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Article abstract

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Formal Lifelong E-Learning for Employability and Job Stability During Turbulent Times in Spain


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Abstract

In recent decades, international organizations have developed initiatives that incorporate lifelong learning as a tool to increase the employability of citizens. In this context, the goal of this research is to test the influence of formal e-learning on estimating employment status. The research made use of a sample of 595 citizens in 2007 and 1,742 citizens in 2011, using microdata from Eurostat's Adult Education Survey (AES) implemented by the Spanish Statistical Office [Instituto Nacional de Estadística] (INE) in Spain. Controlling for socio-demographics and formal education-level information, multiple binary logistic and ordinal regression models on formal education activities are used to check the separate effects of independent variables and demonstrate that Spanish people who have done formal lifelong e-learning activities are more likely to have an employment contract: i) in 2007, before the start of the economic crisis, for all individuals; ii) in 2011, during the economic crisis, for all individuals; iii) in 2011, for individuals with any level of computer literacy; iv) in 2011, for individuals whose highest education level is primary, secondary, or post-secondary non-tertiary; and v) in 2011, for individuals having more stable employment contracts, understood as a combination of duration (temporary, permanent), and working hours (part-time, full-time). Consequently, after inferential judgements based on the empirical results, it is shown that one of the most important factors for estimating employability in times of economic crisis has to do with lifelong e-learning. Moreover, formal e-learning activities can be a strategy for obtaining better job stability.

Keywords: employability, economic crisis, e-learning, lifelong learning, job stability

Introduction

The recent progress in accessing and using information and communication technologies (ICT) has led to numerous social changes. The study of working life and technological developments and their relationships with educational contexts have attracted the interest of researchers (Aceto, Borotis,

Devine, & Fischer, 2014). Specifically, this is true in countries such as Spain, traditionally associated with low levels of innovative, technological, and knowledge intensity, and great problems of youth employability (Moreno Mínguez, 2015).

On the one hand, institutions like UNESCO, OECD, and the European Union have been implementing lifelong learning initiatives for decades, such as the Faure Report and the Delors Report, which have been oriented to the development of abilities and professional skills to increase the competitiveness of countries (Manuelli & Seshadri, 2014). These actions have been designed for formal, non-formal, and informal adult education (Kaufmann, 2015). They aim to develop the skills needed by professionals in the 21st century, and to improve the employment security of citizens and workers (Morgan, Genre, & Wilson, 2001).

On the other hand, in a context of growth constrained by the onset of the economic crisis at the end of the last decade, many young people have not found it easy to choose between studying to develop themselves professionally or gaining work experience directly (Maiolo, Cortini, & Zuffo, 2013). Specially, this is true because the new approaches to the world of work and education are related to work-related learning (Kyndt & Baert, 2013), and labor legislation has favored temporary contracts for young people which has damaged their professional development and long-term welfare (García-Pérez, Marinescu, & Vall-Castelló, 2016).

Considering all this, the study of the relationship between education and manpower is relevant for great social issues. It was demonstrated through research related to the concept of employability, which suggests several relationships with dimensions related to emotions, commitment, and self-esteem (Fugate & Kinicki, 2008). Moreover, various strong relationships exist between training, employment security, and subjective measures in people with low education levels (Bassanini, 2006). Moreover, trends towards flexicurity as a way of job security have been placed on the table (Muffels & Luijkx, 2008). All of this occurs in a context of relationships between dispositional employability and e-learning (Torrent-Sellens, Ficapal-Cusí, & Boada-Grau, 2016).

In this sense, there is a need to research the factors that influence the employability of citizens throughout different periods and economic cycles, and their links with new possibilities of e-learning in the context of lifelong learning. This is due the necessary stimulation that less educated people need to be enrolled in training (Sanders, Oomens, Blonk, & Hazelzet, 2011), the impact that vocational training has on the productivity of countries (Sala & Silva, 2013), and the great importance of e-learning for vocational education and training (Inayat, Amin, Inayat, & Salim, 2013). This study focuses on this gap by exploring human capital factors, such as education, that affect the employability of citizens before and during periods of economic crisis. It takes into account two kind of types of factors: socio-demographic variables, and formal e-learning as a tool for being employable in the 21st century.

Theoretical Context and Hypotheses

This article falls within the context of the implementation of the human capital theory, proposed during the 1960s by Theodore W. Schultz and Gary S. Becker. This theory has close ties to citizen employability, as was proposed by Michael J. Piore and Peter B. Doeringer's "queue theory" and Kenneth J. Arrow's "theory of discrimination". People have to develop their human capital, and not only through education, but also in terms of transversal and personal skills beyond those typically associated with specific and technical skills (Andrews & Higson, 2008).

Moreover, there is a context where the existence of a skill-biased technical change (SBTC) explains the increase in the level of employment of the most educated workers and better skills (Sanders, 2013), a wage growth and purchasing power of workers in the knowledge society (Peracchi, 2006), and the existence of skill mismatching (Desjardins & Rubenson, 2011). Furthermore, the relationship between level of education and work are not always direct, both from a standpoint of overqualification existing in society (Leuven & Oosterbeek, 2011) and investment in education (Davidson & Sly, 2014). As expected, new technologies and their associated processes are changing current and future jobs (Frey & Osborne, 2017; Hodgson, 2016).

The research also fits into existing trends and projections about the future of education. Thus, areas such as lifelong learning -hinted early last century by John Dewey, Alfred E. Smith, and Basil Yeaxlee (Jarvis, 2004)-, applications and uses of ICT in educational contexts, and the globalization of training (Stoyanov, Hoogveld, & Kirschner, 2010), are essential elements for the development of human capital through different educational processes.

In addition, scenarios in which the acquisition of different skills and abilities (professional, learning, social, personal) through new pedagogies (focused and student-centered, interactive, social, at in any time and place), are also theoretical elements taken into account in the future of the world of education and learning (Redecker et al., 2011). And all this within constraints, challenges, and considerations of learning through distance methodologies developed on the Internet (e-learning), such as the globalization of knowledge, the development of open educational resources, and seamless learning (Wong, 2012).

Taking into account all this, it is important to note that the Global Financial Crisis has changed labor conditions and human resource development policies related to training. Companies do not offer training as before but they are using low cost-based online learning (Keeble-Ramsay & Armitage, 2015), which needs new successful and pedagogical approaches in order that mid-career workers contribute to economic revitalization (Booker & Tucker, 2014). Moreover, e-learning is considered a good tool for the efficiency of higher education in countries affected by the crisis (Rennie, Jóhannesdóttir, & Kristinsdottir, 2011).

In the same way, the economic downturn has changed adult education's purposes and knowledge that can be classified as useful for life (Brown, 2010). Lifelong learning has to be understood as a way for reflexive activation in transition between work and education, helping to gain respect, dignity, and self-esteem (Tuama, 2016). For instance, Spanish youth face many problems in school-to-work transitions because there is an educational exclusion for people without compulsory secondary

education, many difficulties in returning to formal learning, and a lack of public policies for them (Salvà-Mut, Thomás-Vanrell, & Quintana-Murci, 2016).

Noting a trend where universities are widening social inequalities related to neoliberalism (Holmwood, 2014), it becomes relevant to analyse the outcomes of employability gained through online education. Especially since this learning mode is not being analysed from both the standpoint of adults in higher education (Broek & Hake, 2012) and in organisations (Frerichs, Lindley, Aleksandrowicz, Baldauf, & Galloway, 2012). Moreover, this is happening within an economic and social context that changes how career development is managed (Barabasch, Merrill, & Zanazzi, 2015), and where students have the possibility to choose between face-to-face or e-learning systems, according to several successful factors and research approaches that do not include employability outcomes (Broadbent & Poon, 2015; Lin & Wang, 2012; Mohammadi, 2015).

