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Education and unemployement in Spain: A logistic model

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Abstract

This paper is focused on the study of the role of education at individual and society level and its increasing importance in the last decades. With the purpose of studying the changing importance of education at individual level we estimate the unemployment probabilities for different population categories over the last two decades. The model applied for obtaining the unemployment probabilities is based on the one used by Nickell (1979), our study refers to the Spanish labour market. (JEL: J16, J21, J31)

1. Introduction

Politicians in OECD countries have started calling for improving the quality of the workforce, the worker must be more educated and better trained. To overcome existing shortages of skills they propose a permanent training of the workers and stress the importance of vocational training as an alternative to university.

This major concern for spreading and improving education does not only extend to overall economic performance. The available evidence supports the importance of education as an essential part for the personal development of individuals apart from a determinant of the economic growth. In particular, the evidence suggests that more educated individuals receive higher earnings and are less vulnerable to unemployment.

The basic reason why more educated individuals receive higher earnings lies with the importance of education to enhance productivity. There are many reasons to believe that better trained workforce has a greater potential to increase productivity. Major changes in the world economy have placed a premium on speedy decision making, high quality output, and the ability to adapt rapidly to change. Apart from receiving higher earnings qualified individuals also enjoy more job opportunities and are less prone to unemployment. A person can accept a job below his educational level but cannot elicit a job offer above it

The increasing importance given to education and the major changes in the world economy raises the question of whether both factors have affected the employment opportunities of the less skilled individuals: Are unskilled individuals more prone to unemployment that ten years, twenty years ago?. This is the question we pose in our paper and that we will try to answer in a very specific context, the Spanish labour market. Using Spanish labour market data and applying a similar model to Nickell's, we shall find out whether population with less qualification have become more vulnerable to the problem of unemployment in the last few decades. The question will be answered by estimating the unemployment probability of several population groups classified according to education achievements and sex.

The paper is organised in six chapters and each chapter has several sections. The first chapter is an introduction to the subject, the interest generated by education at different levels and the transcendence of our study. In the second chapter, the role of education, we review the main outcomes from education going to individuals, the research and the theory supporting the existence of these outcomes as well as the main critiques to this rationale. In the third chapter, we introduce the problem of unemployment in Spain and a description of the labour market according to activity and unemployment rates for various groups. The fourth chapter is dedicated to describing and explaining the Spanish educational expansion as well as the main features of its recent development. Following this chapter is the main body of the paper, the chapter stars with a review of the model used by Nickell to estimate unemployment probabilities for Britain. In the following sections we introduce our model and we shall discuss the results obtained and the conclusions that can be drawn from

them. Chapter six reviews what has been said in the previous chapters and we will try to draw some conclusions about the role of education according to the evidence provided by the model.

The source of data used for estimating the model has been the Labour Population Survey (EPA) for the years 1977 to 1995. This survey is elaborated at official level and gathers information about the Spanish labour market in terms of population employed and unemployed by sex, level of education achieved and age.

2. The role of education

There is a substantial body of both theoretical and empirical research that shows a direct and strong relationship between educational outputs and a wide variety of social, political and economic outcomes. These outcomes accrue to both the individual and society.

2.1. *Pecuniary outcomes*

This section will review briefly the rationale for focusing on the economic outcomes from education.Of all the benefits associated with education, the one that has been subject to the most research and enjoys the most political attention is the wage or pecuniary benefit from education. There are several reasons for this attention. First, pecuniary benefit are very meaningful to both individuals and governments, as they enable people to achieve a higher standard of living and often enjoy higher social status, while enabling society to achieve a higher overall standard of economic well-being. Second, data on pecuniary benefits are routinely collected and available, thus facilitating ready accounting and analysis. Finally, other economic and social benefits of education either accrue directly or indirectly from pecuniary benefits, as we will point out in the following paragraphs.

The most common and popular theoretical explanation for the pecuniary benefits from education is based on human capital theory. This theory was developed by Schultz, Becker and other neo-classical economists to explain the well-known relationship between an individual years of schooling and his or her earnings in the labour market (Schultz, 1961; Becker, 1964).The human capital theory boils down to the following, individuals invest in education, training and other activities that increase their human capital based on their tastes and preferences, the costs of investment

(both direct costs and indirect or foregone income), and the expected economic benefits. Firms hire all factors of production —human capital, physical capital, and land— based on available technologies and market prices until the value of the marginal product associated with each factor equals the costs of employing it. Markets regulate supply and demand for human capital through the price mechanism based on unrestricted competition and ready access to information.

In addition to empirical studies documenting the individual pecuniary benefits to education, other research has demonstrated the social benefits associated with education. Rate of return analysis has been employed to estimate the social benefits to investment in education relative to the costs (McMahon and Geske, 1982).

In general, rates of return to education are similar across countries, although they tend to be somewhat higher in developing countries where the level of educational attainment is lower.

Apart from the pecuniary benefits a wide variety of other economic outcomes have been attributed to education. As in the case of pecuniary returns, these benefits go to both individuals and society at large. In Table 1, we have listed these benefits.

