

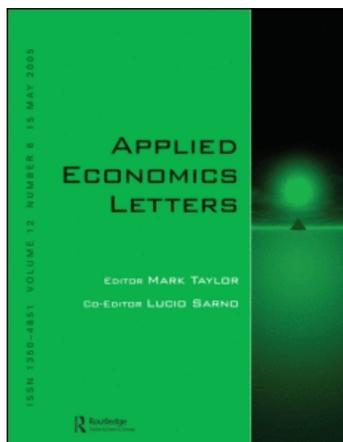
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Martin Falk ^a; Thomas Leoni ^a

^a Austrian Institute of Economic Research WIFO, Vienna, Austria

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Characteristics of self-employment among university graduates

Martin Falk and Thomas Leoni*

*Austrian Institute of Economic Research WIFO, P.O. Box 91, A-1103
Vienna, Austria*

In this article, we investigate the characteristics of nonagricultural self-employment (SE) among university graduates in Austria. Probit regressions based on 380 000 observations from the country's 2001 population census indicate that the probability of choosing SE rises significantly with age. We find that men are more likely to be entrepreneurs than women. There are also strong sectoral and regional effects, such as higher probabilities in rural areas. Furthermore, we observe a significant link between the propensity to be self-employed and the type of university degree. Our findings concerning the relationship between citizenship and SE indicate that highly-skilled immigrants from low-wage countries are less likely to be entrepreneurs than native-born citizens and graduates from high-wage countries.

I. Introduction

A review of the related literature indicates that the self-employed are a heterogeneous category, comprising groups of persons with very diverse skill-levels, social backgrounds and motivations to become self-employed (see e.g. Evans and Leighton, 1989; Cowling and Taylor, 2001; Falter, 2005). The self-employment (SE) rate tends to increase with the level of education, however there is little empirical evidence on the determinants of SE of specific skill-groups. Recently, industrialized countries have experienced a strong increase in the number of self-employed persons with university degrees. In Austria, for instance, the number of self-employed workers with university degrees (excluding agriculture) increased by 4.1% per year between 1994 and 2003, compared to a 2.4% increase in the total number of nonagricultural self-employed workers.

This article aims to help facilitate a better understanding of the self-employed by exploring their characteristics. Exhaustive data from Austria's 2001 population census is used to focus on university graduates in the labour pool. Finnie and Laporte (2003) investigate SE patterns among Canadian university graduates. They provide descriptive statistics confirming the general view that men have a higher propensity of SE than women and that the likelihood of SE increases with age (i.e. with labour market experience).¹ Rates of SE are highest among health science graduates, followed by the applied sciences and lowest among graduates in pure sciences. Concerning occupation, there are patterns indicating high rates of SE in the service sector and low rates in manufacturing. Our objective is to provide multivariate evidence using probit regressions, with a particular focus on field of study and the citizenship/migratory background of

*Corresponding author. E-mail: thomas.leoni@wifo.ac.at

¹ The negative correlation between (female) gender and entrepreneurship has recently been confirmed by Ekelund *et al.* (2005) and Brown *et al.* (2006). On the relevance of age as a factor explaining SE see, among others, Rees and Shah (1986), Luber *et al.* (2000) and Georgellis and Wall (2005).

the self-employed. The structure of the article is as follows: Section II presents the data and the empirical methodology used. The results, along with some concluding considerations, are provided in Section III.

II. Data and Methodology

We use data from Austria's 2001 population census, which contains socio-demographic characteristics, as well as information covering field of study, sector of employment and regional district. A set of variables that enable us to account for ethnic background and citizenship is also included. Self-employed workers are defined as those individuals who identify themselves as self-employed by their own business or professional practice. Unpaid family workers are also counted as self-employed, but persons working in the agricultural sector² are excluded from the sample. Information on the regional districts has been clustered using a classification based on economic and demographic characteristics.³ Education level is measured by the ISCED (International Standard Classification of Education). The ISCED is a system for classifying educational statistics to facilitate international comparison. ISCED 0–2 are the lowest levels, while 5–6 are the highest (university degree or equivalent). The analysis is restricted to university graduates and labour force participants between the ages of 20 and 64 years. The resulting sample size is 378 497 or 378 341 observations, depending on the variables included. Descriptive statistics are shown in table 1.

