Skills Variety and Self-Employment: The Case of Spain

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Abstract. This paper analyses empirically the impact on occupational choice of so called balanced skills, as advanced by Lazear (2004). For this purpose we resort to the contextually rich data collected within the REFLEX survey and study a sample of Spanish university graduates from the year 2000, who were interviewed retrospectively in 2005. Using a logit model we show that higher skills variety is positively related to the probability of self-employment, even after controlling for having followed specific entrepreneurship education courses. Additionally, we show that having changed jobs several times is not a determinant of self-employment as proposed by Silva (2007).

Keywords: balanced skills theory, self-employed, entrepreneurial education.

1. Introduction

This paper studies the relationship between variety of skills and the probability to become self-employed. The major inspiration for the present analysis is the theory of balanced skills proposed by Lazear (2004).

Entrepreneurial activity requires a stable institutional framework with clear rules of the economic game (Williamson, 2000) so that economic agents can concentrate on value creation which is the core of entrepreneurship (Schumpeter, 1934). In the Schumpeterian economy, new value is created through "creative destruction" where the entrepreneur plays a key role. The entrepreneur detects opportunities and undertakes the risk to tackle them in a creative new way (McMullen and Shepherd, 2006). It has been hypothesized that entrepreneurs have to possess certain types of skills to be considered as such. Kirzner (1973) was the first to propose alertness to new opportunities to be the key entrepreneurial characteristic that individuals must have in order to succeed in setting up new

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ventures. Kirzner's theory was further extended on skills such as creativity (Kirzner, 1999, 2009; Valliere, 2013) and self-awareness (Gaglio, 2004). Inspired by the previous theories on entrepreneurial skills, Tang et al. (2012) propose alertness along with creativity and self-awareness to form the basic entrepreneurial skills setup. Alertness along with creativity have been applied already as proxies for entrepreneurial skills in research on entrepreneurial education and labor market outcomes (Kucel et al., 2016; Kucel and Vilalta-Bufi, 2016).

Another insight into entrepreneurial activity comes as a corollary of human capital theory (Becker, 1993). In Becker's model, individuals accumulate education, experience and knowledge, which in turn can be productively applied in new business creation (Davidsson and Honig, 2003; Haber and Reichel, 2007; Martin et al., 2013; Ucbasaran et al., 2008). Notwithstanding, Unger et al. (2011) observe that higher levels of human capital are not necessarily a valid predictor of entrepreneurial success.

Thus far, there is no clear definition of what constitutes a true entrepreneur. On the one hand, as shown before, there is evidence that entrepreneurs have to be alert and creative with respect to their environment. On the other, there is a convincing body of evidence that higher stocks of human capital in general are positively associated with entrepreneurial action (Haber and Reichel, 2007; Martin et al., 2013; Unger et al., 2011). However, there are also necessity entrepreneurs among whom many have low human capital (Poschke, 2013).

Given this mixed evidence, Lazear (2004) proposed another approach to entrepreneurship determinants. According to Lazear's Balanced Skills Theory, entrepreneurs have to possess a large menu of varied skills instead of being specialists in any particular field. Entrepreneurs should be what Lazear calls "Jacks-of-all-trades" (JAT) who have a balanced skills level either in-born or achieved through education and labor market experience. He supported his theory with a sample of Stanford MBA alumni, showing that those who were skilled in many disciplines without excelling in any were much more likely to establish a new venture than those who could be considered specialists in some field (Lazear, 2005). Furthermore, according to Lazear, even though entrepreneurs may be able to hire specialists from virtually any field for their ventures, they need to know enough from this field in order to hire the right people.

