# Entrepreneurial Choice across Occupations

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## Abstract

The propensity of a person to become an entrepreneur is strongly influenced by that person's previous occupation. We argue that entrepreneurial choice can be regarded a two stage process. Accordingly, people first are attracted by different occupational environments and in a second step, when they are in that profession, decide to start an own business or not. Based on data of the German Socio-Economic Panel (SOEP), we find considerable confirmation for such a view.

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## 1. The role of occupation for entrepreneurship

Economic theories of entrepreneurship often analyze entrepreneurship in the framework of an occupational choice model, which allows two states: becoming an entrepreneur versus remaining in dependent employment. In this setting the definition of occupation is arbitrary and in fact only reflects the employment status of an individual, rather than his or her actual occupation. One obvious shortcoming of this approach is that reasons to become self-employed or to remain in dependent employment are assumed to be the same across occupations. This paper extents existing literature by allowing the determinants of entrepreneurial choice to vary across occupations and arguing that the choice of an occupation predetermines an entrepreneurial choice.

The first issue is to define what we mean by occupation. Scholars refer to an occupation as a group of similar jobs that share a certain set of unique characteristics in terms of requirements and rewards that distinguish them from other occupations (Singh, 2006). These unique requirements are, for instance, task similarity of jobs within an occupation, similar structure of rewards or job security. An important property of those characteristics is that they are hardly transferrable between different occupations. In this case, occupation can be regarded as an environment, which entails more homogenous groups of individuals, since it represents individual's certain skills which only hardly can be transferred across occupations. It is, therefore, extremely important to distinguish between the terms *job* and *occupation* which are often used interdependently. Job change is a quite common career trajectory which is often regarded in terms of occupational exploration. By changing jobs within one occupation individuals learn more about their opportunities. (Singh, 2006). Occupational change is a rather rare event, because it requires, as a rule, additional costs of requalification and leads to sunk costs because occupation-specific human capital cannot be used in the new occupation. It has been found that younger people and males are more likely to change their occupation, though this event remains rather rare.

Previous entrepreneurship literature has argued the human capital is important for entrepreneurship. The empirical results suggest a robust relationship between human capital variables and entrepreneurial survival; results for entrepreneurial entry

are, however, mixed. The theory assumes that higher levels of human capital, usually measured as levels of formal education or years of work experience, enable individuals to recognize or create entrepreneurial opportunities providing them with necessary knowledge and skills. In the Lucas' (1978) model, a higher level of formal education determines an individual's managerial ability and hence increases the probability to become self-employed. On the other hand, highly educated individuals have more opportunities in the wage-salary sector and, thus, they are less likely to become entrepreneurs (Le, 1999). It is unclear how one can calculate the net effect of these offsetting influences on the relationship between education and entrepreneurial choice, and this seems to be reflected in the ambiguous empirical evidence. Studies by Evans and Leighton (1989), van Praag and van Ophem (1995), Rotefoss and Kolvereid (2005) and other failed to indentify a statistically significant effect of formal education on entrepreneurship entry. Other studies report positive effects (Borjas, 1986; Borjas and Bronars, 1989) or negative effects (Evans, 1989). More recent studies that include a squared term of human capital variables in the empirical models suggest a curvilinear impact of education: individuals with low and high levels of education are less likely to become entrepreneurs (e.g., Kim et al., 2006). Poschke (2008) finds empirical evidence for the U-shaped relationship between the propensity to start an own firm and education, i.e., whereas people with low and high levels of education are more likely to become entrepreneurs than individuals with intermediate levels of education. Further, Davidsson and Honig (2003) could not support the hypothesis that human capital in terms of formal education and work experience is positively associated with establishing a viable firm, albeit they found significant effect of the human capital variables on the probability to be a nascent entrepreneur.[1] The meta-analytical study by Van der Sluis et al. (2008) concludes that the effect of schooling on selection into entrepreneurship is insignificant.

The ambiguity of the results for the relationship between entrepreneurial entry and general human capital, as measured by formal education or overall work experience, prepared the ground for the discussion about a particular importance of

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[1] Their results refer to nascent entrepreneurs who already initiated a number of gestation activities, for example, money was invested or any sales occured.

specific human capital for entrepreneurship. According to Shane (2003), individuals are more likely to discover potential entrepreneurial opportunities if they start a new venture within the industry where they have gained their previous work experience. This issue was particularly discussed earlier in Bates (1995), who put the emphasis on the role of human capital for entrepreneurial entry, allowing the entry process to vary across industry groups. Bates showed differences between entrepreneurial paths across industries. For instance, he found that higher levels of education are associated with entrepreneurial entry in skilled services, whereas highly educated individuals were less likely to enter self-employment in construction.

Sullivan (2010) studied both occupation and industry-specific human capital. In particular, he points out that "there is no reason to believe that the technology of skill production is the same across all occupations" and concludes that the "specificity of skills accumulated on a job varies widely across one-digit occupations" (ibid., p.568). Occupational experiences in their relationship to entrepreneurship remained almost unexplored. Some studies investigated how previous managerial experience affects entrepreneurial entry (see, for instance, Kim et al., 2006; Boden and Nucci, 2000). It has been found that managerial experience is positively associated with attempted entrepreneurship. However, too long spans of managerial experience (more than 19 years) tend to be negatively associated with entrepreneurial entry.

Evans (1989) noticed in his study: "[…] Occupational status reflects the content and skill demands of jobs, and people often train for and work in occupations as employees for some years before establishing their own businesses […]". In his empirical model he controls for an occupational status, measured as socioeconomic status of respondent's occupation, and finds robust positive effects of occupational status on entrepreneurship. Moreover, Le (1999) points out that studies that do not control for occupational status suffer from the omitted variable bias, since occupational status is positively correlated with both, educational attainment and entrepreneurship entry. To our best knowledge only few studies included occupational status variables in the empirical models, among them Brock and Evans (1989) found that compared to those employed as machine operators, individuals working in sales are more likely to be self-employed. This might be due to the fact that it is relatively easy to start a new business venture in sales or repairs. Evans and

Leighton (1989) found that individuals employed in agriculture or professional occupations have a relatively high propensity to be self-employed. However, there are no comparable studies that investigated occupational experience of individuals before they became self-employed. Indeed, there are a number of reasons to believe why entrepreneurship is not evenly distributed among occupation-specific experiences.

Firstly, occupations tend to be relatively homogenous with regard to educational level because each occupation requires a certain minimal level of education, and it is almost impossible to be hired for a certain position if one does not fulfill these special requirements. It is, for example, obvious that a necessary requirement for starting up a high-tech business is having a high level of knowledge that is based on respective education. In some occupations this hurdle may, however, be relatively low: founders of businesses in housekeeping or retailing are not expected to have a high degree of education. Furthermore, recent findings suggest a nonlinear relationship between entrepreneurial entry and education (Poschke, 2008; Kim et al., 2006). The results of the above mentioned studies are controverse: Poschke (2008) found a U-shaped relationship, whereas the study by Kim et al. (2006) reveals a reversed U-shape of this relationship, assuming the highest probability to become an entrepreneur for individuals with intermediate levels of education. Distinguishing between classes of occupations (Table 1) we find that occupations that share the same required minimum level of education have different shares of start-ups (Figure 1).[2] Interestingly, different groups of professionals that generally require a university degree such as physical, mathematical and engineering professionals, life science and health professionals and teaching professionals are not equally entrepreneurial (Table 2). The highest start-up rates are observed among managers (3.11 percent) and life science and health professionals (3.04 percent). Start-up rates are relatively low for people in teaching professions, plant and machine operators, clerks, teaching professionals and for technicians.

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[2] We investigate previous occupational experience of entrepreneurs, since, as expected, most self-employed individuals report their current occupation as "manager".

Table T1: Description of occupations

| | Three-digit ISCO88 codes | Example three-digit occupations |
|---|---|---|
| managers | 111-131 | directors and chief executives |
| physical, mathematical and engineering professionals | 211-214 | physicists, mathematicians, engineers |
| life science and health professionals | 221-223 | medical doctors, biologists |
| teaching professionals | 231-235 | college, university and higher education teaching professionals |
| other professionals | 241-246 | writers and creative or performing artists |
| technicians and associate professionals | 311-348 | computer associate professionals |
| clerks | 411-422 | secretaries, cashiers |
| service workers | 511-516 | housekeeping and restaurant service workers |
| sales workers | 521-523 | shop salespersons and demonstrators |
| craft and trades worker | 711-744 | building trades workers, machinery mechanics, handicraft workers |
| plant and machine operators | 811-834 | drivers, mining-processing-plant operators |
| elementary occupations | 911-998 | street vendors, cleaners, manufacturing labourers |

[INSERT FIGURE 1 AND TABLE 2 HERE !]

