background are significantly less likely to be employer entrepreneurs (relative to being wage-employed). One possible explanation is that their motivation for becoming self-employed is based more on necessity-related factors (also known in the literature as a "refugee effect"), such as securing a job for themselves and having an opportunity to earn income for paying their living costs (e. g. Kloosterman, 2010; Dvouletý and Lukeš, 2016; Laffineur et al., 2017; Mühlböck et al., 2017). However, this is not supported by the work of Cowling et al. (2004) as they did not find statistically significant relations between being born outside of the country (Great Britain) and being a job creator. More research is required on this relation.

We have a number of suggestions for future research. The present study focused on demographic and personal factors affecting the employment status. We highly recommend future scholars to study also the role of psychological factors, intergenerational transmissions and economic circumstances. We also recommend investigating the role of specific entrepreneurship education, training and previous self-employment experience. We also think that further investigation of the role of health status, ethnicity and migration background is needed as we were unable to draw conclusive findings on these. From the family perspective, it might be worth to study the role of the partner's/spouse's engagement in self-employment and his/her previous self-employment experience, because we were not able to distinguish if the partners/spouses work as employees or self-employed. Another direction of future research could be to explore the differences in entrepreneurial success (measured both objectively and subjectively, see e.g. Wach et al., 2016) of employers and solo-entrepreneurs and to compare their job satisfaction.

Finally, if policymakers aim to support high-growth entrepreneurship, they need to understand the characteristics of current and future employers better. The present paper shows that jobs are created by individuals who on average work more hours, have more experience in their own company and who attained higher levels of education (bachelor, master and doctoral level). Future research may find additional characteristics of job creators which are highly relevant to policy makers.

In conclusion, by studying determinants of self-employed workers with and without employees separately, we created new knowledge on this topic but we also confirmed some earlier findings in the literature, thereby contributing to replication by using more recent data for a broader range of countries (Davidsson, 2015).

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Appendix 1: Sample Descriptive Statistics for Ph.D. Holders Only

Variable	Frequency (%)	N	
Self-employed with Employees with Ph.D. (=1)	10.4	1,213	
Self-employed without Employees with Ph.D. (=1)	11.4	1,213	
Employed with Ph.D. (=1)	78.2	1,213	
Variable/Category	with Employees (Freq. %)	without Employees (Freq. %)	Employees (Freq. %)
Female (=1)	33.7	35.9	43.5
Migrated (=1)	4.3	11.6	15.6
Subject of Discrimination (Race, Ethnic) (=1)	2.7	0.1	1.0
Subject of Discrimination (Disability) (=1)	0.0	3.1	0.5
Living with a Partner/Spouse (=1)	83.5	78.4	74.2
Partner/Spouse Works Full-time (=1)	11.0	11.7	14.4
Partner/Spouse Works Part-time (=1)	1.9	0.0	2.9
Having One Child under 15 (=1)	16.7	20.7	16.6
Having Two Children under 15 (=1)	9.4	16.3	15.6
Having Three and More Children under 15 (=1)	4.4	2.1	6.0

Variable	Mean	SD	Min	Max	N
Age (S. with Employees)	48.3	9.2	26	65	121
Age (S. without Employees)	47.0	11.1	23	65	129
Age (Employees)	42.9	10.3	22	65	954
Working Hours per Week (S. with Employees)	45.7	11.7	8	80	117
Working Hours per Week (S. without Employees)	40.2	16.5	2	75	118
Working Hours per Week (Employees)	40.5	10.9	2	84	942
Years of Experience (S. with Employees)	13.8	9.1	1	38	120
Years of Experience (S. without Employees)	10.2	9.5	1	43	125
Years of Experience (Employees)	10.5	9.6	1	43	953
Number of People in Household (S. with Employees)	2.9	1.4	1	6	123
Number of People in Household (S. without Employees)	2.7	1.3	1	6	131
Number of People in Household (Employees)	2.8	1.4	1	6	958

Note: Self-employed and Employed only. Post-stratification weights applied.