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TRAINING AND TRANSISTIONS OUT OF EMPLOYMENT IN SPAIN *

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Abstract

In this paper we investigate the relationship between firm-provided training and transitions out of employment in Spain. Using microeconomic data for Spain obtained from the first wave of the European Community Household Panel (ECHP), we apply a recursive model with qualitative variables. The main result is that workers who receive training during 1993 face a lower probability of being non-employed in the following year than workers who did not receive training. Also, there is strong evidence that a stable employment realitonship increases the probability of receiving training within the firm.

Keywords: Firm-provided training, labour force transitions, recursive models.

Classification JEL: C35, J41, J62

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1 Introduction

A firm can only obtain the returns to the investment of training a worker if he or she stays with the firm. The risk of loosing the worker discourages the provision of training. This is why sustaining a continuous employment relationship is an incentive to the provision of training and vice versa. The firm itself has the possibility of improving labour stability by offering specific training to their employees and by the promise of boosting their professional career.

As we can show in the next section, there are few studies about the relationship between training and employment mobility. We understand that mobility implies moving jobs or going from employment to non-employment (either unemployment or out of the labour force). This study refers only to the relation between the receipt of training in a period and the probability of non-employment in the next period. This issue has special interest in Spain, a country with high unemployment, high incidence of temporary jobs and low private expenditure in training activities[1].

The data used in this paper belong to the first cycle for Spain of the European Community Household Panel (ECHP), refering to 1994. This database contains information about the receipt of training as well as the type of training received. Moreover, it offers retrospective information about workers' situation in the labour market in two different moments of time. Thus, the data permit to analyse the link between firm-provided training and the exit from employment.

The main problem that arises in this investigation is that there are unobserved variables associated with individuals' jobs which may affect both the probability of receiving training and the probability of staying in employment.

[1] In the second quarter of 1999, the unemployment rate in Spain was 15.6%, whereas the unemployment rate in the EU was 10.2%. On the other hand, the Spanish "Labour Force Survey" reports that the percentage of employees aged 30 and over in training during 1996 was 2.1% in Spain, whereas EU average was 5.6%.

Another problem is the bidirectional causality between the two variables: training is supposed to reduce future mobility and previous stability is supposed to induce firm-provided training. In order to use the appropriate methodology, we present a recursive model in which training and employment stability are both determined. The main result of this exercise is that firm-provided training reduces the probability of exit from employment. This result is only significant for the total sample and for females. When training is considered an exogenous variable in the mobility equation its coefficient is not significant.

In the next section we present a summary of the main theoretical and empirical studies dealing with the issue of training and employment stability. In section 3, we discuss the econometric methodology. We describe the data sample in section 4. We provide the estimation results in section 5, and in section 6 we conclude.

2 Review of the literature

2.1 Theoretical models of training and job turnover

The classical theory of human capital, as formulated by Becker (1962, 1964), recognised that an individual's human capital is affected by more than the level of education achieved. Ability and on-the-job training also play a part. In his book, *Human Capital*, Becker distinguishes between general on-the-job training, which increases an individual's productivity in any firm; and specific training, which increases an individual's productivity only at the firm in which he is employed. However, Becker suggests that most of the training provided by firms is a combination of both, general and specific training.

He argues that the cost of specific training has to be shared by the worker and the firm. The employee might be paid a wage greater than marginal product during the training period. After the training, the employee's wage is below marginal product, although above what the employee could get elsewhere since

the training only increases productivity in the current job. For general training, Becker argues that the employees alone should pay for training costs by accepting lower wages while receiving training. Workers accept lower wages because they expect that, as a result of the training, the present value of the stream of lifetime benefits net of this costs will be higher than if they had not undertaken the training. This view also predicts, such as the Ben-Porath model (1967), that investment in general training declines with age, because of the shorter investment horizon. In the human capital model, there is no inefficiency in the provision of general training unless firms share some of the costs of general training.

However, human capital models predict that the temporal horizon for workers obtaining returns from the training investment depends on the type of training, general or specific. In the case of general training, the investment horizon is the expected remaining time in work. On the other hand, when the training is specific the horizon restricts to the expected remaining time in the current job, since the returns to such investments can only be realised by both the individual and their employer while they keep their current employment relation. This suggests that there should be a negative relationship between the reception of training and the probability of leaving employment. [2].

There are also some recent studies (Katz and Ziderman (1990), Stevens (1994), Acemoglu and Pischke (1998), Chang and Wang (1996), Tugores (1998)) that remark, differing from the classical theory of human capital, the existence of a poaching externality leading to under-provision of firm training. These models predict, as well as the human capital model, a negative effect of training on future labour turnover.

Acemoglu and Pishke (1998) have developed a model which shows that workers may not pay for the general training they receive. In their model, the cru-

[2]In this case, we refer to both, general and specific training. The employer will obtain returns of their investment during the time the trained worker stays in the firm.

cial assumption is that an individual's current employer has better information about the worker's ability than other firms. This informational advantage gives the firm some ex post monopsony power over the worker that encourages the firm to provide general training. The model can lead to multiple equilibria. In one equilibrium, quits are high and therefore the employers are more reluctant to bear the cost of any general training. In the other equilibrium, there is low quits and high training. One interesting feature of this model is that the equilibrium with high quits, which involves a better match of individuals to jobs, may be less efficient because the level of training is too low. Acemoglu and Pishke look at the implications of their model for individuals undertaking apprenticeship in Germany. They use two cross-sections of the German "Qualification and Career Survey" conducted in 1979 and 1985-86.

Theoretical studies make it clear that the link between turnover and training has a number of important features and that different theoretical approaches may well generate different predictions. For example, the life-cycle human capital model generates the prediction that firm-specific training should reduce the probability of an individual leaving his or her current job. When one moves away from the perfect competition notion inherent in this model, predictions become more difficult. Most of the alternative models also predict that firm-specific training should reduce future mobility, but these models also argue that there may be a poaching externality leading to under-investment in general training. On the other hand, according to the human capital model, there should be no employer-funded general training.

From the theoretical point of view, the relation between previous job mobility and training is more ambiguous. On one hand, there is likely to be a positive relation as employers who wish to develop their skill base will want to provide training for newer recruits. On the other hand, if one views recent or frequent job mobility as a signal of problems with previous job matches, this may result in a negative association between on-the-job training and previous job mobility.

Training and turnover are, then, two issues mutually related that have motivated, theoretical work and few empirical studies. These we examine in the next subsection.

2.2 Empirical studies of training and employment stability

There have been relative few empirical studies looking at the relationship between training and employment stability. The studies have considered either the effect of training on employment or the effect of employment stability on training, and refer basically to Great Britain, USA, and Germany. Next, we discuss some of the studies and their not always coincident conclusions.