Table 1. Economic outcomes associated with education. Source: Centre for Educational Research and Innovation(1994). Making education count

INDIVIDUAL OUTCOMES	SOCIAL OUTCOMES
Higher labour market earnings	Higher tax revenues
Higher non-wage remuneration	Improved economic growth
Additional education and training	Reduced economic inequality
Better employment	Better production of knowledge
More efficient labour market search activity	Reduced crime
Better child care quality	Improved political participation
Individual and family care	Reduced demand for social services
Better family decisions	Improved national health
More efficient consumer choice	Improved intergenerational mobility
Better attitudes and behaviour	

At the individual level, several additional economic benefits from education are realised in the labour market. First, educated workers are more likely to find jobs and to keep them in periods of economic downturn than other workers (Oi, 1962). Second, more educated workers not only enjoy higher earnings than less educated workers but they receive higher non-wage remuneration in the form of better working conditions and fringe benefits (Mathios, 1989). Third, educated workers are more likely to have

access to an invest in further education and training that leads to additional economic benefits over their working lives (Mincer, 1989).

In addition to the economic benefits realised in the labour market, several other social benefits from education have been identified. First, parental education is said to enhance the quality of child care and children educational performance. Second, individual and family health are also improved. Third, education is said to lead to more informed fertility decisions. Finally, it is said to enhance consumer efficiency.

At the social level, education has a number of important economic and social benefits. It contributes to economic growth by improving the stock of knowledge in society which leads to improved techniques of production. The pecuniary benefits of education also lead to higher tax revenues for government.

In addition to the benefits already mentioned, there are a number of social benefits that have important economic consequences. First, by raising income, increased education reduces the number of individuals and families living in poverty and thus reduces government outlays for social services. Raising education can also help reduce crime rates, thereby reducing the social costs of processing and incarcerating criminals. Other social outcomes that are also claimed to be associated with education include increased political participation and improved inter-generational mobility (Levin,1987). Finally, education is said to play an important role in the distribution of the level of income in society, although it is not clear from the available evidence whether it contributes to or actually helps reduce economic inequality.

2.2. *Difficulties in assessing the economic benefits of education*

The foregoing discussion suggests there is a relatively simple and straightforward relationship between educational outcomes and a variety of economic outcomes. The strongest theoretical support for this perspective comes from human capital theory.

The human capital explanation of the relationship between education and economic outcomes rests on three primary propositions:

- the primary role of formal schooling is to develop the human capital or the knowledge and skills of future workers.
- the labour market efficiently allocated educated workers to firms and jobs where these are required.
- the human capital of workers increases their productivity in the workplace which is then rewarded with higher earnings.

Each of these propositions can be supported with existing research. But each has also been the subject of considerable challenges by competing theories and research.

2.3. *The functioning of the labour market*

An important proposition to support the human capital perspective is that the labour market effectively allocates educated workers to firms and jobs where their human capital is required. For the labour market to be the appropriate mechanism for allocating educated labour, at least three conditions must be satisfied:

i) labour market must be competitive.
ii) information must be freely available.
iii) prices must reflect relative scarcities.

Each of these conditions has been questioned in the research literature.

First, a growing body of research has questioned whether labour markets are competitive. Two alternative notions have bee advanced. One argues that many jobs are filled through internal labour markets that operate within organisations rather than conventional external labour markets. The other argues that the external labour market is actually segmented into a different number of markets in which different types of workers compete for different types of jobs with different earnings, promotion possibilities and other characteristics.

Second, scholars have questioned how freely information flows to labour market participants. Information is not uniformly available to all participants, resulting in more favourable opportunities and treatment for some individuals than for others.

Third, questions have raised about how well prices can effectively regulate the market for education. In neo-classical economics, a perfect competitive labour market regulated through prices provides the most optimal or efficient allocation of labour. However, some scholars have argued that allocation decisions also involve questions of equity that can not be addressed through efficiency criteria alone.

2.4. *The impact of education on productivity and earnings*

The final difficulty in assessing the pecuniary benefits of education is that those benefits may not be as directly attributable to education as human capital theory points. In human capital theory the economic benefits of education result from two effects: i) the effect of education on worker productivity; and ii) the effect of productivity on earnings. Both have been the subject of considerable research and debate.

Defendants of human capital theory have advanced several explanations as to how education enhances work productivity. They include arguments that education enables workers to work better with other inputs, to use information better on costs and to deal better with desequilibria.

Competing models suggest that the relationship between education and productivity is more complex than considered by human capital. One alternative model is that of job competition, where individuals compete for available jobs that have different skill requirements, wages, and other characteristics. Workers` productivity and earnings result from the jobs that they hold and not directly form their education and training. As a result, there can be a mismatch between the skills and education level of individuals and those that are actually required to perform their jobs. This mismatch can have adverse effects on both productivity and earnings rather than the positive effects suggested by human capital theory.

The primary difference between the human capital and the job competition models is one of emphasis. In the human capital perspective it is primarily the attributes of individuals, such as their knowledge and skills, that determine productivity in the work place.

