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Recent Investments in Human Capital and its Effect on the Chances of Escaping from Low-paid Jobs: The Spanish Case

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ABSTRACT

General education and training are major forces determining earnings. According to the human capital model, wage differentials among individuals over the life-cycle are largely the result of different patterns of investment in human capital. This paper is intended to analyze the effects of recent investments in human capital — general education, vocational/training or language courses - on workers' relative earnings and on the probability of making an upwards transition in the earnings distribution. The analysis is done for Spain, using the European Community Household Panel (1995-2001). Our results reveal that having been recently in education or training (mainly vocational/training courses) significantly increases the probability of escaping from low pay to better paid jobs, while decreases the risk of falling into low-wage employment. Furthermore, this positive effect is significantly higher among those workers with a third level of general education completed. A separate analysis for females also reveals these positive returns of recent investments in human capital relative earnings, although in this case they appear to be none statistically significant.
Keywords: Education; On-the-Job Training; Low Pay; Bivariate Probit.

Inversiones recientes en capital humano y su efecto sobre la probabilidad de salir de un empleo de salarios bajos: El caso español

RESUMEN

La educación y la formación son dos de los factores más importantes a la hora de determinar las ganancias salariales de un trabajador. De acuerdo con el modelo de capital humano, las diferencias salariales entre individuos a lo largo del ciclo vital son en gran medida el resultado de diferentes patrones en la inversión de capital humano. En este artículo tratamos de analizar los efectos de inversiones recientes en capital humano —educación general, cursos de formación específica o cursos de idiomas— sobre las ganancias salariales relativas, y sobre la probabilidad de ascender dentro de la distribución salarial. El análisis se hace para el caso de España utilizando los datos de la Encuesta de Panel de Hogares de la Unión Europea (1995-2001). Los resultados ponen de manifiesto que inversiones recientes en capital humano (principalmente cursos de formación específica) aumentan de manera significativa la probabilidad de salir de un empleo de salarios bajos hacia trabajos mejor remunerados, reduciendo al mismo tiempo la probabilidad de caer en un empleo de salarios bajos. Además, este efecto positivo es significativamente mayor entre aquellos trabajadores que han completado estudios terciarios. Por último, un análisis separado para hombres y mujeres revela que estos rendimientos positivos de inversiones recientes en capital humano resultan no ser estadísticamente significativos para el caso de las mujeres.
Palabras clave: Educación; formación específica; empleo de salarios bajos; Probit bivariante.

Clasificación JEL: C33, J24, J31.

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1. INTRODUCTION

It is well documented that human capital accumulation has a significant impact on individuals' career prospects, wages and employability. Several theories in the literature have tried to examine the labour market outcomes of human capital investments. The Human Capital Theory (Becker, 1964) stems on the existence of competitive labour markets, so that workers invest in general education or training in order to acquire skills necessary to perform more demanding jobs. Under this theory, productivity in the job is mainly determined by worker characteristics, so that investment in education is viewed as increasing future wages.

Many papers in the literature have focused on the impact on human capital on wages. However, very few papers have dealt with the effect on relative earnings, specially from a dynamic perspective. Workers are primarily interested in the absolute changes of their (real) income. However, as suggested by Hirsch (1995), even if a person cared only for the purchasing power of his/her own income, his/her rank in the distribution still matters, as it determines his/her ability to acquire "positional" or status goods. Hence the relative position of the individual in the wage distribution should matter more.

In this paper we aim to contribute to filling this gap in the literature. In particular, we analyse the effects of recent investments in human capital —general education, vocational/training and language courses— on the probability of escaping from low pay towards to better paid jobs in the Spanish labour market. Since the later implies a dynamic analysis, we apply a bivariate probit model that can account for the endogeneity of initial conditions. The analysis of low-pay transitions is based on data extracted from the *European Community Household Panel* (ECHP, 1995-2001). This harmonized data set includes information on the level of general education attained by the worker and information on whether the worker has been recently in education or training.

Our results suggest that recent investments in human capital significantly reduce the risk of remaining in a low-wage employment while it remarkably increases the likelihood of moving upwards in the earnings distribution.

The paper is organised as follows. In the next section we provide an overview of the literature that investigates the effects of investment in human capital on earnings. Section 3 provides some evidence on the importance of general education and training and their linkage to wages. Section 4 concentrates on low-wage employment. Section 5 focuses on the data set and the econometric model. Section 6 provides the estimation results, and Section 7 concludes.

2. HUMAN CAPITAL AND ITS IMPACT ON EARNINGS: A REVIEW OF THE LITERATURE

There is a huge body of literature that provides evidence of a positive relationship between investment in human capital and wage earnings. Basically, human capital

theory states that job skills obtained by workers through general education and training increase productivity. Regarding the later, two types of training have been distinguished: general training, which is transferable across employers, and specific training, of which the returns may accrue largely to the employer providing it.