Secondly, the practice of certain professions may be regulated by law. The German law determines limitations on the admission of individuals for the purpose of pursuing self-employment activities in a number of occupations. For instance, German craftsmen are only allowed to pursue self-employment activities, if they have the Master Craftsman's diploma which requires additional training courses and examination. This regulation applied to all crafts workers in Germany who were willing to become self-employed until 2004. After then it was repealed for 53 of 94 craft professions. Certain prescriptions are legally predetermined for self-employed architects, engineers, medical doctors, lawyers, accountants and some other professions. These requirements may influence the start-up rates out of different professions to a certain degree. However, the start-up rates out of such profession might still be very high, because self-employment in them is a traditional form of employment (like crafts or artists) or is the result of pronounced role models (medical doctors).

Thirdly, occupations are different with regard to the job security they provide. Higher risk of unemployment combined with the limited set of opportunities in the

paid employment on the occupation specific labour market may result in higher entrepreneurship rates out of such occupations.

**Hypothesis 1.1:** The probability of becoming an entrepreneur differs across occupations in which individuals have been previously employed.

**Hypothesis 1.2:** For those individuals who share the same level of education, the probability of becoming an entrepreneur differs across occupations in which individuals have been previously employed.

## 2. The theory of vocational behavior: implications for entrepreneurship research

Occupational (vocational) choice has been particularly studied by scholars in the field of vocational behavior. Most contemporary psychologically oriented theories of occupational choice share a common assumption that people prefer and choose occupations that match their skills, abilities, needs, values, and talents. One of the dominating theoretical positions is the one by Holland (1985), who argued that "vocational choice is […] the result of a person's type" (Holland, 1985, 533). He suggested six major types of occupational environments: intellectual, artistic, social, enterprising, conventional, and realistic. In this theory, an individual's personality characteristics have a significant effect on vocational choice. Indeed, one of the most consistent findings in studies on vocational choice suggests that the personality characteristics of an individual have a considerable effect on the occupation chosen (Holland, 1985; Schneider, 1987; Costa and McCrae, 1992; Filer, 1986; Borghans et al., 2008; Krueger and Schkade, 2008; Cobb-Clark and Tan, 2010). Based on the Holland's theoretical fundament Schneider (1987) proposed the Attraction-Selection-Attrition (ASA) framework in which individuals with certain personality characteristics are attracted by certain occupational environments and leave them after they realized they do not fit into them. Hence, those individuals who remain will constitute a more homogenous group than those who initially chose the particular occupational environment. This selection process results in considerable homogeneity of individuals within a certain occupation with regard to their personality characteristics (Schneider, 1987).

Empirical evidence has indeed shown that individuals who share the same occupations tend to be rather similar with regards to certain personality traits (Barrick et al., 2003; Tokar, 1998; Moutafi et al., 2007; Winkelmann and Winkelmann, 2008; Nieken and Störmer, 2010). For instance, the study by Barrick et al (2003) showed that social workers score higher on the trait "agreeableness" and persons employed in artistic and explorative occupations have higher levels of "openness to experience". Nieken and Störmer (2010) provide empirical evidence that managers and service workers are more extravert than persons occupied in professions that primarily require manual skills, whereas the latter score higher on the trait "conscientiousness". These findings remain statistically significant after controlling for socio-demographic characteristics, such as formal education, work experience, age, marital status and income that are also important for the decision to become self-employed. It remains, however, unclear whether the homogeneity of occupational groups with regard to personality characteristics is the result of the selection process of certain individuals into occupational environments, as the person-environment fit theory proposes (Holland, 1985), or if the occupational environment rather shapes individual's personalities to some degree. Rosen (1986) argues that the employers play a considerable role in the selection of employees into different occupations by trying to choose those candidates whose personalities fit the best to the open position. Also the characteristics of the tasks that have to be performed in a certain occupation may considerably shape a person's personality (Satterwhite et al, 2009; Cable and Parsons, 2001). For instance, pronounced extraversion of managers or sales persons can be regarded as the result of the specificity of their occupation which requires them to be communicative.

Recently, entrepreneurship scholars paid a lot of attention to personality structure of self-employed individuals and found that they score high on such dimensions of personality as openness to experience, extraversion and conscientiousness and they score low on dimensions agreeableness and neuroticism (Rauch and Frese, 2007; Zhao and Seibert, 2006; Schmitt-Rodermund 2004, 2007). Though the findings for the significant relationship of personality and self-employment status are robust, the question about the direction of causality of this relationship remains open. Fritsch and Rusakova (2010) analyzed this relationship for individuals who just have started their new business ventures and found that self-

employment experience is not sufficient in order to shape an entrepreneurial personality. However, it may be the case that certain occupational attainment and work experiences shape an entrepreneurial personality. Further, a two-stage occupational choice might take place where entrepreneurial individuals are attracted to certain occupational environments in the first stage and then decide to become self-employed in the second stage. If persons of a certain occupation tend to have pronounced entrepreneurial personalities, than the probability of becoming self-employed out of this occupation should be also relatively high. Given that occupational environments are rather homogenous with regard to personality characteristics of individuals populating them, the second stage of the two-stage entrepreneurial choice, namely becoming an entrepreneur, would be mainly the result of characteristics of occupational environments, rather than of a personality structure.

## 3. Characteristics of occupational environments

Entrepreneurial activities have been regarded in the literature mainly as the result of environmental influences, 'push' or 'pull' factors (Messenger and Stettner, 2000). The 'push' factors are associated with fewer opportunities on the labor market caused by higher unemployment rates or jobs insecurity. Dissatisfaction with the current job may be regarded as a 'push' factor into entrepreneurship, as well. Self-employment entry due to one of the 'push' factors has been addressed in the literature as necessity entrepreneurship. 'Pull' factors are related to recognition of an opportunity which may be more promising for an individual as dependent employment.

In the following sections, we will concentrate on the 'push' factors that possibly lead to a relatively high propensity to set up an own firm. In particular, we investigate in how far an occupational environment which is associated with a relatively high risk of unemployment leads to a correspondingly high start-up rate.

## 4.1 Occupation-specific unemployment rates and entrepreneurship

Literature provides ambiguous results about the relationship between unemployment and self employment. Some studies found that higher unemployment rates are associated with higher rates of entrepreneurship, which may be labeled the "refugee" effect (Reynolds, Miller and Maki, 1995; Reynolds, Storey and Westhead, 1994;

Hamilton, 1989; Highfield and Smiley, 1987, and Yamawaki, 1990; Evans and Leighton, 1989 and 1990). Other authors conclude that this relationship is of a negative character (e.g. Rotefoss and Kolvereid, 2005; Fritsch and Falck, 2007; Reynolds, 1992 and 1993; Audretsch, 1993). A possible explanation for the negative relationship between unemployment rates and the propensity to start a business could be that the propensity to start a business is lower for unemployed than for employed workers. Hence, a shift from employment to unemployment may result in an overall decline of entry rates (Fritsch and Falck, 2007).

The majority of studies that investigated the overall effects of unemployment on entrepreneurial activity neglect the fact that some occupations are more susceptible to unemployment than others. Unemployment rates do, indeed, vary greatly across occupations with relatively high unemployment rates in low skill jobs (see Candelon et al., 2008). Since not all individuals are affected by unemployment to the same degree, the effect of unemployment on entrepreneurial activities may be the most pronounced for those individuals whose occupation-specific unemployment rate tends to be relatively high.

There are, indeed, large differences of unemployment rates between different occupational groups in Germany (see Table 3)[3]. In line with the study by Candelon (2008), we observe the highest occupation-specific unemployment rates in elementary occupations. The lowest rate of 2.3 percent can be found for life science and health professionals. Generally, occupations that require relatively low skills seem to suffer from higher rates of unemployment than occupations which require relatively high levels of education.

[INSERT FIGURE 2 AND TABLE 3 HERE !]

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[3] We approximate occupation-specific unemployment rates by calculating a ratio of registered unemployed individuals with the same first occupation and the labor force in this occupation. We use information on individual's first occupation in order to approximate unemployment rates, because information on previous occupation of unemployed is not available for all SOEP respondents. Since change of occupation is a relatively rare event (see section 1), this approach might be justified. The correlation coefficient between first and last occupations of dependently employed in the panel is 0.4943 and statistically significant at a 1% level.

Plotting occupation-specific start-up rates and unemployment rates (Figure 2) gives us a picture that suggests a negative relationship between these two indicators. This picture assumes a slightly curvilinear relationship with elementary occupations representing a positive association between unemployment and entrepreneurship. Overall, different occupations are associated with different unemployment rates, and higher unemployment rates, in turn, are associated with both higher and lower entrepreneurship rates.

## 4.2    Occupation-specific insecurity of jobs and entrepreneurship

Occupation specific job security can be thought of as a spectrum of employment opportunities that are growing or remain stable within an occupation for the foreseeable period of time.[4] If employment opportunities in an occupation tend to decline, one can think of occupation specific job insecurity (Probst, 2006). If it is difficult for someone to find a permanent job in his or her occupation, entrepreneurial entry may become an attractive option for people with insecure jobs. OECD (1998) reports that the "flexibility [of labor markets] helps to foster entrepreneurship by allowing the development of more flexible and innovative working arrangements" (OECD, Fostering Entrepreneurship, 1998, 19), and that a higher employment protection legislation (EPL) may be a significant factor discouraging entrepreneurship. Kahn (2007) studied the impact of EPL on temporary employment patterns, and he provides empirical evidence that in countries with strict EPL relatively low-skilled workers are more likely to hold temporary jobs. The occupational specificity of temporary contracts has also been found in a study by Segal and Sullivan (1997), who report for the USA a growth of the fraction of workers with temporary contracts in blue-collar occupations from 18 percent in 1983 to 36 percent in 1993.

