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# Explaining entrepreneurial performance of solo self-employed from a motivational perspective

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## Abstract

This paper investigates whether start-up motivation (opportunity versus necessity) influences entrepreneurial performance of an important subset of entrepreneurs, viz. the solo self-employed. We also explore to what extent human capital measures mediate this relation. We use a unique individual-level panel data set of solo self-employed in the Netherlands for three consecutive years (2009-2011) and construct three separate measures to identify necessity-driven solo self-employment. Our main finding confirms that necessity-driven solo self-employed perform worse than opportunity-driven solo self-employed. Furthermore, start-up motivation seems to have an isolated effect on entrepreneurial performance, considering that we also find that formal education and practical learning hardly mediate the relation. Our results imply that it is important to distinguish between different motivations within the population of solo self-employed in order to understand their entrepreneurial performance.

**Keywords:** solo self-employed, necessity, opportunity, entrepreneurship, performance, start-up motivations

**JEL classification:** J24, L25, L26, C33

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## INTRODUCTION

Since the 1980s many European Union member countries have witnessed an increase in the share of self-employed in the labour force (Luber and Leicht, 2000; Arum and Müller, 2004; Van Stel, 2005). This trend is almost entirely explained by an increase in the number of solo self-employed while the share of self-employed with personnel remained relatively stable (Luber and Leicht, 2000, p. 105; OECD, 2000; Rapelli, 2012: pp. 13-15). In the Netherlands, for example, the number of solo self-employed has increased from 2.7 to 4.8 percent of the active labor force between 2001 and 2009 (Van der Ende, Erken and Streefkerk, 2010). In many countries this trend is reinforced by economic policy regimes promoting self-employment, which is often seen as a route out of unemployment (Meager, 1994; Román, Congregado and Millán, 2013). However, it is not merely the increase in self-employment that contributes to economic prosperity. Certain types of self-employed tend to perform better than other types and show higher rates of productivity (Stam and Van Stel, 2011). Hence, the share of productive self-employed, as opposed to unproductive or even destructive self-employed, is of greater (positive) influence on macro-economic performance (Baumol, 1990).

Extant literature highlights the importance of motivation (Bellu and Sherman, 1995; Kolvereid and Bullvag, 1996; Wiklund and Shepherd, 2003), and start-up motivation in particular (Block and Sandner, 2009; Fossen and Büttner, 2012), as one of the key explanations of productivity differences between entrepreneurs. Reynolds, Camp, Bygrave, Autio and Hay (2002) were the first to introduce the concept of opportunity and necessity entrepreneurs based on opposing motives for starting a business. Opportunity entrepreneurs start a new venture to exploit a unique business opportunity, whereas necessity entrepreneurs start a firm because it is the best option available. Basically this distinction comes down to the extent of voluntariness in the decision to become self-employed. It is often assumed that necessity-driven self-employed display less entrepreneurial capabilities and perform worse than their opportunity-driven counter-parts. This assumption is mainly based on macro-level data and outcomes but empirical evidence at the individual level is lacking. Moreover, many different operationalizations of necessity-driven self-employment circulate in the literature. The public and scholarly debate on this subject could benefit from a robust measure of the concept of necessity-driven entrepreneurship.

This paper investigates whether the start-up motivation influences entrepreneurial performance of solo self-employed while controlling for other determinants of performance. We also explore to what extent human capital measures mediate this relation. Our paper contributes to extant literature in several ways. First, we utilize a unique data base on the performance of solo self-employed. Second, we are, to our knowledge, the first study that, both theoretically and empirically, distinguishes between start-up motivations within the population of solo self-employed. Third, our paper contributes to the validation of measures of necessity-driven entrepreneurship by using three different operationalizations. Fourth, we explore to what extent human capital theory can explain differences in entrepreneurial performance of opportunity versus necessity solo self-employed. The rest of the paper is structured as follows. In the next section we provide an overview of the extant literature on solo self-employment and start-up motivations and the way that human capital might play a role. We also derive some hypotheses. The methods section describes the data source, the measures used and the model specifications. In the results section we discuss the estimations results of the econometric analysis and the corresponding marginal effects and also the outcomes of the mediation analyses. The final section presents the conclusions and discusses the implications. Also the limitations are discussed and future research suggestions are provided.