So, it is necessary to investigate the value of formal lifelong e-learning activities for employability and job stability in times of economic crisis, i.e., whether e-learning influences the employment status of citizens, both in times of economic crisis and not in crisis. For this, five hypotheses were developed. These will be tested by using multivariate regression analysis with official data from Spain:

> H1. People who have done formal lifelong e-learning activities are more likely to have an employment contract in 2007, before the start of the economic crisis.
>
> H2. People who have done formal lifelong e-learning activities are more likely to have an employment contract in 2011, during the economic crisis.
>
> H3. People who have done formal lifelong e-learning activities are more likely to have an employment contract in 2011, regardless of their level of computer literacy.
>
> H4. People who have done formal lifelong e-learning activities are more likely to have an employment contract in 2011, for individuals whose highest education level is primary, secondary, or post-secondary non-tertiary.
>
> H5. People who have done formal lifelong e-learning activities are more likely to have a more stable employment contract in 2011, understood as a combination of duration (temporary, permanent) and working hours (part-time, full-time).

Method

Adult Education Survey (AES)

Data collection. The Eurostat, the Statistical Office of the European Union, was taken into account for data collection. In Spain, this initiative was developed through the Adult Education Survey (AES), which was performed by the Spanish Statistical Office [Instituto Nacional de Estadística] (INE)

in 2007 and 2011. People provided information about their participation in training activities in the prior 12 months, which were related to formal lifelong education activities and their characteristics, such as the use of information and communication technologies (ICT), duration, application to the workplace, and source of funding. The collection method was computer-assisted personal interviewing (CAPI), in which the interviewer visited the dwelling and asked for the information necessary to fill out the electronic questionnaire.

Participants. According to the approach followed by Eurostat and the National Statistics Institute in Spain (Instituto Nacional de Estadística [INE], 2012), the population scope comprised those persons aged 25 to 74 years old in 2007 and 18 to 65 years old in 2011 and living in family households. The type of sampling used was a stratified two-stage sampling. The first-stage units were the census tracts and the second-stage units were adults with their regular residence in the main dwellings in the section. The frameworks for the sample selection were two frameworks of areas comprising the listing of existing census sections in February 2007 and 2011. For the second-stage units, these used the listing of persons in each one of the sections selected for the samples.

The stratification criteria used were the size of the municipality to which the section belonged, as well as the main socio-demographic characteristics thereof. The strata considered municipalities with respect to their number of inhabitants. For each Autonomous Community and Autonomous City -a first-level geographical, political and administrative division in Spain, according to the nomenclature of territorial units for statistics (NUTS 2), which is a hierarchical system for dividing up the economic territory of the European Union- an independent sample was designed to represent it.

Therefore, the samples were distributed among Autonomous Communities and Cities, assigned one uniform part and another part proportional to the size of them, obtaining the distribution shown in Table 1. The final sample size included 24,030 persons in 2007 and 32,000 persons in 2011. After cleaning the fieldwork data, the microdata from the 2007 (20,009 individuals) and 2011 surveys (17,829 individuals) were made publicly accessible through the INE website.

Thus, two datasets based on the research criteria were created by removing observations, dealing with outliers, and transforming, recoding, creating, moving, labeling, and renaming variables. In this way, the final samples for the research were N=595 (AES Formal Education 2007) and N=1,742 (AES Formal Education 2011) individuals (a confidence level of 95.5%, error margin of ±4.02% in 2007 and ±2.35% in 2011, p=q=0.50, $z_{\alpha/2}$=1,96, infinitive universe).

Table 1 shows the corresponding ratios of samples in the research dataset and AES microdata in 2007 and 2011. As can be seen, the differences between the sample distributions were ±5.1% in 2007 and ±1.7% in 2011. The population density of regions was taken into account to show that the samples had geographical representation of rural and urban areas, one of the most important issues related to employment. This ensured that the samples obtained from the microdata were representative of the Spanish population as a whole.

Table 1

Distribution (%) of Samples, by NUTS 2 Region, Year, and Related Research. Listed by Population Density in Spain

	2007			2011			
Autonomous Community (*)	**Sample**	**Microdata AES**	**Difference**	**Sample**	**Microdata AES**	**Difference**	**Population density** (**)
Castilla-La Mancha	4.0	4.9	-0.9	5.1	5.7	-0.6	26.7
Extremadura	0.8	3.7	-2.9	4.5	4.2	0.3	27.1
Castile and León	6.9	5.7	1.2	4.2	5.3	-1.1	27.1
Aragon	4.2	3.9	0.3	5.0	4.1	0.9	28.3
Navarre	3.0	3.4	-0.4	3.8	3.0	0.8	61.7
La Rioja	2.4	3.0	-0.6	2.4	3.0	-0.6	63.8
Galicia	7.3	6.3	1.0	5.9	5.8	0.1	94.5
Andalusia	11.1	13.1	-2.0	12.1	13.0	-0.9	96.6
Asturias	3.2	4.0	-0.8	2.6	3.7	-1.1	101.7
Cantabria	1.9	3.3	-1.4	3.2	3.1	0.1	112.5
Region of Murcia	5.1	4.0	1.1	4.8	4.5	0.3	129.4
Valencian Community	7.8	7.5	0.3	9.4	7.7	1.7	217.1
Balearic Islands	2.2	3.1	-0.9	2.7	2.9	-0.2	219.6
Catalonia	11.6	11.7	-0.1	10.0	11.5	-1.5	234.6
Canary Islands	9.8	4.7	5.1	5.9	4.5	1.4	278.7
Basque Country	6.2	5.6	0.6	5.5	6.0	-0.5	303.4
Community of Madrid	9.8	9.7	0.1	10.6	9.8	0.8	805.2
Ceuta and Melilla (***)	2.7	2.4	0.3	2.3	2.2	0.1	4,295.6 (Ceuta) 5,990.2 (Melilla)
Total	100.0	100.0	0.0	100.0	100.0	0.0	

(*) Autonomous Community in NUTS 2 region (Eurostat)
(**) Population density in 2011 (person per km²)
(***) Ceuta and Melilla are Autonomous Cities located on the north coast of Africa
Difference = Sample – Microdata AES

Measures

Socio-demographics and individual-level information. Participants were asked to report their gender, age, highest level of education successfully completed, and professional or labour status, which was grouped by employed or profession (temporary/permanent, and part-time/full-time) or not (unemployed, student, retired, disabled for work, domestic tasks, caring for people, and other situations). These variables were combined to design several levels of their job stability. The rule for setting them was the greater the duration and the more working hours, the more stable the employment. Table 2 shows these levels according to not having an employment contract, and temporary/permanent and part-time/full-time characteristics of employment contracts.

Table 2

Levels of Stability of Employment Contracts

Levels for multivariate regression models	Professional and labour status: Employed								
	No (*)	Yes							
		Stability by Duration		Stability by Working hours		Stability by			
						Duration		Working hours	
		Temporary	Permanent	Part-time	Full-time	Temporary	Permanent	Part-time	Full-time
0	Yes								
1	-	Yes		Yes		Yes		Yes	
2	-		Yes		Yes	Yes			Yes
							Yes	Yes	
3	-	-		-			Yes		Yes

(*) Unemployed, student, retired, disabled for work, domestic tasks, caring for people, other situation

Formal lifelong learning activities. Participants reported about their formal lifelong learning activities: face-to-face/online learning mode, average number of instruction hours per week, the main reason for participating in formal lifelong learning activities (to work, to do the job better and/or improve career prospects, to be less likely to lose my job, etc.), and who had paid for these activities (family or not).