Table 4 shows the percentage of temporary job contracts in various occupations. Those occupations which require low skilled workers seem, indeed, to provide less protection in terms of unlimited contracts. Occupation-specific levels of job security may lead to different levels of entrepreneurial activities across occupations.

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[4] The job outlook of the Bureau of Labor Statistics in the U.S. provides, for instance, biennial estimates of job security for hundreds of occupations.

[INSERT TABLE 4 HERE !]

In sum, previous sections provide argumentation that supposes that individuals with certain personalities, interests and attitudes are attracted through different selection mechanisms to occupations which are characterized by a number of factors like minimal required level of education, skills structure, job security and others. These occupation-specific characteristics influence, in turn an individual's decision to become an entrepreneur. Thus, we state the following hypothesis:

**Hypothesis 2:** The decision to become an entrepreneur depends on characteristics of occupational environment where individuals have been previously employed, rather than on personality.

## 5 Data

Our empirical analysis is based on the German Socio-Economic Panel (SOEP), a national representative longitudinal study of private households in Germany comprising information on some 21,000 individuals per annum (for details, see Haisken De-New and Frick, 2005, and Wagner et al., 2007). The data set includes detailed information on socio-demographic situation of the German population, education, labor market and occupational dynamics, income, as well as psychological personality traits. For the present analysis, we use the waves 2004 until 2009 because during this period information on personality characteristics was collected for the first time.

We restrict the analyses to individuals between 18 and 64 years old and exclude persons who were retired or engaged in full-time education. We also do not use information about civil servants or respondents in military service since we consider the choice of profession for these groups to be rather different from that of employees in the private sector. Farmers are excluded for the same reason.[5] Next, all persons who stated that their primary activity is helping in a family business are

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[5] Most farms in Germany are family businesses, with their owners being more or less self-employed due to their profession. Thus, the self-employment of farmers may be a result of a family tradition or a tradition in the particular region in which they live.

also omitted because of their mixed status, that is, they are neither "full" entrepreneurs nor "pure" dependent employees.

Self-employment status is reported by respondents in SOEP. The longitudinal structure of the data allows us to identify switches between paid-employment and self-employment which we use as a proxy for new venture creation. This empirical measure is widely used in the economics literature on entrepreneurship (Parker, 2009). After all restrictions, our sample comprises information for 405 persons who had started an own business in the previous year. Each year, approximately 1.6 percent of our sample became self-employed.

One- and two-digit ISCO-88 codes are used to characterize employed individuals according to their current occupation.[6] Table 1 provides information on three-digit occupations that were combined into 12 major occupational groups. We primarily use one-digit codes, and, if there are enough cases, two-digit codes are used. For instance, we were able to distinguish between different professional occupations like engineering professionals, life science and health professionals, teaching professionals and other professionals. Further, we distinguish between service and sales workers. One-digit NACE codes are employed in order to control for previous industry experiences of entrepreneurs.

A panel of questions related to personality traits and attitudes have been included in SOEP for the first time in 2005, and in 2009 those questions were asked for the second time. The questions we employ in the present study refer to a psychological scale, which measures the big five factors asking three questions to each broad dimension. The scale was implemented in SOEP questionnaires on the basis of the research conducted by Costa and McCrae (1992). The detailed description of the procedure used in the survey of SOEP can be found in Gerlitz and Jürgen (2005). In particular, the SOEP respondents were asked to grade themselves on a 7-point scale with the value 1 indicating that a given personality characteristic does not apply at all and the value 7 meaning that the respective characteristic applies perfectly. For each of the five dimensions we construct mean scores of the answers for each corresponding dimension.

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[6] ISCO-88 is an international system for classifying jobs into occupations on the basis of the similarity of skills required to fulfill the tasks and duties of the jobs.

We, then, construct a measure of entrepreneurial personality, using all big five dimensions. The procedure is as in the study by Obschonka et al. (2010). We first construct an entrepreneurial reference type with the highest possible scores (which is 7 for each scale) on openness to experience, extraversion and conscientiousness, and with the lowest possible scores (zero for each scale) on dimensions neuroticism and agreeableness (Schmitt-Rodermund, 2004; 2007). In the next step we define squared deviations for each of the big five dimensions and sum them. Finally, we calculate for each individual his personal entrepreneurial personality fit, which is a deviation from the reference type. The closer the entrepreneurial personality fit is to zero, the less deviation of a particular person from the reference type. As reported in the Table 4, entrepreneurs in our sample do, indeed, deviate less from the entrepreneurial reference type than their dependently employed counterparts.

Further explanatory variables are experienced years of unemployment and level of job insecurity. Unemployment experience is measured in years of unemployment that individuals experienced during their entire careers. Occupation-specific job insecurity is more commonly conceptualized and measured as a subjective perception of an employee's chances to remain or to find a new job within his or her occupation. We use the SOEP question about the self-perceived level of uncertainty related to the security of job places, which sounds: "How likely is it that the following career changes will take place in your life within the next two years: […] lose your job?" The possible answer options suggest an 11-point probability scale with a 10-point step, whereas "0" means "definitely not" and "100" means "definitely".

We have two sets of control variables. The first set includes standard demographic characteristics, such as age, gender and marital status, since they may influence the decision to become an entrepreneur. The second set of control variables includes human capital variables that may be important for occupational choices, such as formal education, work experience, as well as the level of occupational autonomy in the previous year. It also includes a gross labor income variable, measured in Euros. Formal education is measured in years of education individuals enjoyed in their lives. Work experience is measured in years of full-time and part-time experience. Level of occupational autonomy is a 6-point scale with the value "0" meaning "apprenticeship" and the value"5" meaning "high level of

autonomy". Correlation table, as well as mean values and standard deviations for all variables can be found in Tables A1 and A2 in Appendix.

## 6   Results

The descriptive evidence suggests that different occupations assume very different intensiveness of transitions into self-employment. As Table 2 suggests, the highest shares of entrepreneurs come from such occupations as technicians and associated professionals (20 percent), followed by managers (17.5 percent) and the group "other professionals" (10.1 percent). This distribution of entrepreneurs is different from the distribution of dependently employed individuals (column 1 of the Table 2). The highest shares of dependently employed have been previously employed as technicians and associate professionals (24.3 percent), craft and trades workers (13.7 percent) and clerks (12.6 percent). Further, we report the results of a t-test of equal means for probability of being a new business founder and coming from a certain occupation (column 3 of the Table 2) which suggest very different distributions of entrepreneurs and paid-employed by previous occupations. In terms of average probabilities, entrepreneurs are three times more likely to have been previously employed as managers, life science and health professionals. They are significantly more likely to come from the group "other professionals" or "sales workers". In the last case, however, the t-test provided significant results at a 5 percent level. On the other hand, entrepreneurs are significantly less likely to come from such occupations as technicians and associate professionals, clerks, craft and trades workers, as well as plant and machine operators. We did not find significant results for distribution differences in the groups physical, mathematical and engineering professionals, teaching professionals, service workers, as well as elementary occupations.

Further, descriptive statistics for variables of interest (Table 4) suggest that entrepreneurs have enjoyed longer years of formal education. They gained significantly less work experience, but they experienced longer spans of unemployment during their careers. New business founders had relatively low levels of self-perceived job security in their previous occupations, as compared to those individuals who decided to remain in paid employment. In their previous paid employment entrepreneurs earned significantly more than those individuals who

decided to remain in dependent employment. The average age of entrepreneurs is 41.2 years; about 52 percent of entrepreneurs are males; more than 57 percent of them are married.

Concerning the personality traits, as manifested in the Big Five dimensions of personality, we find that founders score significantly higher on the dimensions "extraversion", "agreeableness", and "openness to experience". Overall, the entrepreneurial personality fit is significantly higher (closer to zero) for founders than for dependently employed individuals.

[INSERT TABLE 4 HERE !]

In order to get a first idea whether the distribution of entrepreneurial personality fit is the same or not in different occupations, we apply the oneway ANOVA model. This method provides a statistical test of whether or not the means of several groups (occupations in our case) are all equal. The results of this test are provided in Table 5. The occupation average entrepreneurial personality fit differs substantially from -67.5 points for elementary occupations to -55.9 points for managers. The test suggests that the entrepreneurial personality fit is differently distributed across occupations, and that some occupations are more entrepreneurial than others.[7]

[INSERT TABLE 5 HERE !]