## THEORY AND HYPOTHESES

### **Solo Self-Employment**

Over the last few decades we have witnessed a rise in the rate of self-employment in many European Union Member States (Luber and Leicht, 2000; Arum and Müller, 2004; Van Stel 2005). Most of the existing research treats the self-employed as a more or less homogeneous group of entrepreneurs (Congregado, 2008; Verheul and Van Stel, 2010). However, we also know that there is great diversity within this labour force category (OECD, 1992; Bosch and Van Vuuren, 2010; Bögenhold and Fachinger, 2012). Self-employment covers a wide spectrum of entrepreneurship varying from innovative starters to independent professionals and from dependent workers (Román, Congregado and Millán, 2011) to sole proprietary retailers. Acknowledging this heterogeneity is important because certain types of self-employed tend to perform better than other types and show higher rates of productivity (Stam and Van Stel, 2011).

Baumol (1990) states that the share of productive self-employed, as opposed to unproductive or even destructive self-employed, is of greater (positive) influence on macro-economic performance. The rise of self-employment can to a great extent be explained by the surge of the solo self-employed (Luber and Leicht, 2000; OECD, 2000; Rapelli, 2012: pp. 13-15). Along with this trend questions are raised about the quality of this type of self-employment, as it sometimes involves non-entrepreneurial behavior and lacks job growth (Smeaton, 2003). It can therefore be argued that the distinction between solo self-employed and employer entrepreneurs is relevant to take into account when investigating productivity differences and entrepreneurial performance. In addition, as argued in the introduction, start-up motivation is known to be an important driver of productivity differences between entrepreneurs. To our knowledge no research has been carried out that specifically studies start-up motivations of solo self-employed. Especially when considering performance differences between opportunity and necessity-driven activities we deem the solo self-employed as a highly relevant group. Most of nascent entrepreneurship and business start-ups lead to solo self-employment as opposed to employer firms (Capelleras, Mole, Greene and Storey, 2008). Due to low constraints and stimulating policy measures, it is likely that necessity-driven entrepreneurship can be found especially among the solo self-employed. For instance, unemployed founders may be considered more likely to start a business in craftsmanship or in the services industry, instead of starting capital intensive firms like retail shops or even high-tech spinoffs.

The definition of solo self-employed that is used in this study is one that specifically suits our research topic. Individuals are considered to be solo self-employed if they independently undertake entrepreneurial activities without employing another person. In addition they have to indicate that he or she mainly offers labor (knowledge, skills et cetera) instead of selling goods. By following these criteria the defined group of solo self-employed shows resemblance to regular employees. This definition emphasizes that there may be lower entry barriers for necessity-driven solo self-employment as it may be similar to employee activities. Solo self-employed can be seen as a subgroup of the own account workers, the latter group also containing individuals that mainly sell goods.

### **Necessity versus opportunity driven entrepreneurship**

Reynolds et al. (2002) introduced the dichotomy between opportunity and necessity entrepreneurs in the Global Entrepreneurship Monitor (GEM) of 2001. The most recent GEM report shows that on average, eighteen percent of Total Entrepreneurial Activity (TEA) in the 23 *innovation-driven* economies is based upon necessity motives (Kelley, Singer and Herrington, 2012). The Netherlands has the fourth lowest proportion of necessity entrepreneurs among the innovation-driven economies. About nine percent of the total Dutch entrepreneurial activity is necessity-driven. Only three Scandinavian countries (Denmark, Sweden and Norway, respectively) have a lower share of necessity-driven entrepreneurial activity. This may be partly due to the strong, generous social security system and highly developed employment protection legislation (EPL) scheme. Other factors that lower the prevalence rate of necessity entrepreneurship are economic development, dependency on international trade, the empowerment of women in the economy and the accessibility to more diversified labor markets (Kelley, Singer and Herrington, 2012). The average prevalence rate of necessity entrepreneurship equals 28 percent in the 24 *efficiency-driven* economies, and 37 percent in the seven *factor-driven* economies. In general, GEM results confirm that entrepreneurial activity is more likely to be opportunity-driven in high-income countries than in middle- and low-income countries (Bosma, Jones, Autio and Levie, 2008). Necessity entrepreneurship in the Netherlands has been relatively stable over time (at about nine percent).

The motivational taxonomy of Reynolds et al. (2002) suffers from two main problems that limit the explanatory power of this approach. First, there is much ambiguity in the empirical evidence due to different operationalizations of the necessity concept. Block and Sandner (2009) present an overview of studies on necessity entrepreneurship in Germany. The shares of necessity entrepreneurship found in these studies vary considerably (from 6.7 percent to 45.3 percent). These differences are mainly caused by different interpretations of the necessity concept and the use of alternating measures. Some measures are based on the subjective self-classification as defined by GEM. Other measures are based on a more objective but narrower operationalization, like starting out of unemployment or the degree of voluntariness in leaving a previous paid job. Based on the latter definition of necessity-driven entrepreneurship, Block and Sandner (2009) find a share of 28.7 percent in Germany. However, classifying start-ups of previously unemployed as necessity-based is not as straightforward as it seems. Caliendo and Kritikos (2009) present evidence of both opportunity and necessity motives among this type of start-ups. What is still lacking is a measure that is objective and still covers the broad spectrum of start-up motives that drives people to become solo

self-employed (Wennekers, Van Stel, Carree and Thurik, 2010). In the data section we will suggest a measure to overcome this problem.