Our main interest consists of the fundamental factors determining an individual's state of employment at a given point in time. In other words, we are concerned with the probability of observing an individual in either wage employment (WE) or SE. The starting point for the empirical model is the utility maximization function of a labour force participant (Lechner and Pfeiffer, 1993). For simplicity's sake, we initially assume that the individual faces two choices: SE or WE. These two alternatives provide the individual with a hypothetical utility, the level of which is determined by the pecuniary and nonpecuniary returns from either SE or WE and by the individual's idiosyncratic characteristics as captured by a set of variables. Changes in any of

these variables may change the probability of a person being self-employed. Accordingly, the utility maximization process will induce a labour force participant to opt for SE if the utility of being self-employed is higher than that of being wage employed. Provided the above decision procedure is valid, our estimation takes the form of a simple probit equation. In order to analyse the determinants of the probability of being self-employed, we use the following binary probit model (individual index i is suppressed for convenience):

$$y^* = \beta_0 + \beta_{a1}x_a + \beta_{a2}x_a^2 + \beta_f x_f + \sum_{g=1}^2 \beta_m x_{mg} + \sum_{h=1}^7 \beta_r x_{r,h} + \sum_{j=1}^{13} \beta_s x_{s,j} + \sum_{k=1}^{14} \beta_{st} x_{st,k} + \sum_{n=1}^7 \beta_{lg} x_{lg,n} + \sum_{o=1}^9 \beta_c x_{c,o} + e$$

The latent variable y^* is observed as a binary variable y , which is defined as:

$$y = \begin{cases} 1 & \text{if } y^* > 0 \\ 0 & \text{if } y^* \leq 0 \end{cases}$$

The binary dependent variable y takes the value of 1 for SE and 0 for WE. The parameters to be estimated are denoted as: $(\beta_0, \dots, \beta_c)$ and can be estimated by maximum likelihood. x_a denotes age; x_f is a dummy variable taking the value 1 for women; x_m denotes a set of dummies for marital status; x_r is a set of dummies that capture regional districts with distinctive economic features; x_s denotes the dummies for the sector; x_{st} is a set of dummies for field of study; x_{lg} is a set of dummies for language spoken in the household; and x_c is a set of dummies that indicates either country of birth or citizenship of the individual. Random factors, as well as unobservable factors influencing the employment decision, are captured by the error term e .

III. Empirical Results

Table 2 displays the estimation results of the probit model of the determinants of SE for university graduates. We present marginal effects indicating the change in predicted probability of SE given an

² Here, the agricultural sector is understood to include fishing. It consists of the NACE (Classification of Economic Activities in the European Community) categories 1 through 5.

³ The classification of the regional districts is based on factors like capital intensity, population density and sectoral employment concentration. For a detailed description of the methodology see Palme (1995).

Table 1. Descriptive statistics (dummy variables multiplied by 100)