*Testing hypotheses H1*

In order to test our first set of hypotheses we estimate random effects probit models (Table 6) where the dependent variable equals one if transition from paid employment to self-employment took place in the current wave, and equals zero if an individual decided to remain in paid employment instead. The random effects estimator allows to control for a number of time invariant demographic characteristics

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[7] The results are similar when applying a non-parametric test, e.g. the Kruskal-Wallis one-way analysis of variance.

that have been found to have a significant effect on the start-up decision in other studies (see, e.g. Fritsch and Rusakova, 2010, and Parker, 2009, for an overview). The fixed effects estimator would drop time invariant covariates. Another problem with the fixed effects estimator arises when individuals do not change their status in the panel (for instance, the most individuals in our sample decide to remain in paid employment). Then, using the fixed effects estimator would drastically reduce the number of cases, since the non-changing status of those individuals will be perfectly explained by their fixed effects. Using the random effects model in this case is a common empirical strategy (see Parker, 2009).

The first specification of the model (column 1) includes lagged occupational dummies and the first set of control variables. The group of service workers is the omitted group in all models, because this group represents entrepreneurship rate which is the closest to the sample average among all occupational groups (see Figure 1). The results for the first specification suggest that the probability to become an entrepreneur is significantly higher for those individuals who have been previously employed as managers, life science or health professionals, for "other professionals" and for "sales workers". We obtain significant and negative effects for craft and trades workers, as well as plant and machine operators. Variation in the size of the effects also suggests differences in probability of becoming an entrepreneur out of different professions.

The second model specification (column 2) includes both sets of control variables. According to the recent literature, we account for possible non-linear relationship between formal education and entrepreneurship, and work experience and entrepreneurship. Occupational autonomy allows individuals independent decision making and assumes a certain level of responsibility. Higher levels of autonomy may reflect a managerial ability of individuals. Thus, we control for the level of occupational autonomy in previous year. Additionally, we control for gross labor income, measured in Euros. The results suggest an inverse U-shape for the relationship between formal education and entrepreneurial entry; this corresponds with the results found by Kim et al. (2006). The relationship between work experience and entrepreneurship seems also to be curvilinear where more years of work experience and few years of work experience are positively associated with the

probability to become an entrepreneur. The effect of financial capital is slightly negative and close to zero, though it is significant at a 10 percent level. Concerning the results for occupational dummies, the effects remain generally unchanged. We still observe statistically significant effects for managers, life science and health professionals, sales workers, and plant and machine operators. However, significant effects for "other professionals" and "craft and trades workers" disappeared after having controlled for education, work experience, occupational autonomy and financial capital.

Previous literature suggests that there may be considerable differences in entrepreneurial paths across industries. In order to capture this industry-effect we include dummies for one-digit NACE codes in the model. The model specification III (Table 6) reflect the results for explanatory variables after having controlled for industry structure. We observe that a positive significant effect of having been employed as a sales worker in the previous year disappears after including industry dummies into the model. This result may reflect that sales workers who decide to become self-employed also remain in the trade sector. Further, the significant negative effect of a lagged occupational dummy for plant and machine operators also disappears in this model specification.

*Testing hypothesis H2*

The test of the hypothesis H2 is presented in Table 7 and Table 8. Particularly, we estimate a pooled probit model with robust standard errors. This analysis is performed for years 2005 and 2009, since data on personality traits were available for these particular waves. In the basic model specification (column 1 of Table 7) entrepreneurship is explained by the Big Five dimensions of personality and both sets of control variables. In line with empirical literature, we find a positive and significant association between higher levels of openness to experience and entrepreneurship, and higher levels of conscientiousness and entrepreneurship. However, the trait "extraversion" has not proved to be significant in the model. In the model II (column 2 of Table 7) we replace the Big Five dimensions by an entrepreneurial fit measure, which also have a significant and positive coefficient, though its size is small. The positive effect of personality variables on entrepreneurship remains almost unchanged when we include lagged occupational

dummies in the model III (column 3 of Table 7). Models IV and V (columns 4 and 5 of Table 7) include explanatory variables "experienced unemployment" and "job insecurity". More years of experienced unemployment are significantly and positive associated with the probability of becoming a business founder. We do not find a statistically significant effect of the self-perceived level of job insecurity. However, a positive and significant effect of personality trait "conscientiousness" disappears, as well as the effect of entrepreneurial personality fit. This might reflect our proposition about differences in personality structure across occupations. In the further step we run probit regressions as in model IV (column 4 of Table 7) for different occupational groups. Table 8 reflects the results for variables of interest. The both sets of control variables are included in the model and the results for them are suppressed. The results assume that the personality structure still plays role for the decision to become self-employed within different occupations. Moreover, different personality traits are important for entrepreneurship in different occupational groups. Trait "conscientiousness" was important for business founders who have been previously employed as life science and health professionals, service workers and in elementary occupations. Higher levels of extraversion by self-employed individuals previously employed as clerks are associated with the higher probability of self-employment, but with lower probability of self-employment by those employed in elementary occupations. Openness to experience is conducive for self-employment among those persons who have been employed as "other professionals", technicians and associated professionals, craft and trades workers, and in elementary occupations. Neuroticism is positively associated with self-employment among service workers and is negatively associated with self-employment among teaching professionals. Agreeableness is positively associated with entrepreneurship by those persons previously employed as "other professionals" and is negatively associated with the probability to become an entrepreneur in elementary occupations. Experienced years of unemployment are associated with the higher propensity to become self-employed among teaching professionals, other professionals, clerks, and service workers.

Overall, the results suggest that both, personality variables and experienced unemployment are relevant for the decision to become an entrepreneur. However, the effects of these variables differ strikingly across occupations. These differences

are especially pronounced in the personality structure, which varies significantly across occupations.

## 4. Preliminary conclusions and discussion

In the present paper we investigated the role of occupational experience of new business founders. In particular, we argued that entrepreneurial selection is a two-stage occupational choice process. The majority of the self-employed individuals work in paid employment directly before they decide to start a new business venture. Previous occupation-specific experience may influence the decision to become an entrepreneur for some reasons. For instance, each occupation assumes a minimal required level of education and it is almost impossible to be hired for a certain occupation if one does not fulfill training requirements. Previous empirical studies find no significant effect of formal education on the entrepreneurship selection. We show that education does matter for the decision to become an entrepreneur. In particular, education has a strong positive effect on the probability to become self-employed, when controlling for occupation-specific experience. Further, occupations are different in terms of job security they provide. In our analysis we found strong and positive effect of experienced years of unemployment on the probability to become self-employed. However, this effect was not statistically significant for in occupations like managers, physical, mathematical and engineering professionals, life science and health professionals, and others.

In line with the theory of vocational behavior, we found that individuals are attracted to certain occupations according to their personalities. Personality variables had a significant effect on the propensity to become a business founder. Moreover, we found that personality structure of business founders varies significantly across occupations. This corresponds with Schneider (1987), whose attraction-selection-attrition framework for study of occupational selection of individuals assumes that different kinds of people are likely to be effective leaders in different occupational environments.

All in all, our findings suggest the following. Firstly, entrepreneurship activities differ across occupations where business founders have been previously employed. Secondly, education has a strong and positive effect on the decision to become self-employed if one includes occupational dummies in the model. Thirdly, personality

structure is important for entrepreneurship decision, but it varies significantly across occupations assuming different personalities of entrepreneurs in different occupations.

This study has a number of limitations. Firstly, we were able to perform the analysis only for a limited number of occupational groups. Further distinction would reduce the number of cases dramatically. This might result in heterogeneity of occupations with regard to a number of parameters. Previous literature suggests that using of one-digit occupational codes is sufficient for performing the analysis of occupational groups. Sometimes, when possible, we distinguish between two-digit occupational codes. Secondly, we are limited in defining occupation-specific characteristics, like occupation-specific unemployment rates. The Statistical Office does not provide this information for ISCO-codes. One alternative to overcome this shortcoming would be to calculate unemployment rates using a representative sample of German population, such as the German Micro-Census. Furthermore, the personality variables were only available in two waves of the SOEP. This contributed to a reduced number of cases in a part of analysis.

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# Figures and Tables

Table 2: Cross-tabulation of becoming self-employed with previous occupation

| Prev. occupation | Remained depend. Employed | Become self-employed | t-test of equal means for probability of being a new business founder by previous occupation | entrepreneurship rate | Total |
|---|---|---|---|---|---|
| managers | 2,211 (5.31%) | 71 (17.53%) | *** | 3.11% | 2,282 |
| phys., math., engin. professionals | 2,418 (5.8%) | 25 (6.17%) | | 1.02% | 2,443 |
| life science & health professionals | 447 (1.07%) | 14 (3.46%) | *** | 3.04% | 461 |
| teaching professionals | 2,037 (4.89%) | 16 (3.95%) | | 0.78% | 2,053 |
| other professionals | 2,873 (6.9%) | 41 (10.12%) | ** | 1.41% | 2,914 |
| technicians & assoc. Professionals | 10,112 (24.27%) | 81 (20%) | ** | 0.79% | 10,193 |
| clerks | 5,257 (12.62%) | 36 (8.89%) | ** | 0.68% | 5,293 |
| service workers | 2,923 (7.02%) | 27 (6.67%) | | 0.92% | 2,950 |
| sales workers | 1,737 (4.17%) | 24 (5.93%) | * | 1.36% | 1,761 |
| craft & trades worker | 5,706 (13.7%) | 36 (8.89%) | *** | 0.63% | 5,742 |
| plant & machine operators | 3,008 (7.22%) | 12 (2.96%) | *** | 0.40% | 3,020 |
| elementary occupations | 2,932 (7.04%) | 22 (5.43%) | | 0.74% | 2,954 |
| Total | 41,661 (100%) | 405 (100%) | | 0.96% | 42,066 |
| Test | Value | d.f. | | p-value | |
| Pearson Chi2 | 166.997 | 11 | | 0.00 | |

*** p<0.001; ** p<0.01; * p<0.05

Figure 1: Start-up rate by previous occupation.



