

# The Relationship between Employability and Training

X. Mamaqi, J. Miguel and P. Olave

**Abstract**—The aim of this paper is to provide an empirical evidence about the effects that the management of continuous training have on employability (or employment stability) in the Spanish labour market. With this purpose a binary logit model with interaction effect is been used. The dependent variable includes two situations of the active workers: continuous and discontinuous employability. To distinguish between them an Employability Index Stability (ESI) was calculated taking into account two factors: time worked and job security. Various aspects of the continuous training and personal workers data are used as independent variables. The data obtained from a survey of a sample of 918 employed have revealed a relationship between the likelihood of continuous employability and continuous training received. The empirical results support the positive and significant relationship between various aspects of the training provided by firms and employability likelihood of the workers, postulate alike from a theoretical point of view.

**Keywords**—training management, employability/employment stability, binary logit model, interaction effect, Spanish market labour.

## I. INTRODUCTION

RECENT years have witnessed important changes in the Spanish employment market and labour relations. These changes are particularly manifest in a loss of stability in employment and employability. In the last decade the high temporary and job instability are two characteristics that accompany the Spanish labor market. Labour reforms started in the 2006 from the government to mitigate the effect of temporality and instability were able to control the increase in the rate of temporary have now been eroded by the financial and economic crisis. In this framework, the concept of employability is making way for quite some time, contrast to the traditional job stability concept as result of the transformation of the relationship between training and work. In the old conception of unique worklife and also excluding other possible uses, there are new concepts involving greater commitment by firms. In this sense the term employment stability has been significantly transformed to become more open and relative, where both actors employers and employee

will have equal responsibility to ensure their presence [12], [19]. Invest in intangible assets as training worker, its one of the ways to provide the necessary incentives to stimulate the employment and employability. In this framework the current state of the market labour in Spain requires reflections about the relationship among employability, employment stability and training.

The paper is structured as follows: in the present section a brief background on the concepts of the job stability, employability and training are shown. In the second section, there are described the approach of the logit model and its adaptation to continuous employability. In the two next sections there are presented the empirical work, hypothesis and results, respectively. Finally in the last section there are formulated some conclusions.

### *A Employment stability versus employability and training*

The changes producing in the labor market have prompted other changes that affect the relationship between training and work. In the last few years the notion of employability has been highlighted rather than employment stability. The employment stability is a set of perceptions that depending not only on the employer but also on employees. The latter will have employment stability providing they do not lose their capacity to innovate and guarantee that they will constantly add value to the employers interested in their services, irrespective of social status, age or beliefs. So the employment stability is defined as the ability to become or remain employed. Hence employability currently is defined as 'the probability of a given unemployed population finding employment in a given period of time' or 'an individual's ability to find employment on the labour market', when said individual has a series of skills, know-how and experience that ensure access to said employment [16-19]. According to Jacoby [14] the firms cannot guarantee job stability in the long term but they can provide employability by supplying their employees with training and experience, increasing their value for the labour market. An employee can have job stability if he/she is capable of innovating and helping to satisfy his/her employer's needs, thus counteracting other factors that could favour his/her replacement. Currently the job is not only considered productive, then, but also creative [20]. So, the CVT<sup>1</sup> is a key factor in tackling problems related to integration or reintegration in the labour market. In fact, it is the only reciprocity factor in employment stability in the sense of employability, is the fact that firms promise to help to develop their employees' skills and that employees promise to manage their careers and develop their skills, so that they can

X. Mamaqi is assistant professor in the Department of History and Structural Economics (Area of quantitative methods for economics and business) Faculty of Economics and Business, University of Zaragoza (Spain) Gran Via, 2, 50005, Zaragoza, Spain (e-mail: mamaqi@unizar.es).

Jesus Miguel, is professor in the Department of History and Structural Economics (Area of quantitative methods for economics and business) Faculty of Economics and Business, University of Zaragoza (Spain) Gran Via, 2, 50005, Zaragoza, Spain (e-mail: jamiguel@unizar.es).