Digital literacy. Participants were asked to report about their level of expertise in using computers, with several possibilities related to tasks that can be performed by using computers (copying or moving a file or folder, writing a text using a word processor, using formulas in spreadsheets, installing devices and/or programmes, using databases, programming, etc.).

Data Analysis

Recoding. A dichotomous variable related to being employed was used as a dependent variable. Ordinal and dichotomous variables were created according to Table 2. People were classified into three age groups (34 and under, 35-54 years, 55 and over) and three education levels (groups 0-1-2), according to their highest level of education successfully completed and ISCED 2011 (UNESCO, 2012) (1-2-3: Primary and Secondary education, 4: Post-secondary non-tertiary education, and 5-6-7-8: Short-cycle tertiary, Bachelor, Master, Doctoral, or equivalent, respectively). The Chi-square test of independence showed that all these groups were statistically independent with respect to the dependent variable.

The average number of instruction hours per week was calculated in formal lifelong learning (10 and 20 hours per week, in 2007 and 2011). The lifelong learning method was a dichotomous variable: face-to-face education vs. online education. A dichotomous variable was created for learning activities paid by family. These groups were statistically independent to the dependent variable. The level of using computers was classified into three groups, according to questionnaire used in 2007 and INE's instructions (INE, 2012): beginner (4 and under), advanced (5-7), and expert (8 and over).

Finally, the work-related reason for participating in formal lifelong learning activities was recoded as a dichotomous variable, according to the AES 2007 questionnaire. For finding the work reason in AES 2011, we developed a principal components analysis (PCA) (Table 3) with the related questions and their dichotomous answers. It was done by using the software FACTOR. Unrestricted Factor Analysis (Lorenzo-Seva & Ferrando, 2013) with a classical parallel analysis and a dispersion matrix based on polychoric correlations, direct Oblimin rotation, and weighted Varimax rotation start. It found a component with three valid variables: KMO=0.522 (Dziuban & Shirkey, 1974; Kaiser & Rice, 1974), Bartlett's statistic significant (p=0.000), eigenvalue=1.622, and good cumulative proportion of variance (54.069). Thus, a mean value related to these three answers was constructed as a new variable. The Chi-square test of independence was fine for this variable as well.

Table 3

Principal Components Analysis (PCA) on Work Reason for Participating in Learning Activities in AES 2011 in Spain

Items	Factor 1	
	Loading	Communality
To be less likely to lose my job	0.807	0.651
To do my job better and/or improve career prospects	0.721	0.519
I was obliged to participate	0.672	0.452
Statistics		
Procedure for determining the number of dimensions	Classical Parallel Analysis (PA)	
Dispersion matrix	Polychoric Correlations	
Rotation to achieve factor simplicity	Direct Oblimin	
Clever rotation start	Weighted Varimax	
KMO (Kaiser-Meyer-Olkin)	0.522	
Bartlett's sphericity test χ^2	61.9	
df	3	
p-valor	0.000	
Eigenvalue	1.622	
Variance	0.541	
Reliability	0.575	

Statistical methods. We used IBM SPSS Statistics Version 22 for the data analysis: descriptive, two-sample T-test for comparing means, bivariate correlations (Spearman's rho (rs) between ordinal variables and phi (rϕ) between dichotomous and pairs formed by dichotomous and ordinal variables) (Table 4), and multiple binary logistic regressions (Table 5). Comparisons between correlations were made following Diedenhofen and Musch (2015). The major assumptions of logistic regression modelling were checked. The Box-Tidwell's test, for observing whether relationships between continuous predictors and their logit (log odds) were linear, were not necessary because the dataset did not have any continuous variables. In order to analyse the stability of employment contracts in 2011, multiple ordinal and binary logistic regressions were calculated and analysed.

Reverse causality. We checked the possible reverse causality, where e-learning was the dependent variable and employment contract was the independent variable. For checking the signs of reverse causality, three aspects were considered and analyzed: i) Hosmer and Lemeshow's test (H&L) and effects over time of reverse causality, because we had microdata from 2007 and 2011; ii) Cox and Snell's and Nagelkerke's interval (C&S, N) and their confidence intervals; and iii) split samples by education level.

After checking that $\chi 2$ had $p<0.05$ in the global and split-sample by education level in 2007, we found that H&L was insignificant in formal lifelong learning in 2007 (0.575), but not in 2011 (0.003), so we could reject the hypothesis that the model fit the data, and we did not find any effect over time of reverse causality.

Regarding the year 2007, (C&S, N) was lower with reverse causality than without reverse causality: (0.107, 0.174) and (0.194, 0.272), respectively. We did not find any significant coefficient in education-split samples and their independent variables related to having employment with inverse causality: i) H&L=0.822 but with p=0.998 in Primary and Secondary education; ii) H&S=0.006 but p=0.098 in Post-secondary non-tertiary education; and iii) H&L=0.558 but p=0.117 in Short-cycle tertiary, Bachelor, Master, Doctoral, or equivalent. In this way, we rejected the reverse causality.

Analyses of reverse causality were used in multivariate analysis of stability of employment contracts in 2011 as well. Specifically, ordinal and binary logistic regression models with exchanges between dependent and independent variables were tested looking for H&L. The results (Table 7 and Table 8) show that reverse causalities were rejected.

Results

Descriptive and Bivariate Analysis

Table 4 shows the differences between 2007 and 2011 in formal lifelong learning activities, before and during the periods of economic crisis in Spain. Note that there were differences between the mean scores of 2007 and 2011 at the 5% significance level in all variables. Large differences regarding the number of people with employment contracts in 2007 and 2011 were detected (68% and 37%, respectively). Regarding sociodemographic variables, nearly half of the samples were young women, with a post-secondary non-tertiary education level.

Formal e-learning education activities were slightly higher in the years of non-economic crisis (18% versus 12%, respectively), with less hours per week (M=0.50 and M=0.55). Completing these education activities for work reasons was lower (M=0.45 and M=0.55), with more courses paid by families (M=0.88 and M=0.75). Levels of computer literacy, according to the development of the information society, were much higher in 2011 (M=0.73 versus M=1.32).

Positive correlations between having an employment contract and various variables were detected, regardless of the year 2007 or 2011: with doing formal education activities by e-learning (r_ϕ=0.19 and

r_ϕ=0.24), and doing so for work reasons (r_ϕ=0.21 and r_ϕ=0.13). A negative relationship between the variables having an employment contract and the number of hours spent per week in education activities was found, especially in the years of economic crisis (r_ϕ=-0.18 and r_ϕ=-0.39, with a significant change between years).

Regarding formal education activities by e-learning in 2011, significant positive relationships were detected with work reasons and with more educated people (r_ϕ=0.05 and r_ϕ=0.15). Formal education activities in 2007 and 2011 had more hours when people were younger (r_s=-0.17 and r_s=-0.28, with significant change between years) and had lower education levels (r_s=-0.14 and r_s=-0.18).

Comparing additional results between 2007 and 2011, there were more people working when they had a higher level of education, especially in times of economic crisis (r_ϕ=0.24 and r_ϕ=0.33, with a significant change between years). Moreover, older people had more employment in crisis times than younger (r_ϕ=0.33, with a significant change between years). Direct relationships between better use of computers and being male (r_ϕ=0.23 and r_ϕ=0.18) and having higher education levels (r_s=0.20 and r_s=0.16) were also seen. This was also the case between having a higher level of use of computers and younger people (r_s=-0.18, both in 2007 and 2011).