Lazear's theory has attracted significant attention in the entrepreneurship literature (Åstebro and Thompson, 2011; Bublitz and Noseleit, 2014; Hyytinen and Ilmakunnas, 2007; Oberschachtsiek, 2012; Stuetzer et al., 2013a, 2013b). Most of this evidence confirms Lazear's observation about the balanced skills pool being positively related with entrepreneurial action. Oberschachtsiek (2012) as well as Stuetzer et al. (2013a) stress the importance of the origin of the skills pool among entrepreneurs. According to them, previous work experience in business and sales mixed with knowledge of various fields could be considered the key to entrepreneurial success. This view is questioned by Silva (2007), who

claims that when unobserved heterogeneity in ability is accounted for, balanced skills do not play any role in prediction of entrepreneurial action. Silva's hypothesis is that individuals acquire varied skills through job changes. In such a scenario, individuals who changed jobs several times are by default equipped with more skills. According to Silva the taste for variety, exemplified by frequent job changes, and not skills variety, explains the higher propensity to enterprise.

This paper aims at shedding some new light on this topic by employing a unique and contextually rich data set from a university graduates survey (REFLEX) in Spain from the year 2005. The contribution of our paper is twofold. Firstly, we test Lazear's hypothesis in a different context, i.e., a sample of Spanish university graduates being interviewed five years after graduation and show that Silva's hypothesis does not hold. Skills variety measured directly through an index of self-reported skills holds significant, even if the number of previous jobs is controlled for. Secondly, we show that skills variety may be a product (to some degree) of specific entrepreneurship education. Our data contain information if a graduate attended an entrepreneurial university program (Bae et al., 2014; Van der Sluis et al., 2008).

The remainder of the paper is organized as follows. The next section reviews the literature, and forms the hypotheses. Section 3 describes the REFLEX survey [2] and specifies the econometric techniques used in the analysis. Results are presented and discussed in Section 4, while Section 5 concludes the analysis.

2. Theoretical background

The theory of balanced skills proposed by Lazear (2004) has gained significant importance in the entrepreneurship literature today. In a nutshell, the theory posits that entrepreneurs are expected to be "jacks-of-all-trades" (JAT) in their companies. An entrepreneur has to be able to control all aspects of the company at its beginnings. Using a sample of Stanford MBA graduates, Lazear (2005) showed that those who had more varied experience before joining the MBA were significantly more likely to establish their own businesses. Furthermore, according to Lazear, the skills that entrepreneurs possess are only necessary but not sufficient in order to succeed. In light of the balanced skills theory, the least developed skill of the entrepreneur is their major limitation. In contrast, it is not important if the possible entrepreneur excels in any particular skill. Following the human capital model, Lazear's theory claims that balanced (more varied) work experience, equips individuals with a more varied, and thus a more equilibrated, set of skills.

In the same vein, Stuetzer et al. (2012) show that a more varied skills set is indeed indicative of a higher probability to enterprise. Similar evidence

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2. For more information on the REFLEX survey see: http://www.fdewb.unimaas.nl/roa/reflex/ and Allen and Van der Velden (2007).

corroborating Lazear's theory can be found in Lechmann and Schnabel (2014), suggesting that entrepreneurs need not only very basic but also certain advanced business skills. Oberschachtsiek (2012) and Stuetzer et al. (2013a) refine the theory by suggesting that relevant job experience predicts entrepreneurial skills and hence correlates positively with entrepreneurial action. Accordingly, as Lazear predicted, entrepreneurs, even if they could hire someone else to perform for them certain tasks, which they cannot do themselves, they would still need to have enough knowledge of the task in question to hire the right person (Lazear, 2005). Extending this view, Stuetzer et al. (2013b) provide evidence that managerial experience and other relevant skills, when balanced, positively affect the likelihood of entrepreneurship, net of the personality traits of the entrepreneur. The empirical evidence on the balanced skills theory suggests that even though the equilibrated set of skills does increase the probability to start a new business (or become self-employed) it does not necessarily lead to better income or higher entrepreneurial success (Åstebro and Thompson, 2011; Silva, 2007). In contrast, Hartog et al. (2010) find that more balanced basic skills, such as a combination of mathematical and verbal abilities are positively related with higher incomes for entrepreneurs. Despite the mixed evidence about the income effects of balanced skills, it remains clear that there is abundant empirical support for Lazear's theory (Lechmann and Schnabel, 2014; Tegtmeier et al., 2016; Wagner, 2003, 2006).

Our first hypothesis reads as follows:

H1: A worker's number of skills is positively associated with the probability of self-employment.