Pilar Olave is professor in the Department of History and Structural Economics Area of quantitative methods for economics and business) Faculty of Economics and Business, University of Zaragoza (Spain) Gran Via, 2, 50005, Zaragoza, Spain (e-mail: polave@unizar.es)

<sup>1</sup> Continuous (or continuing) vocational training (CVT) includes non-formal and informal learning.

'obtain and maintain employment, change jobs without difficulty' (ILOTERM<sup>2</sup>). Therefore the employability and employment stability should be understood as a shared responsibility between employer and employee, aimed at ensuring the latter's effective participation in his/her working environment. From this viewpoint, training is one of the principal reasons for an excellent employability/job stability performance. It is important, therefore, to study the aspects of training as a factor that influence on employability. In the field of the market labour Spanish considerable efforts have been made to evaluate the effects of CVT on the economic incentives for employees (productivity and wages) [9], [11], [19-20]. They have shown that the relationship between training and quantitative parameters (employee productivity before and after training and cost/benefit ratio of training initiatives per employee) is less important (in terms of statistical significance) than the relationship with qualitative parameters (increased mobility opportunities, promotion and/or professional success in general and job performance/satisfaction).

Fewer studies have been developed on the impact of training on other qualitative dimensions, such as stability, job security and employability, even there is some empirical evidences that the probability of employees losing their jobs is related to their training [8], [15], [19].

In this framework, the central hypothesis is that the proper development of continuing training activities (in addition to other variables that may intervene in this process) should have a positive impact on the continuous employability of the workers.

## II. METHODOLOGY

### A Binary logit model

The binary logit model allows the possibility of running regressions even when the dependent variable is dichotomous (binary dependent variable). The dependent variable show an event occurs ( $y = 1$ ), or it does not ( $y = 0$ ). In the binary response model, the principle concern is with the response probability,

$$\Pr(y = 1|x) = \Pr(y = 1|x_1, x_2, \dots, x_k) \quad (1)$$

where  $y$  is the dependent binary variable and  $x_1, x_2, \dots, x_k$  are independent variables. In the logit model we assume the following:

$$\Pr(y = 1|x) = F(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k) \quad (2)$$

The logit model can be derived from a latent variable model.

Let  $y^*$  be an unobserved or latent variable determined by:

$$y^* = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k + \varepsilon \quad (3)$$

The idea is that the observed variable,  $y$  will take on a value  $y = 1$  if  $y^* > 0$  and 0 otherwise. Because  $y^*$  does not have a

measure that is easily interpretable, we examine it in relation to the effect it has on  $\Pr(y = 1|x)$ :

$$\frac{\partial F(x\beta)}{\partial x_j} = f(x\beta)\beta_j \quad (4)$$

The interpretation of the logit model coefficients is the degree of change in the logit of the outcome for a one-unit change in the predictor. The positive sign of the coefficient indicate that the likelihood of the occurrence of the event increase and the vice versa. Also odds ratios (OR) are the exponentiated logit coefficient can be interpreted as the factor change in the odds of the outcome being a 1 as compared to the odds of the outcome being a 0 for a one-unit change in the predictor [1-3].

### B Interaction effects

Many phenomena important frequently hypothesize that the event will occur that the effect of one independent variable is conditional on the value of the other and this condition estimated coefficients of the model. If two independent variable ( $x_1$  and  $x_2$ ) interact when the event will occur  $\Pr(y = 1)$  if given an increment in ( $x_1$  and  $x_2$ ).

$$\Pr(y = 1|x) = F(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_1 x_2 + \dots + \beta_k x_k) \quad (5)$$

where  $x_1 x_2$  is the product term and  $\beta_3$  the coefficient of interaction. When both increments are infinitesimal, this requires that the second derivative,  $\frac{\partial^2 \Pr(y = 1)}{\partial x_1 \partial x_2}$  be different

from zero. When the difference in  $x_1$  is infinitesimal, but the difference in  $x_2$  is discrete, this requires that the marginal effect of  $x_1$  on  $\Pr(y = 1)$   $\left[ \frac{\partial^2 \Pr(y = 1)}{\partial x_1} \right]$  has different values

at  $x_2$ . When both increments are discrete, this requires that a second difference in probabilities be non zero [1], [4], [5-7]. According to William *et al.*, [1], if  $\beta_3$  is significant, accept the hypothesis of interaction if is not significant, reject the hypothesis of interaction. The authors insist that testing the statistical significance of the product term is necessary to confirm a hypothesis that independent variables interact in influencing the unbounded latent dependent variable. But this test does not shed light on the nature of the interaction between the variables in influencing  $\Pr(y)$ . Whether the variables interact in influencing  $\Pr(y)$  should be tested by direct examination of estimated effects on  $\Pr(y)$  [1 pp.265].