self-employed	14.5	polytechnic degree	1.8
age	41.0	health programs	5.2
age squared	1766.5	education	18.7
female	47.9	college ('Kolleg', 'Akademie')	6.3
single	35.2	language dummies	
married	56.2	German	89.9
divorced/widowed	8.5	Slavic	5.1
regional dummies		Turkish	0.4
metropolitan area	35.9	English	1.9
large cities	20.6	French	0.4
suburban areas	10.0	Italian	0.3
regional centers	6.9	other European languages	0.8
industrialised areas	9.5	other languages	1.2
intensive tourism areas	4.2	country of birth dummies	
peripheral industrialised areas	5.9	birth country Austria	85.6
rural areas	6.9	birth country EU15/EFTA	5.5
sectoral dummies		birth country NEW EU	2.8
other production	0.9	birth country Other OECD	0.6
consumer manufacturing goods	0.8	birth country other CEEC	1.3
intermediate manufacturing goods	3.3	birth country Yugoslavia	1.5
investment goods	3.4	birth country Turkey	0.4
construction	1.5	birth country Africa, Arabic	0.9
trade, hotels and restaurants	8.9	birth country Asia	1.0
transport	1.6	birth country South America	0.3
communication	0.8	country of citizenship dummies	
financial intermediation	4.6	citizenship Austria	92.6
business services	14.0	citizenship EU15/EFTA	3.7
public administration	6.8	citizenship NEW EU	1.0
education	31.5	citizenship Other OECD	0.4
health	15.9	citizenship other CEEC	0.6
other personal services	6.0	citizenship Yugoslavia	1.0
field of study dummies		citizenship Turkey	0.2
religious studies	1.6	citizenship Africa, Arabic	0.3
law	7.6	citizenship Asia	0.3
social sciences	12.0	citizenship South America	0.1
medical degree	9.4		
humanities	12.6		
natural science	7.0		
pharmacy	1.3		
sports	0.8		
engineering & construction	2.0		
agriculture	9.8		
arts	4.1		

Source: Austrian Census of population 2001. All figures are expressed in %, with the exception of age and age squared.

infinitesimal change in each individual dependent variable, holding all other variables at their means. Wald tests of joint significance for each set of dummy variables indicate that the probability of SE differs significantly with marital status, region of residence, industry affiliation, field of study, language, country of birth and citizenship (see table 3). Age and its squared term are important determinants of the probability of SE among the highly skilled. As people get older, they are more likely to become self-employed. This is consistent with the theoretical literature, according to which workers have

a tendency to accumulate some labour market experience before attempting to become self-employed (see e.g. Luber *et al.*, 2000). In our specification, age is also likely to be accompanied by the availability of capital, which is an important determinant of entrepreneurial activity (see e.g. Holtz-Eakin *et al.*, 1994; Blanchflower, 2000). The negative sign of the coefficient of age squared indicates an inverted-U relationship between the probability of SE and age. This is also in line with our expectations, although the magnitude of the coefficient indicates that, for university graduates,