The literature that has focused on the returns to schooling, is notably wide. Several papers have provided extensive summaries of the payoffs to schooling (Psacharopoulos, 1994; Card, 1998; Ashenfelter *et al*., 1999), covering a wide range of countries and using a variety of statistical techniques. In general, the average estimate of the rate of return to a year's additional schooling is found to range between 6 and 9 per cent of additional earnings. For the UK, Harmon and Walker (1999 a, b) use the *General Household Survey* pooled from 1974 to 1994 and find that while traditionally the return to an additional year of schooling in the UK was the order of 7%, more recent papers conclude to a much higher figure (of about 15%). Based on the *Encuesta Piloto de Ingresos (1990)*, the work of Alba-Ramírez and San Segundo (1995) finds that an additional year of education in Spain yields about 8.4% increase in earnings. For Denmark, the returns have been found to be a little bit lower. Using the *Integrated DataBase for Labour Market Research* for the period 1981-1990, the work of Bingley and Westergård-Nielsen (1997) finds that male returns to education are around 5%, a little bit higher than the corresponding return for their female counterparts. Similar results are found in the work of Vieira (1999) for the case of Portugal. Using the *Quadros de Pessoal* for years 1986 and 1992, this author finds a rate of return around 7.5%-8.2% when using OLS estimates, while the returns appear to be slightly lower when IV estimation is applied. The opposite is observed for the case of the Netherlands. Based on *OSA-labormarket* survey 1985-1994, the work of Plug (2001) provides a return to education of about 3%-4% based on least-square estimation. The returns are found to be doubled when IV estimation is applied. The estimated rate of returns in Ireland provided in the paper of Callan and Harmon (1997) also falls in the range of 8 per cent return for an additional year of schooling.

More recent papers have estimated the returns to education for a set of European countries. For instance, Harmon *et al*. (2001) find that an additional year of education yields to a 6.5% increase in wages, while the figure is about 9% when the analysis is based only on those Member States with less regulated labour markets. In the same vein, De la Fuente and Jimeno (2005) reveal a private rate of return of education between 7.5% and 10% for most European countries.

There is also a branch of the literature intended to analyze the impact of training on current and future earnings. Most of these works usually find that training matters (e.g. Brown, 1989; Lynch, 1992; Lillard and Tan, 1992; Levine, 1993; Bartel, 1995; Krueger and Rouse, 1998). Several studies have used internationally comparable data to examine the determinants and effects of training participation in different countries (Duncan and Hoffman, 1979; Groot, Hartog and Oosterbeeck, 1994; Barth, 1997; Goux and Maurin, 2000; OECD, 1999, 2003 a; Brunello, 2004; Arumpalam, Booth and Elias 1995; Arulampalam *et al*., 2003; Ok and

Tergeist, 2003). In general, it is found that workers reporting recent training are paid more than other comparable workers. For instance, using the *Panel Study of Income Dynamics (PSID)* the paper of Duncan and Hoffman (1979) finds that an additional year of training raises wages by 5.4% and 8.5% for white men and women respectively. This positive relationship is also found in other papers using the same data set (Brown, 1983; Mincer, 1984; Barron, Black and Loewenstein, 1989). For the UK, Arumpalam, Booth and Elias (1995) showed that expected earnings of youths who experienced at least one training event increase by more than 10%. Similarly, the work of Groot, Hartog and Oosterbeeck (1994) found that, in the Netherlands, employees who have participated at least once to employer-provided training earn 11% more than other comparable employees.

Other studies have also examined the returns to training from current and previous employers (Olsen and Sexton, 1996; Veum, 1998; Loewenstein y Spletzer, 1998a, 1998c; Parent 1999). Parent (1999) finds that training in both the previous and current firm has positive effect on wages. However, Loewenstein and Spletzer (1998a) find that completed periods of training with the previous employer have larger effects on wages than completed periods of training paid for by the current employer.

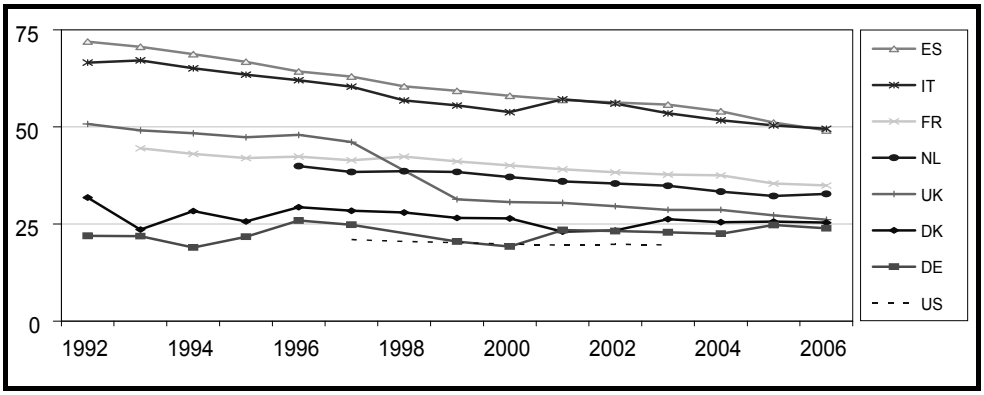
3. TRENDS IN EDUCATION, TRAINING AND PAY