### **Start-up motivation and entrepreneurial performance**

The second problem with the motivational approach is the lack of empirical evidence at the individual level while the available evidence at macro level is often indirect. For instance, developing countries have higher prevalence rates of necessity entrepreneurship than more developed, high-income countries (Acs, Arenius, Hay and Minniti, 2005). This tentatively suggests that necessity-driven self-employed have less entrepreneurial capabilities (as developing countries are often associated with lower economic performance). However, the evidence for such a claim is rather indirect and studies attempting to more directly link national economic growth with prevalence rates of necessity entrepreneurship do not always support such a claim (e.g. Reynolds et al., 2002: 21-23).

At micro level, Caliendo and Kritikos (2009) consider three types of entrepreneurs. Next to opportunity and necessity entrepreneurs they also define a group of entrepreneurs with mixed start-up motives simultaneously. They find that the survival rates of entrepreneurs with mixed start-up motives are significantly higher than those of necessity entrepreneurs, even though both entrepreneurial types have very similar socio-economic characteristics. Block and Sandner (2009) analyze whether or not opportunity entrepreneurs stay significantly longer in self-employment than necessity entrepreneurs, and find this to be the case. However, after controlling for the entrepreneurs' educational level in the field in which they have founded their firm (professionalism), this result is no longer significant. In short, empirical evidence for a significant relationship between start-up motives and entrepreneurial performance is as yet limited.

### **Human capital endowment**

Following Block and Sandner (2009: 119-120) we draw on the *Human Capital Theory* (HCT) to postulate that opportunity entrepreneurs are likely to have higher human capital endowments and a higher cognitive ability, which leads to more productive and efficient activity. Compared to their necessity counterparts they have enhanced personal control over the returns on their education, and are therefore likely to perform better (Fossen and Büttner, 2012: 10). However, human capital not only consists of formal education, but it also includes experience, practical learning (c.f. Jovanovic, 1982) and entrepreneurial skills, such as the ability to perceive and exploit entrepreneurial opportunities. Furthermore, Block and Sandner (2009) suggest that the entry of opportunity entrepreneurs into self-employment probably relies on a better preparation than the involuntary entry of necessity entrepreneurs, for example by having invested in the specific human capital that is needed to become a successful entrepreneur. This then would enhance a better performance of opportunity entrepreneurs as compared to necessity entrepreneurs. When controlling for all aspects of human capital, potential differences in start-up motivation should not have any influence on entrepreneurial performance. In other words, according to Block and Sandner's interpretation of HCT, the relation between start-up motive and entrepreneurial performance is expected to be fully mediated by human capital endowment. Using the available data set we will be able to test for mediation effects of formal education and practical learning as human capital aspects. From the literature we thus derive the following hypotheses:

*H1: Necessity solo self-employed display worse entrepreneurial performance than opportunity solo self-employed.*

*H2a: The relationship between start-up motives of solo self-employed and entrepreneurial performance is mediated by formal education.*

*H2b: The relationship between start-up motives of solo self-employed and entrepreneurial performance is mediated by practical learning.*

## DATA AND METHOD

### Representative panel of solo self-employed

We use a unique individual-level panel data set of solo self-employed in the Netherlands, operated by Panteia/EIM. This panel measures entrepreneurial performance of solo self-employed next to their personal, business and organizational characteristics. This enables us to explore variations in performance across entrepreneurs and over time. The database specifically targets the solo self-employed and consists of annual waves of longitudinal data. Panel members are considered to be a solo self-employed if they meet the criteria mentioned in the literature section. As soon as they do not meet all of the criteria (e.g. quit their business or hire personnel), or if they cannot be contacted anymore, members drop out of the panel. Data collection is conducted via telephonic interviews, which holds the advantage of an active approach. This enhances the reliability of the results, and increases control over the representativeness of the sample. The panel is set up according to a stratified sample plan to assure sufficient coverage in all industries, but with random selection within each stratum/industry.

For our regression analysis we construct an unbalanced panel data set from two consecutive years (2010 and 2011) containing 1,360 unique panel members corresponding to 1,803 observations. By definition the sample consists of solo self-employed with a unique start-up motivation.