## III. EMPIRICAL RESEARCH

### A Logit model specification for employability

The concept of employability (E) refers to the continuity and discontinuity of an employee in market labour. In order to introduce a binary variable in the analysis, related to employability state, an Employability Stability Index (ESI) was calculated. This calculation involves two employability parameters: time worked and job security. The first is related to the time the person is working continuously and the second

<sup>2</sup>International Labour Organization:  
<http://www.ilo.org/public/english/employment>.

to the conservation a job for enough time to encourage subjects to participate in training initiatives. The index is calculated as follows:

$$ESI = \frac{\text{Time worked}(36\text{months}-\text{month unemployed})}{\text{Jobsecurity} (\text{n}^\circ \text{ of contracts signed})} \quad (1)$$

The category of continuous or discontinuous E is calculated with reference to ESI value, if:

$$\begin{cases} 18 \leq ESI \leq 36 (\text{months}) \rightarrow \text{the worker were in continued E situation} \\ ESI < 18 (\text{months}) \rightarrow \text{the worker were in discontinued E situation} \end{cases} \quad (2)$$

If  $y$  represents employability,

$y = 1$  reflects continuous employability and

$y = 0$  reflects discontinuous employability conditioned by the values of the  $x_1, \dots, x_k$  representing continuous training and personal workers variables. The variables introduced into the model are shown in Table I.

The principal hypothesis in the logit model refers to the

TABLE I  
VARIABLES IN THE EMPLOYABILITY LOGIT MODEL

**Dependent variable (y):** Employability: random variable that can takes the value 1 and 0 if the worker was in a continuous and discontinuous employability, respectively for period 2002-2004.

**Independent explanatory variables ( $x_1, \dots, x_5$ ) of continuous vocational training (CVT):**

1. Degree of difficulty of courses (categories: 1-medium, 0-advanced)
2. Types of CVT courses: (categories: 1-specific, 0-general)
3. Promoter initiative CVT courses (categories: 1-bouth firm's management and employees, 0-otherwise)
4. Training area: (Categories: 1-Computer; 2-Sales and marketing, 3-Production area 4-Others area)
5. Purpose of training courses: (categories: 1-improve job prospects, 0-own satisfaction)

**Independent personal workers variables :**  $x_6, x_7, x_8$

6. Initial level of education (categories 1-basic education, 2-secondary education; 3-bachelor 4- Graduated and high graduated)
7. Age: (categories: 1-under 45; 0-over 45).
8. Gender: 1-male, 0-female

**Control variable**  $x_9$  : Economic sectors: Categories 1-Industry; 2-Construction; 3. Commerce; 4. Services

Source: Own elaboration.

overall effect of the training on continuous employability.

According to the theoretical contributions expected a positive and significant relationship between training's variables and continuous employability [9], [10], [15], [23] and [25]. At the same time training depends on the various personal workers' variables three interaction effects has planed. The type of training (specific or general) depends on the economic sectors [24], [25] and the age and gender are variables that determinate the greatest difference producing on the continued employability and job stability in the labor market in Spain [9-11], [15], [21-22] and [19]. So in the logit model analyzes the main and interaction effects are important to investigate the relationships between training and employability. The principal and interaction effects have been made in the following hypothesis:

$H_1$ : There is a positive and significant relationship between CVT and continuous employability.

$H_{1-1}$ : The type of CVT course and sectors economic interact between them, when explain the continuous employability.

$H_{1-2}$ : The promoter initiative of CVT and gender, interact when explain the continuous employability.

$H_{1-3}$ : The variables the promoter initiative of CVT and age interact when explain the continuous employability.