Figure 1: Start-up rate by previous occupation.

Average entrepreneurship rate = 0.96%
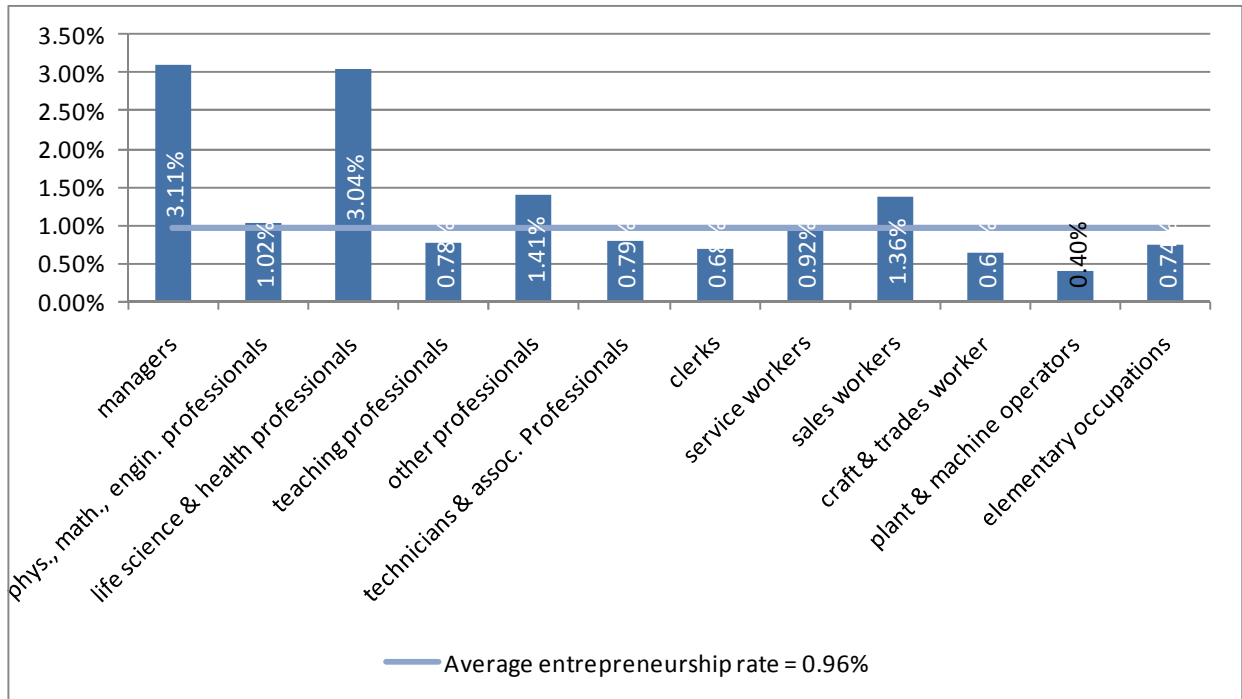
Table 3: Cross-tabulation of occupational unemployment- and start-up rates

| Occupation: | Unemployment rate | Start-up rate |
| --- | --- | --- |
| Managers | 6.53% | 3.11% |
| Physical, mathematical, engineering professionals | 5.65% | 1.02% |
| Life science and health professionals | 2.27% | 3.04% |
| Teaching professionals | 3.23% | 0.78% |
| Other professionals | 2.83% | 1.41% |
| Technicians and associate Professionals | 6.34% | 0.79% |
| Clerks | 7.85% | 0.68% |
| Service workers | 8.19% | 0.92% |
| Sales workers | 10.48% | 1.36% |
| Craft and trades worker | 11.86% | 0.63% |
| plant and machine operators | 17.58% | 0.40% |
| Elementary occupations | 22.59% | 0.74% |

Figure 2: Occupational unemployment- and entrepreneurship rates.
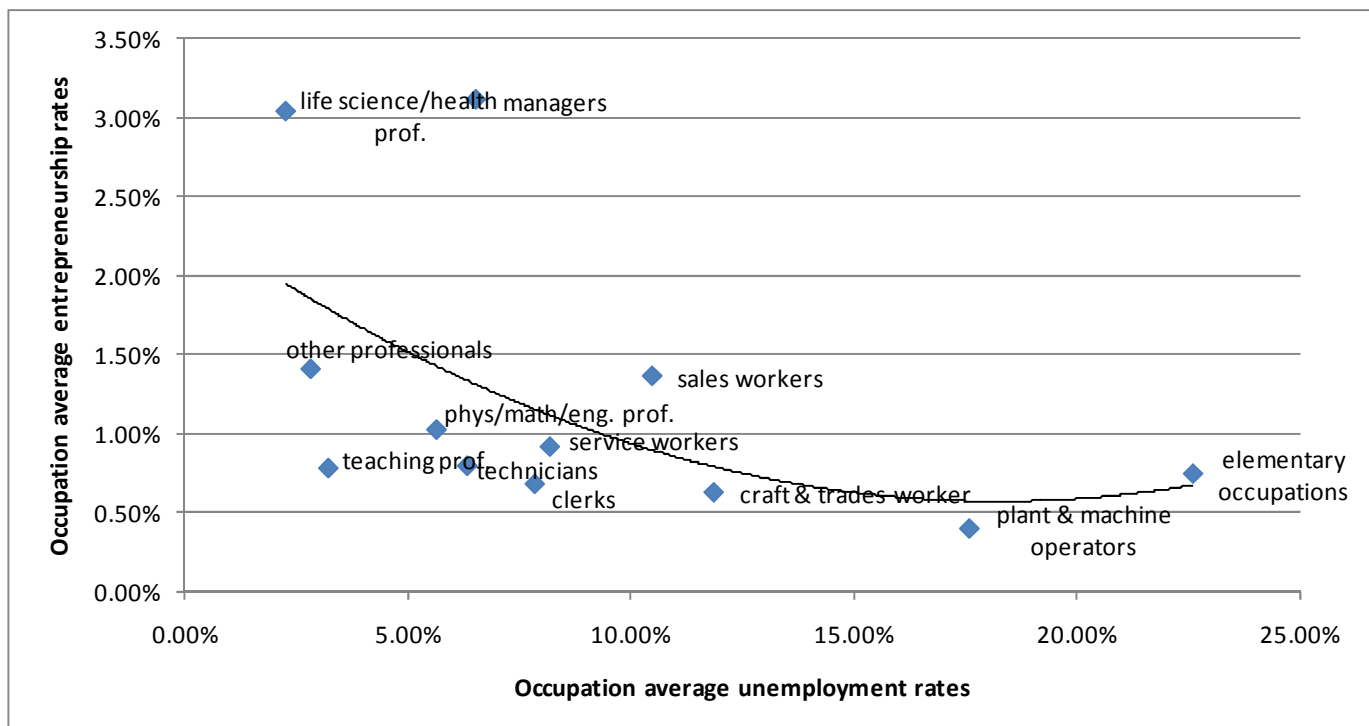
Table 4: Descriptive statistics

| Variable | Enter self-employment | | Remain in paid-employment | |
|---|---|---|---|---|
| | Mean | Standard deviation | Mean | Standard deviation |
| Years of education | 13.389*** | 2.787 | 12.572 | 2.700 |
| Work experience, years | 15.618*** | 0.385 | 18.196 | 0.051 |
| Level of occupational autonomy, lagged | 2.989*** | 0.062 | 2.639 | 0.006 |
| Gross income, lagged | 2,682*** | 141.435 | 2,447 | 8.497 |
| Experienced years of unemployment | 1.096*** | 2.022 | 0.550 | 1.458 |
| Occupational insecurity, lagged | 25.053* | 2.193 | 21.801 | 0.190 |
| Age | 41.204* | 10.954 | 41.476 | 11.486 |
| Dummy: male=1 | 0.519 | 0.500 | 0.512 | 0.500 |
| Dummy: married=1 | 0.571** | 0.495 | 0.597 | 0.490 |
| *Personality traits (Big Five):* | | | | |
| Conscientiousness | 5.976 | 0.871 | 5.930 | 0.881 |
| Extraversion | 5.1*** | 1.051 | 4.853 | 1.136 |
| Agreeableness | 5.44* | 1.050 | 5.352 | 0.970 |
| Openness to experience | 5.032*** | 1.142 | 4.466 | 1.167 |
| Neuroticism | 3.792 | 1.279 | 3.808 | 1.201 |
| Entrepreneurial personality fit | -58.395*** | 16.008 | -61.136 | 16.481 |