It is obvious that in recent decades participation in education in European countries has increased tremendously, elevating larger shares of the population to secondary- and tertiary-level education. For the most recent decade and a half, Figure 1, Panel A, mirrors this development using the share among the working-age population of the low skilled, defined as ISCED levels 0-2. The panel shows a clear decline for Italy and Spain down from 70-75% to 50% — levels that are still high by comparison. The other countries experienced a similar evolution in preceding decades (not shown). After 1992 more gradual declines and lower levels are found for the UK, France and the Netherlands while Denmark, Germany and the US had the lowest levels of around 15 percent which in addition remained virtually stable.

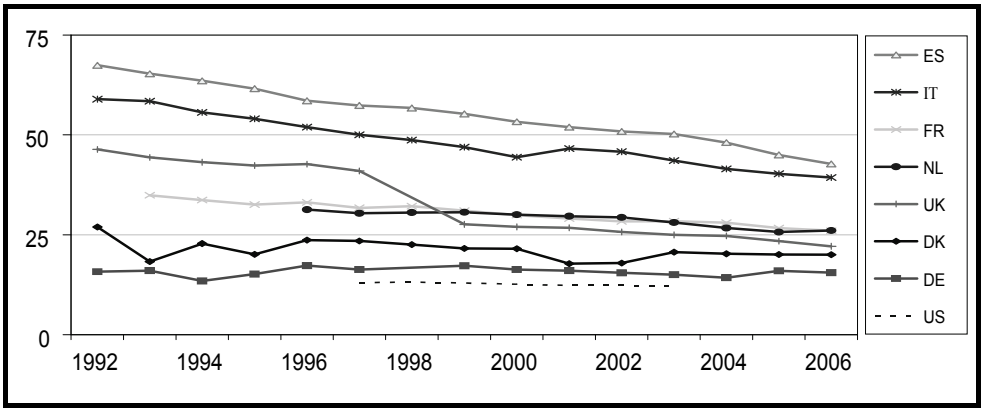
On the labour demand side, the skills structure of employment has also changed significantly (see Panel B). Here the low-skilled shares were always somewhat below those among the population as a whole but again Italian and Spanish levels are well above the other countries. However, the trends for both run basically parallel and, however surprising it may be, the employment-to-population rate of the low-skilled did not fall but remained stable in most countries or slightly rose in Spain and the Netherlands (Panel C). The employment rates are clearly higher in Denmark, the UK and the Netherlands than in France, Italy, Germany or the US, while Spain moved from the lower group almost up to the higher one. The skill structure of the male and female population is more similar that for male and female employment. In all countries, low-skilled women have clearly lower employment rates than low-skilled men. The gap is around 10 percentage-points for Denmark,

Germany, France, the UK and the US, more than 20% for the Netherlands and more than 30% for Italy and Spain. It does not necessarily imply that the female employment rate is low. For Germany the gap is small because the male employment rate is also low, for the Netherlands the gap is large while the male rate is high. Consequently, the Dutch female employment rate higher than in e.g. Germany or France.

FIGURE 1
Shares of low skilled and low paid, ages 15-64, %, (1992-2005).