The coefficients sign of the interaction hypotheses are not specified because the literature in general has investigated the direct relationships between gender, age and results of the training at individual level, but not as these variables determine the employability through trainings' variables.

#### B Data source and sample design

The data was obtained from a personal survey addressing employed individuals in the spring of 2006. It was designed to gather information about each subject's ongoing training and employment stability. The survey consisted of 27 questions. It was divided in three sections: nature of ongoing training (number of initiatives, areas, typology, difficulty, location, origin of the initiatives, objective, etc.), areas of profitability (variables measuring effects of training on wages, changes in professional category and employability/stability) and socio-professional profile of subjects (age, gender, previous education and functional working area). The delimitation of the survey's geographical distribution (due to the difficulty of extending it to all regions) was achieved through hierarchical cluster analysis, including Spain's 17 regions and using the active labour force and number of employees involved in registered training activities between 2002-2004, per regions, economic sector<sup>4</sup>, according to EPA<sup>5</sup> and FTFE<sup>6</sup>, respectively, as variables. The results of this classification are shown on Figure 1.

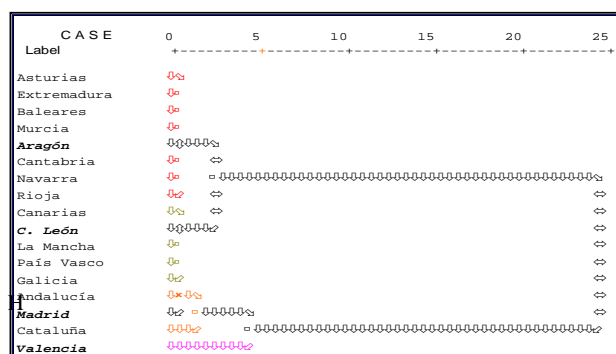


Fig. 1 Regions hierarchical cluster result

The centres of the four clusters obtained on the basis of similar values in labour force and employees trained, oriented

<sup>4</sup> Economic sectors: industry, construction, services and the commerce.

<sup>5</sup> Active Population Survey (2005), supplied by INE (2004).

<sup>6</sup> Fundación Tripartita Para la Formación y Empleo (Tripartite Agreements for Continuing Training (FTFE, 2005)

<sup>3</sup> The horizon of the study is three years (2002-2004) or 36 months.

in the selection of the four regions: Aragon, Castilla Leon, Madrid and Valencia Community. Sample calculation was conducted against the total labour force in the selected regions. The survey was directed at employees who had received training during the triennium's 2002-2004. The characteristics sample and survey are shown in Table II.

#### IV. RESULTS AND DISCUSSION

Following the recommendations of the specific literature on the test of interaction effects in the logit binary model two models are estimated through the maximum likelihood method: the first without product term of interaction effects and the second with them. The results of both are shown in the Table III (Appendix).

The results of these two models are quite similar with regard to the main effects. The coefficients estimated for main effect confirmed in both models the principal hypothesis of this work since four of the five variables of continuous training: degree of difficulty of courses, types of CVT courses, promoter initiative CVT courses and training area, increases the probability that workers were in the situation of the continuous employability. The sign and the significant of the coefficients match specified above. Only one variable, "the purpose of training course" result insignificant. Regarding personal variable in the first model age and gender result insignificant while the control variable (economics sectors) is positive and highly significant.

For the logistic model with interaction effect, the null hypothesis that the interaction coefficient is equal to zero is

rejected,  $\chi^2_{(1)} = 19.7, p < .0001$  using a likelihood ratio test. All coefficients of product terms showed a strong positive effect with the probability of continuous employability. So, both age and gender not are significant when determine directly the outcome variable (continuous employability) but where interact with variable of the promoter of continuing training the coefficient of those product term result positive and highly significant. In the same mode the product term between economic sectors and type of the training indicate a positive and significant coefficient. Therefore the relationship between training and continuous employability in the labour Spanish market is stronger and positive when gender, age and economic sectors variables are involved [15].