In contrast, some recent literature shows important caveats in Lazear's theory. Using Canadian data, Åstebro and Thompson (2011) demonstrate that even though the self-employed are more generally skilled than employees, their incomes are somewhat lower due to their self-employment. Their interpretation goes in line with that proposed by Silva (2007) for Italy, namely, that balanced skills signal a taste for variety and not necessarily a higher ability in entrepreneurship. Silva (2007) claims that individuals with a larger pool of skills are those who exhibit higher taste for variety. Accordingly, one should control for previous job changes of a respondent in order to capture their taste for variety. Changing jobs, individuals learn new things, meet new people constantly and keep up to date. This however, is their taste and not the means to become self-employed. Becoming self-employed may merely be a manifestation of a taste for more variety, rather than a result of having many skills.

This brings us to our second hypothesis:

H2: A worker's number of previous employment posts is positively associated with the probability of self-employment.

Lazear's analysis does not have any explicit measures for the number of skills in which the graduates were equipped. As we will see in the next section, our data permits us to address this issue directly. Moreover, we have information about the number of previous jobs, as proposed by Silva. The richness of our data base thus allows us to test hypotheses 1 and 2.

Summing up, given these theoretical premises we hypothesize that graduates with wider menu of skills (following Lazear's balanced skills theory) are more likely to become self-employed than those who specialize in only some selected skills. The argument of Silva (2007) whereby individuals who change jobs more frequently possess more skills is also tested in this paper.

3. Data, Model and Methods

This paper relies on the REFLEX survey. It is a survey of university graduates in Spain from the year 2000 who have been interviewed in the year 2005. The data contain detailed information on the study program of the graduates, their background, including their secondary education, and the mean grade from that education, along with detailed questions on levels of skills at the moment of the interview (Allen and Van der Velden, 2007). Specifically, through a set of 19 self-reported questions, graduates surveyed in REFLEX reported their levels of different skills. Apart from that, we have also data on the types of jobs (occupation) that graduates perform, particularly distinguishing between employees and the self-employed. This allows us to analyze the probability to become self-employed in the REFLEX sample for Spain.

3.1. Model

The dependent variable in our analysis is binary and defined as 0 for employees and 1 for the self-employed. There are two key explanatory variables in this analysis. Firstly, we count all those skills where an individual answered that he or she had at least level 5 out of 7 levels of this skill on a Likert type scale (the maximum number is 19 skills). This allows us to directly address hypothesis 1 whereby more skills provide for a higher probability of entrepreneurship (proxied here through self-employment).

Secondly, we know how many previous job posts each individual held in their past since graduation from the university, which permits us to address the second hypothesis, derived from Silva's (2007) research, which claims that individuals with more skills are merely more interested in variety. This hypothesis would suggest a positive association with self-employment probability for the number of previously held jobs, but not for the number of skills.

Finally, we test whether specific entrepreneurship education could be a source of the multiple skills observed among some individuals. If so, then a larger menu of skills would partly be the result of having studied an entrepreneurial program rather than an innate propensity to learn new things, which Lazear associated with the likelihood of becoming an entrepreneur. Given the dichotomous nature of our dependent variable we use logit regression in all our subsequent models that predict the probability of becoming self-employed.[3]

Control Variables
Our research controls for the major sources of unobserved heterogeneity which plague all empirical economic work. The chief problem is the unobserved heterogeneity due to differences in cognitive ability among people. We do not dispose of clear measures of numeracy nor literacy, which would serve as the direct measures of cognitive ability. However, we use a proxy for the general ability which is the grade point average (GPA) in the secondary education (Arcidiacono, 2004). More cognitively able individuals should achieve higher GPA. Certainly, including the GPA may be troubling to an extent as more able individuals should be expected to acquire more skills than their less able peers. Notwithstanding, if GPA and the number of skills prove both significant then the skills variety does not stem entirely from the higher cognitive ability. Apart from these controls we also introduce age and its squared component to control for the age effects on self-employment (Levesque and Minniti, 2006), gender (Leoni and Falk, 2008) and the dummies for levels of education: professional 3-year degree, academic 5-year degree and the graduate degree jointly with the degree in medicine (Åstebro et al., 2011; Blanchflower, 2000; Iglesias et al., 2016).