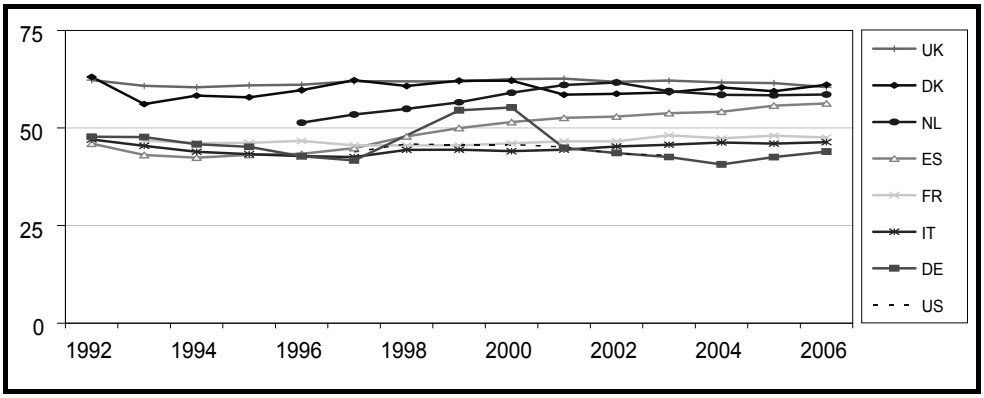


A. Low-skilled among population.

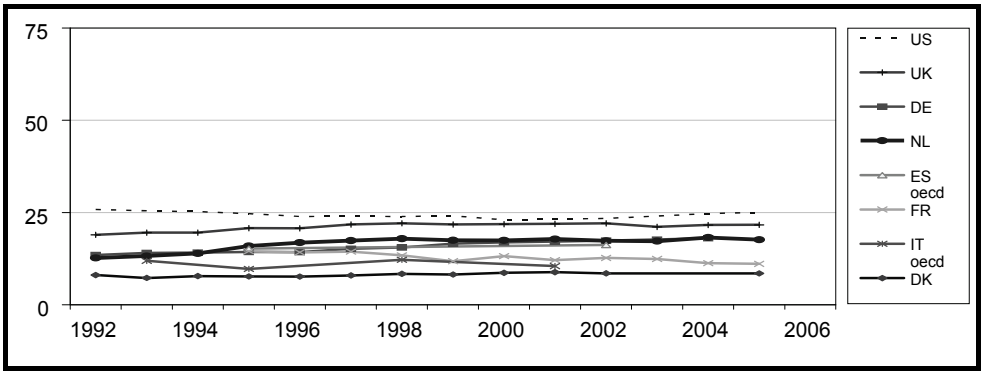


B. Low-skilled among employed.

FIGURE 1 (cont.)
Shares of low skilled and low paid, ages 15-64, %, (1992-2005).



C. Employment rate among low-skilled population.



D. Share of low-paid among employees.

Sources: A-C: European Labour Force Survey and OECD LFS; D: Bosch *et al*., 2008, Lloyd *et al*., 2008, Salverda *et al*., 2008, Caroli *et al*., 2008, Westergård-Nielsen *et al*., 2008, Italy and Spain from OECD earnings distribution database, US estimated from EPI, 2007

Perhaps most surprising is how this contrasts with the earnings structure (Panel D). The low-wage[1] shares are much lower than the low-skilled shares in many countries, and are also found within a relatively narrow band. In addition, the pay shares have not at all followed the decline of the low-skilled shares but were virtually stable or increased (comparatively) slightly — in the UK, Germany and the Netherlands. Interestingly, there is no one-to-one correspondence between the low-skilled employment rate and low pay. The Danes have the lowest rate of low-wage employment but the highest employment rate among the low-skilled population.

[1] Low pay is defined following the OECD as less that two-thirds of median earnings, per hour on a weekly basis to enable covering part-time workers.

The French have almost equally low pay but also a low employment rate. In the Netherlands both rates grew at the same time while in Germany the low-paid rate increased and the low-skilled employment rate stayed put (on balance). UK and US employment rates are not uniform but find themselves at opposite ends of the range. In the US the low-paid rate actually exceeds the low-skilled rate implying that some better skilled employees must remain low paid. As not all low-skilled are necessarily low paid this can also happen in other countries. The evolution of both shares has increased the risks of this.

4. LOW-WAGE EMPLOYMENT

The economic and institutional changes experienced by many industrialized countries over the last decades have influenced the distribution of wages both over time and among different groups of individuals in the labour market. In most European countries the distribution of earnings has become more dispersed giving rise to increased analysis of those workers who are considered to be *low paid*. This naturally stresses the need for dynamic analytical approaches to address the question whether particular individuals or groups are trapped over time in low-paid segments of the labour market, or whether by contrast low pay is a transitory phenomenon for the individual.

Low-wage employment has been a focus of research and policy interest both at a macro level, and from a micro perspective (OECD, 1996; Asplund *et al*., 1998; Lucifora and Salverda, 1998; Salverda *et al*., 2001; Marx and Salverda, 2005). Most of these works have paid particular attention to differences between particular European countries and the USA with respect to the incidence of low-wage employment. Recently, the European Commission has provided comparative data about the incidence of low-wage employment among the European countries[2]. The study provides evidence of little variation in the incidence of low pay between 1995 and 2000, with a decrease from 15.6% in 1995 to 14.9% in 1998, rising again but only marginally in 1999 and 2000 to 15.1%. However, there exist wide variations between different Member States, with the highest incidence of low pay in the UK and Ireland (19.4% and 18.7% respectively in 2000), and lowest in Denmark and Italy (8.6% and 9.7% respectively). The analysis also reveals a marked decline in the incidence of low-wage employment in Spain (from 18.9% in 1995 to 15.6% in 2000) and Portugal (from 14.4% to 10.9%), while the Netherlands and Germany have experienced a considerable increase (from 13.3% in 1995 to 16.6% in 2000 in the Netherlands, and from 13.9% in 1998 to 15.7% in 2000 in Germany). These finding are consistent with Figure 1, Panel D.