#### V. CONCLUSIONS

For some time, it has been produced the convergence between the concepts of the job stability and employability as the result of the change on the global market labour. In this framework the continuous training provided by companies plays an important role. In the present paper, centred in the Spanish market labour, there has been postulated four hypotheses to test empirically the effect of continuous training on the continuous employability. The principal results indicate that:

- The typologies of the training, the initiative of its realization as an agreement between employers and employees and degree of difficulty are the

characteristics of the training which most affect the continuous employability.

- The results of the estimated interaction effects have shown that the product term used in the model increase the probability of the continuous employability.
- As a result the training has not a separated effect. It depends positively on the gender and age of the workers and economic sectors.

#### REFERENCES

- [1] D. B., William, H.R. de Meritt, E. Justin, "Testing for Interaction in Binary Logit and Probit Models: Is a Product Term Essential?" *American Journal of Political Science*, Vol. 54, n° 1, January 2010, pp. 248-266.
- [2] D. N., Gujarati *Econometría*, 1997. Editorial Mc Graw-Hill.
- [3] D. W., Hosmer S., Lemeshow *Applied Logistic Regression*. 1989. NY: John Wiley Sons, Inc.
- [4] Y. Ganzach, I. Saporta, Y. Weber, "An Interaction in Linear Versus Logistic Models: A Substantive Illustration Using the Relationship Between Motivation, Ability, and Performance", *Organizational Research Methods*, Vol. 3 No. 3, 2000, pp. 237-253.
- [5] M. N. Mitchell, X. Chen, "Visualizing main effects and interactions for binary logit models. *The Stata Journal*, 2005, Vol. 5, n° 1, pp. 64-82.
- [6] C. Ai, E. Norton, "Interaction Terms in Logit and Probit Models," *Economics Letters*, 80, 2003, pp. 123-129.
- [7] W. Greene, *Econometric Analysis*, 6th Ed., Prentice Hall, Englewood Cliffs, NJ, 2008.
- [8] C., Abellan, F. Felgueroso, "Formación no reglada y productividad *Presupuesto y Gasto Público*, 2005, 39, pp. 73-101.
- [9] A. Alba-Ramírez, Formal training, temporary contracts, productivity and wages in Spain, *Oxford Bulletin of Economics and Statistics*, 1994, 56 (2), pp. 151-170.
- [10] C. Amuedo, Work Safety in the Context of Temporary Employment: The Spanish Experience, *Industrial and Labour Relations Review*, 2002, 55/2, pp. 262-285.
- [11] A. Alba-Ramírez, M. Tugores, Training and transitions out of employment in Spain, 2000, Working paper in Economics No 00-06 (01), University Carlos III, Madrid.
- [12] A. Bartel, Measuring the Employer's on investments in training: evidence from the literature, *Industrial Relations*, 2000, Vol. 39, n°3, pp. 502-524.
- [13] FTFE (Fundación Tripartita para la Formación y Empleo), (2005). [www.ftfe.es](http://www.ftfe.es)
- [14] S.M. Jacoby, Are Career Jobs Headed for Extinction?, *California Management Review*, 1999, Vol., 42, n°1, pp. 123-145.
- [15] X., Mamaqi, J. Miguel, (2009) El impacto de formación en la estabilidad laboral. En actas del XIII Congreso de Economía Laboral, Julio, Zaragoza, España. Available at [http://www.unizar.es/centros/fccee/doc/jornadas\\_economia/ponencias/1\\_1\\_Mamaqi-Miguel.pdf](http://www.unizar.es/centros/fccee/doc/jornadas_economia/ponencias/1_1_Mamaqi-Miguel.pdf) (accessed 9 July 2010)
- [16] X., Mamaqi, J. Miguel, The professional profile of the Spanish trainers in continuous training. *Electronic Journal of Educational Research, Assessment and Evaluation (RELIEVE)*, 2011 Vol. 17, n° 1, art. 2, Available at [http://www.uv.es/RELIEVE/v17n1/RELIEVEv17n1\\_2.htm](http://www.uv.es/RELIEVE/v17n1/RELIEVEv17n1_2.htm) (accessed 20 April 2011)
- [17] X. Mamaqi, J. Miguel, P. Olave, Evaluation of the importance of professional competences: the case of Spanish trainers. *On the horizon. New normal education*, 2011, Vol 19, n°3. In press.
- [18] X. Mamaqi, The impact of training on the firms result. Paper presented in IX Jornadas de Economía Laboral, Santiago de Compostela, Spain, 2011.
- [19] Puijijt, H., Dérogee, P. (2010) Employability and job security, friends or foes? The paradoxical reception of employacurity in the Netherlands, *Socio Economic Review*, Vol. 8 n°3, 437-460.
- [20] M. Tugores, A. Alba-Ramírez, "Estudio microeconómico de la formación continua en España: 1992-2002", *Economía Industrial*, (2002) pp.348. 77-94.
- [21] Ottersten P., (1996), Modelización teórica de los efectos de formación. *Industrial Relation*, Vol. 33, pp. 425-445.