t-test of equal means: *** $p<0.001$; ** $p<0.01$; * $p<0.05$

Table 5: Oneway ANOVA for entrepreneurial personality fit in different occupations

|  | Mean | Std. Dev. | Freq. |
|---|---|---|---|
| Managers | -55.958 | 14.829 | 513 |
| Phys., math., engin. professionals | -58.977 | 15.357 | 557 |
| Life science & health professionals | -61.239 | 15.984 | 96 |
| Teaching professionals | -59.094 | 14.439 | 504 |
| Other professionals | -58.795 | 15.162 | 610 |
| Technicians & assoc. Professionals | -61.189 | 15.285 | 2322 |
| Clerks | -63.047 | 17.176 | 1233 |
| Service workers | -63.076 | 17.096 | 695 |
| Sales workers | -64.881 | 16.863 | 451 |
| Craft & trades worker | -60.609 | 16.342 | 1367 |
| Plant & machine operators | -62.619 | 16.197 | 708 |
| Elementary occupations | -67.558 | 18.403 | 693 |
| Total | -61.545 | 16.326 | 9749 |

Bartlett's test for equal variances:  chi2(11) =  81.9966  Prob>chi2 = 0.000

Table 6: Testing H1

| Variable | I | | II | | III | |
|---|---|---|---|---|---|---|
| | Coefficient | Standard error | Coefficient | Standard error | Coefficient | Standard error |
| Managers | 0.664*** | 0.139 | 0.587*** | 0.150 | 0.591*** | 0.155 |
| Phys., math., engin. professionals | 0.025 | 0.155 | -0.151 | 0.166 | -0.105 | 0.172 |
| Life science and health professionals | 0.679*** | 0.211 | 0.500** | 0.225 | 0.618*** | 0.232 |
| Teaching professionals | 0.050 | 0.170 | -0.159 | 0.187 | 0.019 | 0.198 |
| Other professionals | 0.243* | 0.140 | 0.036 | 0.154 | 0.037 | 0.157 |
| Technicians and assoc. professionals | -0.046 | 0.121 | -0.119 | 0.127 | -0.087 | 0.131 |
| Clerks | -0.098 | 0.135 | -0.119 | 0.139 | -0.082 | 0.146 |
| Sales workers | 0.287* | 0.158 | 0.333** | 0.162 | 0.218 | 0.172 |
| Craft and trades worker | -0.288** | 0.141 | -0.200 | 0.145 | -0.104 | 0.157 |
| Plant and machine operators | -0.481*** | 0.181 | -0.366* | 0.187 | -0.277 | 0.198 |
| Elementary occupations | -0.105 | 0.154 | -0.023 | 0.160 | -0.083 | 0.171 |
| Years of education | - | - | 0.509*** | 0.134 | 0.568*** | 0.140 |
| Years of education, squared | - | - | -0.016*** | 0.005 | -0.018*** | 0.005 |
| Work experience | - | - | -0.044** | 0.018 | -0.046** | 0.018 |
| Work experience, squared | - | - | 0.001* | 0.000 | 0.0007* | 0.000 |
| Occupational autonomy, lagged | - | - | 0.024 | 0.034 | 0.015 | 0.035 |
| Gross labor income, lagged | - | - | -0.00003* | 0.000 | -0.00002 | 0.000 |
| Age | 0.049** | 0.020 | 0.089** | 0.035 | 0.103*** | 0.036 |
| Age, squared | -0.001*** | 0.000 | -0.0009** | 0.000 | -0.001*** | 0.000 |
| Male | 0.224*** | 0.065 | 0.270*** | 0.071 | 0.242*** | 0.073 |
| Married | -0.090 | 0.064 | -0.050 | 0.064 | -0.048 | 0.066 |
| Intercept | -3.875*** | 0.478 | -8.304*** | 1.201 | -8.868*** | 1.391 |
| Rho | 0.467 | 0.063 | 0.449 | 0.065 | 0.437 | 0.066 |
| Year dummies | Yes | | Yes | | Yes | |
| Industry dummies | No | | No | | Yes | |
| N | 40001 | | 40785 | | 39876 | |
| No. Individuals | 12576 | | 12126 | | 12006 | |
| Log Likelihood | -2174.598 | | -2077.3762 | | -1953.2021 | |
| Chi2 | 105.44*** | | 119.11*** | | 135.56*** | |

Dependent variable: equals one if an employee becomes self-employed, and equals zero if an individual remains in paid-employment;

Service workers is the omitted group; Estimator: random effects probit; *** p<0.01; ** p<0.05; * p<0.1

Table 7: Testing H2

| VARIABLES | I | II | III | IV | V |
|---|---|---|---|---|---|
| | | | Coefficients and standard errors | | |
| Conscientiousness | 0.0711* | - | 0.0797** | 0.0675 | - |
| | (0.0392) | - | (0.0406) | (0.0460) | - |
| Extraversion | 0.0453 | - | 0.0295 | 0.0120 | - |
| | (0.0284) | - | (0.0300) | (0.0326) | - |
| Agreeableness | -0.0246 | - | -0.0154 | 0.0296 | - |
| | (0.0363) | - | (0.0382) | (0.0411) | - |
| Openness to experience | 0.110*** | - | 0.111*** | 0.106*** | - |
| | (0.0301) | - | (0.0306) | (0.0327) | - |
| Neuroticism | 0.0154 | - | 0.0160 | 0.00667 | - |
| | (0.0267) | - | (0.0280) | (0.0301) | - |
| Entrepreneurial personality fit | - | 0.00465** | - | - | 0.00250 |
| | - | (0.00206) | - | - | (0.00220) |
| Experienced unemployment | - | - | - | 0.0735*** | 0.0728*** |
| | - | - | - | (0.0197) | (0.0198) |
| Job insecurity | - | - | - | 0.000878 | 0.000569 |
| | - | - | - | (0.00155) | (0.00156) |
| Years of education | 0.434*** | 0.452*** | 0.532*** | 0.489*** | 0.507*** |
| | (0.141) | (0.139) | (0.154) | (0.171) | (0.170) |
| Years of education, squared | -0.0146*** | -0.0152*** | -0.0178*** | -0.0162*** | -0.0168*** |
| | (0.00496) | (0.00491) | (0.00543) | (0.00604) | (0.00604) |
| Work experience | -0.0663*** | -0.0676*** | -0.0656*** | -0.0587*** | -0.0609*** |
| | (0.0182) | (0.0179) | (0.0197) | (0.0228) | (0.0227) |
| Work experience, squared | 0.00106** | 0.00108** | 0.00106** | 0.000959* | 0.000987* |
| | (0.000428) | (0.000422) | (0.000469) | (0.000558) | (0.000553) |
| Occupational autonomy, lagged | 0.0432 | 0.0450 | -0.0213 | -0.0106 | -0.0102 |
| | (0.0442) | (0.0442) | (0.0500) | (0.0567) | (0.0564) |
| Gross labor income, lagged | -1.74e-05 | -2.00e-05 | -3.30e-05 | -1.02e-05 | -1.00e-05 |
| | (3.57e-05) | (3.70e-05) | (4.30e-05) | (3.73e-05) | (3.86e-05) |
| Age | 0.0945*** | 0.0948*** | 0.105*** | 0.0847* | 0.0872** |
| | (0.0355) | (0.0348) | (0.0380) | (0.0447) | (0.0443) |
| Age, squared | -0.000914** | -0.000903** | -0.00105** | -0.000890* | -0.000894* |
| | (0.000415) | (0.000407) | (0.000450) | (0.000534) | (0.000528) |
| Male | 0.146** | 0.0839 | 0.183** | 0.201** | 0.150* |
| | (0.0742) | (0.0704) | (0.0840) | (0.0884) | (0.0831) |
| Married | -0.0406 | -0.0487 | -0.0707 | -0.0413 | -0.0556 |
| | (0.0682) | (0.0681) | (0.0703) | (0.0757) | (0.0757) |
| Managers | - | - | 0.585*** | 0.555*** | 0.531*** |
| | - | - | (0.167) | (0.181) | (0.181) |
| Phys., math., engin. professionals | - | - | -0.233 | -0.362 | -0.396* |
| | - | - | (0.205) | (0.228) | (0.229) |
| Life science and health professiona | - | - | 0.456* | 0.481* | 0.462* |
| | - | - | (0.243) | (0.255) | (0.253) |
| Teaching professionals | - | - | -0.0913 | -0.182 | -0.189 |
| | - | - | (0.215) | (0.242) | (0.242) |
| Other professionals | - | - | 0.102 | 0.124 | 0.105 |
| | - | - | (0.169) | (0.183) | (0.183) |
| Technicians and assoc. professiona | - | - | -0.0699 | -0.0339 | -0.0484 |
| | - | - | (0.135) | (0.146) | (0.146) |
| Clerks | - | - | -0.0519 | -0.137 | -0.169 |
| | - | - | (0.147) | (0.167) | (0.166) |
| Sales workers | - | - | 0.0998 | 0.204 | 0.192 |
| | - | - | (0.184) | (0.192) | (0.191) |
| Craft and trades worker | - | - | -0.0931 | -0.0975 | -0.112 |
| | - | - | (0.160) | (0.171) | (0.170) |
| Plant and machine operators | - | - | -0.291 | -0.460* | -0.471* |
| | - | - | (0.212) | (0.266) | (0.266) |
| Elementary occupations | - | - | -0.0279 | -0.0753 | -0.104 |
| | - | - | (0.180) | (0.204) | (0.204) |
| Intercept | -8.167*** | -6.904*** | -8.908*** | -8.371*** | -7.222*** |
| | (1.194) | (1.128) | (1.265) | (1.461) | (1.395) |
| | | | | | |
| Pseudo R2 | 0.0486 | 0.0352 | 0.079 | 0.0915 | 0.0795 |
| Log Likelihood | -887.73382 | -900.2066 | -820.017 | -690.954 | -700.086 |
| Wald Chi2 | 75.85*** | 61.45*** | 155.15*** | 157.19*** | 135.78*** |
| Observations | 16947 | 16947 | 16359 | 14960 | 14960 |