### Panel attrition

Panel studies typically suffer from panel attrition. That is, individuals that initially participated in one of the waves failed to be interviewed again in subsequent waves. This might be due to a variety of reasons, but it is unlikely that the attrition is completely at random. Without using any formal test, we argue that the attrition bias seems to be limited in case of our panel.<sup>1</sup> For instance, entrepreneurial performance in the panel might be positively skewed because of dropouts who ended their entrepreneurial activities. Then, by definition we are left with a data set containing solo self-employed that perform well (better) leading to a non-response bias. If one of the two types of solo self-employed (opportunity vs. necessity) systematically performs worse, then the sample might suffer from a selection effect. One way to check the presence of a non-response bias is to compare the ratio of both types between different waves. Using all three indicator variables, it appears that the ratio of both types is quite constant over time. Moreover, on average both types participate in approximately the same number of waves. This suggests that a possible non-response bias has a limited or even no influence on the results. Also, the participation rate, defined as the number of completed interviews as a percentage of successful contacts, is very high, pointing at a high willingness to cooperate. The active approach certainly helped to create a high sense of loyalty among panelists (70 percent). This can be seen as a measure of the quality of the panel.

### Measures and descriptive statistics<sup>2</sup>

*Explanatory variables.* In existing empirical research there is no consensus on how to distinguish between opportunity and necessity entrepreneurs. In order to make a better distinction between the two types, and thus shed more light on this scholarly debate, we use three different binary variables denoting necessity solo self-employed. This operationalization also functions as validation and enhances the robustness of the results. The first measure is commonly used in the literature (see Block and Sandner 2009) and identifies those solo self-employed that started out of an *unemployment* situation (*unemployed*). This is a dummy variable indicating whether the respondent was unemployed, incapacitated and/or entitled to benefits prior to becoming solo self-employed. A second measure resembles the classification of Reynolds et al. (2002) and contains *self-proclaimed* necessity solo self-employed (*necessity1*). This dummy variable is based on the question whether becoming solo self-employed was the only option for suitable paid work. The third measure captures necessity solo self-employed based on *author classification* of a list of reported start-up motives (*necessity2*). It is based upon a manual classification of all possible answers to a multiple-choice question asking for the respondents' motives that played a role in their decision to become solo self-employed (see Appendix A). The classification is validated by considering the correlation of each individual answer category with the indicator variable for self-proclaimed necessity solo self-employment.<sup>3</sup> The share of necessity solo self-employed in the data set depends on which indicator variable is being used. According to the *unemployed* indicator 6.1 percent of solo self-employed can be classified as necessity-driven. The self-proclaimed necessity indicator (*necessity1*) results in a share of 26.5 percent of necessity solo self-employed. In line with our expectations in the literature section, this proportion is higher than in GEM because of our focus on solo self-employment. The author-

classified necessity indicator (*necessity2*) yields a share of 25.2 percent of necessity-driven solo self-employed. A chi-square test gives us a first notion that there is a statistically significant relationship between annual turnover and the type of solo self-employed. This appears to be the case for all three type-dummies and can be seen as a preliminary indication supporting the hypothesis that opportunity and necessity solo self-employed differ in terms of economic performance.

A comparison between the most elementary characteristics of opportunity and necessity solo self-employed shows that there are substantial differences between the two types. However, whether these differences are statistically significant depends on which indicator variable has been used. Like Block and Sandner (2009) and Wagner (2005), we find necessity solo self-employed to be significantly older than opportunity solo self-employed, but only when the distinction is made by the self-proclaimed or the author-classified indicator variable. It seems that the share of female solo self-employed is higher among necessity types, but only *unemployed* confirms the presence of a statistically significant difference. According to all three indicator variables, the proportion of solo self-employed running a private limited liability company is significantly higher among opportunity solo self-employed.

*Mediators.* Human capital is incorporated in the models via the highest self-stated *formal educational level*. Dummy variables were constructed indicating solo self-employed with a low, medium or high educational level, where high education refers to a bachelor's or master's degree. Only 20.0 percent of the sample has a low educational degree, whereas 45.6 percent is highly educated. We used *firm tenure* as a proxy for another aspect of human capital, namely practical learning. Here we consider practical learning as part of the *passive learning model* (Jovanovic, 1982) where an individual who becomes a solo self-employed starts learning about his/her efficiency after entry. Based on information of one's own entrepreneurial performance, profitability can be improved. The firm tenure in our data ranges from zero to 61 years, the mean tenure is slightly more than nine years. Apparently, the largest part of the firms is relatively recently established. These two variables act as mediation variables.