Another challenge to the human capital model concerns the relationship between productivity and earnings. Human capital theory assumes that workers wages are directly proportional to the value of their marginal contribution to work output. Yet some empirical research has shown that wages are not always proportional to productivity.

To summarise, the previous discussion points out that there is substantial research literature to support the linkage between educational outputs and a variety of economic and social outcomes. However, recent contributions to the issue also stress the theoretical limitations of the human capital. The linkage between educational achievements and economic outcomes is much more complicated and less straightforward than human capital theory suggests.

3. Spanish labour market

3.1. *General considerations about unemployment*

Unemployment is a serious problem in many European countries, but in Spain it has been specially pressing. Among all the industrial countries, Spanish has shown to be the country with the most severe and intractable unemployment problem.

There is not a single explanation for Spanish unemployment problem. A number of factors interact to produce the extraordinary unemployment rates of the 80's and 90's. Demographic trends produced a sharp increase in the number of workers. The growth of the Spanish population and the entrance of women into the labour market have generated increases in the economically active population averaging 1.2 % per year since 1980. The share of women in the Spanish labour force rose significantly, from 28.76% in 1977 to 38% in 1995, in spite of this increase women's participation still lags behind most West European countries.

At the same time, rapid modernisation of the Spanish economy led to large declines in employment in agriculture and traditional basic industries. Because of the expansion of the non-agriculture labour force, Spain would have needed to create more jobs to reduce unemployment.

Demographics and structural changes alone do not explain why the Spanish economy has been unable to generate enough jobs to prevent an explosion in the unemployment rate. We could also refer to three main factors that contribute to explain the high unemployment rate.

One distortion of the market commonly mentioned is the underground economy, the existence of a sub-economy that employs large number of people formally listed as jobless. Different surveys have been conducted to measure the level of clandestine workers or frauds in unemployment benefit. The data suggests that between 1.8% and 7.3% of unemployment could be explained by the underground economy.

A second important distortion in the Spanish labour market is the overly generous unemployment benefits. Both the coverage and the generosity of unemployment benefits increased substantially during the 80's.

In addition, severe labour-market rigidities affecting hiring and firing, wages and employment contracts contributed to the stickiness of real wages and inhibit the creation of stable, permanent jobs.

3.2. *Description and trends in labour market participation*

This section analyses with a descriptive approach the Spanish labour market. It describes the trend followed by the activity rates for males and females of different age groups in the last two decades. In this description we have not included differences in activity rates associated to different levels of studies. Description according to education achievements of the labour population will be done in the chapter about Spanish educational expansion.

When studying the Spanish labour market, the first outstanding feature is the remarkable difference between the Spanish activity rates and the activity rates of other OECD countries.

According to the Table 2 we observe the following:

- only 60.35% of the Spanish total population were active population in 1995. This rate was one of the lowest in Europe just higher than the participation rate of Italy and Luxembourg.
- this result was mainly due to the reduced participation of women in the Spanish labour market. Only Greece, Luxembourg and Italy have lower rates of women's participation.

Table2. Activity rates in the European Union for the period 1975-1995. Percentage of active population with respect to the total population between 16 and 64 year old

Years	1975	1985	1990	1995	1975	1985	1990	1995	1995
	MEN				WOMEN				Average
Belgium	82.7	73.8	71.4	73.0	39.2	44.7	45.9	52.4	62.7
Denmark	89.6	89.9	89.3	87.3	63.4	76.4	78.6	74.2	80.7
Germany	87.1	83.2	81.4	78.4	49.4	53.0	57.0	60.3	69.3
Greece	87.9	83.1	79.0	80.0	33.1	41.8	43.1	45.5	62.7
France	89.3	80.4	78.7	75.7	54.6	57.8	59.5	61.3	68.5
Ireland	90.4	83.7	80.6	78.7	36.4	39.5	42.4	47.9	63.3
Italy	83.7	78.3	76.9	73.5	33.5	38.9	42.1	43.0	58.2
Luxembourg	84.5	79.9	78.0	75.9	47.2	41.9	42.8	44.2	60
Netherlands	92.5	80.6	80.1	78.9	34.7	44.1	52.2	58.1	68.5
Austria	86.2	86.1	85.4	82.9	50.6	53.9	58.7	64.4	73.6
Portugal	89.5	85.6	82.7	80.4	51.1	54.6	57.0	61.5	71
Finland	79.9	82.1	81.2	75.9	67.3	75.9	73.6	71.3	73.6
Sweden	90.9	86.4	86.5	82.0	69.1	78.8	82.2	76.8	79.4
UK	91.7	87.6	88.6	85.0	55.0	61.9	67.0	66.9	75.9
Spain	90.6	79.8	78.4	75.1	31.7	33.8	41.0	45.6	60.35

Source: OECD Databank.

Desegregating by sex it can be also observed how the evolution has followed an opposed direction for males and females. During the last 20 years the activity rate for men has followed a steady decline, falling from 90.6% in 1975 to 75% in 1995 and it is similar for the rest of the EU members. The evolution of the activity rate for women has been very different, from a very low percentage in 1975 of 31.7% it has increased to 45.6% in 1995. This activity rate is still below the levels for most of the OECD countries.