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 8: Testing H2

| VARIABLES | Managers | Phys., math., engin. professionals | Life science and health professionals | Teaching professionals | Other professionals | Technicians and assoc. professionals | Clerks | Service Workers | Sales workers | Craft and trades worker | Elementary occupations |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Coefficients and standard errors | | | | | | |
| Conscientiousness | -0.0293 | -0.0115 | 0.342* | 0.0533 | 0.00713 | 0.0559 | 0.0480 | 0.574** | 0.254 | 0.202 | 0.154** |
| | (0.126) | (0.175) | (0.203) | (0.156) | (0.122) | (0.0829) | (0.1000) | (0.285) | (0.254) | (0.127) | (0.0747) |
| Extraversion | -0.0257 | 0.129 | -0.0759 | -0.126 | 0.0342 | 0.0690 | 0.163* | -0.0813 | 0.238 | 0.0287 | -0.312*** |
| | (0.0665) | (0.129) | (0.113) | (0.174) | (0.111) | (0.0639) | (0.0870) | (0.115) | (0.172) | (0.0699) | (0.0758) |
| Agreeableness | 0.163 | 0.0907 | -0.235 | -0.326 | 0.321** | -0.0792 | -0.0359 | -0.0453 | -0.0326 | -0.123 | -0.311*** |
| | (0.113) | (0.163) | (0.337) | (0.251) | (0.136) | (0.0729) | (0.128) | (0.112) | (0.126) | (0.103) | (0.0922) |
| Openness to experience | 0.0195 | 0.0435 | -0.0754 | 0.250 | 0.208* | 0.162*** | -0.0249 | -0.0529 | 0.0364 | 0.163** | 0.325** |
| | (0.0961) | (0.0940) | (0.211) | (0.174) | (0.113) | (0.0615) | (0.0731) | (0.167) | (0.0993) | (0.0826) | (0.142) |
| Neuroticism | -0.0201 | 0.00578 | 0.103 | -0.535*** | -0.00919 | 0.0658 | -0.0353 | 0.312*** | -0.0971 | 0.138 | -0.261** |
| | (0.0639) | (0.0938) | (0.111) | (0.166) | (0.0923) | (0.0590) | (0.0911) | (0.104) | (0.104) | (0.0888) | (0.115) |
| Experienced unemployment | 0.0838 | -0.136 | -0.298 | 0.892*** | 0.187** | 0.0197 | 0.125*** | 0.158*** | 0.0540 | 0.0452 | -0.0847 |
| | (0.100) | (0.196) | (0.301) | (0.185) | (0.0840) | (0.0553) | (0.0421) | (0.0591) | (0.0858) | (0.0390) | (0.0950) |
| | | | | | Two sets of control variables | | | | | | |
| Observations | 907 | 962 | 184 | 827 | 1138 | 3978 | 2024 | 1135 | 676 | 2218 | 1135 |