[2] European Community: "Labour market transitions and advancement: temporary employment and low pay in Europe", Chapter 4 of *Employment in Europe*, 2004. ECHP is used with exception of persons working less than 15 hours per week.

Recent research on low-paid employment underlines the need for a longitudinal analysis of the phenomenon (Stewart and Swaffield, 1999; Dickens, 2000, Cappellari, 2004). Evidence on the degree of individual earnings mobility across the low-pay threshold from one period to another can reveal to what extent low pay is a transitory or a prolonged episode of the earnings careers. To the extent that low pay is a transient phenomenon, involving individuals who are experiencing a temporary setback, or young workers acquiring skills and experience that will enhance their future earnings, the situation is self-limiting. But when workers are trapped in low-paid jobs and economic disadvantage becomes a persistent characteristic, serious issues of inequality and welfare arise. Some papers in the literature have tried to analyse which factors increase the probability of escaping from low-paid jobs. Amongst these factors, education and training seem to play an important role. For instance, Sloane and Theodossiou (2000) find substantial upwards earnings mobility among younger men and the better educated, and they find that low pay is more persistent among the less qualified. Asplund *et al*. (1998) estimate the year-to-year upward mobility of low-wage earners in Denmark and Finland, and find that acquiring occupation specific skills and other human capital tends to be related to upward mobility. In the Netherlands, Van Opstal *et al*. (1998) found that the accumulation of firm-specific human capital contributes far less to upward earnings mobility than does general human capital. For the UK, Gosling *et al*. (1997) also find that human capital assists upward earnings mobility.

5. DATA AND THE ECONOMETRIC MODEL

Longitudinal data are essential for conducting both cross-sectional and dynamic analysis. In this paper we use data from the European Community Household Panel (ECHP), which forms the most closely co-ordinated component of the European system of social surveys. This survey gathers information for several socio-economic aspects in the European Union. It occupies a central position in the development of comparable social statistics across Member States on income including social transfers, labour, poverty and social exclusion, housing, health, as well as various other indicators relating to the living conditions of private households and persons. It is, therefore, a harmonized longitudinal survey that makes it possible to follow up and interview the same private households and persons over several consecutive years. We use the 1995-2001 waves of the ECHP to investigate the extent to which recent investments in human capital help low-paid Spanish workers to move upwards in the earnings distribution.

The selected sample consists of individuals aged between 16 and 64 years old, who are in wage employment in two consecutive years, t and t+1. In each period, we define workers in low-paid jobs as those earning less than two-thirds of the median. In addition, low pay is measured in terms of hourly gross earnings. This allows covering part-time workers whose quantitative importance varies significantly across countries and is generally increasing and who play an important role for

low-wage employment. Hourly earnings are derived using two variables *PI211MG* (*current wage and salary earnings-gross (monthly)*) and *PE005A (how many hours (included paid overtime) do you work in your main job or business*) for those working more than 15 hours per week. For those individuals working less than 15 hours per week we use variable *PE005 —total number of hours working per week (in main plus additional jobs)* — since variable *PE005A* is not observed for these workers. Using both variables, which are virtually identical, enables us to include those working less than 15 hours per week. They play a significant role in low-wage employment but are usually not accounted for in studies based on the ECHP. Once hourly earnings are derived, we compute, from 1995 to 2001, the low-pay threshold, below which earnings are considered to be low, as two-thirds of median earnings. Finally, we classify workers in three groups according to the highest level of general education they have attained at moment *t*: primary, secondary and tertiary education (variable *PT022*). Since we want to examine the effects of recent investment in human capital, once the individual has a given level of educational attainment, and he/she is already in employment, we restrict our sample to those who report "no" to variable *PT001* (*Have you been in education or training since January last year?*) in period *t*. In year *t*+1 we have people answering either "yes" or "no" to variable *PT001*. Based on this information, we construct a dummy variable that takes value 1 if the individual answer "yes" to question *PT001* and 0 otherwise. This dummy variable would be included as an explanatory factor in the probability of being low-paid at *t*+1.