Greenhalgh and Stewart (1987) study the determinants and effects of on-the-job and off-the-job training. They use data from the "National Training Survey", including information about training practices of more than 50.000 women and men in Britain. Their study distinguishes between men, married and not married women. Using a logit model, they examine the probability of being trained and the effect that the receipt of training has on the occupational mobility. Results show that women have a smaller probability of receiving training than men. Moreover, the returns of recent training are greater for women, married or not, than for men. The authors interpret it as a possible inefficiency distribution of training resources between men and women.

Lynch (1991) examines the factors that contribute to explain the quit rate of individuals that work in their first job. As explanatory variables, she includes the receipt of on-the-job training and off-the-job training; and uses data from the USA "National Longitudinal Survey of Youth". Distinguishing between men and women, she concludes that no type of training has a significant effect on the probability of leaving the job in the male sample. However, women have a lower probability of leaving the firm if they have received on-the-job training. The effects turn to be the contrary in the case of off-the-job training.

Lillard and Tan (1992) use data on reported training in several cross-sectional and panel surveys to answer several questions: Who receives training?, how much and why?, and how does training affect future earnings and employment stability? The effects of training on unemployment are investigated using a probit model. The study includes three measures of training: training in the current period, accumulated training events, and duration since training. Results show that training is associated with a subsequent decline in the likelihood of unemployment. Of all the sources of training, company training is most enduring.

Tan et al. (1992) compare the postchool training experiences of young men in the United States, Britain and Australia. They analyse, among other things, the determinants of training as well as the exogenous impact of training on employment stability. Their probit results suggest that training reduces the likelihood of unemployment in all three countries.

Campbell III (1993) estimates quit equations to test the efficiency wage hypothesis using USA data from the "Employment Opportunity Pilot Proyect Survey". In all his specifications, training has a negative impact on the probability of quitting a job. This result confirms the idea of a correct efficiency wage theory: training, as a good indicator of productivity, increases wages and, therefore, mobility costs, reducing the quits rate.

Mincer (1993) uses information of the "Panel Study of Income Dynamics" in order to analyse the effect of training on mobility, that is, on the length of tenure in the firm in which training was received and on the frequency of job change over longer periods of time. Moreover, it looks at the effects of training on wages over time. Results estimate negative effects of job training on turnover and positive effects on wage growth in the firm over longer periods.

A British study is that of Booth and Satchell (1994), who use data from the "National Child Development Survey" of 1981 to look at the impact of apprenticeships on tenure. Their sample is formed of individuals who left school at the

age of 16 and entered the labour market. They found that men who completed apprenticeship had a lower exit rate from jobs than men who undertook no training, whereas men who terminated their apprenticeship before completion had a higher exit rate.

Elias (1994) focuses on a regional subsample of British adults using panel data from the "Social Change and Economic Life Initiative" of 1986-90. He uses these data to look at whether or not job-related training received in the job held in the preceding month of employment influences the probability of leaving a job. He uses a logit model that allows for unobserved individual heterogeneity and controls for factors such as job tenure, trade union membership, and other individual and job-related characteristics. He finds that such training reduced the probability of turnover for women but was not an important determinant of men's job mobility.

Winkelmann (1994) looks at the effect of education and training on labour mobility in West Germany . He uses data from the "German Socio-Economic Panel" over the period 1974 to 1990. In looking at the determinants of labour mobility, he uses a Poisson regression model, and for occupational mobility he uses a probit model. He finds that apprenticeships and all other types of vocational training reduce labour mobility. General schooling, on the other hand, has no effect on labour mobility. He argues that this supports the idea that the negative effect of training on mobility is mainly due to firm specificness. His results for occupational mobility are less clear.

Greenhalgh and Mavrotas (1996) use data from the 1984 and 1989 "British Labour Force Surveys" to look at the determinants of job mobility and training. They find that job mobility is highest for the young and for those individuals with higher educational qualifications. They use a recursive model to look at the determinants of mobility during the past year and then the impact this has on the probability of receiving training in the last four weeks. They find that mobility has no significant effect on training incidence for men. For women,

recent job movers are more likely to be trained than others. They also find that public sector workers have high training rates and low mobility. Sectoral R&D activity is only associated with more training for men.

Royalty (1996) looks at the effect of predicted probability of job-to-job turnover and job-to-nonemployment turnover on the probability of undertaking general and specific training. She uses data from the 1980-86 US "National Longitudinal Survey of Youth" for both men and women. She finds that a higher estimated probability of job-to-nonemployment turnover reduces the probability of receiving company training for men and women and off-the-job training for men. A higher estimated probability of job-to-job turnover has no effect on company training and increases the likelihood of undertaking off-the-job training for women. Interestingly, she finds that the significant gender difference in the probability of undertaking both types of training is strongly reduced once controls for the predicted probability of job turnover are included.

Dearden et al. (1997) examine the link between training and job mobility in Britain, drawing on two large-scale microeconomic data sources, the "National Child Development Survey" and the "Quarterly Labour Force Survey". They find that mobility is lower for individuals who received training in previous periods, specially when training involved a qualification being obtained. Looking at the relationship between training and previous mobility, they find that, for men, there is no clear evidence that training receipt is lower or higher for recent movers. For women, there is some evidence of a positive link. This study remarks that different effects emerge for different forms of training, being specially important the distinction between employer-funded and non-employer-funded training.

To summarise, the studies dealing with the relationship between training and mobility have focused mainly on the British, USA, and German economies. Their results can be summarise in the following way:

- There is a negative effect of previous training on employment mobility.

This result is often small or insignificant for the male sample.

- There are insignificant effects of employment mobility on training for men, with some evidence of positive, but statistically weak, effects for women.

In the Spanish case, the relation between training and employment mobility has not been treated for the moment. There are also few works analysing the determinants and consequences of the investment in training activities. This scarcity of studies is partially justified by the difficulties in obtaining adequate data. For example, Alba (1994) studies the determinants of training and their effect on productivity at firm level using data from the "Encuesta de Negociación Colectiva en las Grandes Empresas". This database contains information about the economic characteristics and industrial practices of about 600 firms. The data indicate that in 1988, 60% of the big firms trained some of their workers, while 15.9% of the workers received training.

In work in progress, Alba and Tugores (1999) study the factors that determine training in Spain using data from the "Labour Force Survey" (Encuesta de Población Activa), from 1987 to 1998. Results reveal that the incidence of training in Spain is relatively small. Only 0.30% of the employees has been trained in the firm in the 4 weeks that precede the interview. This percentage raises up to 2.62% in case of receiving courses off the firm.