Table 4

Means, Standard Deviations and Correlations Between the Observed Variables in Formal Lifelong Learning Activities AES 2007 (N=595) and 2011 (N=1,742) in Spain

	Year	*M*	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Employed (1)	2007 2011	0.68 0.37 (mm)	0.47 0.48	-								
Formal lifelong learning method (2)	2007 2011	0.18 0.12 (mm)	0.39 0.33	0.19** 0.24**	-							
Number of hours per week (3)	2007 2011	0.50 0.55 (m)	0.50 0.50	-0.18** -0.39** (cc)	-0.18** -0.23**	-						
Job reasons (4)	2007 2011	0.45 0.55 (mm)	0.50 0.50	0.21** 0.13**	0.08 0.05*	0.07 -0.01	-					
Paid by family (5)	2007 2011	0.88 0.75 (mm)	0.33 0.43	0.16** 0.05* (c)	0.12** 0.10**	-0.13** -0.08**	0.03 -0.00	-				
Digital literacy (6)	2007 2011	0.73 1.32 (mm)	0.65 0.76	0.14** -0.01 (cc)	0.09* 0.01	0.09* 0.08**	0.04 0.01	0.14** 0.08**	-			
Gender (7)	2007 2011	0.41 0.46 (m)	0.49 0.50	0.16** -0.01 (cc)	0.16** -0.05* (cc)	0.03 0.04	0.03 -0.01	0.05 -0.01	0.23** 0.18**	-		
Age (8)	2007 2011	0.44 0.29 (mm)	0.58 0.52	-0.01 0.33** (cc)	0.09* 0.18** (c)	-0.17** -0.28** (c)	-0.04 0.00	-0.07 -0.06*	-0.18** -0.18**	-0.02 -0.04	-	
Highest level of education successfully completed (9)	2007 2011	1.46 1.06 (mm)	0.64 0.70	0.24** 0.33** (c)	0.06 0.15**	-0.14** -0.18**	0.19** 0.09** (c)	0.21** 0.21**	0.20** 0.16**	-0.03 -0.11**	-0.02 0.17** (cc)	-

(m) $p < 0.05$; (mm) $p < 0.01$ [comparing means with t-test]
(c) $p < 0.05$; (cc) $p < 0.01$ [comparing correlations with Fisher's z]
* $p < 0.05$
** $p < 0.01$

Employed (1)={0=No, 1=Yes}
Formal mode (2)={0=Face-to-face, 1=e-Learning}
Number of hours (3)={0=Median and under, 1=Median + 1 and over [Median (2007)=10, Median (2011)=20]}
Job reasons (4)={0=No, 1=Yes}
Paid by family (5)={0=No, 1=Yes}
Digital literacy (6)={0=Beginner, 1=Advanced, 2=Expert}
Gender (7)={0=Female, 1=Male}
Age (8)={0=34 and under, 1=35-54 years, 2=55 and over}
Highest level of education successfully completed (9)={0=Primary and Secondary, 1=Post-secondary non-tertiary, 2=Tertiary}

Multivariate Analysis in 2007 vs 2011

Table 5 shows two parallel multiple binary logistic regressions related to formal lifelong learning activities carried out in 2007 and 2011. The adjustment obtained for the proposed models had valid values: χ^2 with p=0.000, Hosmer–Lemeshow's tests were insignificant (p=0.660 and p=0.294), Cox and Snell's (0.194 and 0.287), and Nagelkerke's (0.272 and 0.391) R^2 indices had good measurements of goodness-of-fit.

Thus, in 2007 and 2011, to be employed in Spain was statistically greater among people with tertiary education (Exp(B)=2.305 and Exp(B)=5.374, compared to the reference group of people with primary and secondary education level), being 35-54 years old (Exp(B)=1.661 and Exp(B)=4.317, compared to the reference group of being 34 and under), doing formal education activities by e-learning (Exp(B)=2.486 and Exp(B)=1.913), and for work reasons (Exp(B)=2.239 and Exp(B)=1.659).

Regarding the year 2007 (without the economic crisis), having advanced skills for using computers (Exp(B)=2.451, compared to the reference group of beginner), being male (Exp(B)=1.899), and attending training paid by families (Exp(B)=1.785) were also considered significant predictors of having an employment contract. It is worth noting that doing formal online education activities had the greatest effect on having an employment contract, slightly surpassing the other relevant variables in having an employment contract, such as being an expert in computer literacy and having tertiary education.

In 2011, four aspects should be taken note of: i) to have a post-secondary non-tertiary education level was a significant variable to having an employment contract (Exp(B)=1.674, compared to the reference group of compulsory education); iii) to conduct a training activity through e-learning reached the third highest position in terms of relative importance as a significant predictor after the variables related to having an university degree and being 35-54 years old; iii) the level of computer literacy did not have any significant relationship to employment contracts; and iv) there were fewer significant variables that helped to estimate employment status, because there were seven variables in 2007 and five variables in 2011. The results confirmed hypotheses H1, H2, and H3.

Table 5

Multiple Binary Logistic Regression Models of Formal Lifelong Learning Activities in Adult Education Survey (AES) in Spain

Independent variables	Dependent variable							
	Employed in before economic crisis Year 2007				Employed in during economic crisis Year 2011			
	B	S.E.	Exp(B)	95% CI	*B*	S.E.	Exp(B)	95% CI
Intercept	-0.726	0.444	0.484	-	-1.537***	0.226	0.215	-
Gender								
Female	-	-	-	-	-	-	-	-
Male	0.642**	0.212	1.899	[1.254, 2.878]	0.235	0.124	1.266	[0.992, 1.615]
Age								
34 and under	-	-	-	-	-	-	-	-
35-54 years	0.507*	0.225	1.661	[1.069, 2.580]	1.463***	0.148	4.317	[3.229, 5.772]
55 and over	-1.476**	0.482	0.229	[0.089, 0.588]	0.388	0.311	1.474	[0.801, 2.711]
Highest level of education successfully completed								
Primary and Secondary	-	-	-	-	-	-	-	-
Post-secondary non-tertiary	-0.025	0.376	0.975	[0.467, 2.038]	0.515**	0.172	1.674	[1.196, 2.343]
Tertiary	0.835*	0.385	2.305	[1.083, 4.905]	1.682***	0.187	5.374	[3.723, 7.759]
Digital literacy								
Beginner	-	-	-	-	-	-	-	-
Advanced	0.262	0.221	1.300	[0.844, 2.003]	0.094	0.183	1.098	[0.767, 1.572]
Expert	0.897*	0.393	2.451	[1.134, 5.301]	0.074	0.178	1.077	[0.759, 1.528]
Number of hours per week								
Median and under	-	-	-	-	-	-	-	-
Median and over	-0.817***	0.211	0.442	[0.292, 0.667]	-1.340***	0.124	0.262	[0.205, 0.334]
Job reasons								
No	-	-	-	-	-	-	-	-
Yes	0.806***	0.209	2.239	[1.485, 3.376]	0.506***	0.123	1.659	[1.304, 2.111]
Paid by family								
No	-	-	-	-	-	-	-	-
Yes	0.580*	0.292	1.785	[1.008, 3.163]	-0.003	0.145	0.997	[0.751, 1.324]
Formal lifelong learning mode								
Face-to-face	-	-	-	-	-	-	-	-
e-Learning	0.911**	0.328	2.486	[1.308, 4.724]	0.649***	0.181	1.913	[1.341, 2.730]
Model summary								
Sample size	595				1,742			
χ^2 (df)	128.582 (11)				588.231 (11)			
χ^2 (Sig.)	0.000				0.000			
(C&S,N)	[0.194, 0.272]				[0.287, 0.391]			
H&L χ^2 (df)	5.889 (8)				9.604 (8)			
H&L (Sig.)	0.660				0.294			

(C&S,N)=(Cox & Snell R^2, Nagelkerke R^2); H&L=Hosmer & Lemeshow; * p<0.05; ** p<0.01; *** p=0.000

Multivariate Analysis in 2011 of People With Non-Tertiary Education Levels

In order to analyse people without tertiary education, who are more likely to suffer in periods of economic crisis, a focused analysis was developed by filtering the education level of people. Table 6 shows two parallel multiple binary logistic regressions related to formal lifelong e-learning activities in 2011 and with three split-samples: primary and secondary, post-secondary non-tertiary, and tertiary education levels. The adjustment obtained for the proposed models had valid values: χ^2 with p=0.000, the Hosmer–Lemeshow's tests were insignificant (p=0.807, p=0.958, and p=0.601), and the Cox and Snell's (0.154, 0.228, and 0.167) and Nagelkerke's (0.237, 0.328, and 0.230) R^2 indices had good measurements of goodness-of-fit as well.