The evolution of the activity rate for women has been characterised as very cyclical. During the periods of recession the activity rate reduces, to increase again during the years of economic expansion. The cyclical behaviour is often explained by the role of women as the additional earner supplementing male income. This seems to suggest that women participation increases during periods in which the economic expansion makes relatively easy get a job.

The evolution of the labour force has differed remarkably from 1977 to 1995 due to the existence of periods of economic expansions and recessions over these years.During the period of crises 1977-1985, the low increase in the number of new entrants in the labour market relieved the pressure caused by the increase in unemployment. The labour population only increased by 60 thousand people per year.

In the period of recovery 1986-1990, the incorporation of 1.3 million people to the labour market limited the impact of important job creation at that time. The unemployment pool only decreased by 80 thousand people on average.

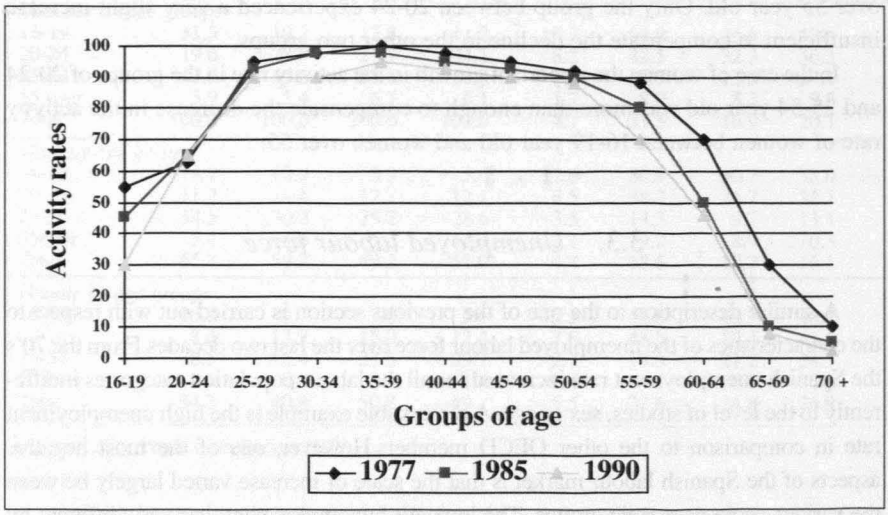
In the last period of recession, 1990-1992, the same pattern of behaviour has been observed in the activity rates. The labour population growth slows down again, the increase in the labour force has been of 75 thousand individuals per year. However, employment growth has fallen down at a faster pace which made the decrease in labour population insufficient to avoid the boost of unemployment. The impact of this recession period on the unemployment rate was much worse than the previous recession. The explanation of this deeper impact could lie on the growing flexibility of the Spanish economy. More labour market flexibility tends to strengthen the impact of labour adjustment processes whether in one direction or on the other. During the final period, 1992-1995, there was an increase of the activity rate of women without particular change with respect to the activity rates of men.

The final conclusion that can be drawn from the analysis of the data is the cyclical behaviour of the activity rates of both sex, although more accentuated in the female activity rate. This cyclical behaviour was of essential importance to reduce the overall increase of unemployment during the recession periods.

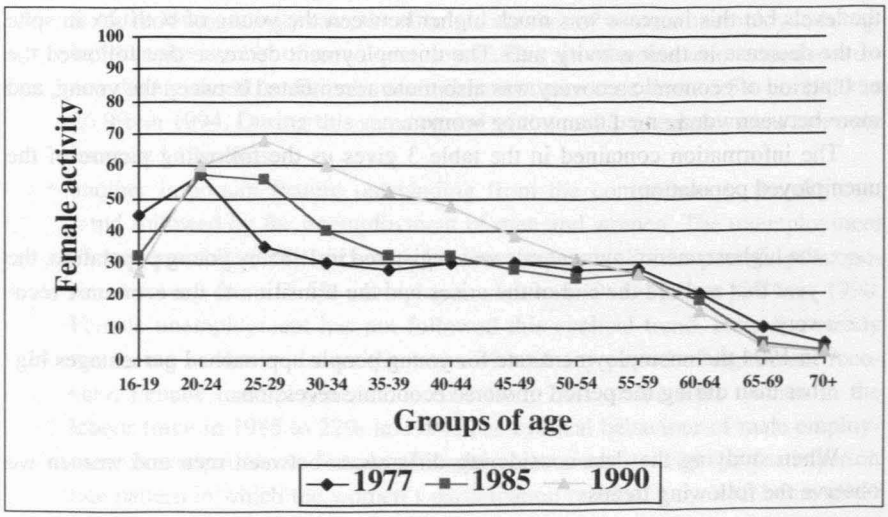
The labour market can also be described using other main characteristics of the

labour population. Differentiating by groups of age we obtain the following results, Graph 1 and 2 display the activity rates for men and women

Graph 1. Males activity rates for groups of age



Graph 2. Females activity rates for groups of age



From the graphs it is possible to derive which is the factor underlying the different pattern observed for the activity rates of men and women. Between 1976 and 1992, the activity rate of men in the age group 16 to 19 underwent a constant decrease. A similar trend was followed by the activity rate of the men population over 55 year old. Only the group between 20-24 experienced a very slight increase insufficient to compensate the decline in the other two groups.