Moreover, Abellán et al. (1997) describe the main characteristics of the Spanish system of collective bargaining, and analyse its influence on the labour market and firm-provided training. The authors conclude that sectoral bargaining creates a negative incentive for firms to train its workers. Their sample belongs to the "Encuesta de Estructura, Conciencia, y Biografía de Clase" and they use a logit model to estimate the probability of receiving training controling for factors such as gender, age, education, experience and type of union negotiation. As regards the determinants of training, results are consistent with those obtained here. Moreover, we attempt to contribute to the research on the

relation between training and employment stability where there is no evidence for Spain.

3 Methodology

How do we model the relationship between transitions out of employment and firm-provided training? The ECHP allows us to track individuals' labour market stata over time, so we can measure directly the effects of training received in one period on labour market status in a subsequent period. It is also possible to analyse the relationship between past labour force transitions and the probability of receiving training. However, the nature of the observed data makes it easier to focus on the first relationship: the effect of training on future labour market transitions.

Modelling the relationship between mobility and training is not straightforward. Using longitudinal data gives the possibility of adopting an explicit "before and after approach". This involves a crucial question: "if an individual receives training in time period t, do they change their labour status in $t+1$?". To answer this question, we analyse the assumptions underlying different alternative models.

It seems reasonable to think that there are unobserved variables which may affect both the probability of receiving training and the probability of keeping an employment. Training and employment are the outcome of structural determinants on both demand and supply sides, which cannot be analysed separately with individual cross-section data. The equations which follow, therefore, must be regarded as a reduced-form relationship reflecting the respective matching of the demand and supply of training and employment.

For example, from the employers' side, we can think that the employer decides simultaneously the provision of training and whether to keep or lay off a worker in the near future. So, when the employer decides to train a worker in

period t, he is implicitly deciding to try to maintain the employment relation in period $t+1$. This is consistent with the fact that the employer who provides training obviously desires to reap the benefits of their investment.

The problem can be stated by the following two latent equations conditional on a set of exogenous variables:

$$TRAINING_i^* = b1X1_i + V_i \quad (3.1)$$

$$EMPLOYMENT_i^* = a1X2_i + a2TRAINING_i + U_i \quad (3.2)$$

where $TRAINING^*$ is the net utility or the profit obtained by the employer when training a worker, $EMPLOYMENT^*$ is the net utility or the profit when keeping (not laying off) the worker. On the other hand, X1 and X2 are the vectors of exogenous variables that condition each equation; and a y b are the interest parameters. We assume for simplicity of notation that the error terms V_i and U_i have symmetric distributions.

However, data permit to observe choices instead of utilities. We know if an individual has been trained or not, and if he remains employed or not. The relation between observed and latent variables is given by:

$$TRAINING_i = 1 \quad if \quad TRAINING_i^* > 0$$

$$TRAINING_i = 0 \quad otherwise$$

$$EMPLOYMENT_i = 1 \quad if \quad EMPLOYMENT_i^* > 0$$

$$EMPLOYMENT_i = 0 \quad otherwise$$

Of course, because $TRAINING^*$ and $EMPLOYMENT^*$ are observed as dichotomous variables, we need to impose the conditions $Var(V_i) = 1$ and $Var(U_i) = 1$.

So, latent variables measure *intentions* whereas observed variables measure *actions*. The model presented above implies that the intention of keeping or not the employee depends on the action of being trained or not. It seems clear that $TRAINING_i$ precedes $EMPLOYMENT_i^*$, but is not a precondition, it is possible to change the labour situation with or without being trained. So, we shall refer to this model as a recursive model, not a sequential model.

3.1 Identifying conditions

The conditions for logical consistency in models with mixtures of latent variables and their partially observed realizations can be checked by considering the corresponding reduced forms, or by considering the sum of the different probabilities.

In this model the conditions for identification are that V_i and U_i be independent, or that there is at least one variable in $X1_i$ not included in $X2_i$.[3]

3.2 Estimation of the model

For the estimation of the model, we can use the maximum likelihood method. Different assumptions imply the use of different methodology in estimating it.

If V_i and U_i are independent, then one can estimate both equations separately, each one as a probit model. However, given the special nature of our data, it seems reasonable to think that there exists interdependency between the unobserved latent variables, which causes the not independence of the error terms[4]. If V_i and U_i are not independent, the estimation of both equations separately does not give consistent estimates of the parameters for the second equation (3.2). The use of the two-stage method, in which we first obtain the

[3]The identifying and estimation conditions of different recursive models are exposed in Maddala (1983).

[4]The papers of Booth (1991) and Green (1993) remark the necessity of treating the receipt of training as an endogenous variable in the study of their effects on wages and labour turnover.

probit estimates of (3.1) and then substitute this prediction in (3.2) as a regressor, is not an adequate estimation method in the recursive model used here.

For the maximum likelihood estimation of our model, we proceed as follows: Denote the joint distribution function of (V_i, U_i) by $F(.,.)$ and assume that it is a bivariate normal distribution. This yield the well known bivariate probit model. Then, the joint probability distribution of $TRAINING$ and $EMPLOYMENT$ is given by the following expressions:

$$P11 = Prob(TRAINING = 1, EMPLOYMENT = 1) =$$
$$F[(b1X1_i, a1 + a2X2_i), \rho]$$

$$P10 = Prob(TRAINING = 1, EMPLOYMENT = 0) =$$
$$F[(b1X1_i, -a1 - a2X2_i), \rho]$$

$$P01 = Prob(TRAINING = 0, EMPLOYMENT = 1) =$$
$$F[(-b1X1_i, a2X2_i), -\rho]$$

$$P00 = Prob(TRAINING = 0, EMPLOYMENT = 0) =$$
$$F[(-b1X1_i, -a2X2_i), -\rho]$$

And the likelihood function to be maximized is:

$$\begin{aligned} L(b1, a1, a2) \quad = \quad & \prod P11^{TRAINING \quad EMPLOYMENT} \\ & *P10^{TRAINING(1-EMPLOYMENT)} \\ & *P01^{(1-TRAINING)EMPLOYMENT} \\ & *P00^{(1-TRAINING)(1-EMPLOYMENT)} \end{aligned}$$

The use of the maximum likelihood method involves evaluation of double integrals. However, it assures obtaining consistent estimations[5].

4 Data description

This research uses data from the European Community Households Panel (ECHP) for Spain. We use information of the first cycle in 1994 and some retrospective questions regarding 1993.