During the economic crisis, and according to compulsory (primary and secondary), post-secondary non-tertiary, and tertiary education levels, it is noted that to be employed in Spain was statistically greater among adult people 35-54 years old (Exp(B)=2.515, Exp(B)=5.092, and Exp(B)=4.473, compared to the reference group of being 34 and under). The importance of learning by formal online

education activities is only significant in people with non-tertiary education (Exp(B)=2.598 and Exp(B)=2.685). It is interesting to note that being enrolled in formal education activities for work reasons had a significant positive relationship with being employed by people with post-secondary non-tertiary and tertiary education levels (Exp(B)=1.655 and Exp(B)=1.738). It was also noted that computer skills are significant in tertiary educated people (Exp(B)=2.371 and Exp(B)=1.992, in people with digital literacy=advanced and digital literacy=expert, compared to the reference group of people with digital literacy=beginner).

Finally, three aspects have to be highlighted: i) when a low level of education exists (primary and secondary), this predictor was the one with the greatest relative importance; iii) to be digitally literate was only relevant for having an employment contract in people with tertiary education; and iii) in post-secondary non-tertiary education, the relative importance of this predictor was surpassed only by being aged 35-54 years old. The results confirmed hypothesis H4.

Table 6

Multiple Binary Logistic Regression Models of Formal Lifelong Learning Activities in Adult Education Survey (AES) in Spain 2011; Split-Sample by Education Level

Independent variables	Dependent variable: Employed in economic crisis year 2011											
	Highest level of education successfully completed											
	Primary and secondary education level				Post-secondary non-tertiary education level				Tertiary education level			
	B	S.E.	Exp(B)	95% CI	*B*	S.E.	Exp(B)	95% CI	*B*	S.E.	Exp(B)	95% CI
Intercept	-1.268**	0.387	0.282	-	-0.812*	0.342	0.444	-	-0.282	0.433	0.754	-
Gender												
Female	-	-	-	-	-	-	-	-	-	-	-	-
Male	0.156	0.291	1.169	[0.661, 2.069]	0.285	0.178	1.330	[0.938, 1.886]	0.149	0.228	1.161	[0.742, 1.816]
Age												
34 and under	-	-	-	-	-	-	-	-	-	-	-	-
35-54 years	0.922**	0.337	2.515	[1.300, 4.865]	1.628***	0.218	5.092	[3.321, 7.807]	1.498**	0.268	4.473	[2.647, 7.556]
55 and over	0.647	0.716	1.909	[0.469, 7.774]	0.228	0.581	1.256	[0.402, 3.927]	0.359	0.421	1.432	[0.627, 3.271]
Digital literacy												
Beginner	-	-	-	-	-	-	-	-	-	-	-	-
Advanced	-0.047	0.347	0.954	[0.484, 1.883]	-0.195	0.273	0.823	[0.482, 1.405]	0.863*	0.361	2.371	[1.170, 4.808]
Expert	-0.600	0.371	0.549	[0.265, 1.135]	0.008	0.261	1.008	[0.604, 1.682]	0.689*	0.342	1.992	[1.018, 3.896]
Number of hours per week												
Median and under	-	-	-	-	-	-	-	-	-	-	-	-
Median and over	-1.396***	0.294	0.248	[0.139, 0.441]	-1.422***	0.182	0.241	[0.169, 0.345]	-1.186***	0.220	0.305	[0.198, 0.470]
Job reasons												
No	-	-	-	-	-	-	-	-	-	-	-	-
Yes	0.338	0.284	1.402	[0.804, 2.445]	0.504**	0.179	1.655	[1.166, 2.349]	0.553*	0.220	1.738	[1.129, 2.676]
Paid by family												
No	-	-	-	-	-	-	-	-	-	-	-	-
Yes	0.421	0.290	1.524	[0.862, 2.691]	-0.169	0.218	0.845	[0.551, 1.296]	-0.170	0.278	0.844	[0.490, 1.454]
Formal lifelong learning mode												
Face-to-face	-	-	-	-	-	-	-	-	-	-	-	-
e-Learning	0.955*	0.426	2.598	[1.128, 5.985]	0.988**	0.293	2.685	[1.513, 4.764]	0.187	0.271	1.206	[0.708, 2.053]
Model summary												
Sample size	374				887				481			
χ^2 (df)	62.530 (9)				229.147 (9)				87.680 (9)			
χ^2 (Sig.)	0.000				0.000				0.000			
(C&S,N)	[0.154, 0.237]				[0.228, 0.328]				[0.167, 0.230]			
H&L χ^2 (df)	4.525 (8)				2.040 (7)				6.410 (8)			
H&L (Sig.)	0.807				0.958				0.601			

(C&S,N)=(Cox & Snell R^2, Nagelkerke R^2); H&L=Hosmer & Lemeshow; * p<0.05; ** p<0.01; *** p=0.000

Multivariate Analysis: Stability of Employment Contracts in 2011

In order to analyse the stability of employment contracts during an economic crisis, several analyses were developed following the classification in Table 2. The main results are shown below, which can be supplemented in Table 7 and Table 8. Specifically, Table 7 shows the main results of three ordinal regressions related to formal lifelong e-learning activities in 2011.

First, the ordinal regression model for stability by duration showed a good adjustment: X^2 with p=0.000, p-Pearson=0.128, and p-Deviance=0.400 higher than 0.05 (Agresti, 2010), p-Parallel Lines=0.183 higher than 0.05 (Tarling, 2009), and the corresponding reverse causality was rejected (p-Hosmer & Lemeshow=0.003<0.05). In this sense, to have more stability by duration, both in people without an employment contract compared to people with a temporary or permanent contract (B=1.464), and in people without an employment contract or with a temporary contract compared to people with a permanent contract (B=2.144), was statistically greater among adult people learning by formal online education activities (B=0.664). So, people doing formal e-learning activities are more likely to have a better stability by duration of employment contract.

Regarding stability by working hours, reverse causality was also rejected (p-Hosmer & Lemeshow=0.000<0.05). But p-Pearson=0.038 and p-Parallel Lines=0.002 lower than 0.05 did not allow us to accept the corresponding ordinal regression model. A similar situation was found in stability by duration and working hours: the reverse causality was rejected (p-Hosmer & Lemeshow=0.001<0.05), but p-Parallel Lines=0.000. To solve this situation, we developed several alternatives by proposing binary logistic regression models. Table 8 shows the main findings of this analysis.