In the case of women the important growth in the activity rate in the groups of 20-24 and 25-54 year old was more than enough to compensate the decrease in the activity rate of women between 16-19 year old and women over 55.

3.3. *Unemployed labour force*

A similar description to the one of the previous section is carried out with respect to the characteristics of the unemployed labour force over the last two decades.From the 70's the Spanish unemployment rate increased for all the labour population categories indifferently to the level of studies, sex or age. A remarkable example is the high unemployment rate in comparison to the other OECD members.However, one of the most negative aspects of the Spanish labour market is that the scale of increase varied largely between the various socio-economic groups. The impact of unemployment was very different by age groups, unemployment increase affected to women and young more dramatically.

During the recession period, 1977-1984 the unemployment rate increased at all the levels but this increase was much higher between the young of both sex in spite of the decrease in their activity rates.The unemployment decrease that followed the next period of economic recovery was also more accentuated between the young, and more between young men than young women.

The information contained in the table 3 gives us the following picture of the unemployed population:

- the highest unemployment rate was registered in 1985 by young populatino, the year that marked the end of the crises and the transition to the economic recovery.
- in 1994 the unemployment rate for young people approached percentages higher than during the period of worse economic recession.

When studying the data considering differences between men and women we observe the following trends:

Table 3. Distribution of the unemployed labor force and the unemployment rates by groups of age and sex for 1977, 1985, 1990 and 1994

	Distribution by percentage				Unemployment rates			
	1977	1985	1990	1994	1977	1985	1990	1994
Both sex by age groups								
16-19	31.5	19.7	12.8	11.2	13.7	54.9	36.6	42.6
20-24	19.6	28.3	27.7	24.5	8.2	42.5	32.3	36.3
25-54	42.9	46.6	52.8	58.3	3.3	15.7	13.5	17.1
55 over	5.9	5.4	6.7	6.1	1.7	8.0	8.3	9.5
Total	100.0	100.0	100.0	100.0	4.7	21.5	16.9	20.1
Male by age groups								
16-19	14.7	10.0	5.9	5.6	12.0	30.9	30.7	38.0
20-24	11.2	14.4	12.7	12.1	8.5	38.2	26.7	32.1
25-54	34.5	30.2	25.2	28.6	3.5	14.3	9.7	13.1
55over	5.4	4.6	5.3	4.7	2.1	9.2	8.9	10.3
Total	65.7	59.2	49.2	51.0	4.4	18.6	12.7	16.1
Female by age groups								
16-19	16.9	9.7	7.0	5.6	15.5	59.8	43.7	48.4
20-24	8.4	13.9	15.0	12.4	7.8	48.3	39.4	41.6
25-54	8.5	16.4	27.5	29.7	2.7	19.3	21.2	24.3
55 over	0.6	0.8	1.4	1.4	0.6	4.7	6.4	7.6
Total	34.3	40.8	50.8	49	5.5	27.6	24.8	26.9

Source: Labor Population Survey (EPA).

- as we have already mentioned the female activity rate has risen steadily since 1977. This increase has not been enough to achieve the male activity rate yet and gap widens in the age group between 20 and 55 years old. However in spite of the lower activity rate, the absolute number of women unemployed is higher than the number of men unemployed. This situation has also tended to worsen during the 80's. Female unemployment rate rose from 5.5% in 1977 to 26.9% in 1994. During this same period of time male unemployment rate only increased 12 points.
- another important feature outstanding from the comparison is the different trend followed by the unemployment of men and women. The unemployment of men has followed a cyclical behaviour, improving in the periods of economic recovery, from 18.6% unemployment rate in 1985 it fell to 12.7% in 1990. Female unemployment has not followed this cyclical trend, instead a steady worsening is observed over the years without any period of significant recovery. Female unemployment rate rose from 25% of the total women in the labour force in 1985 to 27% in 1994. The cyclical behaviour of male employment in comparison to female unemployment contrasts with the participation rate pattern in which the women's participation rate had a cyclical behaviour.

In terms of similar trends observed for both groups it is worthwhile mentioning the negative correlation between age and unemployment, although more remarkable for men than for women.

To conclude, it is important to point out two of the discriminatory characteristics of unemployment in Spain:

- Spanish unemployment has affected more seriously to women than to men. Women unemployment represents 50% of the total unemployed and only 1/3 of the occupied population.
- young population is the group more affected by the unemployment however during the economic recovery, they also experienced the most important improvement.

4. Spanish educational expansion

The educational expansion taken place in the last decades gives a picture of the labour participation by educational level very different to the existing 20 years ago. The expansion has led to a dramatic increase in the number of highly educated people. The demand for higher education has often overcome the capacity of the educational system. Universities have found themselves overwhelmed by the number of applicants and without capacity for all of them.