To account for the real effect of general education and training on the chances of escaping from low pay to better paid jobs, we estimate a bivariate probit model for the probability of being low paid at *t* and *t*+1, using pooling data from ECHP (1995-2001). Let us assume that earnings in year *t* are specified according to the following equation:

$$f\left(w_{it}\right) = \gamma' m_{it} + u_{it}, \qquad u_{it} \sim N\left(0,1\right)$$

Considering τ_t as the low-pay threshold for year *t*, established as two-third of median earnings, the chances of low pay in year *t* can be expressed through the following equation:

$$l_{it}^{*} = \delta' m_{it} + v_{it}, \qquad v_{it} \sim N\left(0,1\right) \tag{1}$$

where $l_{it}^{*} \equiv f\left(\tau_t\right) - f\left(w_{it}\right)$ and $v_{it} \equiv -u_{it}$. We define the low-pay indicator L_{it} as follows:

$$L_{it} = \begin{cases} 1, & \text{if} \quad l_{it}^{*} > 0 \\ 0, & \text{if} \quad l_{it}^{*} \leq 0 \end{cases}$$

Similarly, for year *t*+1 we have the following expression for the risk of low pay:

$$l^*_{it+1} = \varphi' k_{it+1} + \theta L_{it} + \beta t_{it+1} + \eta_{it+1}, \qquad \eta_{it+1} \sim N(0,1) \tag{2}$$

where the vector k_{it+1} contain all the personal and job characteristics in $t + 1$, except the variables on the highest educational level attained that it is the corresponding to year *t*. And t_{it+1} is the dummy variable identifying whether the individual has been in education or training since January last year. We define the low pay indicator variables, L_{it+1} as follows:

$$L_{it+1} = \begin{cases} 1, & \text{if} \quad l^*_{it+1} > 0 \\ 0, & \text{if} \quad l^*_{it+1} \le 0 \end{cases}$$

We assume that the unobservable factors in equations (1)-(2) are jointly distributed as a bivariate normal with zero means, unit variances, and unrestricted correlations:

$$(v_{it}, \eta_{it+1}) \sim N_2(0, \Sigma)$$

where

$$\Sigma = \begin{pmatrix} 1 & \rho_{12} \\ \rho_{12} & 1 \end{pmatrix}$$

The bivariate probit model is estimated by maximum likelihood using pooling annual transitions from the ECHP (1995-2001). As we have repeated observations for individuals making more than one transition and, as a consequence, the *i.i.d* assumption is violated, we used a Pseudo Simulated Maximum Likelihood (PSML) estimator.

6. ESTIMATION RESULTS

6.1. Descriptive Analysis

Table 1 shows, for those workers in employment at *t* and who have not been recently in education or training, the percentages of them who in year *t*+1 remain in employment and report to have been in education or training since January last year. The analysis is done for the total sample of employees, using pooled data from 1995-2001, and for females separately. Furthermore we distinguish workers by the highest level of general education completed at *t*.

TABLE 1

% Workers in education or training since January last year (reported at $t+1$).

Highest level of general education at t	Total	Females
Primary	6.19	6.52
Secondary	15.17	16.13
Tertiary	26.49	28.58
Total	13.13	15.88

Around 13% of the selected sample report to have been in education or training since January last year. As it can be observed, independently on the highest level of general education already attained, females are slightly more likely to be involved in further education and training. Furthermore, the results reveal that the higher the level of education already completed the higher the probability of getting recently involved in education and training. For instance, we find that almost 30% of females with a tertiary level of education completed in year t, have being involved in education or training between t and $t+1$. This could be explained by the fact that those workers with higher levels of education tend to occupy skilled jobs whose skill requirements are more likely to increase over time.

TABLE 2

Type of course the individual has been involved since January last year.

Whole Sample	**Total**	**Primary**	**Secondary**	**Tertiary**
General education, vocational/training and language course	0.004	0.000	0.005	0.005
General education and vocational/training	0.008	0.006	0.014	0.007
General education and language course	0.007	0.004	0.007	0.009
Vocational/training and language course	0.056	0.044	0.061	0.060
General education only	0.052	0.034	0.045	0.064
Vocational/training only	0.690	0.728	0.725	0.655
Language course only	0.182	0.183	0.143	0.199
Females	Total	Primary	Secondary	Tertiary
General education. vocational/training and language course	0.006	0.000	0.012	0.007
General education and vocational/training	0.008	0.000	0.018	0.007
General education and language course	0.010	0.007	0.018	0.009
Vocational/training and language course	0.063	0.055	0.059	0.068
General education only	0.039	0.027	0.018	0.050
Vocational/training only	0.650	0.658	0.698	0.628
Language course only	0.224	0.253	0.178	0.232

Table 2 shows, for the sample observed in t+1, the type of course the individual has been enrolled since January last year. The results suggest that after completing a given level of general education and entering into employment, further investments in human capital are mainly associated with vocational or training courses. Around 70% of the sample observed in employment at t+1, have been enrolled in a vocational or training course since January last year. This percentage is higher for those individuals who in year t have only primary or secondary level of general education (around 72%) while the corresponding value for those with tertiary education is lower (around 65%). These results suggest that those individuals with lower levels of general skills tend to compensate them with other forms of human capital accumulation.

Following a language course is the second most common way of investing further in human capital. However, different to those enrolled in vocational or training, individuals with tertiary education seem to be the most likely to acquire language skills. Thus, it appears to be some kind of complementarity between general education and language skills.