- [22] Peraita, C. (). "Características de la formación de la empresa española". *Papeles de Economía Española*, 2000, Vol. 86, pp. 295-307ç
- [23] Wade, P., 1994. *Measuring the Impact of Training*. Londres: Kogan Page.
- [24] Loewenstein, M., A. Spletzer, J., R. (1999), General and specific training: Evidence and implications. *Journal of Human Resources*, 34(4), 710-733.
- [25] Becker, G. S. (1964), *Human Capital*. Chicago: University of Chicago Press.

TABLE III  
RESULT OF THE EMPLOYABILITY LOGIT MODEL

Independent variables	Dependent variable: 1= continuous employability (cases 641 (69,8%)) 0= discontinuous employability (cases 277(30,2%))					
	Model without product term			Model with product term		
	$\hat{\beta}$	$p >  z $	95% confidence interval	$\hat{\beta}$	$p >  z $	95% confidence interval
X <sub>1</sub>	0,728 (0,162)	0,000	0,413;1,043	0,698 (0,152)	0,000	0,41;1,043
X <sub>2</sub>	1,291 (0,789)	0,000	0,765;1,876	1,289 (0,765)	0,000	0,765;1,876
X <sub>3</sub>	0,805 (0,084)	0,001	0,123;1,987	0,895 (0,184)	0,001	0,123;1,987
X <sub>4</sub>	1,386 (0,325)	0,000	0,987;1,984	1,245 (0,335)	0,000	0,987;1,984
X <sub>5</sub>	-0,688 (0,152)	0,260	-0,134;1,126	-0,654 (0,158)	0,260	-0,134;1,126
X <sub>6</sub>	1,451 (0,965)	,112	0,089;2,437	1,459 (0,965)	,135	0,089;2,437
X <sub>7</sub>	-0,045 (-0,290)	0,155	-0,02;-0,345	-0,042 (-0,292)	0,155	-0,02;-0,345
X <sub>8</sub>	0,528 (0,169)	0,030	0,371;1,124	0,428 (0,119)	0,030	0,371;1,124
X <sub>9</sub>	1,765(0,328)	0,000	0,123;1,678	1,715(0,318)	0,000	0,123;1,678
X <sub>2</sub> *X <sub>9</sub>				0,987(0,444)	0,02	0,120;1,867
X <sub>3</sub> *X <sub>7</sub>				0,036(0,003)	0,00	0,001;0,356
X <sub>3</sub> *X <sub>8</sub>				0,011(0,0031)	0,00	0,009;0,045
Constant	-3,472	0,654	-4,312;-1,823	-3,374	0,000	-4,125; 1,876
Correctly predicted cases: Total: 744/891 (83,5%); Continuous employability. 550/642 (85,6%); Discontinuous employability: 194/277(73,6%) Goodness of feet statistics -2LL=789,33 Pseudo R <sup>2</sup> =0,267				Correctly predicted cases: Total: 740/891 (83,2%); Continuous employability. 545/642 (82,6%); Discontinuous employability: 194/277 (73,6%) -2LL=779,33 Pseudo R <sup>2</sup> =0,216		
Cases included in the model: 891 Correctly predicted cases: Total: 744/891 (83,5%); Continuous employability. 550/642 (85,6%); Discontinuous employability: 194/277(73,6%) In parenthesis standard error						