The main training question is asked to the workers as follows: "During 1993, did you receive some education or training courses, including part time and short courses?". In case of a positive answer the worker is asked: "Did your employer pay or organise the course?". When the two questions are positively answered we consider that the worker has received firm-provided training. We also consider the case in which the worker has received off-the-job training when the employeee received a non ordinary course that was neither paid nor organised by their employer. Moreover, the questionnaire offers complementary information about the type, duration, aim and utility of the courses.

The sample used is restricted to individuals who have been employed at least during one month in 1993. We are left with a final data set of 5.970 individuals, of which approximately one third are women.

Table 1 reports the training incidence by gender. As it is shown, 9.05% of the sample (540 individuals) received firm-provided training during 1993. This percentage is slightly greater for women (9.71%) than for men (8.69%)[6]. The proportion of people receiving non ordinary courses out of the firm is 7.92%, with a greater difference between women (11.14%) and men (6.19%).

Table 2 shows that the probability of being trained increases with the level of education. This result is true in the case of both, within-the-firm and off-the-

[5]For more detailed econometric analysis see Maddala and Lee (1976).

[6]In the same year, 1993, 4.55% of the employees in Spain where receiving training subsidies in their firms throughout FORCEM.

firm training. People with three years of higher education (*diplomatura*) have the greatest probability of being trained in the firm, 24.12%, whereas 18.10% people with four or more years of university studies (*licenciatura*) received training. This percentaje falls to 1.85% in the case of non-qualified individuals. In the case of off-the-firm training, the workers with a higher training incidence were the ones with vocational education (*Formación Profesional*), 14.20%. This percentage is also obtained for people with university studies.

The relationship between training and age is shown in Table 3. It shows that people aged 26 to 45 years have been trained in the firm in a higher proportion than both the youngest and the oldest groups of workers. The highest proportion, 13.82%, corresponds to people between 36 and 45 years old. This pattern is different for off-the-firm training, which incidence decreases with age. The proportion of young workers between 16 and 25 years old who follow the latter type of studies is 12.71% compared to 1.32% of people older than 55 [7].

To complement this data description we shall take into account the information provided by the 1994 ECHP for Spain about the inherent characteristics of the courses received in and off the firm. This data set offers information about the type of studies, the intensity and duration of the courses, as well as the goal and utility associated with this investment in human capital.

Table 4 shows that most of the training received by employees is given as part-time courses. Part-time courses are 75% of firm-provided courses; and about 72% of off-the-firm training courses. The rest of training is, usually, given in the form of full-time courses. Other type of courses (most of which are by mail courses) are really infrequent when provided by the firm and reaches the 8.66% of the courses provided out of the firm.

Total duration of courses appears in Table 5. Of firm-provided training courses, 37.04% have duration of less than two weeks. The rest of them are equally distributed between more than three months and less than three months.

[7] Note that we are always refering to employees.

There is not a clear pattern in the courses offered out of the firm: 75.90% of them are taken during less than 3 months. Then, we can conclude that, in general, courses provided by the employer are shorter than the others.

Table 6 refers to the main aim of the training. Of the employees receiving training in their firms, 97.78% assure that the courses have the goal of improving their qualifications and professional outlook. This percentage is slightly small, 92.60%, when referring to other courses.

When the workers have answered in the afirmative that the main objective of the courses is to improve their qualifications and professional outlook, they are asked about the extent to which such objectives are achieved. Table 7 shows that most of the workers think that the training courses are the way to reach their goals. The 87% of the employees indicate that training has been really usefull or quite useful. This percentage falls to 82% when referring to off-the-firm training. There are few studies that find a positive relation between the receipt of training and an increase in workers' productivity and salaries[8]. According to Table 7, workers' perception of the utility of the training received is quite positive.

To finish with the data description, we present the employment transitions from 1993 to 1994. We have to keep in mind that the sample includes 5.970 persons who worked as employees at least for one month during 1993. These individuals can be working, unemployed or inactive in 1994. The main objective at this point is to study labour transitions according to whether training was provided and the type of training received. Table 8 shows that 80.17% of individuals working at least for one month during 1993 remain in work in 1994[9], 10.94% are unemployed and 8.89% left the labour force. These numbers substantially change when considering only people trained in 1993. The percentage of workers receiving firm-provided training during 1993 and being

[8]For the Spanish case, see Alba (1994).

[9]As indicated earlier, the ECHP does not allow us to distinguish the job-to-job movements.

in work during 1994 grows to 92.96%, and the transition to unemployment and to inactivity is to 4.63% and 2.41% respectively. Then, our data show a negative relation between the reception of on-the-job training and the probability of leaving employment.

The contrary seems to occur when studying the relation between the reception of off-the-firm training and transitions from employment to unemployment or inactivity. The percentage of people receiving these courses and remaining in work in 1994 falls to the 71.25% compared with the 79.6% of the individuals not trained during 1993. These different patterns point out the convenience to differentiate these two types of training.

Tables 9 and 10 show the results for men and women. There not seem to exist important differences by gender when training is provided within the firm. However, men are more likely to remain in work in case they have been trained out of the firm or in case they have not received any training.

5 Econometric analysis

In this section we analyse the relationship between firm-provided training and exit from employment. As we explained in section 3, it seems reasonable that the employer that provides training to an employee decides, at the same time, to retain him in the firm. That is, the labour situation in period $t+1$ depends on the training decision in period t; and the probability of receiving training in t depends on the employer's disposition to retain the worker. The problem, as stated through the equations (3.1) and (3.2), can be expressed as follows:

$$\begin{aligned} TRAINING_i^* &= b1X1_i + V_i \\ EMPLOYMENT_i^* &= a1X2_i + a2TRAINING_i + U_i \end{aligned}$$

This recursive model requires different estimation methods depending on the assumptions about the error terms, V_i and U_i.

If there is independence between the error terms, that is, if there is not unobservable elements affecting the training and the mobility decision, the model can be estimated separately using a probit model for each equation. Results are presented in subsection 5.1 for this case.

However, as we have previosly discussed, it seems reasonable to consider the existence of certain dependence between training and mobility in the model, causing a correlation between the error terms. In this case, a correct estimation of the model requires the use of a particular maximum likelihood method. Section 3 contains the detailed expression of the maximum likelihood function. The results obtained through this methodology are presented in subsection 5.2.

At this point, it is important to remark that we are going to estimate the relation between training and remaining in employment. In the employment equation, the dependent variable is equal to one if the worker remains employed. With the data used in this article, it is not possible to distinguish the job-to-job movements. We study the effect of firm-provided training on the probability of remaining in employment[10]. The key point we stress is that it is the employer who decides whether or not to layoff a worker, and this decision depends on having invested in that workers' human capital or not. So that, the proposed model is the one that better fits the data available for this paper, that is, a bivariate probit model.