Table 2. Probit estimates of the probability of being self-employed

	(i)		(ii)	
	marg effect	z-value	marg effect	z-value
age	0.008**	17.04	0.008**	17.27
age squared	0.000**	-9.29	0.000**	-9.63
female	-0.019**	-18.86	-0.020**	-19.36
married (ref. category: single)	-0.001	-0.92	-0.001	-1.25
divorced/widowed	0.010**	5.33	0.009**	5.08
large cities (ref. category: metropolitan)	0.000	0.38	0.001	0.65
suburban areas	0.046**	25.43	0.046**	25.56
regional centres	0.016**	7.75	0.016**	7.94
industrialised areas	0.049**	25.41	0.049**	25.57
intensive tourism areas	0.063**	22.55	0.063**	22.63
peripheral industrialised areas	0.068**	27.78	0.069**	28.08
rural areas	0.055**	24.06	0.056**	24.32
other production (ref. cat: investment goods)	0.040**	5.54	0.040**	5.60
consumer manufacturing goods	0.103**	13.1	0.104**	13.11
intermediate manufacturing goods	0.077**	14.87	0.078**	14.91
construction	0.166**	23.65	0.165**	23.60
trade, hotels and restaurants	0.236**	42.09	0.235**	41.96
transport	0.125**	18.65	0.125**	18.67
communication	0.041**	4.87	0.040**	4.81
financial intermediation	0.090**	17.33	0.090**	17.33
business services	0.354**	61.79	0.354**	61.85
public admin	-0.078**	-23.35	-0.078**	-23.27
education	-0.019**	-5.25	-0.018**	-5.07
health	0.158**	30.84	0.158**	30.84
other personal services	0.224**	37.81	0.225**	37.84
religious studies (ref. category. law)	-0.076**	-27.33	-0.077**	-27.47
social sciences	-0.035**	-21.03	-0.035**	-21.21
medical degree	0.070**	23.98	0.069**	23.81
humanities	0.005**	2.51	0.005**	2.32
natural science	-0.049**	-25.03	-0.049**	-25.28
pharmacy	-0.032**	-10.04	-0.031**	-9.94
sports	-0.007	-1.43	-0.008	-1.63
engineering & construction	-0.048**	-17.36	-0.048**	-17.43
agriculture	-0.027**	-14.73	-0.028**	-15.26
arts	0.075**	24.25	0.073**	23.74
polytechnic degree	-0.032**	-10.57	-0.033**	-10.97
health programs	-0.040**	-16.85	-0.040**	-16.86
education	-0.088**	-43.47	-0.089**	-43.52
college ('Kolleg', 'Akademie')	-0.048**	-25.53	-0.048**	-25.54
Slavic (reference category German)	-0.009**	-2.98	-0.022**	-9.76
Turkish	-0.002	-0.17	-0.002	-0.24
English	0.029**	7.63	0.023**	6.32
French	0.006	0.91	0.006	0.91
Italian	0.038**	4.38	0.035**	4.04
other European languages	0.004	0.83	0.003	0.64
other languages	0.009*	1.73	-0.001	-0.14
birth country EU15/EFTA (reference category AT)	0.005**	2.43		
birth country NEW EU Member	-0.021**	-7.36		
birth country other OECD	0.007	1.2		
birth country other CEEC	-0.009**	-2.22		
birth country Yugoslavia	-0.040**	-10.88		
birth country Turkey	0.012	0.95		
birth country Africa, Arabic country	0.003	0.53		
birth country Asia	-0.022**	-4.81		
birth country South America	0.011	1.22		
citizenship EU15/EFTA (ref. cat. AT)			0.009**	3.75
citizenship NEW EU			-0.015**	-3.17
citizenship Other OECD			0.019**	2.65

(continued)

Table 2. Continued

	(i)	(ii)	
citizenship other CEEC		0.013*	2.11
citizenship Yugoslavia		-0.032**	-7.32
citizenship Turkey		0.021	1.48
citizenship Africa, Arabic country		0.006	0.74
citizenship Asia		-0.008	-0.99
citizenship South America		0.020	1.39
# of Observations	378 497	378 341	
Pseudo R ²	0.221	0.221	

Notes: * (**) denotes significance at the 0.10 (0.05) level.

Table 3. Wald tests of joint significance

Specification (i) (d.o.f. in parentheses)	chi ²	p-Value
marital status (2)	45.4	0.00
Region (7)	2077.6	0.00
industry affiliation (13)	22656.3	0.00
field of studies (17)	10159.5	0.00
language (7)	89.1	0.00
country of birth (9)	180.3	0.00
specification (ii)		
citizenship (9)	94.9	0.00

the switch to SE remains an attractive option for longer than it does for the rest of the labour force. Figure 1 shows that the probability to be self-employed is more than twice as high among 50-year-old highly skilled workers as among those 30 years of age. This age effect peaks at a hypothetical age of 90 years. Note that the oldest university graduate in the sample is 64 years old. Interestingly, even when focusing on the well-educated and controlling for sector of occupation, we find that the probability of being self-employed is significantly higher for men than for women. A male with a university degree is 1.9 percentage points more likely to be self-employed than a comparable female. In numerous studies, marriage is associated with a positive impact on SE, arguably because it provides stability and thus a suitable background for the risks associated with self-employed activity (Le, 1999). Our results do not corroborate this expectation; however, we find that divorced individuals are more likely to be self-employed than those who have never been married with a marginal effect of 1 percentage point.