It is also important to point out that 5.6% of the whole sample report to have been in both a vocational/training and language course. This percentage is higher than the corresponding to those individuals that have been in a course of general education only (5.2%).

Finally, it is worth noting that females are more likely to be enrolled in language courses. Around 22% of females have being in a language course since January last year. But now, we observe some complementarity between language skills and general education.

TABLE 3
Low pay / No low pay transitions (Descriptive analysis).

		Whole sample ($t+1$)				Females ($t+1$)			
		Total		Training		Total		Training	
Year t		Low	No low	Low	No low	Low	No low	Low	No low
Low	Primary	56.98	43.02	55.26	44.74	66.58	33.42	66.67	33.33
	Secondary	52.69	47.31	41.18	58.82	64.25	35.75	46.67	53.33
	Tertiary	43.55	56.45	40.54	59.46	43.75	56.25	42.86	57.14
	Total	**55.13**	**44.87**	**47.88**	**52.12**	**64.15**	**35.85**	**53.16**	**46.84**
No low	Primary	8.99	91.01	6.19	93.81	15.81	84.19	11.76	88.24
	Secondary	5.30	94.70	3.34	96.66	7.74	92.26	4.32	95.68
	Tertiary	1.93	98.07	1.17	98.83	2.26	97.74	1.38	98.62
	Total	**6.24**	**93.76**	**2.85**	**97.15**	**8.70**	**91.30**	**3.74**	**96.26**

Table 3 presents a descriptive analysis for low pay / no low pay transitions between *t* and *t*+1. Some points are worth noting. First, if we do not distinguish by the highest level of general education completed in year *t*, females are significantly more likely to remain in a low pay situation and to fall into low pay, even when looking at those who have been in education or training since January last year. However, when looking at those with a tertiary level of education completed at *t*, we observe that the risk of remaining low pay among females is very similar to the corresponding to the whole sample. Second, having a tertiary level of general education completed in year *t* is associated with the highest chances of moving from low pay to better paid jobs between *t* and *t*+1. These chances are augmented when the individual has been involved in education or training between *t* and *t*+1. Third, for all individuals in employment at *t*+1, having been in education or training since January last year reduces the probability of remaining low pay while it increases the chances of moving upwards in the earnings distribution. Nonetheless, the effect is remarkably higher among those individuals with a secondary level of general education completed in year *t*. Finally, having been in education or training since January last year also reduces the risk of falling into low pay for all educational levels.

6.2. Effects of General Education and Training

The descriptive analysis reveals that, in general, higher levels of formal education and training reduce the risk of being in a low-pay situation and increase the chances of moving towards better paid jobs. However, there may be other personal and job characteristics that play an important role in determining the probability of escaping from low-paid jobs and that are not accounted for. In order to control for those and assess the real effect of recent investments in human capital on the likelihood of escaping from a low-pay situation, we estimate a bivariate probit model as the one described in previous section. The estimation results are reported in Table 4. First, we obtain that the correlation coefficient ρ_{12} is positive and statistically significant, which suggests the presence of unobserved factors that affect yearly low pay / no low pay transitions. However, this source of endogeneity appears being non significant when doing a separate analysis for females.

Our main interest is on the estimated coefficient of the variable "training" in the equation low pay at *t*+1, that is a dummy variable that takes value 1 if the individual has been in education or training since January last year. As it can be observed this variable significantly reduces the risk of being in low-wage employment when looking at the whole sample. However, for females although the estimated coefficient remains being positive, it is no more statistically significant.

Higher levels of general education completed significantly reduces the risk of low pay for both the whole sample and for the subsample of females. However, we find that while for the whole sample age significantly reduces the risk of low pay, this finding is not observed among females.

Being employed on a temporary basis, being at first job and having unemployed previous to current job increase the likelihood of being in low-wage employment. In contrast, the risk of low pay significantly decreases with tenure at current job and job experience.

TABLE 4
Bivariate probit for the probability of being low pay at *t* and *t* +1.

Low-wage employment at *t*	**Total**		**Females**	
	Coef.	*t*	Coef.	*t*
Female	0.494	10.74	—	—
Age	—	—	—	—
16-29	—	—	—	—
30-44	–0.118	–2.14	–0.180	–2.14
45-64	–0.293	–3.02	–0.196	–1.42
Education level	—	—	—	—
Primary	—	—	—	—
Secondary	–0.344	–7.26	–0.371	–4.91
Tertiary	–0.691	–10.08	–0.745	–6.53
Part-time employment	–0.245	–3.50	–0.339	–3.87
Temporary contract	0.528	12.44	0.658	10.12
Job tenure > = 5 years	–0.176	–3.70	–0.157	–2.14
Unemployed before current job	0.084	1.87	0.106	1.50
First job	0.209	3.86	0.249	3.04
Job experience	–0.049	–7.14	–0.040	–3.75
Job experience^2	0.001	5.92	0.001	2.66
Constant	–1.013	–10.33	–0.541	–3.55
Low-wage employment at *t* +1				
Female	0.475	10.42	—	—
Age	—	—	—	—
16-29	—	—	—	—
30-44	–0.138	–2.45	–0.111	–1.33
45-64	–0.209	–2.37	0.021	0.17
Education level	—	—	—	—
Primary	—	—	—	—
Secondary	–0.299	–6.18	–0.216	–2.67
Tertiary	–0.549	–7.45	–0.553	–4.44
Part-time employment	–0.231	–3.36	–0.337	–4.18
Temporary contract	0.376	9.41	0.523	8.35