Table 4. Active population by education levels

Education	1977	1985	1990	1995
Illiterate	551.03	319.59	242.98	142.46
Without studies	1690.58	1412.86	1486.81	1087.42
Primary	8159.4	6653.58	5703.99	4764.81
Secondary	1717.63	3572.47	4637.29	5600.49
Vocational	168.05	390.57	1211.96	1767.16
Tertiary	360.71	622.88	874.68	1027.27
University	346.93	586.62	834.66	1118.08

Source: Labor Population Survey (EPA).

As Table 4 suggests, the change in the schooling levels of the Spanish labour force has been spectacular. Whereas in 1977 the active population illiterate and without studies represented 17.25% of the total active population, in 1995 this share reduced to 8%. However this figure is still high compared to other OECD countries.

In spite of the decrease in young population during the 80's, the active population of Tertiary and Vocational Training grew approximately in two million people in absolute terms. Labour force with University studies has grown from 346,930 in 1977 to 1,118,080 in 1995. This sharp increase is mainly due to the incorporation of women to the secondary and post-secondary education.

Table 5 provides a picture of the women participation in the labour population by education levels. The sharpest share increase for women in the active population took place in the group with University studies, where women share rose steadily from 18.93% in 1977 to 43.39% in 1995, and in the Vocational training studies with an increase from 8.45% in 1977 to 39.88% in 1995. However the largest share of women in the labour market is found between those with Tertiary school.

Table 5. Women participation in the labour force by education levels

Education	1977	1980	1985	1990	1995
Illiterate	44.08	41.93	40.71	44.52	48.33
Without studies	25.55	26.03	27.39	30.96	34.79
Primary	27.29	26.11	25.2	28.4	31.45
Secondary	36.94	38.26	37.6	39.25	39.07
Tertiary	38.35	47.04	47.65	53.06	57.31
Vocational Training	8.45	14.14	22.01	36.5	39.88
University	18.93	23.54	29.93	37.02	43.39

Source: Labor Population Survey (EPA).

The increase in the years of schooling also led to a reduction in the labour participation of population under 25 years old. The share of labour population under 24 year old has decrease from 22.7% in 1977 to 17.5% in 1995.

In spite of spectacular educational expansion process there is still an important educational lag with respect to other OECD countries, only Greece and Portugal have higher unskilled population rates than Spain. In the Spanish labour market there is still a strong presence of people with basic educational levels particularly within older population. This high percentage is a direct consequence of the Spanish delay in setting the free access to education and implies a social problem of first magnitude. Two factors have contributed to reduce the consequences of the high share of labour population without studies. On one hand the fact that this share mainly consists of people already retired or about to retire. On the other hand, the activity rate increases steadily with the level of education achieved.

These two factors are not enough to cancel the consequences of the high rate of labour population without studies. The existence of an unusually high percentage

without education or very basic skills together with a lack of skills flexibility to meet today's economic challenges contribute to undermine the capacity of the Spanish economy and it implies a problem of first magnitude to achieve convergence with other developed countries.

5. Education and Unemployment: a logistic model

This chapter constitutes the main body of our paper in which we shall prove that in spite of the general increase in unemployment at all socio-economic levels, this has been particularly high for unskilled population.

5.1. *General considerations about the logistic model*

In economic theory very often the dependent variable of the model is a qualitative variable that can take several attributes. For modelling this type of data the logistic regression is a tool of major importance. In comparison to alternative models the logit model is very attractive to use since the probabilities obtained for the dependent variable do not increase linearly with the independent variable, as happens in the linear probability model. This is a property of essential importance for models studying the effect of additional years of schooling, since additional years may not contribute by the same proportion to reduce the likelihood of unemployment.

The objectives of the logistic model are mainly three: to determine the existence or absence of a relationship between independent variables (X) and a dichotomous dependent variable (Y). This variable only admits two possible categories, which are mutually exclusive.

$$P_i = E(Y - 1/X_i) = \frac{1}{1 + e^{-zi}} \qquad (1)$$

$$Z_i = \alpha + \beta_1 x_1 + \beta_2 x_2 \qquad (2)$$

The above equation represents what is known as the logistic distribution function. It is easy to verify that as Z_i ranges from $-\infty$ to $+\infty$, P_i ranges between 0 and 1 and that P_i is nonlinearly related to Z_i.

The interpretation of the logistic model is as follows: β_i, the slope, measures the change in Z_i for a unit change in the independent variable X_i. The constant term a is the value of the log-odds being the set of independent variables equal to 0. Like most of the interpretations of intercepts this interpretation may not have any physical meaning.