Table 7

Multivariate Regression Models of Formal Lifelong Learning Activities in Adult Education Survey (AES) in Spain 2011 (N=1,742)

Ordinal regression: Independent=Formal lifelong learning method												
	Stability by Duration				Stability by Working hours				Stability by Duration & Working hours			
Independent variables	Threshold	B	SE	95% CI	Threshold	B	SE	95% CI	Threshold	B	SE	95% CI
	Level 0 vs Level 1-2	1.464***	0.213	[1.046, 1.882]	Level 0 vs Level 1-2	1.513***	0.216	[1.089, 1.936]	Level 0 vs Level 1-2-3	1.491***	0.211	[1.078, 1.904]
	Level 0-1 vs Level 2	2.144***	0.217	[1.718, 2.570]	Level 0-1 vs Level 2	2.050***	0.219	[1.621, 2.480]	Level 0-1 vs Level 2-3	1.776***	0.212	[1.360, 2.192]
	-	-	-	-	-	-	-	-	Level 0-1-2 vs Level 3	2.456***	0.217	[2.030, 2.882]
Gender												
Female		-	-	-		-	-	-		-	-	-
Male		0.279*	0.116	[0.051, 0.508]		0.375**	0.118	[0.142, 0.607]		0.356**	0.115	[0.131, 0.581]
Age												
34 and under		-	-	-		-	-	-		-	-	-
35-54 years		1.444***	0.133	[1.183, 1.705]		1.427***	0.136	[1.160, 1.695]		1.458***	0.130	[1.203, 1.713]
55 and over		0.744**	0.284	[0.188, 1.300]		0.596*	0.291	[0.026, 1.166]		0.835**	0.278	[0.291, 1.380]
Highest level of education successfully completed												
Primary and Secondary		-	-	-		-	-	-		-	-	-
Post-secondary non-tertiary		0.568**	0.165	[0.244, 0.891]		0.512**	0.166	[0.187, 0.837]		0.558**	0.164	[0.238, 0.879]
Tertiary		1.590***	0.177	[1.244, 1.937]		1.693***	0.178	[1.344, 2.043]		1.629***	0.174	[1.287, 1.971]
Digital literacy												
Beginner		-	-	-		-	-	-		-	-	-
Advanced		0.035	0.170	[-0.299, 0.368]		0.010	0.173	[-0.329, 0.349]		0.017	0.168	[-0.311, 0.346]
Expert		-0.016	0.166	[-0.341, 0.309]		0.081	0.168	[-0.249, 0.411]		0.041	0.163	[-0.279, 0.361]
Number of hours per week												
Median and under		-	-	-		-	-	-		-	-	-
Median and over		-1.312***	0.118	[-1.543, -1.082]		-1.329***	0.119	[-1.562, -1.096]		-1.334***	0.116	[-1.563, -1.106]
Job reasons												
No		-	-	-		-	-	-		-	-	-
Yes		0.418***	0.115	[0.193, 0.643]		0.467***	0.117	[0.239, 0.696]		0.421***	0.113	[0.200, 0.643]
Paid by family												
No		-	-	-		-	-	-		-	-	-
Yes		-0.004	0.136	[-0.271, 0.262]		-0.043	0.138	[-0.313, 0.226]		-0.025	0.134	[-0.288, 0.238]
Formal lifelong learning mode												
Face-to-face		-	-	-		-	-	-		-	-	-
e-Learning		0.664***	0.161	[0.348, 0.981]		0.609***	0.165	[0.286, 0.933]		0.619***	0.156	[0.312, 0.925]
Model summary	X^2 (df)=620.722 (11); χ^2 (Sig.)=0.000 Pearson χ^2 (df)=780.744 (737); Pearson (Sig.)=0.128 Deviance χ^2 (df)=746.086 (737); Deviance (Sig.)=0.400 (C&S,N)=(0.300, 0.362); McFadden=0.203 Parallel Lines χ^2(df)=14.979 (11); Parallel Lines (Sig.)=0.183 Good model				X^2 (df)=633.454 (11); χ^2 (Sig.)=0.000 Pearson χ^2 (df)=806.555 (737); Pearson (Sig.)=0.038 Deviance χ^2 (df)=750.757 (737); Deviance (Sig.)=0.354 (C&S,N)=(0.305, 0.372); McFadden=0.213 Parallel Lines χ^2(df)=30.131 (11); Parallel Lines (Sig.)=0.002 Alternatives working fine in Table 6				X^2 (df)=649.931 (11); χ^2 (Sig.)=0.000 Pearson χ^2 (df)=1,175.805 (1,111); Pearson (Sig.)=0.086 Deviance χ^2 (df)=969.306 (1,111); Deviance (Sig.)=0.999 (C&S,N)=(0.311, 0.361); McFadden=0.188 Parallel Lines χ^2(df)=175.771 (22); Parallel Lines (Sig.)=0.000 Two alternatives working fine in Table 7 (Model A and Model C)			
	Stability by Duration: Level 0=No employment contract Level 1=Temporary Level 2=Permanent				**Stability by Working hours:** Level 0=No employment contract Level 1=Part-time Level 2=Full-time				**Stability by Duration and Working hours:** Level 0=No employment contract Level 1=Temporary+Part-time Level 2=Temporary+Full-time, or Permanent+Part-time Level 3=Permanent+Full-time			
Reverse causality with binary logistic regression (Dependent=Formal lifelong learning method)												
	Independent											
	Stability by Duration				Stability by Working hours				Stability by Duration and Working hours			
Model summary	χ^2 (df)=195.847 (12) χ^2 (Sig.)=0.000 (C&S,N)=(0.106, 0.202) H&L χ^2(df)=23.592 (8) H&L (Sig.)=0.003 Reverse causality rejected				χ^2 (df)=193.850 (12) χ^2 (Sig.)=0.000 (C&S,N)=(0.105, 0.200) H&L χ^2(df)=28.147 (8) H&L (Sig.)=0.000 Reverse causality rejected				χ^2 (df)=197.642 (13) χ^2 (Sig.)=0.000 (C&S,N)=(0.107, 0.203) H&L χ^2(df)=25.261 (8) H&L (Sig.)=0.001 Reverse causality rejected			

(C&S,N)=(Cox & Snell R^2, Nagelkerke R^2); H&L=Hosmer & Lemeshow; * p<0.05; ** p<0.01; *** p=0.000

First, we created two binary logistic regression models for stability by duration by grouping employment levels (No employment versus Temporary+Permanent; and No employment+Temporary versus Permanent). These models were useful for checking the first result explained in Table 7. We again found that they fit very well (p=0.000 and p-Hosmer & Lemeshow>0.05). The corresponding reverse causalities were rejected as well (p-Hosmer & Lemeshow=0.003<0.05, and p-Hosmer & Lemeshow=0.011<0.05).

Second, we repeated this process in stability by working hours. We grouped employment levels into two cases: No employment contract versus Part-time+Full-time; and No employment contract+Part-time versus Full-time. Then we tested the corresponding two binary logistic regression models. In summary, we found that the adjustment of models was valid (p-Hosmer & Lemeshow=0.294 and p-Hosmer & Lemeshow=0.050). We also rejected the corresponding reverse causalities (p-Hosmer & Lemeshow=0.003<0.05, and p-Hosmer & Lemeshow=0.001<0.05). Thus, to have more stability by working hours was statistically greater among adult people learning by formal online education activities (Exp(B)=1.913, and Exp(B)=1.863).

Finally, we used this process in stability by duration and working hours. We created three models according to Table 2: A) No employment contract versus Temporary+Part-time, Temporary+Full-time or Permanent+Part-time, Permanent+Full-time; B) No employment contract, Temporary+Part-time versus Temporary+Full-time or Permanent+Part-time, Permanent+Full-time; and C) No employment contract, Temporary+Part-time, Temporary+Full-time or Permanent+Part-time versus Permanent+Full-time.