Before presenting and interpreting the main results, we define the explanatory variables that are included in each equation.

Explanatory variables included in the training equation

1. Dummy variables regarding the workers' personal characteristics: sex (it

[10]Notice that the workers who may have left the firm voluntarely are very likely to show up employed somewhere else.

takes value equal to one for women); marital status (with value equal to one if the worker is married); age (grouped in different categories); and maximum level of studies completed (primary, secondary or university education).

2. Variables related to the workers' labour history: a group of dummy variables reflecting the number of times the worker has been unemployed in the five years that precede the interview (none, one, two, three or more).

3. Geographic variables: referred to the region of residence: south, east, centre, Madrid, and north of Spain.

Explanatory variables included in the employment equation

1. Training variables: "training93" (firm-provided training) is a dummy variable that takes the value equal to one when the individual has received a course paid or organised by the employer. On the other hand, "course93" (off-the-firm training) is a dummy that takes the value equal to one if the worker has received other non regulated courses. Both are the crucial variables in the study of the effect that the receip of training has in the probability of remaining in employment.

2. Variables related to personal characteristics: the same as in the training equation, that is, sex, marital status, age, and education.

3. Variables related to labour status during 1993: a group of dummies referring to the proportion of the year 1993 that the individual has been employed (all 1993, from 9 to 11 months, from 6 to 8 months, from 3 to 5 months, or less than 3 months).

4. Other geographic variables: the same as in the training equation.

5.1 The case of independent errors

In Table 11 results of the probit model estimation on training determinants are presented. This specification is correct under the assumption of independent distribution of the error terms. The model has been estimated for the total sample, as well as for men and women separately. Results show that there is not a significant difference by gender in the probability of receiving training. Differentiating by marital status, married men result to have a greatest probability of receiving training in their firms than single men, whereas the marital status appears to be insignificant in the women sample. In the total sample, individuals of less than 36 years and more than 55 years have a smaller probability of been trained compared with adults between 36 and 45 years old. Differentiating by gender, it appears that the oldest men are the ones with less probability of being trained, whereas the group of women with the smaller probability corresponds to the youngest.

It can be shown that having secondary or university studies increases substantially the probability of being trained at work. This result remains the same for the subsamples of men and women separately. Regional or geographical variables point out that there are not important differences in the Spanish territory on the receipt of training. However, the dummies that measure the labour stability of the worker's history (the number of times the worker has been unemployed in the past 5 years) appears to be very significant. People with no unemployment in their recent history show higher probability of receiving training. Women who suffered unemployment once in the preceding five years are not less likely to receive training than women who never were employed during that time.

Table 12 presents the results of the probit model that studies the determinants of remaining employed one year after the provision of training, under the assumption of independently distributed errors. The effect that the receipt of firm-provided training has on the probability of being employed in 1994 is in-

significant. Once we control for the effect of education, age, stability, and other demographic variables, the receipt of training has no effect on the probability of being in employment the following period. We will later see that this result changes when considering the possibility of correlation between the error terms. On the other hand, it is worth mentioning that the receipt of off-the-firm training in 1993 has a significant and negative effect on the probability of remaining employed in 1994.

Other results worth mentioning are that the probability of remaining employed is higher for men, married men, higher educated, and middle age people. Geographically, people leaving in the south of Spain have the highest probability of going to unemployment or inactivity. The impact that having been in work during the complete year 1993 has in the probability of being in work in 1994 is strongly positive and significant. The greater the unemployment incidence during 1993 the highest the probability of being unemployed or inactive in 1994.

Finally, in the next subsection we study the relation between firm-provided training and posterior mobility through a recursive model. This specification admits the possibility of dependence in the error terms caused by the existence of unobservable heterogeneity. We think that this is a more reasonable specification.

5.2 The case of dependent errors

Table 13 presents the results corresponding to the recursive model of training provision in one period and employment in the following period. Admiting the existence of correlation between the error terms of the two equations, we have estimated the model presented in section 3. In fact, the results presented in the previous subsection are a particular case of this general model when the correlation between the error terms is imposed to be zero. Table 13 shows the values of these correlations. We present the results for the total sample, 5.970 employees working at least one month during 1993, as well as for men and

women separately.

TRAINING EQUATION RESULTS

In general, results coincide with the ones obtained in the estimation of the probit model on determinants of training. Men and women do not present significant differences in the probability of receiving training. On one hand, being middle age, highly educated, and married (only for men) appears to be associated with a higher probability of receiving training in the firm. On the other hand, a labour history of high unemployment incidence decreases this probability.

EMPLOYMENT EQUATION RESULTS

As expected, the results for the effect of firm-provided training on mobility are quite different from those obtained assuming independence of error terms. When we consider the receipt of training in 1993 as an endogenous variable in the mobility equation, its effect on the probability of retaining employment is positive and significant for the total and the female samples. This results implies that receiving training improves the employment prospects of the workers. However, this result does not hold for the male sample[11].

Again, receiving off-the-firm training has a negative and significant effect on future employment. Workers who receive this type of training have a smaller probability of being in work the following year than not trained and firm-trained workers. These results emphasize the differences between training within the firm and off the firm highlighted in the descriptive as well as in the econometric analysis. The rest of the explanatory variables included in the regression do not

[11]We have worked with other specifications, for example, excluding the labour history variables during 1993. This alternative specification presents a higher positive and significant effect of training on employment, so,it reinforces the indicated finding. Results are available on request.

present great differences with respect to the results contained in Table 12.

Identification of the coefficient estimates of the employment equation is achieved by the inclusion of the group of dummies reflecting the number of times the worker has been unemployed in the preceding 5 years in the training equation and their absence from the employment equation[12].

ESTIMATION OF THE CORRELATION BETWEEN THE ERROR TERMS

The estimator for the errors correlation appears to be negative and significantly different from zero in the total and the female samples. This result seems to confirm the need to modelize the relation between training and mobility through a recursive model in order to obtain consistent estimations for the parameters. As the correlation coeficients are close to zero in the male sample, the estimations from the simultaneous model are very similar to those obtained using a simple probit model. Recall that in the male sample receiving training in a certain year does not affect in a significant way the probability of being in employment the following year.

The negative sign of the estimated correlation coefficient between the errors would be consistent with the idea that, in the total and the female sample, the unobservables affecting both equations show a dichotomy between the reception of training and the keeping of an employment.