We control for the heterogeneous distribution of entrepreneurial preference and ability across different fields of study by introducing the fields of study controls (Bae et al., 2014; Li et al., 2016; Martin et al., 2013). Following the methodology in Kucel and Vilalta-Bufi (2016), we use a battery of self-reported skill levels for 19 different skills.[4] These skills include both analytical and "soft" skills (Heckman and Kautz, 2012) which are also known to affect the probability and posterior success of an entrepreneurial action. Entrepreneurs are daily confronted with a very dynamic social environment and their social skills play a key role here. Some of these skills are thought to be purely relational while others are on the border between cognitive and non-cognitive skills (Baron, 2000, 2004a, 2004b; Baron and Markman, 2003). The set of skills included in our analysis here, and explained in the next section, contains both skills that are typically considered

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3. In the last part of the paper we regress, using OLS, the number of skills on a set of predictors such as age, age squared, gender, education level, fields of study, GPA from secondary education and having followed entrepreneurial education at the university. The number of skills is treated as a continous variable ranging between 1 and 19.
4. See Finnie and Meng (2005) for an analysis on self-reported versus tested basic skills outcomes. In our case we only have self-reported skill levels and so we cannot contrast them with the same skills types through external testing. This clearly is a limitation to our approach.

cognitive (e.g. knowledge of own field or related fields) along with skills which are often catalogued as non-cognitive (e.g. relational skills, creativity, alertness).

Role of Entrepreneurship Education
Finally, another source of influence on the probability of starting a company exists which comes through so called "entrepreneurial education" (Bae et al., 2014; Martin et al., 2013; Pittaway and Hannon, 2006). There are no clear results when it comes to entrepreneurial education. Some authors find a positive influence of teaching entrepreneurship courses at the secondary or tertiary level on the likelihood of starting a new company (Martin et al., 2013). In contrast, others find that there is no positive return to entrepreneurial education and sometimes it actually discourages graduates from trying to start a company (Bae et al., 2014; Oosterbeek et al., 2010; Von Graevenitz et al., 2010). Whichever the final result in a particular situation, the mere presence of these studies points towards the necessity for controlling for entrepreneurial education in studies of university graduates like ours. Hence, we test whether the number of skills matters for self-employment despite the control for the entrepreneurial university studies. In this regard, we also test whether entrepreneurship education leads to an increase in the number of skills that a person reports.

3.2. Descriptive Statistics

The skills that were measured in the survey are presented in detail below.
It is easily observable from Table 1 that the majority of the sample responded that their skills level for each particular type of skills is above 4 and in the majority of cases it oscillates around 5. This levied on our decision to codify all those skills for each individual as high when the individual reported at least level 5 (out of 7). Some of the above skills could be considered as purely cognitive. Mastery of own field, knowledge of other fields, ability to use computers, ability to learn, analytical thinking, and the ability to speak a foreign language, present and write are the skills that one can train and enhance through formal learning. On the other hand, ability to negotiate, coordinate, exert authority, mobilize others, make meaning clear to them are examples of purely relational skills, which would fall into the category of soft skills. In contrast, ability to come up with new ideas, alertness to new opportunities and, perhaps, willingness to question ideas could be categorized as soft skills but also as core entrepreneurial skills (Kucel et al., 2016; Kucel and Vilalta-Bufi, 2016).

Table 1: Skill types distribution

Skill type	Mean	Std. dev.	Min	Max
Mastery of own field	5.225	1.045	1	7
Knowledge of other fields	4.373	1.201	1	7
Analytical thinking	5.112	1.212	1	7
Ability to learn	5.758	0.997	1	7
Ability to negotiate	4.553	1.443	1	7
Ability to work under pressure	5.479	1.250	1	7
Alertness to opportunities	4.764	1.312	1	7
Ability to coordinate	5.441	1.179	1	7
Ability to use time efficiently	5.533	1.145	1	7
Ability to work with others	5.801	1.168	1	7
Ability to mobilize others	4.804	1.308	1	7
Ability to make meaning clear	5.508	1.107	1	7
Ability to assert authority	4.757	1.354	1	7
Ability to use computers	5.639	1.229	1	7
Ability to come up with ideas	5.351	1.096	1	7
Willingness to question ideas	5.338	1.188	1	7
Ability to present	4.773	1.520	1	7
Ability to write	5.445	1.242	1	7
Foreign language	3.890	1.840	1	7

Source: REFLEX data base.