*Control variables.* The data set allows us to control for various personal, firm and organizational characteristics. These control variables include age, gender, industry, legal form and the number of hours per week spent on running the firm. The mean age of the panelists is approximately 48 years. This is somewhat higher than a mean age at around 40 in several other studies (Block and Wagner, 2010; Wagner, 2005). The youngest solo self-employed participant of the panel is nineteen years old, while the oldest participant is a 86 year-old entrepreneur. Moreover, more than two third of the solo self-employed is male. This is broadly consistent with previous research (Baumgartner and Caliendo, 2008; Block and Wagner, 2010; Reize, 2000). Solo self-employed appear to be hard workers, as more than half of the solo self-employed in the sample spends more than the equivalent of a fulltime job on running their firm. 12.9 percent spends even more than 60 hours per week. It should be stressed though that these include both billable and non-billable hours. A vast majority of the solo self-employed runs a sole proprietorship (90.3 percent) instead of a private limited liability company (9.7 percent). Most of the solo self-employed are active in business services (15.4 percent), followed by construction (11.9 percent) and transport, storage and communication industry (11.4 percent). The service industry in total covers 55.5 percent of the solo self-employed in the sample.

*Dependent variable.* Entrepreneurial performance is measured by annual turnover as stated by the respondents. This variable is actually a 'best estimate' of the current calendar year, but it is deemed a reliable estimate for annual turnover as the data collection has been executed in the end of November each year. In the case of the solo self-employed this variable is quite valid to measure performance because they mainly offer services and charge by the hour. Due to the lack of capital investments and other costs, their turnover rate is basically their business case. This measure also holds the advantage that it is exempt from subsidies or tax deductions and hence more clearly reflects actual performance. Due to the privacy sensitivity of the information and to avoid missing values the respondents were asked to classify their annual turnover into seven predetermined categories. The turnover category ranging from 25,000 up to 50,000 euro per year, represents the mode as well as the median category. The descriptive statistics also reveal that, although annual turnover of necessity solo self-employed is on average lower than that of opportunity solo self-employed, a share of 45 (*unemployed*) to 60 (*necessity1*) percent of the necessity solo self-employed still manages to generate more than 25.000 euro per year.

## **Model specifications**

The specific structure of our data set requires us to adopt Mundlak's (1978) approach to estimate several quasi fixed effects (FE) models. We use the pooled ordered probit estimator with clustered robust standard errors to allow



for correlation of the error terms within individuals. In practice this approach comprehends replacing the usual individual fixed effects (FE) with a set of time-invariant regressors, which are computed as the individual-specific averages over time.<sup>4</sup> A Hausman test clearly states that both the random effects (RE) and pooled estimator are appropriate ( $\chi^2 = 9.830$ ,  $p = 0.631$ ). The econometric formula is as follows:

$$y_{it}^* = x_{it}'\beta + \bar{w}_{it}'\lambda + u_{it} \quad (1)$$

where  $y_{it}^*$  is the dependent variable in seven categories,  $x_{it}'$  is a vector of independent variables, and  $\beta$  is a vector of coefficients to be estimated.  $\bar{w}_{it}'$  denotes the vector of time-invariant regressors (individual-specific averages over time) and the  $\lambda$ 's are auxiliary parameters. The error term  $u_{it}$  is standard normally distributed and independent of  $x_{it}'$  and the  $\lambda$ 's. The model is estimated by means of maximum likelihood estimation and controls for a large set of independent variables containing personal, firm and organizational characteristics.

## RESULTS

### Estimates and marginal effects

Table 1 presents the results of the regression analysis. The base model includes all controls for personal, firm and organizational characteristics, such as age, gender, sector and the number of hours per week spent on running the firm, but does not include our indicator variables for necessity solo self-employment. In models 2-4, these indicators are then added to the baseline model. For brevity, the coefficients and robust standard errors of some of the regressors are omitted from the table. The estimation results are based on a sample of 1,360 solo self-employed corresponding to 1,803 observations. Likelihood ratio tests show that the increases in the log pseudolikelihood are statistically significant, indicating that by adding the indicator variables to the base model, annual turnover is better predicted. The pseudo R-squared also slightly increases.

- INSERT TABLE ONE ABOUT HERE -

All three necessity indicator variables are highly significant and show a negative relation with annual turnover, thereby fully supporting Hypothesis 1. Also a high educational level is positively associated with a higher annual turnover at the ten percent significance level. Here, an individual is considered to be highly educated if he or she obtained either a bachelor's or master's degree.