According to the human capital theory education leads directly to the accumulation of human capital. Furthermore, increases in the level of schooling significantly raises the rate of return to future training, which leads, presumably, to the accumulation of still higher levels of human capital during working life. In so far as part of this human capital is firm specific, the more human capital an individual possesses, the less likely firms are to make him/her redundant, and the less lik.ely he/she is to quit. There is thus an obvious link between the probability of an individual entering unemployment and the level of his/her education

One of the first studies trying to quantify the impact of education on unemployment was the paper by Nickell (1978). In this article he analysed the evidence concerning the relationship between education and unemployment incidence over an individual's life-time for Britain. The estimates obtained for this relationship were split into the impact of schooling and qualifications on the probability of entering unemployment and on the expected duration of unemployment spells. The estimated probabilities were computed on the basis of a logit model estimated by standard maximum-likelihood methods.

5.2. *Logit model for Spanish education*

We estimate a logistic model to obtain the probabilities of unemployment for Spanish labour population in the last two decades. The parameters are estimated by standard maximum likelihood methods. The specification of the model has some elements in common with Nickell's model however the nature of data we have used leads to important modifications with respect to Nickell's.

The dependent variable of the model (Z_i) is the percentage probability of being unemployment. As independent variables we include levels of education in terms of years of schooling (X_1) and sex (X_2) which is introduced as a dummy variable. Being a dummy variable only takes two possible outcomes, one for man and zero for woman. The introduction of sex as a dummy variable makes possible to observe the probability differences of being unemployed depending on the individual of reference being a man or women.

Many more specific characteristics could have been introduced such as age cohort, marital status, sector of activity, two are the main reasons to specify the model in this way. On one hand the main purpose of our paper is not the accuracy of the estimated probabilities but the probability difference between categories of population. On the other hand the introduction of more variables could lead to problems of multicollinearity.

The estimates are obtained for five years representatives of each of the periods undergone by the Spanish economy in the recent history. The first year for which estimates are obtained is 1977, representing the year of the political transition to Democracy after 40 years of dictatorship ruling the country. For many of the OECD members this was the year in which the crises got its peak. However in Spain the crises did not hit the economy so dramatically until the beginning of the 80's. The year 1980 marked a clear worsening of the economic situation and with it of the employment prospects. The peak of the crises was approached in 1985 when the unemployment got its highest rates. The next year studied is 1990, is part of a new period of economic prosperity and growth. The unemployment situation worsened again slightly during the next couple of years. From the most recent period characterised by prosperity together with economic uncertainty we have considered 1995.

Table 6 shows the different educational levels considered in the model and the years of schooling corresponding to each of them.

Table 6. Educational levels-years of schooling

Education	Years of schooling
Illiterate	0
Without studies	2
Primary school	5
Secondary school	8
Tertiary school	12
University Faculty or STS	17

One of the educational levels introduced in the section about Spanish education expansion, vocational training, was excluded in the estimation of the model. The reason was to try to avoid distortions when obtaining the effect of additional years of schooling in employment probabilities. These studies have been suffering particularly high rates of unemployment due to their labour market inadequacy. To introduce them in the model as years of additional education would have undermined the effect of education on employment opportunities.

The illiterate group includes all that population without any type of academic skills. Those without any education qualification but with some basic educational skills are included in the group of people without studies. Based on previous studies (Castillo y Toharia, 1995) we have assigned for this group an average of two years of schooling. The years of schooling for the other groups have been determined according to their average duration.

It is also important to draw attention to another element of the model. The source of data used for estimating the model does not allow differentiating between short and long University degrees. Some unemployment disparities have been observed between both groups, however these differences are not important enough to alter the main results of the model.

5.3. *Results of the estimation of the model*

Table 7. The estimated parameters, the estimates standard deviation between brackets and the t-ratios

Parameter	1977	1980	1985	1990	1995
Constant	–2.6704	–1.8973	–1.1496	–1.2279	–.5974
S.E.	(.0095)	(.0834)	(.0664)	(.0688)	(.0588)
Education	–.0055	–.0060	–.0167	–.0281	–.0529
S.E.	(.1166)	(.0069)	(.0055)	(.0063)	(.0056)
t–ratio	.0471	.8695	3.036	4.46	9.44
Sex	–.1012	–.1135	–.1064	–.4990	–.4672
S.E.	(.1139)	(.0837)	(.0663)	(.0723)	(.0624)
t–ratio	0.8884	1.35	1.60	6.9	7.48

Applying the logistic distribution function

$$P_i = E(Y - 1/X_i) = \frac{1}{1 + e^{-z_i}}$$

With $Z_i = \alpha + \beta_1 x_1 + \beta_2 x_2$.

In table 7 we obtain the probability estimates for the different groups over the years.