6 Conclusions

In Becker's theory of human capital, firms prefer to invest in specific training instead of general training because the latter type of investment offers less guaranties of return. In recent studies, where market imperfections (imperfect

[12]We have tried the inclusion of other variables like the amount of government subsidies devoted to training activities in each region. We do not include them because they do not appear to affect significantly the results.

competition or asymmetric information) are introduced, the distinction between general and specific training appears less important in explaining the employers attitude toward bearing the training costs. However, the mobility of workers is the key point to understand the resources allocation to training: investing in training reduces future labour mobility and, in turn, labour stability favours the investment in training. Empirical studies does not have concluding results. Some find a negative but sometimes insignificant relation between training and mobility, and also insignificant results are found in the study of the effect that previous mobility has on the investment in training.

The aim of this paper has been to investigate the relationship between training and transitions out of employment, using data from the first wave of the ECHP. A first look at the data confirms that the training incidence in Spain is substantially smaller than in other countries; only 9% of Spanish employees have participated in courses paid or organised by the employer. The main characteristics associated with a higher probability of receiving training are: middle age, high qualification, and previous labour stability. The typical person in the reception of off-the-job training is a young woman with secondary education. In general, courses received in the firm are of less duration and intensity than courses received off the firm. The main objective of all types of training is to improve the worker's qualification and professional prospects.

In analysing the relation between labour and mobility, we have used a two equations model -a training equation and a employment equation- that allows for the possibility of correlation between the error terms. The likelihood function is constructed by the assumption of a normal bivariate distribution of the error terms.

When exogenous, in the employment equation does not change the result that being a woman and having participated in off-the-firm training courses reduce the probability of being in work the following year does not depend on whether the variable receipt of training is taken as endogenous or exogenous.

Moreover, to be a middle-aged person, to have higher education and to have been in work during all 1993, affects positively the probability of remaining in employment. However, the effect that the training variable has on the probability of being in work in the following period differs according to the type of model estimated. If we consider the receipt of training as an exogenous variable and estimate the model by two separated probits, the effect that the training variable has on the employment equation appears to be insignificant. However, if we estimate the recursive model considering the training variable as endogenous, it has a positive and significant effect on the probability of being in work the following year. However, this effect is not significant for the male sample.

These findings are quite consistent with those obtained for other countries. However, we have not tackle the question of why firm-provided training increases the probability of remaining in employment among women but not among men. In future research, it will be worth investigating the possible differences between men and women in this respect.

Table 1. Type of courses received

	Man	Woman	Total
Firm-provided	337	203	540
	8.69	9.71	9.05
Off-the-firm	240	233	473
	6.19	11.14	7.92
No courses	3302	1655	4957
	85.13	79.15	83.03
Total	3879	2091	5970
	100.00	100.00	100.00

Table 2. The level of education and the type of courses received

	Firm-provided	Off-the-firm	No courses	Total
No studies	40	52	2065	2157
	1.85	2.41	95.73	100.00
Primary	89	117	1294	1500
	5.93	7.80	86.27	100.00
Secondary	116	86	585	787
	14.74	10.93	74.33	100.00
Vocational	77	69	345	491
	15.68	14.05	70.26	100.00
University(1st level)	123	71	316	510
	24.12	13.92	61.96	100.00
University(2nd level)	95	78	352	525
	18.10	14.86	67.05	100.00
Total	540	473	4957	5970
	9.05	7.92	83.03	100.00

Table 3. Age and the type of courses received

	Firm-provided	Off-the-firm	No courses	Total
16-25 years	45	148	971	1164
	3.87	12.71	83.42	100.00
26-35 years	171	192	1434	1797
	9.52	10.68	79.80	100.00
36-45 years	209	93	1210	1510
	13.82	6.15	80.03	100.00
46-55 years	93	33	839	965
	9.64	3.42	86.94	100.00
56 years or more	22	7	503	532
	4.14	1.32	94.55	100.00
Total	540	473	4957	5970
	9.05	7.92	83.03	100.00

Table 4. Intensity of courses

	Firm-provided	Off-the-firm
Full-time	128	88
	23.70	18.60
Part-time	407	344
	75.37	72.73
Others	5	41
	0.93	8.66
Total	540	473
	100.00	100.00

Table 5. Duration of courses

	Firm-provided	Off-the-firm
Less than 2 weeks	200	36
	37.04	7.61
From 2 to 9 weeks	163	72
	30.19	15.22
More than 9 weeks	171	359
	31.67	75.90
No answer	6	6
	1.11	1.27
Total	540	473
	100.00	100.00

Table 6. Do the courses improve qualifications and professional outlook?

	Firm-provided	Off-the-firm
Yes	528	438
	97.78	92.69
No	12	31
	2.22	6.55
No answer	0	4
	0.00	0.85
Total	540	473
	100.00	100.00

Table 7. Usefulness of the courses

	Firm-provided	Off-the-firm
Very useful	201	149
	38.07	33.71
Quite useful	260	214
	49.24	48.42
Barely useful	54	61
	10.23	13.80
Not useful	6	12
	1.14	2.71
No answer	7	6
	1.33	1.36
Total	528	442
	100.00	100.00

Table 8. Workers' labour market situation at interview date in 1994 (total sample)

	Firm-provided	Off-the-firm	No courses	Total
Employed	502	337	3947	4786
	92.96	71.25	79.62	80.17
Unemployed	25	74	554	653
	4.63	15.64	11.18	10.94
Inactive	13	62	456	531
	2.41	13.11	9.2	8.89
Total	540	473	4957	5970
	100.00	100.00	100.00	100.00

Table 9. Workers' labour market situation at interview date in 1994 (men)

	Firm-provided	Off-the-firm	No courses	Total
Employed	314	187	2714	3215
	93.18	77.92	82.19	82.88
Unemployed	15	27	350	392
	4.45	11.25	10.60	10.11
Inactive	8	26	238	272
	2.37	10.83	7.21	7.01
Total	337	240	3302	3879
	100.00	100.00	100.00	100.00

Table 10. Workers' labour market situation at interview date in 1994 (women)

	Firm-provided	Off-the-firm	No courses	Total
Employed	188	150	1233	1571
	92.61	64.38	74.50	75.13
Unemployed	10	47	204	261
	4.93	20.17	12.33	12.48
Inactive	5	36	218	259
	2.46	15.45	13.17	12.39
Total	203	233	1655	2091
	100.00	100.00	100.00	100.00