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

# Appendix

Table A1: Correlation matrix

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Entrepr. | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 Years of edu. | 0.036 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 Age | -0.024 | 0.081 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 Male | 0.038 | 0.019 | 0.029 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 Married | 0.000 | 0.014 | 0.414 | 0.052 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 Managers | 0.085 | 0.120 | 0.057 | 0.103 | 0.038 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 Phys., math., engin. p | -0.024 | 0.265 | 0.029 | 0.167 | 0.030 | -0.061 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 Life science and healt | 0.023 | 0.178 | 0.004 | 0.016 | 0.016 | -0.025 | -0.027 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 Teaching professiona | -0.004 | 0.384 | 0.131 | -0.067 | 0.027 | -0.056 | -0.060 | -0.024 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 Other professionals | 0.018 | 0.297 | 0.056 | 0.005 | 0.003 | -0.064 | -0.069 | -0.028 | -0.063 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 Technicians and asso | -0.006 | -0.015 | -0.011 | -0.164 | -0.035 | -0.136 | -0.147 | -0.060 | -0.134 | -0.154 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | |
| 12 Clerks | -0.016 | -0.073 | -0.043 | -0.172 | -0.027 | -0.089 | -0.097 | -0.039 | -0.088 | -0.101 | -0.216 | 1.000 | | | | | | | | | | | | | | | | | | | | | | |
| 13 Service workers | -0.016 | -0.131 | -0.099 | -0.139 | -0.056 | -0.065 | -0.070 | -0.028 | -0.064 | -0.073 | -0.157 | -0.103 | 1.000 | | | | | | | | | | | | | | | | | | | | | |
| 14 Sales workers | 0.006 | -0.120 | -0.020 | -0.141 | 0.002 | -0.051 | -0.055 | -0.022 | -0.050 | -0.057 | -0.122 | -0.080 | -0.058 | 1.000 | | | | | | | | | | | | | | | | | | | | |
| 15 Craft and trades work | -0.019 | -0.234 | -0.096 | 0.306 | -0.013 | -0.093 | -0.101 | -0.041 | -0.092 | -0.105 | -0.225 | -0.147 | -0.107 | -0.084 | 1.000 | | | | | | | | | | | | | | | | | | | |
| 16 Plant and machine op | -0.009 | -0.200 | 0.021 | 0.185 | 0.045 | -0.068 | -0.073 | -0.030 | -0.067 | -0.076 | -0.163 | -0.107 | -0.078 | -0.061 | -0.111 | 1.000 | | | | | | | | | | | | | | | | | | |
| 17 Elementary occupatio | 0.001 | -0.199 | 0.048 | -0.052 | 0.026 | -0.062 | -0.067 | -0.027 | -0.061 | -0.070 | -0.149 | -0.098 | -0.071 | -0.055 | -0.102 | -0.074 | 1.000 | | | | | | | | | | | | | | | | | |
| 18 nace1 | 0.008 | -0.019 | 0.024 | 0.027 | 0.019 | -0.002 | -0.005 | 0.026 | -0.018 | 0.001 | -0.011 | -0.012 | -0.021 | -0.016 | 0.001 | 0.038 | 0.038 | 1.000 | | | | | | | | | | | | | | | | |
| 19 nace2 | -0.005 | -0.080 | -0.005 | 0.037 | 0.002 | 0.005 | -0.005 | -0.018 | -0.040 | -0.036 | -0.049 | -0.021 | -0.041 | 0.025 | 0.081 | 0.080 | 0.020 | -0.013 | 1.000 | | | | | | | | | | | | | | | |
| 20 nace3 | -0.014 | -0.106 | -0.007 | 0.192 | 0.033 | 0.001 | 0.064 | -0.027 | -0.094 | -0.068 | -0.062 | -0.031 | -0.103 | -0.084 | 0.183 | 0.165 | -0.002 | -0.030 | -0.069 | 1.000 | | | | | | | | | | | | | | |
| 21 nace4 | -0.005 | -0.033 | -0.017 | 0.131 | 0.024 | 0.002 | 0.121 | -0.032 | -0.073 | -0.048 | -0.034 | -0.050 | -0.079 | -0.064 | 0.195 | 0.010 | -0.011 | -0.023 | -0.053 | -0.125 | 1.000 | | | | | | | | | | | | | |
| 22 nace5 | 0.014 | -0.078 | -0.022 | 0.151 | 0.009 | -0.021 | 0.044 | -0.020 | -0.058 | -0.048 | -0.089 | -0.017 | -0.065 | -0.052 | 0.267 | 0.026 | -0.022 | -0.018 | -0.042 | -0.099 | -0.076 | 1.000 | | | | | | | | | | | | |
| 23 nace6 | 0.029 | -0.171 | -0.097 | -0.112 | -0.054 | 0.068 | -0.080 | -0.018 | -0.093 | -0.102 | -0.051 | 0.020 | 0.060 | 0.470 | -0.084 | -0.062 | 0.004 | -0.031 | -0.070 | -0.166 | -0.128 | -0.101 | 1.000 | | | | | | | | | | | |
| 24 nace7 | 0.011 | 0.007 | -0.004 | 0.056 | -0.004 | 0.034 | -0.043 | -0.035 | -0.076 | -0.025 | -0.050 | 0.286 | -0.074 | -0.063 | -0.099 | 0.116 | -0.035 | -0.025 | -0.057 | -0.135 | -0.104 | -0.082 | -0.138 | 1.000 | | | | | | | | | | |
| 25 nace8 | -0.021 | 0.117 | 0.044 | -0.013 | -0.004 | -0.017 | 0.052 | -0.020 | -0.096 | 0.211 | 0.118 | -0.009 | 0.001 | -0.095 | -0.136 | -0.115 | 0.038 | -0.034 | -0.077 | -0.182 | -0.140 | -0.111 | -0.186 | -0.151 | 1.000 | | | | | | | | | |
| 26 nace9 | -0.019 | 0.233 | 0.075 | -0.276 | 0.001 | -0.067 | -0.102 | 0.133 | 0.430 | 0.008 | 0.137 | -0.142 | 0.178 | -0.110 | -0.181 | -0.135 | -0.040 | -0.039 | -0.088 | -0.207 | -0.160 | -0.126 | -0.212 | -0.172 | -0.232 | 1.000 | | | | | | | | |
| 27 nace10 | 0.025 | -0.010 | -0.001 | -0.032 | 0.000 | 0.012 | -0.014 | -0.025 | -0.037 | 0.063 | -0.026 | 0.006 | 0.044 | -0.044 | -0.048 | 0.016 | 0.060 | -0.018 | -0.042 | -0.099 | -0.076 | -0.060 | -0.101 | -0.082 | -0.110 | -0.126 | 1.000 | | | | | | | |
| 28 nace11 | -0.004 | 0.012 | -0.008 | -0.005 | -0.015 | 0.006 | 0.005 | -0.004 | -0.009 | 0.017 | -0.014 | -0.004 | -0.010 | -0.008 | 0.026 | -0.011 | 0.004 | -0.003 | -0.007 | -0.015 | -0.012 | -0.009 | -0.016 | -0.013 | -0.017 | -0.020 | -0.009 | 1.000 | | | | | | |
| 29 Entrepr. Personality f | 0.034 | 0.102 | -0.024 | 0.149 | -0.024 | 0.081 | 0.045 | 0.004 | 0.032 | 0.040 | 0.002 | -0.035 | -0.030 | -0.046 | 0.027 | -0.023 | -0.091 | -0.014 | -0.007 | 0.028 | 0.014 | 0.044 | -0.048 | 0.012 | 0.017 | -0.034 | 0.001 | -0.016 | 1.000 | | | | | |
| 30 Job insecurity | 0.031 | -0.063 | -0.147 | 0.003 | -0.071 | -0.014 | 0.016 | 0.002 | -0.123 | -0.063 | -0.020 | 0.042 | -0.043 | 0.048 | 0.078 | 0.025 | 0.022 | 0.001 | 0.024 | 0.040 | 0.018 | 0.088 | 0.062 | 0.016 | -0.087 | -0.098 | 0.010 | -0.003 | -0.072 | 1 | | | | |
| 31 Experience of unemp | 0.001 | -0.123 | 0.032 | -0.061 | -0.020 | -0.052 | -0.043 | -0.018 | -0.053 | -0.065 | -0.027 | -0.002 | 0.019 | 0.040 | -0.010 | 0.071 | 0.147 | 0.023 | 0.019 | -0.023 | -0.005 | -0.007 | 0.056 | -0.042 | -0.004 | -0.021 | 0.038 | 0.010 | -0.077 | 0.1123 | 1 | | | |
| 32 Work experience | -0.025 | -0.070 | 0.906 | 0.113 | 0.366 | 0.056 | -0.018 | -0.032 | 0.059 | 0.014 | -0.011 | -0.030 | -0.092 | -0.027 | -0.012 | 0.079 | 0.021 | 0.027 | 0.017 | 0.040 | 0.002 | 0.010 | -0.082 | 0.025 | 0.020 | -0.007 | -0.021 | -0.007 | -0.003 | -0.127 | -0.049 | 1 | | |
| 33 Gross labor income | 0.042 | 0.420 | 0.245 | 0.380 | 0.136 | 0.271 | 0.251 | 0.128 | 0.111 | 0.151 | -0.026 | -0.099 | -0.171 | -0.159 | -0.062 | -0.050 | -0.178 | -0.028 | -0.022 | 0.081 | 0.098 | -0.002 | -0.200 | 0.100 | 0.050 | -0.051 | -0.031 | 0.000 | 0.176 | -0.129 | -0.17 | 0.2373 | 1 | |
| 34 Autonomy | 0.073 | 0.610 | 0.253 | 0.103 | 0.124 | 0.251 | 0.235 | 0.116 | 0.270 | 0.252 | 0.084 | -0.038 | -0.142 | -0.131 | -0.221 | -0.250 | -0.279 | -0.020 | -0.068 | -0.103 | -0.030 | -0.037 | -0.155 | 0.023 | 0.153 | 0.152 | -0.027 | -0.004 | 0.157 | -0.138 | -0.188 | 0.1785 | 0.5691 | 1 |

Table A2: Summary statistics for variables by occupational groups

| | Managers | | Phys., math., engin. professionals | | Life science and health professionals | | Teaching professionals | | Other professionals | | Technicians and assoc. professionals | | Clerks | | Service workers | | Sales workers | | Craft and trades worker | | Plant and machine operators | | Elementary occupations | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Years of education | 14.107 | 2.870 | 15.464 | 2.457 | 17.167 | 1.864 | 17.093 | 1.847 | 15.500 | 2.517 | 12.607 | 2.127 | 12.113 | 1.975 | 11.327 | 1.661 | 11.191 | 1.461 | 11.022 | 1.289 | 10.773 | 1.532 | 10.718 | 1.769 |
| Experienced unemployment | 0.248 | 0.803 | 0.263 | 0.769 | 0.295 | 0.785 | 0.198 | 0.681 | 0.250 | 0.879 | 0.412 | 1.106 | 0.501 | 1.229 | 0.673 | 1.694 | 0.732 | 1.531 | 0.584 | 1.383 | 0.871 | 1.687 | 1.423 | 2.778 |
| Job insecurity | 19.667 | 22.899 | 23.225 | 23.639 | 23.245 | 23.956 | 10.050 | 22.784 | 16.831 | 23.652 | 21.478 | 24.585 | 23.569 | 24.553 | 19.421 | 25.049 | 26.186 | 25.272 | 25.540 | 25.143 | 23.914 | 24.566 | 24.135 | 26.445 |
| Age | 45.242 | 9.666 | 42.906 | 9.898 | 41.863 | 9.848 | 47.576 | 10.833 | 43.950 | 10.703 | 41.433 | 11.153 | 40.740 | 11.480 | 37.920 | 11.977 | 40.190 | 11.642 | 38.988 | 11.596 | 43.071 | 10.634 | 42.942 | 11.587 |
| Male | 0.724 | 0.447 | 0.818 | 0.386 | 0.537 | 0.499 | 0.361 | 0.480 | 0.521 | 0.500 | 0.365 | 0.482 | 0.299 | 0.458 | 0.261 | 0.439 | 0.194 | 0.396 | 0.898 | 0.303 | 0.829 | 0.376 | 0.435 | 0.496 |
| Married | 0.699 | 0.459 | 0.645 | 0.479 | 0.633 | 0.482 | 0.679 | 0.467 | 0.629 | 0.483 | 0.586 | 0.493 | 0.571 | 0.495 | 0.517 | 0.500 | 0.607 | 0.488 | 0.571 | 0.495 | 0.673 | 0.469 | 0.615 | 0.487 |
| Work experience | 21.458 | 10.029 | 17.409 | 10.094 | 14.903 | 9.453 | 20.787 | 10.924 | 18.703 | 10.787 | 17.865 | 11.097 | 17.291 | 11.088 | 14.320 | 10.966 | 16.190 | 10.996 | 17.516 | 11.736 | 21.308 | 10.993 | 17.963 | 11.679 |
| Occupational autonomy | 3.980 | 0.868 | 3.754 | 0.800 | 3.913 | 0.712 | 4.062 | 0.837 | 3.729 | 0.927 | 2.809 | 0.978 | 2.477 | 0.998 | 2.032 | 1.034 | 1.944 | 0.759 | 1.947 | 0.989 | 1.619 | 0.768 | 1.412 | 0.744 |
| Gross net income, € | 4,541 | 2,893 | 4,127 | 2,019 | 4,550 | 2,943 | 3,202 | 1,667 | 3,414 | 2,204 | 2,380 | 1,547 | 1,975 | 1,402 | 1,341 | 942 | 1,171 | 876 | 2,149 | 1,031 | 2,152 | 943 | 1,216 | 1,021 |