Summarizing the results, we found that two models fit well: specifically, model A (p-Hosmer & Lemeshow=0.294) and model C (p-Hosmer & Lemeshow=0.123) had good adjustments. We rejected again their corresponding reverse causalities (p-Hosmer & Lemeshow=0.003 and p-Hosmer & Lemeshow=0.002 lower than 0.05). Thus, these results confirmed hypothesis 5: people who have done formal e-learning activities are more likely to have a more stable employment contract in 2011, understood as a combination of duration (temporary, permanent) and working hours (part-time, full-time).

Table 8

Multivariate Regression Models of Formal Lifelong Learning Activities in Adult Education Survey (AES) in Spain 2011 (N=1,742)

Binary logistic regression: Independent=Formal lifelong learning method																					
Depenent variable																					
Independent variables	Stability by Duration						Stability by Working hours						Stability by Duration and Working hours								
	Level 0 vs Level 1-2			Level 0-1 vs Level 2			Level 0 vs Level 1-2			Level 0-1 vs Level 2			Model A: Level 0 vs Level 1-2-3			Model B: Level 0-1 vs Level 2-3			Model C: Level 0-1-2 vs Level 3		
	SE of B	Exp(B)	95% CI	SE of B	Exp(B)	95% CI	SE of B	Exp(B)	95% CI	SE of B	Exp(B)	95% CI	SE of B	Exp(B)	95% CI	SE of B	Exp(B)	95% CI	SE of B	Exp(B)	95% CI
Intercept	0.226	0.215***	-	0.250	0.111***	-	0.226	0.215***	-	0.247	0.124***	-	0.226	0.215***	-	0.237	0.157***	-	0.266	0.081***	-
Gender																					
Female	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Male	0.124	1.266	[0.992, 1.615]	0.134	1.442**	[1.108, 1.877]	0.124	1.266	[0.992, 1.615]	0.135	1.628***	[1.250, 2.121]	0.124	1.266	[0.992, 1.615]	0.129	1.361*	[1.056, 1.754]	0.143	1.796***	1.356, 2.379]
Age																					
34 and under	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35-54 years	0.148	4.317***	[3.229, 5.772]	0.145	4.590***	[3.452, 6.101]	0.148	4.317***	[3.229, 5.772]	0.148	4.599***	[3.439, 6.150]	0.148	4.317***	[3.229, 5.772]	0.147	4.585***	[3.436, 6.117]	0.151	4.917***	[3.660, 6.605]
55 and over	0.311	1.474	[0.801, 2.711]	0.308	3.110***	[1.700, 5.687]	0.311	1.474	[0.801, 2.711]	0.316	2.389**	[1.287, 4.437]	0.311	1.474	[0.801, 2.711]	0.312	2.018*	[1.095, 3.720]	0.315	3.862***	[2.085, 7.154]
Highest level of education successfully completed																					
Primary and Secondary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Post-secondary non-tertiary	0.172	1.674**	[1.196, 2.343]	0.198	1.867**	[1.267, 2.751]	0.172	1.674**	[1.196, 2.343]	0.192	1.535*	[1.053, 2.237]	0.172	1.674**	[1.196, 2.343]	0.184	1.779**	[1.240, 2.551]	0.212	1.602*	[1.058, 2.425]
Tertiary	0.187	5.374***	[3.723, 7.759]	0.206	4.380***	[2.926, 6.558]	0.187	5.374***	[3.723, 7.759]	0.201	5.567***	[3.752, 8.259]	0.187	5.374***	[3.723, 7.759]	0.196	5.688***	[3.874, 8.351]	0.217	4.437***	[2.903, 6.784]
Digital literacy																					
Beginner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Advanced	0.183	1.098	[0.767, 1.572]	0.195	1.102	[0.752, 1.614]	0.183	1.098	[0.767, 1.572]	0.196	0.989	[0.673, 1.454]	0.183	1.098	[0.767, 1.572]	0.189	1.006	[0.694, 1.458]	0.207	1.094	[0.729, 1.640]
Expert	0.178	1.077	[0.759, 1.528]	0.190	1.015	[0.699, 1.474]	0.178	1.077	[0.759, 1.528]	0.190	1.185	[0.816, 1.721]	0.178	1.077	[0.759, 1.528]	0.184	1.059	[0.738, 1.519]	0.201	1.146	[0.773, 1.700]
Number of hours per week																					
Median and under	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Median and over	0.124	0.262***	[0.205, 0.334]	0.137	0.256***	[0.195, 0.335]	0.124	0.262***	[0.205, 0.334]	0.136	0.251***	[0.193, 0.328]	0.124	0.262***	[0.205, 0.334]	0.130	0.265***	[0.205, 0.341]	0.150	0.226***	[0.169, 0.303]
Job reasons																					
No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yes	0.123	1.659***	[1.304, 2.111]	0.133	1.414**	[1.090, 1.833]	0.123	1.659***	[1.304, 2.111]	0.133	1.654***	[1.275, 2.146]	0.123	1.659***	[1.304, 2.111]	0.128	1.632***	[1.270, 2.097]	0.141	1.434*	[1.088, 1.891]
Paid by family																					
No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yes	0.145	0.997	[0.751, 1.324]	0.158	1.013	[0.744, 1.381]	0.145	0.997	[0.751, 1.324]	0.156	0.862	[0.635, 1.170]	0.145	0.997	[0.751, 1.324]	0.151	0.922	[0.687, 1.239]	0.167	0.945	[0.681, 1.312]
Formal lifelong learning mode																					
Face-to-face	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
e-Learning	0.181	1.913***	[1.341, 2.730]	0.173	2.012***	[1.432, 2.826]	0.181	1.913***	[1.341, 2.730]	0.177	1.863***	[1.318, 2.634]	0.181	1.913***	[1.341, 2.730]	0.179	2.125***	[1.497, 3.016]	0.176	1.836**	[1.300, 2.592]
Model summary	χ^2(df)=588.231 (11) χ^2 (Sig.)=0.000 (C&S,N)=(0.287, 0.391) H&L χ^2(df)=9.604 (8) H&L (Sig.)=0.294 Good model			χ^2(df)=512.541 (11) χ^2 (Sig.)=0.000 (C&S,N)=(0.255, 0.371) H&L χ^2(df)=8.399 (8) H&L (Sig.)=0.395 Good model			χ^2(df)=588.231 (11) χ^2 (Sig.)=0.000 (C&S,N)=(0.287, 0.391) H&L χ^2(df)=9.604 (8) H&L (Sig.)=0.294 Good model			χ^2(df)=581.844 (11) χ^2 (Sig.)=0.000 (C&S,N)=(0.284, 0.406) H&L χ^2(df)=15.521 (8) H&L (Sig.)=0.050 Good model			χ^2(df)=588.231 (11) χ^2 (Sig.)=0.000 (C&S,N)=(0.287, 0.391) H&L χ^2(df)=9.604 (8) H&L (Sig.)=0.294 Good model			χ^2(df)=592.111 (11) χ^2 (Sig.)=0.000 (C&S,N)=(0.288, 0.402) H&L χ^2(df)=18.017 (8) H&L (Sig.)=0.021 Model rejected			χ^2(df)=517.337 (11) χ^2 (Sig.)=0.000 (C&S,N)=(0.257, 0.388) H&L χ^2(df)=12.695 (8) H&L (Sig.)=0.123 Good model		
	Stability by Duration: Level 0=No employment contract Level 1=Temporary Level 2=Permanent						**Stability by Working hours:** Level 0=No employment contract Level 1=Part-time Level 2=Full-time						**Stability by Duration and Working hours:** Level 0=No employment contract Level 1=Temporary+Part-time Level 2=Temporary+Full-time, or Permanent+Part-time Level 3=Permanent+Full-time								
Reverse causality with binary logistic regression (Dependent=Formal lifelong learning method)																					
	Independent																				
	Stability by Duration						Stability by Working hours						Stability by Duration and Working hours								
	Level 0 vs Level 1-2			Level 0-1 vs Level 2			Level 0 vs Level 1-2			Level 0-1 vs Level 2			Level 0 vs Level 1-2-3			Level 0-1 vs Level 2-3			Level 0-1-2 vs Level 3		
Model summary	χ^2(df)=192.948 (11) χ^2 (Sig.)=0.000 (C&S,N)=(0.105, 0.199) H&L χ^2(df)=23.741 (8) H&L (Sig.)=0.003 Reverse causality rejected			χ^2(df)=193.563 (11) χ^2 (Sig.)=0.000 (C&S,N)=(0.105, 0.199) H&L χ^2(df)=19.809 (8) H&L (Sig.)=0.011 Reverse causality rejected			χ^2(df)=192.948 (11) χ^2 (Sig.)=0.000 (C&S,N)=(0.105, 0.199) H&L χ^2(df)=23.741 (8) H&L (Sig.)=0.003 Reverse causality rejected			χ^2(df)=190.650 (11) χ^2 (Sig.)=0.000 (C&S,N)=(0.104, 0.197) H&L χ^2(df)=25.963 (8) H&L (Sig.)=0.001 Reverse causality rejected			χ^2(df)=192.948 (11) χ^2 (Sig.)=0.000 (C&S,N)=(0.105, 0.199) H&L χ^2(df)=23.741 (8) H&L (Sig.)=0.003 Reverse causality rejected			χ^2(df)=197.637 (11) χ^2 (Sig.)=0.000 (C&S,N)=(0.107, 0.203) H&L χ^2(df)=19.859 (8) H&L (Sig.)=0.011 Reverse causality rejected			χ^2(df)=187.917 (11) χ^2 (Sig.)=0.000 (C&S,N)=(0.102, 0.194) H&L χ^2(df)=25.050 (8) H&L (Sig.)=0.002 Reverse causality rejected		