The coefficients for industry affiliation are all sizeable. The probability of SE is highest in business services, wholesale and retail trade and hotels

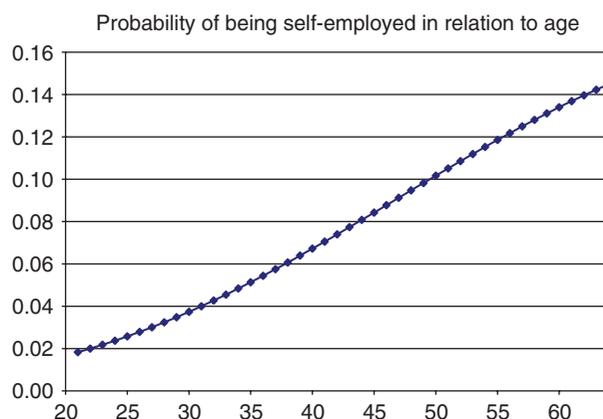


Fig. 1. Relationship between age and the probability of SE
Notes: Calculated as cumulative normal distribution of the coefficients of age and age squared multiplied by the values of age and age squared.

and restaurants. Not surprisingly, we find that the probability is lowest in public administration, education, and manufacturing (e.g. other production and the reference group, the investment goods industry).⁴ Turning to the regional effects, we find that there is a tendency for university graduates to exhibit higher SE rates in areas featuring heavy tourism. This can be explained by the large number of capital- and skill-intensive small enterprises, as well as of small businesses in rural Austria. The propensity of university graduates to be self-employed is also significantly higher in rural areas and peripheral industrialized areas than in metropolitan areas. This is an interesting finding that suggests that, when conditions on the labour market are unfavourable, SE can be a second-best option among the highly educated, as well.⁵ The low coefficient for districts in metropolitan areas and other large cities indicates that, in these areas, the presence of administrative centres and company headquarters provides

⁴ Other production includes mining, energy and water.

⁵ According to the recession-push theory, bad or worsening perspectives in paid employment push workers towards SE (Taylor, 1996).

university graduates with attractive job opportunities in WE. The propensity to be self-employed also varies significantly with field of study: as expected, it is highest among graduates in medicine and law. A high probability of SE is also found for graduates with degrees in art and, to a lesser extent, humanities. Those with a degree in educational studies have the lowest likelihood of being their own boss. Also of interest is the fact that graduates of polytechnic colleges, a recent and distinctive feature of the Austrian educational system, are not likely to be self-employed. One explanation for this finding may be the lower skill level associated with a shorter duration of study.

In order to investigate whether foreigners with university degrees have a lower or higher probability of SE, we apply two different specifications. First, we use country of birth to define nationality, taking Austrians as the reference group. Alternatively, we use citizenship as a measure of nationality. Note that persons born in Austria are not automatically Austrian citizens. In addition, we use the spoken language. When we define nationality as country of birth, we find that university graduates from the new EU member states, the former Yugoslavia, and Asia are all significantly less likely to be self-employed than Austrians. This conforms to the notion that the propensity of ethnic minorities and immigrants to become entrepreneurs depends on the existence of ethnic enclaves (Borjas, 1986). In contrast, people born in the EU-15 states have a significantly higher propensity to employ themselves than Austrians. When nationality is defined as citizenship, we find similar results. Again, respondents from the EU-15, EFTA and other OECD countries are more likely than university graduates from other countries to become entrepreneurs. University graduates who speak Italian/English at home are 2.9/3.8% points more likely to be self-employed than German-speaking people. The Slavic languages are associated with a significant drop of 1 percentage point in probability of SE.

IV. Conclusions

Our results are consistent with a number of findings from previous research, while at the same time presenting a nuanced picture of university graduates' employment decisions. Evidence points to the notion that university graduates behave similarly to the remaining labour force, choosing SE dependent on sectoral circumstances and regional labour market conditions. Arguably, the skills they possess allow

them to switch to SE at later stages of their careers, as well. The gender gap in the propensity to be self-employed within this comparatively homogeneous population is noticeable and deserves further attention. The same holds for the differences characterizing persons with a different ethnic background. Alternative measures of citizenship point to the conclusion that the SE rate of highly-skilled immigrants from low-wage countries is somewhat lower than that of native-born citizens and graduates from high-wage countries. This finding may be associated with capital constraints and represents an issue that is of particular relevance to policy makers.

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