Table 2 shows the descriptive statistics for all variables. It is observable from Table 2 that, on average, respondents have reported 13 different types of skills. The sample is slightly skewed towards the female population and the average age is 29 years. The average grade from secondary education is 2.9 out of 5.

Table 2: Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max
Self-employed	0.081	0.273	0	1
Number of previous jobs	2.972	3.500	0	98
Number of skills	13.491	4.121	0	19
Female	0.613	0.487	0	1
Age	29.870	3.107	26	59
Age squared	901.880	213.111	676	3481
Professional university degree	0.305	0.460	0	1
Academic university degree	0.669	0.470	0	1
Graduate university degree	0.024	0.156	0	1
Average grade secondary education	2.880	0.928	1	5
Entrepreneurial program	0.278	0.448	0	1
Fields of study				
Education	0.108	0.310	0	1
Humanities	0.067	0.248	0	1
Social science	0.338	0.473	0	1
Sciences	0.142	0.349	0	1
Engineering	0.169	0.375	0	1
Agriculture & vet.	0.039	0.194	0	1
Health	0.129	0.335	0	1
Services	0.007	0.083	0	1
Economic sectors				
Agriculture and fishing	0.048	0.215	0	1
Manufacturing	0.093	0.291	0	1
Construction	0.069	0.253	0	1
Distribution, hotels, repairs	0.067	0.250	0	1
Transport	0.058	0.233	0	1
Financial services	0.206	0.405	0	1
Other services	0.378	0.485	0	1
Public bodies	0.081	0.273	0	1

Source: REFLEX data base.

4. Results

We estimated a set of models in order to test the two previously stated hypotheses. We start with a basic set of controls such as age, age squared, sex, grade point average from the secondary education, a dummy indicating a long vs. short program (*licenciatura/diplomatura*)[5] and a dummy indicating graduate degree jointly with the degree in medicine. The dependent variable is a binary, taking value 1 when an individual is self-employed and 0 otherwise. We apply the model

building strategy and resort to logit model given the binary nature of our dependent variable. Models in Table 3 are numbered from 1 to 4. Results in all models are transformed into odds ratios (ratios between the probability of success and the probability of failure of a random event, in our case the odds of being self-employed).

The first model is the base model for further analysis. It is readily observable from this first step that the entrepreneurial education increases the odds of becoming self-employed by 69%. Similarly, and in line with Levesque and Minniti (2006) the age and age squared controls indicate that older individuals are more likely to enterprise but that this effect slowly wanes with time. Female gender as expected diminishes the likelihood of self-employment by roughly 30%.

Despite the controls for the entrepreneurial program the number of skills correlates positively with the probability of self-employment in our sample. Having one more skill on the number of skills increases the odds of starting up a new company by about 5%. This directly confirms the Lazear's jack-of-all-trades hypothesis for our sample of Spanish graduates (H1).

However, a larger number of jobs in the past (variable Number of employers since graduation in Table 3) as proposed by Silva (2007), does not come significant in any of our models in Table 3. This variable was meant to test for hypothesis 2 whereby entrepreneurs are more likely to possess varied skills not because of their entrepreneurial spirit but because of their taste for variety. By changing jobs frequently, individuals gain on varied experiences which may be positively related with entrepreneurship (Silva, 2007). Silva's hypothesis does not find empirical confirmation in our data (H2 rejected).

In the next steps, in Models 2 and 3 we introduce fields of study controls and economic sectors controls, respectively. Fields of study show that Engineering, Health, and Humanities are more likely to lead to self-employment than Social Sciences. As regards economic sectors, no sector offered higher probability of self-employment between 2000 and 2005 than Construction. Model 4 contains the whole set of explanatory variables. Our main results of interest remain unaltered through all four models. The number of skills possessed by graduates influences positively the likelihood of self-employment, confirming Lazear's hypothesis, whereas a larger number of previous employers does not correlate significantly with self-employment, rejecting Silva's hypothesis of taste for variety.