The magnitude of the effects can be shown by using marginal effects. Marginal effects show that necessity solo self-employed have a higher probability of generating an annual turnover of less than 50,000 euro, while the probability of generating an annual turnover of more than 50,000 euro is lower. The extent to which the probabilities go up or down differs across the type dummies. For example, relative to opportunity solo self-employed, the probability of generating an annual turnover of more than 50,000 euro decreases with 10.1 percent based on our indicator *unemployed*, with 7.4 percent based on *necessity1*, and with 5.5 percent based on *necessity2*.<sup>5</sup>

### Mediation of relation between necessity motive and entrepreneurial performance by human capital

Conform the theoretical section we are interested in whether human capital aspects mediate the relationship between necessity solo self-employment and entrepreneurial performance. We focus on educational level and firm tenure (as a proxy for practical learning). To test Hypotheses 2a and 2b we performed mediation analyses by estimating our quasi FE models alternately with and without the mediators (see Table 2). In model 1 we show the coefficients of the separately regressed necessity indicators on entrepreneurial performance when both mediating variables are excluded from the model. The consecutive models comprise of the same procedure but excluding only firm tenure (model 2) and excluding only educational level (model 3). Model 4 shows the complete regressions including both mediators. If there is a mediating effect the inclusion of a specific mediator would significantly reduce the coefficient of the necessity indicators.<sup>6</sup> This is not the case with formal education. Adding education to the models does not reduce the direct effect of all three necessity indicators (compare models 3 and 4 in Table 2). Thus we find no

support for Hypothesis 2a. Firm tenure as a proxy for practical learning has a small mediating effect of 10 percent on the *unemployed* and the *necessity2* indicator, but no effect on self-proclaimed necessity (*necessity1*) (compare models 2 and 4 in Table 2). Hence, we find rather weak support for Hypothesis 2b.

- INSERT TABLE TWO ABOUT HERE -

## DISCUSSION

### Conclusion

The results of the empirical analysis reveal that expected annual turnover is significantly lower for necessity solo self-employed, compared to opportunity solo self-employed. This outcome supports hypothesis 1 and is robust to the applied definition of necessity solo self-employment. Marginal effects show that the necessity measure of previous unemployment accounts for the largest performance difference with opportunity solo self-employment. Importantly though, we also find that a majority of necessity solo self-employed still generates annual turnover levels which are sufficient to make a living. Our results also suggest that formal education level and firm tenure do not mediate the effect of start-up motivation (opportunity versus necessity) on performance. To the contrary, the start-up motive seems to have an isolated effect on entrepreneurial performance, which suggests that other aspects of human capital, not included in this study, may explain the performance difference between opportunity and necessity solo self-employed.

### Theoretical contribution

Our results do not provide evidence for the human capital approach advocated by Block and Sandner (2009: 119), stating that differences in the performance of opportunity and necessity entrepreneurs might be rooted in their different levels of human capital. Human capital, however, not only consists of formal education, practical learning and experience, but it also includes other aspects like for instance entrepreneurial talent and skills, industry experience and intrinsic motivation. We speculate that some of these factors might better explain the performance difference. Some evidence is presented that controlling for industry experience diminishes some of the differences (Block and Sandner, 2009; Fossen and Büttner, 2012). In fact, they no longer observe a significant difference between opportunity and necessity entrepreneurs when they control for the entrepreneurs' education in the professional field where they start their firm. Entrepreneurial talent and skills could explain the way that opportunity solo self-employed are better at perceiving and exploiting opportunities, whereas intrinsic motivation could be manifested through better preparation and investment in the necessary human capital. These are aspects not controlled for by our models.

### Implications

Earlier research has shown that solo self-employed and self-employed with personnel have different motivations to run a business (Parker, 2004: 80; Wennekers et al., 2010). An implication of our study is that, in addition, it is also important to distinguish between motivations within the population of solo self-employed to understand their entrepreneurial performance. However, our empirical results do not allow us to jump to conclusions and we should be careful in stating policy implications. First of all, although we find significant differences between the entrepreneurial performance of necessity and opportunity types, these are rather small in magnitude. The largest marginal effects indicate a ten percent gap in the probability of high annual turnover. Moreover we also find that still a substantial number of necessity solo self-employed generates annual turnover rates of over 25,000 euro. These results can therefore lead to different policy implications depending on the policy motives at play. When stimulating economic growth is the objective, it can be advisable to discourage start-ups with necessity motives. On the other hand from a more social-economic point of view these necessity-driven activities still provide a certain level of subsistence and may lower social welfare expenditures and the total costs for society. Either way we get a more nuanced picture if we incorporate the motivational approach. Efficiency of entrepreneurship policy schemes may benefit if they take into account that several aspects of human capital might influence economic performance of solo self-employed. Some of these aspects have been discussed in this paper.