Table 8. Percentage of unemployment probability for each group. M=men, W=women. (Estimated from a logit model)

Year	1977		1980		1985		1990		1995	
Sex	M	W	M	W	M	W	M	W	M	W
Illiterate	5.88	6.47	11.8	13.04	22.16	24	15	22.65	25.64	35.49
Without Studies	5.82	6.4	11.68	12.9	21.5	23.45	14.39	21.68	23.67	33.11
Primary School	5.73	6.3	11.4	12.7	20.75	22.56	13.38	20.28	20.93	29.69
Secondary School	5.64	6.21	11.3	12.5	19.94	21.7	12.43	18.95	18.42	26.49
Tertiary School	5.53	6.08	11	12.24	18.9	20.58	11.26	17.29	15.45	22.57
University	5.39	5.93	10.78	11.92	17.65	19.25	9.93	15.37	12.3	18.29

Several features can be pointed out from the results:

- the probability of being unemployed has risen for all the groups without exception for any educational level. The probability of unemployment for a man with Tertiary school in 1977 was 5.53%, this probability increased to 15.45% in 1995.
- the increasing trend has not been so steep for those individuals with higher educational levels. At the end of the 70's the chances of unemployment were very similar for the different groups, between 5% and 6%. The difference in relative terms of being unemployed for an illiterate individual with respect to a university graduate were 9%. This relative difference rose to 108% points in 1995, the year in which the disparity between both groups achieves their widest difference. The worsening in the unemployment chances is also extensive to all the compulsory levels, primary and secondary, and only a slight recovery is perceived from Tertiary school.
- the difference in the unemployment probability are very narrow between Tertiary school and university degrees, although lower for the latter. The narrow margin raises the question of whether the unemployment probability difference is enough to compensate the higher costs associated to University studies.
- unemployment probabilities for women have worse performance than for men as well as an upward trend. Apart from higher unemployment probability the margin between men and women has tended to widen over the years. Whereas the relative differences between men and women with Primary school was of 41% in 1995, this difference was only of 9% in 1977. At the level of Tertiary school this difference is even wider, in 1977 it was of 9.9% and it has risen to 46% in 1995.

The results obtained allow answering the question posed at the beginning of the paper. An important percentage of the university students in 1995 were unemployed.

However the probability differences between those without skills or very basic ones and those with educational achievements have widened in the last decades. This implies that the access to an employment has worsened for those without skills or insufficient skills. Unqualified population has become more vulnerable to the problem of unemployment. If during the 70's education just contributed to difference the earnings received by the individuals. Its current importance makes it an element to difference the access to a job.

The result is also confirmed by the value obtained for the t-ratios in the model. The value of the t-ratios for the variable education increases over the years confirming that education becomes a more significant variable to explain unemployment. While in 1977 the variable education has a very low t-ratio equal to 0.0471 and its estimate is significantly different of 0 at 56.32% significance level, in 1985 the t-ratio is 3.036 and the estimate is significant at any level. In 1995 the t-ratio approaches 9.44.

With respect to the sex as explicative variable, it has become a more significant variable in the model over the years. Its t-ratio has increased from 0.8884 in 1977 to 7.48 in 1995. Women participation rate has increasing steadily particularly at higher education levels which has prevented education from contributing to reduce unemployment. The positive impact of education employment was more than overcome by the growing number of young women entering the labour market.

6. Conclusions

The implications of education at individual and society level make education an issue of current concern in the political agenda of the OECD countries. Education has been shown to be an element of main importance for economic growth. Technological revolution and the appearance of strong competitors make the demand for highly qualified labour force an urgent necessity in many of the developed nations. A shortage of skilled labour supply could frustrate growth prospects and prevent keeping a pace with technological change.

Individuals also obtained great advantages in access to higher education. Immense research on the subject has showed the existing link between education achievements and job performance. This job performance is understood as employment possibilities, average earnings, etc. Several reasons gather together to explain why more educated individuals are less vulnerable to unemployment. Every individual independently of his education level can learn the skills required for his job by training. However research on the subject has shown that the learning speed and capacity to

assimilate important amounts of information is much higher in those individuals that already achieved education. Some of the reasons focus on job search behaviour. More educated individuals are more efficient in job matching that is, finding suitable employment with less job-shopping. This job search behaviour is explained by the greater stock of information accumulated by educated individuals and their higher efficiency in searching. There are also factors focused on the own characteristics of the sectors employing the more educated labour force. Demand for educated individuals is higher in those industries with more rapidly increasing productivity and growth, ensuring a steady increasing demand for educated workers. Another important impact of schooling is on unemployment spells. Education also reduces the unemployment probability by reducing the incidence of unemployment spells among the workers.

Apart from the existing linkage between education and unemployment there is also reason to believe that the relationship has strengthened in the last decades. We have studied this hypothesis with respect to the Spanish labour market and different educational categories. The study of the evolution of unemployment probabilities in the context of the Spanish labour market was particularly interesting. Spain during the last few decades has undergone an important educational expansion that has brought the schooling rates to similar levels of other OECD countries. However there is still an important share of the labour population with insufficient skills. The education expansion has been parallel to the growth of the unemployment from the 70's, only showing signs of recovery already in the 90's. Unemployment has been a persisting problem in the Spanish labour market affecting all the socio-economic groups without exception. In spite of this negative picture through our analysis we have shown that unemployment has evolved more positively for individuals with high education. We have explained this pattern on the grounds of rapid technological change, increasing demand for highly flexible workers and structural shifts in the economy. As a result of the different economic changes those individuals with very basic skills, and particularly older workers are more vulnerable to be unemployed. The solution of their unemployment problem seems untractable unless skills and training are ensured.

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