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5.   We define diplomatura as professional university degree, and licenciatura as an academic degree.

Table 3: Logit regression for probability of self-employment

DV=Self-employed	Model 1	Model 2	Model 3	Model 4
Number of skills	1.050**	1.046**	1.049**	1.045**
	(0.020)	(0.020)	(0.021)	(0.021)
Number of employers since graduation	0.965	0.966	0.965	0.962
	(0.033)	(0.034)	(0.035)	(0.035)
Entrepreneurial education	1.693***	1.637***	1.683***	1.642***
	(0.260)	(0.254)	(0.264)	(0.260)
Female	0.648***	0.691**	0.626***	0.630***
	(0.096)	(0.110)	(0.097)	(0.101)
Age	1.850***	1.729***	1.558**	1.560**
	(0.379)	(0.356)	(0.304)	(0.300)
Age-squared	0.992***	0.993**	0.995*	0.995*
	(0.003)	(0.003)	(0.003)	(0.003)
Academic university degree	1.109	1.258	1.299	1.434*
	(0.185)	(0.228)	(0.224)	(0.268)
Graduate degree and medicine	0.552	0.704	0.603	0.778
	(0.340)	(0.439)	(0.377)	(0.493)
Average grade secondary education	0.977	0.912	0.980	0.946
	(0.081)	(0.079)	(0.084)	(0.084)
Education		1.268		1.505
		(0.396)		(0.508)
Humanities		2.326***		2.500***
		(0.654)		(0.727)
Science & Math		0.838		0.824
		(0.233)		(0.232)
Engineering		2.116***		1.663**
		(0.461)		(0.411)
Agriculture & Vet		1.851*		2.145**
		(0.663)		(0.811)
Health		1.840**		2.057**
		(0.479)		(0.602)
Services		3.184*		4.106**
		(2.096)		(2.728)
Agriculture and fishing			0.220***	0.228***
			(0.090)	(0.098)
Manufacturing			0.090***	0.095***
			(0.038)	(0.041)
Distribution, hotels and repairs			0.387***	0.403**
			(0.128)	(0.146)

Transport			0.216***	0.239***
			(0.082)	(0.093)
Financial services			0.319***	0.396***
			(0.077)	(0.108)
Other services			0.314***	0.290***
			(0.071)	(0.082)
Public bodies			0.139***	0.139***
			(0.057)	(0.060)
Observations	2564	2564	2564	2564
Pseudo R^2	0.044	0.062	0.084	0.099
AIC	1418.6	1406.5	1373.7	1365.5
BIC	1477.1	1505.9	1473.2	1505.9

Odds ratios are reported. Standard errors in brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Reference field of study: Social science
Reference economic sector: Construction
Reference level of education: Professional university degree: *diplomatura*

Finally, and somewhat surprisingly, the average grade from the secondary education, which surrogates the control for cognitive ability, does not seem to affect the probability of self-employment. It stands in contrast with the results from Hartog et al. (2010). It could be argued that the number of skills captures all the relevant variation and so the secondary school GPA does not come significant in models 1 through 4. In order to test this possibility we run Model 5 presented in Table 4, where we regress through OLS the number of skills on the previously explained basic controls from Model 2.

Table 4: OLS estimation explaining number of skills from selected correlates

DV=Number of skills	Model 5
Female	-0.324[*]
	(0.177)
Age	-0.324
	(0.215)
Age-squared	0.005
	(0.003)
Academic university degree	0.439[**]
	(0.199)
Graduate degree and medicine	1.856[***]
	(0.540)
Average grade secondary education	0.330[***]
	(0.093)
Education	0.429
	(0.299)
Humanities	0.560
	(0.341)
Science & Math	0.245
	(0.258)
Engineering	0.900[***]
	(0.257)
Agriculture & Vet	0.297
	(0.427)
Health	0.018
	(0.276)
Services	1.159
	(0.963)
Entrepreneurial education	1.434[***]
	(0.180)
Constant	17.207[***]
	(3.703)
Observations	2564
Adjusted R^2	0.039
AIC	14451.8
BIC	14539.5