## Limitations and future research

The data set is of high quality, but some shortcomings remain. First, the data set is unbalanced, because of participating panelists dropping out and the sample being complemented with new respondents on an annual basis. Although the attrition bias seems to be limited, the exact reasons for panelists not participating (anymore) remain unclear. Amongst others, this could be due to unsuccessful entrepreneurship forcing respondents to leave solo self-employment, to successful entrepreneurship causing respondents to hire employees (and being no longer solo self-employed), or simply to called respondents being unavailable. Second, the average number of observations per individual is less than one and a half. Ideally, one would have had a larger number of observations per solo self-employed. In that case we would have been able to better explore the dynamics over time of both types of solo self-employed. Third, for practical reasons the nature of our dependent variable is categorical instead of continuous. It would have been more precise to use continuous data for our annual turnover variable, but then response rates would probably have been lower, as people are less willing (or even able) to reveal their exact turnover.

Further research may address the speculated explanations, to see whether the observed performance differences between opportunity and necessity solo self-employed are in fact influenced by industry experience, entrepreneurial talent and skills and/or intrinsic motivation. Future research may also focus on other performance indicators, e.g. the extent of innovativeness of solo self-employed (both product and process innovation) and levels of growth ambition.

## NOTES

1. For an extensive discussion about nonparametric tests of attrition bias in panel surveys see Das, Toepoel and Van Soest (2011).
2. Descriptive statistics in section “Measures and descriptive statistics” are based on the period 2009-2011. The regression analysis uses data for 2010-2011, because data for several control variables were missing for 2009.
3. These correlations are available on request. Respondents could choose several answers from the list in Appendix A. In a minority of cases (about 12%), respondents chose a mix of opportunity and necessity motives. These respondents were removed from the analysis.
4. Using FE would imply throwing away our variable of interest, i.e., the start-up motive, as this variable does not vary over time.
5. These percentages should be interpreted with care, because their joint significance was not determined.
6. In addition, the mediators should be highly correlated with the independent variables of interest.

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**TABLE ONE**

**Entrepreneurial performance difference of necessity-driven versus opportunity-driven solo self-employment (Dependent variable: annual turnover)**

<b>Variables</b>	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>
	<b>coeff.</b>	<b>coeff.</b>	<b>coeff.</b>	<b>coeff.</b>
	<b>(robust S.E.)</b>	<b>(robust S.E.)</b>	<b>(robust S.E.)</b>	<b>(robust S.E.)</b>
<b>Indicator variables</b>				
<i>Opportunity solo self-employed</i>		reference	ref.	ref.
		category (ref.)		
<i>Start-up from unemployment (unemployed)</i>		-0.285*		
		(0.120)		
<i>Self-proclaimed necessity (necessity1)</i>			-0.200**	
			(0.065)	
<i>Author-classified necessity (necessity2)</i>				-0.149*
				(0.066)
<b>Time Dummy</b>				
<i>Year_2010</i>	ref.	ref.	ref.	ref.
<i>Year_2011</i>	-0.237*	-0.240*	-0.263*	-0.248*
	(0.111)	(0.111)	(0.111)	(0.111)
<b>Personal Characteristics</b>				
<i>Several controls (see table note)</i>				
<i>Educational level (low)</i>	ref.	ref.	ref.	ref.
<i>Educational level (medium)</i>	0.057	0.057	0.056	0.057
	(0.087)	(0.087)	(0.087)	(0.086)
<i>Educational level (high)</i>	0.171 <sup>+</sup>	0.176 <sup>+</sup>	0.167 <sup>+</sup>	0.173 <sup>+</sup>
	(0.092)	(0.092)	(0.093)	(0.092)
<b>Firm Characteristics</b>				
<i>Several controls (see table note)</i>				
<i>Firm tenure</i>	-0.256	-0.267	-0.193	-0.234
	(0.241)	(0.241)	(0.241)	(0.240)
<i>Firm tenure (squared)</i>	-0.004	-0.004	-0.004	-0.004
	(0.003)	(0.003)	(0.003)	(0.003)
<b>Organisational Characteristics</b>				
<i>Several controls (see table note)</i>				
<b>Model Summary</b>				
Number of observations	1,803	1,803	1,803	1,803
Number of individuals	1,360	1,360	1,360	1,360
Log pseudolikelihood	-2,463.344	-2,459.973	-2,457.563	-2,460.198
Pseudo R <sup>2</sup>	0.189	0.190	0.191	0.190

*Notes:* For brevity, some of the control variables included in the regression analysis are omitted from the table. These include *Personal char.:* Age, Age<sup>2</sup>, Female; *Firm char.:* Legal form, 10 industry dummies and *Organizational char.:* Unpaid family workers, Business hours (25-40/wk, 40-60/wk, >60/wk), Alternative income sources, Pension savings, Clientele (private customers and mixed), Worksite (external and varying) and 13 auxiliary parameters (the lambda's) for the individual-specific averages over time. The standard errors (between parentheses) refer to robust clustered standard errors, allowing for intragroup correlation.