Table 11. Probit model on the determinants of firm-provided training

	Total		Men		Women	
Training93	Coeff.	t	Coeff.	t	Coeff.	t
Woman	-0.0134	-0.253				
Married	0.1292	2.054	0.2269	2.536	0.05565	0.598
16-25 years	-0.3765	-3.852	-0.1690	-1.320	-0.6814	-4.210
26-35 years	-0.2030	-3.187	-0.1312	-1.612	-0.3234	-3.090
46-55 years	-0.1059	-1.431	-0.0725	-0.822	-0.1799	-1.285
56 or more	-0.4873	-4.296	-0.5224	-3.884	-0.3751	-1.749
Second.	0.7587	12.242	0.6835	9.274	1.0049	8.418
Univ.	0.9106	14.541	0.7686	9.532	1.1943	10.940
East	-0.0103	-0.149	-0.0071	-0.082	-0.0009	-0.008
Centre	-0.1221	-1.331	-0.0938	-0.839	-0.2114	-1.299
Madrid	-0.0650	-0.757	0.0008	0.008	-0.1875	-1.253
North	-0.0799	-1.045	-0.0520	-0.557	-0.1269	-0.942
Unem1	-0.2017	-2.712	-0.2452	-2.460	-0.1071	-0.931
Unem2	-0.3438	-3.037	-0.2781	-2.054	-0.4563	-2.176
Unem3	-0.5755	-5.213	-0.5452	-3.946	-0.6162	-3.305
Constant	-1.546	-16.216	-1.6311	-13.030	-1.601	-10.492
N. observ.	5970		3879		2091	
Adj. R2	0.1325		0.1117		0.1835	
Chi 2	480.38		255.86		244.53	
% cases	9.05%		8.69%		9.71%	

Table 12. Probit model on the determinants of maintaining employment

	Total		Men		Women	
Employ94	Coeff.	t	Coeff.	t	Coeff.	t
Training93	0.0480	0.486	0.0022	0.018	0.0672	0.407
Course93	-0.2166	-2.716	-0.0825	-0.713	-0.3620	-3.143
Woman	-0.2815	-6.129				
Married	0.1513	2.830	0.3849	5.231	-0.0696	-0.846
16-25 years	-0.3258	-4.292	-0.1860	-1.811	-0.4337	-3.703
26-35 years	-0.1509	-2.410	-0.0607	-0.694	-0.2381	-2.282
46-55 years	-0.0047	-0.059	-0.0112	-0.113	0.0121	0.087
56 or more	-0.6877	-8.334	-0.7643	-7.714	-0.5012	-3.217
Second.	0.1427	2.411	0.1839	2.401	0.0931	0.970
Univ.	0.5356	6.930	0.4143	3.813	0.6893	6.114
East	0.1586	2.701	0.1378	1.811	0.2262	2.397
Centre	0.1483	2.031	0.1255	1.394	0.1862	1.457
Madrid	0.1245	1.496	0.0553	0.524	0.2762	2.002
North	0.0654	0.987	0.1311	1.557	-0.0571	-0.516
Emp100	1.6127	33.410	1.5049	24.343	1.7668	22.361
Emp75	1.1294	7.966	1.2239	6.561	0.9592	4.151
Empu50	0.9653	7.093	0.9580	5.143	1.0022	4.915
Emp25	0.6488	5.003	0.6441	3.759	0.6095	3.029
Constant	-0.1547	-1.783	-0.2865	-2.563	-0.3773	-2.839
N. observ.	5970		3879		2091	
Adj. R2	0.3031		0.2799		0.3442	
Chi 2	1.802.67		994.15		807.32	
% cases	80.17%		82.88%		75.13%	

Table 13. Training and employment in a recursive model

	Total		Men		Women	
Training	Coeff.	t	Coeff.	t	Coeff.	t
Woman	-0.0035	-0.067				
Married	0.1212	1.928	0.2266	2.520	0.0541	0.587
16-25 years	-0.3484	-3.529	-0.1684	-1.301	-0.6344	-3.911
26-35 years	-0.1937	-3.037	-0.1312	-1.611	-0.3010	-2.875
46-55 years	-0.1003	-1.357	-0.0724	-0.820	-0.1745	-1.256
56 or more	-0.4324	-3.705	-0.5213	-3.695	-0.2896	-1.346
Second.	0.7445	11.943	0.6833	9.223	0.9811	8.247
Univ.	0.8810	13.622	0.7683	9.419	1.1282	9.883
East	-0.0154	-0.223	-0.0072	-0.083	-0.0130	-0.111
Centre	-0.1299	-1.420	-0.0939	-0.839	-0.2348	-1.454
Madrid	-0.0694	-0.812	0.0008	0.008	-0.1960	-1.324
North	-0.0839	-1.100	-0.0521	-0.557	-0.1309	-0.981
Unem1	-0.1306	-1.593	-0.2436	-2.120	-0.0183	-0.153
Unem2	-0.2253	-1.777	-0.2757	-1.730	-0.2983	-1.371
Unem3	-0.4778	-3.942	-0.5433	-3.525	-0.4816	-2.470
Constant	-1.5018	-15.309	-1.6303	-12.672	-1.5116	-9.592

Table 13. Training and employment in a recursive model (continued)

	Total		Men		Women	
Employed	Coeff.	t	Coeff.	t	Coeff.	t
Training93	0.2104	1.812	0.0060	0.033	0.2756	1.673
Course93	-0.2133	-2.664	-0.0824	-0.713	-0.3574	-3.088
Woman	-0.2761	-6.011				
Married	0.1478	2.769	0.3847	5.209	-0.0669	-0.818
16-25 years	-0.3229	-4.259	-0.1861	-1.811	-0.4206	-3.594
26-35 years	-0.1613	-2.449	-0.0609	-0.694	-0.2341	-2.251
46-55 years	-0.0055	-0.069	-0.0113	-0.114	0.0106	0.077
56 or more	-0.6735	-8.135	-0.7640	-7.678	-0.4915	-3.167
Second.	0.1261	2.107	0.1836	2.382	0.0645	0.667
Univ.	0.5053	6.376	0.4137	3.744	0.6420	5.552
East	0.1587	2.712	0.1378	1.811	0.2265	2.413
Centre	0.1526	2.096	0.1256	1.394	0.1935	1.521
Madrid	0.1291	1.555	0.0555	0.525	0.2771	2.021
North	0.0706	1.068	0.1312	1.556	-0.0505	-0.459
Emp100	1.5936	32.072	1.5046	24.067	1.7344	21.367
Emp75	1.1162	7.887	1.2235	6.537	0.9719	4.220
Emp50	0.9702	7.133	0.9584	5.136	0.9928	4.868
Emp25	0.6404	4.947	0.6439	3.755	0.6096	3.050
Constant	-0.1555	-1.797	-0.2864	-2.561	-0.3772	-2.847
Ro	-0.1914	-2.119	-0.0040	-0.028	-0.2855	-2.434
N. observ.	5970		3879		2091	
Adj. R2	0.5157		0.5214		0.5110	
Chi 2	7757.51		5001.46		2739.40	
% cases	9.05%		8.69%		9.71%	

References

[1] Abellán, C., F. Felgueroso and J. Lorences, 1997, "La negociación colectiva en España: Una reforma pendiente", Papeles de Economía Española, 72, 250-60.