Standard errors in brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Reference field of study: Social science
Reference economic sector: Construction
Reference level of education: Professional university degree: *diplomatura*

It turns out that indeed the secondary school grade point average affects positively and significantly the number of skills. Similar effects come also from higher levels of education and from having studied Engineering at the university. All those variables increase the number of skills that graduates report in our sample, and which in turn, positively and significantly correlate with the probability of becoming self-employed (see Table 3). Furthermore, even despite the controls for ability and fields of study, entrepreneurial education affects positively the number of skills that the individuals report. This gives an important policy implication since entrepreneurship education seems a good tool in order to increase the skills pool of individuals and, consequently promote entrepreneurship in Spain.

5. Conclusions

The aim of this paper was to test empirically the theory of Jacks-of-all-trades advanced by Lazear (2004, 2005). The theory has attracted a significant level of attention in the economics literature (Åstebro and Thompson, 2011; Bublitz and Noseleit, 2014; Hyytinen and Ilmakunnas, 2007; Lazear, 2005; Oberschachtsiek, 2012; Stuetzer et al., 2013a, 2013b).

Using a unique data set with rich contextual information we were able to observe 19 different types of skills for Spanish university graduates from the year 2000 and interviewed in 2005. For each type of skill respondents have evaluated in a Likert-type scale their own level with 1 being the lowest level and 7 being the highest level. We have coded as having a certain type of skill if an individual answered at least level 5. This way we were able to construct an index recounting all skills that individuals had with a level of at least 5. It permitted us to test explicitly if a higher number of skills was positively associated with the probability of self-employment. We used self-employment as a proxy for entrepreneurship. This is a common practice in the entrepreneurship literature, especially if one studies the occupational choice between self-employment and wage-employment (Parker, 2009).

Results suggest that having a larger number of skills is positively associated with being self-employed. This finding is robust to controls for fields of study (Bae et al., 2014) and economic sectors (Simoes et al., 2015). Our results demonstrate the empirical validity of Lazear's jack-of-all-trades theory for a sample of university graduates in Spain. Similar findings were shown for Germany (Wagner, 2006) the US (Baumol, 2005) and Canada (Åstebro and Thompson, 2011). In contrast, Silva (2007), testing the JAT hypothesis on Italian data, demonstrated that individuals with more taste for variety change jobs more frequently and learn more skills in different jobs. Accordingly, taste for variety and not skills variety would be responsible for the mechanism in Lazear's theory. In order to test this hypothesis we add an explicit control for the number of

previous jobs. Our results reject Silva's hypothesis as the coefficient for the number of previous jobs remained insignificant across all model specifications.

Our paper contributes to the literature on the determinants of entrepreneurship in two ways. Firstly, we show that the number of skills is positively associated with becoming an entrepreneur as proposed by Lazear. Secondly, we do not find empirical support for the hypothesis of Silva that the root of more skills observed among entrepreneurs is their taste for variety.

We also show that entrepreneurship education is positively related to the number of skills. This suggests that entrepreneurship education both directly and indirectly (via skills variety) influences the probability of self-employment. Nevertheless, the positive association of skills variety with self-employment in a model that controls for entrepreneurship education, shows that relevant skills variety does not stem from entrepreneurship education alone.

Despite the richness of our data the paper is not free from limitations. Firstly, the measures of skills are self-reported. This may have affected our result in a significant way. More self-confident individuals may artificially inflate the evaluations of their skills whereas the opposite may occur for their more shy peers. Secondly, we cannot control for unobservable heterogeneity stemming from both cognitive as well as non-cognitive abilities. We alleviate these flaws with our controls for skills and grade point average at secondary education but a panel structure in the data would permit us stronger conclusions.

In conclusion, we observe that a wider menu of skills in Spain helps university graduates become self-employed and that such a higher skills variety can be achieved, at least to some extent, through the wider implementation of entrepreneurship education.

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