TABLE 4 (cont.).
Bivariate probit for the probability of being low pay at *t* and *t* +1.

Low-wage employment at *t* +1	Total		Females	
	Coef.	*t*	Coef.	*t*
Training	–0.183	–2.04	–0.091	–0.63
Secondary*Training	0.003	0.02	–0.132	–0.62
Tertiary*Training	–0.015	–0.11	–0.131	–0.63
Job tenure > = 5 years	–0.156	–3.43	–0.078	–1.07
Unemployed before current job	0.070	1.72	0.148	2.36
First job	0.192	3.57	0.279	3.54
Job experience	–0.020	–2.69	–0.027	–2.42
Job experience^2	0.000	2.16	0.000	1.97
Low pay at t	0.899	6.36	1.008	4.63
Constant	–1.422	–12.50	–1.087	–5.74
ρ_{12}	0.204	2.67	0.151	1.23
Wald test of $\rho_{12} = 0$	$\chi^2(1) = 7.11488$ $\Pr > \chi^2(1) = 0.0076$		$\chi^2(1) = 1.508$ $\Pr > \chi^2(1) = 0.2194$	

6.3. Transition Rates and the Effects of Education and Training

Table 5 reports the estimated low pay / no low pay transition rates obtained from the bivariate probit model.

The estimated transition rates reveal that recent investments in human capital have a positive effect on earnings growth. This result is in line with previous papers in the literature that find that workers reporting recent training are paid more than other comparable workers (see Duncan and Hoffman (1979) for the case of USA and Arumpalam, Booth and Elias (1995) for the UK).

This positive return of recent investment in human capital (mainly vocational/training course) is observed for all levels of general education and for the female subsample. For instance, more than 75% of workers with a tertiary level of general education, who were in low-wage employment at *t*, and who enrolled in education or training between *t* and *t*+1, moved upwards in the earnings distribution. For females this transition rate is found to be slightly lower, 72.46%. Furthermore, recent investments in human capital also reduce the risk of falling into low-wage employment.

TABLE 5
Low pay / No low pay transitions (Transition rates after bivariate probit).

		Whole sample ($t+1$)				Females ($t+1$)			
		Total		Training		Total		Training	
Year t		Low	No low	Low	No low	Low	No low	Low	No low
Low	Primary	49.05	50.95	44.92	55.08	62.93	37.07	58.84	41.16
	Secondary	43.07	56.93	36.84	63.16	54.78	45.22	46.68	53.32
	Tertiary	28.91	71.09	24.24	75.76	33.76	66.24	27.54	72.46
	Total	46.27	53.73	37.79	62.21	58.69	41.31	45.73	54.27
No low	Primary	10.17	89.83	7.41	92.59	17.27	82.73	13.35	86.65
	Secondary	6.16	93.84	3.92	96.08	9.50	90.50	5.99	94.01
	Tertiary	2.25	97.75	1.44	98.56	2.54	97.46	1.67	98.33
	Total	7.12	92.88	3.42	96.58	9.75	90.25	4.54	95.46

7. CONCLUDING REMARKS

In this paper we contribute to the literature analyzing the importance of human capital investment for wage earnings. In particular, we analyze how recent investment in human capital-general education, vocational/training and language courses affect the chances of low-paid workers to move towards better paid jobs. For this purpose we use data from the European Community Household Panel (1995-2001), and we estimate a bivariate probit model for the probability of being low paid at t and t+1.

Selecting a sample of individuals in employment at t and t+1 and reporting in year t that had not been in education or training since January last year, we find that around 13% of them get involved in further education or training between t and t+1. Of this 13% around 70% corresponds to workers enrolled in vocational or training course, and more than 18% to workers enrolled in a language course.

Our results reveal that, once the individuals completed a general level of education and enter into employment, further investments in human capital significantly increase the probability of moving upwards in the earnings distribution, and reduce the risk of falling in low-paid jobs.

A separate analysis for females reveals that in general women are less likely to improve their earnings, while they exhibit a higher risk of becoming low-paid. However, different to the results obtained for the whole sample, the estimation results of the bivariate probit model reveal that recent investments in human capital have no significant effects in reducing the risk of low pay among Spanish females.

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