[2] Acemoglu, D. and J. Pischke, 1998, "Why do firms train? Theory and evidence", Quarterly Journal of Economics, 113(1), 79-119.

[3] Alba-Ramírez, A., 1994, "Formal training, temporary contracts, productivity and wages in Spain", Oxford Bulletin of Economics and Statistics, 56(2), 151-70.

[4] Alba-Ramírez, A., 1996, "En busca del primer empleo: el precio de la experiencia", Economistas, 70, 14-22.

[5] Alba-Ramírez, A. and M. Tugores, 1999, "Los determinantes de la formación continua en España, 1987-1998", Mimeo.

[6] Becker, G.S., 1962, "Investment in human capital: A theoretical analysis", Journal of Political Economy, Suppl., 9-49.

[7] Becker, G.S., 1964, Human Capital, New York: Columbia University Press.

[8] Ben-Porath, H., 1967, "The production of human capital over the life-cycle", Journal of Political Economy, 75, 352-65.

[9] Betcherman, G., 1993, "Research gaps facing training policy-makers", Canadian Public Policy, XIX:1, 18-28.

[10] Booth, A., 1991, "Job-related formal training: who receives it and what is it worth?", Oxford Bulletin of Economics and Statistics, 53(3), 281-93.

[11] Booth, A. and S. Satchell, 1994, "Apprenticeships and job tenure", Oxford Economic Papers, 46, 676-95.

[12] Campbell III, C., 1993, "Do firms pay efficiency wages? Evidence with data at the firm-level", Journal of Labor Economics, 11, 442-70.

[13] Chang, Ch. and Y. Wang, 1996, "Human capital investment under asymmetric information: The pigovian conjecture revisited", Journal of Labor Economics,14, 505-19.

[14] Consejo Económico y Social (CES), 1995, La negociación colectiva en la comunidad de Madrid en 1994 y avance de 1995, Comunidad de Madrid.

[15] Dearden, L., S. Machin, H. Reed and D. Wilkinson, 1997, Labour Turnover and work-related training, The Institute for Fiscal Studies, KKS Printing.

[16] Durán, F., M. Alcaide, M. González and I. Flórez, 1994, Análisis de política contractual en materia de formación profesional continua en España, Ministerio de Trabajo y Seguridad Social.

[17] Elias, P., 1994, "Job related training, trade union membership, and labour mobility: a longitudinal study", Oxford Economic Papers, 46, 563-78.

[18] García, L., 1992, "Estudio relativo a las cláusulas sobre formación profesional en la negociación colectiva de 1991", Revista de Economía y Sociología del Trabajo, 18, 89-102.

[19] Green, F., 1996, "The impact of tarde union membership on training in Britain", Applied Economics, 25, 1033-43.

[20] Greenhalgh, C. and G. Mavrotas, 1996, "Job training, new technology and labour turnover", British Journal of Industrial Relations, 34, 131-50.

[21] Greenhalgh, C. and M. Stewart, 1987, "The effects and determinants of training", Oxford Bulletin of Economics and Statistics, 49(2), 171-90.

[22] Katz, E. and A. Ziderman, 1990, "Investment in general training: the role of information and labour mobility", Economic Journal, 100, 1147-58.

[23] Lillard, L. A. and H. W. Tan, 1992, "Private sector training: who gets it and what are its effects?", Research in Labor Economics, 13, 1-62.

[24] Lynch, L.M., 1991, "The role of Off-the-job vs. On-the-job training for the mobility of women workers", American Economic Review, 81:2, 151-6.

[25] Maddala, G.S. and L.F. Lee, 1976, "Recursive models with Qualitative Endogenous Variables", Annals of Economic and Social Measurement, 5(4), 525-45.

[26] Maddala, G.S., 1983, Limited-dependent and qualitative variables in econometrics, Cambridge University Press.

[27] Mincer, J., 1993, "Job training, wage growth, and labor turnover", in *Colected essays of Jacob Mincer. Studies in human capital*, Chap.8, 1, 239-62.

[28] Royalty, A.B., 1996, "The effects of job turnover on the training of men and women", Industrial and Labor Relations Review, 49, 506-21.

[29] Stevens, M., 1994, "A theoretical model of on-the-job training with imperfect competition", Oxford Economic Papers, 46, 537-62.

[30] Tan H. W., B. Chapman, C. Peterson and A. Booth, 1992, "Youth training in the United States, Great Britain and Australia", Research in Labor Economics, 13, 63-99.

[31] Tugores, M., 1998, "Un modelo de formación con externalidades y competencia en el mercado del producto", Universitat de les Illes Balears, Working Paper 12.

[32] Winkelmann, R., 1994, "Training, earnings and mobility in Germany", Centre for Economic Policy Research, Human Resources, Discussion Paper 982.

Appendix

Means of the variables included in the training and employment equations

	Total	Men	Women
Training93	0.0904	0.0868	0.0970
Course93	0.0792	0.0618	0.1114
Employed	0.8016	0.8288	0.7513
Unemployed	0.1093	0.1010	0.1248
Inactive	0.0889	0.0701	0.1238
Woman	0.3502		
Married	0.6296	0.6790	0.5380
16-25 years	0.1949	0.1789	0.2247
26-35 years	0.3010	0.2866	0.3275
36-45 years	0.2532	0.2510	0.2572
46-55 years	0.1616	0.1807	0.1262
56 years or more	0.0891	0.1026	0.0640
Primary	0.6125	0.6501	0.5428
Second.	0.2132	0.2126	0.2142
Univ.	0.1733	0.1361	0.2424
South	0.2293	0.2276	0.2324
East	0.3157	0.3013	0.3424
Centre	0.1321	0.1392	0.1190
Madrid	0.1179	0.1167	0.1200
North	0.2048	0.2150	0.1860

Means of the variables included in the training and mobility equations (continued)

	Total	Men	Women
Unem0	0.6073	0.6377	0.5509
Unem1	0.1728	0.1492	0.2166
Unem2	0.0857	0.0830	0.0908
Unem3	0.1340	0.1299	0.1415
Emp100	0.7288	0.7476	0.6939
Emp75	0.0197	0.0213	0.0167
Emp50	0.0180	0.0159	0.0219
Emp25	0.0182	0.0167	0.0210
Emp0	0.2152	0.1984	0.2464
N. observ.	5970	3879	2091

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