(C&S,N)=(Cox & Snell R^2, Nagelkerke R^2); H&L=Hosmer & Lemeshow; * p<0.05; ** p<0.01; *** p=0.000

Discussion

Key Findings

The most important outcome has to do with the importance of formal lifelong online education as a factor to provide an adequate explanation for having an employment contract, both in times of economic growth (year 2007) and in economic crisis (year 2011). The findings confirm this fact, especially in 2011, with people who are mostly young, without tertiary education, unemployed, digitally literate, and enrolled in formal lifelong education activities paid by families.

Focusing the analysis on times of economic crisis, this research suggests that people who have done formal lifelong e-learning activities are more likely to have an employment contract, especially if they do not have a university degree. Finally, it tests that these people have more stable employment contracts, understood as a combination of duration (temporary, permanent) and working hours (part-time, full-time). Thus, it shows that developing their human capital by choosing different educational modes during their lives can generate positive outcomes. It should be noted, however, that knowledge and skills, as a part of human capital, are dynamically developed throughout life via numerous inputs (Behrman, 2010).

In a context of job insecurity and precarious employment in Mediterranean countries (Kretsos & Livanos, 2016), Spain has more temporary contracts than other countries (Kahn, 2016), and part-time contracts are common among young people without a degree (Corrales-Herrero & Rodríguez-Prado, 2016). For these reasons, these research outcomes are very useful for future issues related to employability. Moreover, they contribute to the ongoing controversy about work-related training causality for moving to permanent employment (McVicar, Wooden, Leung, & Li, 2016). In this sense, it shows that e-learning is useful in adult education for non-precarious employment. Thus, it provides data related to rarely chances of improving personal situations by obtaining non-precarious jobs expressed by Vono de Vilhena, Kosyakova, Kilpi-Jakonen, and McMullin (2016).

Strengths and Limitations

This analysis contributes to the research on factors influencing the employability of individuals. The approach and methodology can be useful for other researchers investigating educational methodologies and employability. It proposes a multi-dimensional view of formal lifelong learning that takes into account the importance of many personal and learning factors, such as gender, age, education level, number of hours per week, reasons of being enrolled, purchasing power of families to pay for courses, and digital literacy level. Moreover, it rules out the possibility of reverse causality. It takes into account two official surveys and microdata developed by European institutions in 2007 and 2011.

Contributing to the reflection on theories of education throughout life (Edwards, Ranson, & Strain, 2002), the study presents data and evidence on the effectiveness and direct application of e-learning to the contexts of post-secondary and tertiary education. It offers empirical results about how to improve employability skills caused by undertaking e-learning activities (Ficapal-Cusí, Torrent-Sellens, Boada-Grau, & Sánchez-García, 2013). This research shows the value of post-compulsory education and continuing education in the young (Serrano Martínez & Soler Guillén, 2015) and the outcomes of attracting students after the traditional school years (Blanco & Rodríguez-Martínez,

2015). It is important to understand that the links between lifelong learning and online education are fundamental in the current context with inclusive and humanistic initiatives developed by the United Nations (Majhanovich & Brook Napier, 2014) or via MOOCs (Steffens, 2015).

The research argues for the benefits of e-learning for less educated workers, and reaffirms approaches against its lower prestige in the labor market (Barberà Gregori, 2015; Rojas-Rojas, 2014). In this sense, it adds results aligned to its importance to employment factors, such as increasing the salary of the young (Castaño-Muñoz, Carnoy, & Duart, 2015) or integrating groups at risk of social exclusion (Storm, Uiters, Busch, den Broeder, & Schuit, 2015).

Although the study presents data and evidence on the effectiveness of the direct application of e-learning to post-secondary education and university contexts (Bell & Federman, 2013), and adult education (Taha, Czaja, & Sharit, 2016), the study has some limitations. The results should be viewed as a first exploration of education and e-learning factors that affect employability. The findings help to establish a relationship between formal lifelong e-learning and having an employment contract by using the theory of human capital, which has several objections related to its exclusively economic, isolated, and utilitarian orientation of education (Gilead, 2012). On the other hand, the current changing nature of work, jobs, and psychosocial contracts should be considered as well (Alcover, Rico, Turnley, & Bolino, 2016).

Further studies are needed, because it is necessary to consider other situations, such as non-formal education activities and e-learning in work contexts (Tynjälä & Häkkinen, 2005), which may add more explanations to education predictors related to employment. Additionally, more complementary variables (level, number, fields, etc.) and countries would help to increase the understanding of linkages between formal lifelong education and having an employment contract. In this sense, these ideas are suggested for future research, where current findings could be compared to situations found in other European countries.

Conclusion

Research on the need for lifelong learning has been promoted and gradually developed over the past decades, where labor market and businesses have been demanding new skills and abilities in workers. In recent years, the economic crisis has impacted the employability of people. Adding empirical findings to theory of human capital, the study presented here analyses the influence of formal lifelong online education activities on having an employment contract by using Spanish microdata from official European surveys before and during economic crisis. Accordingly, and controlling for socio-demographics and formal lifelong education-level characteristics, the findings suggest that formal lifelong e-learning is an important predictor of having employment. During the crisis years, it particularly helps Spanish citizens who do not have tertiary education. Moreover, it is a good strategy for having more stable employment contracts. In this sense, these results have to be taken into account by public policies aiming to improve human capital. In this sense, future training plans that customize the type of educational methodology are needed.

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