Significance levels: + 0.05 < p ≤ 0.10; \* 0.01 < p ≤ 0.05; \*\* 0.001 < p ≤ 0.01; \*\*\* p ≤ 0.001.

TABLE TWO

Testing for mediating effects of educational level and firm tenure (Dependent variable: *annual turnover*)

	Model 1 (excl. educational level and firm tenure (squared))	Model 2 (excl. firm tenure (squared))	Model 3 (excl. educational level)	Model 4 (incl. all mediators)
Variables	coefficient (robust S.E.)	coefficient (robust S.E.)	coefficient (robust S.E.)	coefficient (robust S.E.)
<i>Unemployed</i>	-0.307** (0.119)	-0.315** (0.118)	-0.277* (0.121)	-0.285* (0.120)
<b>Controls</b>	included	included	included	included
<b>Model summary</b>				
Number of obs.	1,803	1,803	1,803	1,803
Number of individuals	1,360	1,360	1,360	1,360
Log pseudolikelihood	-2,470.998	-2,467.984	-2,462.726	-2,459.973
Pseudo R2	0.186	0.187	0.189	0.190
<i>Necessity1</i>	-0.207*** (0.064)	-0.204** (0.064)	-0.202** (0.065)	-0.200** (0.065)
<b>Controls</b>	included	included	included	included
<b>Model summary</b>				
Number of obs.	1,803	1,803	1,803	1,803
Number of individuals	1,360	1,360	1,360	1,360
Log pseudolikelihood	-2,470.998	-2,466.063	-2,460.005	-2,457.563
Pseudo R2	0.186	0.188	0.190	0.191
<i>Necessity2</i>	-0.166* (0.065)	-0.167** (0.065)	-0.148* (0.066)	-0.149* (0.066)
<b>Controls</b>	included	included	included	included
<b>Model summary</b>				
Number of obs.	1,803	1,803	1,803	1,803
Number of individuals	1,360	1,360	1,360	1,360
Log pseudolikelihood	-2,471.011	-2,468.165	-2,462.825	-2,460.198
Pseudo R2	0.186	0.187	0.189	0.190

Notes: This table shows coefficients of quasi FE models while using pooled ordered probit estimators. The standard errors (between parentheses) refer to robust clustered standard errors, allowing for intragroup correlation. Controls are the same as in the full model except for the mediators: formal education and firm tenure.

Significance levels: + 0.05 < p ≤ 0.10; \* 0.01 < p ≤ 0.05; \*\* 0.001 < p ≤ 0.01; \*\*\* p ≤ 0.001.

## APPENDIX A

Classification procedure for author-classified necessity solo self-employment (*necessity2* indicator variable).

### Manual classification of solo self-employed into opportunity and necessity-driven start-up motives

What motivation(s) played a role in the decision to become solo self-employed?	Start-Up Motive
I can earn more as solo self-employed.	Opportunity
The contents of the work as solo self-employed are more satisfying.	Opportunity
I wanted to be my own boss and be able to make my own decisions.	Opportunity
As solo self-employed I am better able to combine work and care.	Necessity
I have many solo self-employed friends and family members.	Opportunity
I wanted to contribute to the society.	Opportunity
I found that my income as an employee was too low.	Opportunity
The company that I worked for performed poorly (or, went bankrupt).	Necessity
I could not find a suitable paid job.	Necessity
I was in danger of becoming unemployed.	Necessity
For my former employer, it was more attractive to hire me as solo self-employed instead of retaining me as an employee.	Necessity
It was the only possibility to keep working for my former employer.	Necessity
I turned my hobby into a career as solo self-employed.	Opportunity
My kind of work can only be done as solo self-employed.	Necessity
I had reached retirement age (or, I was retired).	Necessity
It started as a part-time job for some extra income.	Opportunity
I had a conflict at and/or was dissatisfied with my former job.	Necessity
For tax reasons.	Opportunity
For legal reasons.	Necessity
For health reasons.	Necessity
A corporate takeover within the family.	Necessity

Based on a multiple-choice question. The classification is validated by considering the correlation of each individual answer category with self-proclaimed necessity solo self-employment (*necessity1* indicator variable).



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