Human Capital Investment in the Presence of Unemployment: Application to University Enrolment in Spain.

Rosa M. Fernández and Etsuro Shioji*†

August 2000

Abstract

This paper explores the effects of unemployment on the school enrolment decisions. A few studies that have taken up this issue in the past have produced results that are seemingly contradictory with each other. We build a model of the enrolment decision that is capable of explaining these results in a unified manner. In this model, unemployment affects the enrolment decision both through changing costs of and returns to education (*investment effect*) and through changing parental wealth and thus affecting intergenerational transfers (*wealth effect*). We develop an empirical framework that allows us to test presence of these two effects separately, and apply this to panel data of Spanish regions on university enrolment. We find that both effects are present.

Keywords: Education Participation, Unemployment, Intergenerational Transfers, Opportunity Costs.

JEL Clasification: I1 J2 J6.

*University of Oxford and Yokohama National University, respectively. Correspondence to: Rosa M. Fernández. SKOPE. Department of Economics. University of Oxford. Manor Road. Oxford OX1 3UQ. UK. E.mail: rosa.fernandez@economics.oxford.ac.uk

†We would like to thank Xavier Sala-i-Martin, Jose Maria Labeaga, Silvio Rendon and Ken Mayhew for useful comments on earlier drafts of this paper. Shioji also thanks financial assistance from the Ministry of Education of Japan (through the Scientific Research Grant) and the Nikkei Foundation.

1 Introduction

1.1 Motivation

In this paper we will study the effects of unemployment on school enrolment decisions using a panel on university enrolment across regions in Spain. Most of the research on the impact of labour market conditions on education participation decision builds on Mincer (1974) and Becker (1976). Education participation is an investment decision by which individuals forego time and resources in order to earn higher wages in the future. Wages therefore represent the returns to education and they establish a link between labour market prospects and schooling decisions. Following this approach a big part of the subsequent literature concentrated on studying the effect of wages on enrolment (Lehvari and Weiss, 1974; Willis and Rosen, 1979; Kodde, 1988). A different way to explore this relationship is to consider how labour market prospects affect the costs of schooling. As in Freeman (1986), time spent in school are lost hours of work and hence wages can also be controlling for the opportunity cost of education. Future and current wages are thus good approximations to the costs and benefits of education, however, wages are only earned if a job is effectively available. In the presence of unemployment education becomes and investment decision subject to uncertainty. Both the costs and the benefits of education are unsure and the final decision may be completely different from that taken under certainty. Holding wages constant, higher unemployment in the present makes schooling more attractive because it is less likely that a wage is lost. Higher unemployment reduces the opportunity cost of education. Similarly, higher future unemployment reduces the benefits of education and therefore it discourages enrolment. In this paper we want to highlight the role of unemployment as determinant of educational investments.

Some previous research has attempted to study the effects of unemployment on different types of schooling decisions obtaining mixed results. Rees-Mocan (1997) and Beths-McFarland (1995) use panel data analysis to investigate the role of unemployment in explaining high school dropouts and community college enrolment, respectively. Both studies find a positive effect of unemployment on education participation, reducing dropouts or increasing enrolment. Micklewright et. al. (1990) find a positive effect of unemployment on early school *leaving* while the time series analysis of Withfield an

Wilson (1991) yields the opposite answer to the same question. Frederiksson (1997) obtains a very small effect of unemployment clearly inferior to the role played by wages in explaining the demand for Higher Education. More recently papers concerned with youth living arrangements[1] have also found differing effects depending on specifications. Card and Lemieux (1997) find that the employment-population ratio reduces the proportion of youth attending school, but turning to explaining changes over time, labour market measures lose their explanatory power. Martinez and Ruiz-Castillo (1998) obtain a negative effect of regional unemployment on the probability of studying. In this paper we propose a plausible explanation for this diversity of findings.

The central hypothesis of the paper is that unemployment could have two different effects on enrolment decisions. The one we call **investment effect** works solely through changing the costs and benefits of education. A high current rate of unemployment for non-graduates encourages enrolment by lowering the opportunity cost of education. In the same way, the expectation of a high rate of unemployment of graduates upon finishing the degree discourages enrolment by reducing the benefits of education. Furthermore, given the intertemporal nature of schooling decisions, serial correlation in unemployment rates boosts both effects . So long as high rates of unemployment are expected to occur in the future following today's observed ones, then the investment effect will be at work. Most previous studies consider implicitly or explicitly the investment effect. However, given the inconsistency of results, this effect alone does not seem to give a sufficient explanation to the empirical relationship between unemployment and enrolment. This is why we introduce the other type of effect, the **wealth effect**. Higher unemployment rates will make households poorer in general. In the presence of financial market imperfections, investments in education will be negatively affected by the lack of income. Thus, unemployment could unambiguously reduce enrolment if the wealth effect predominates. We develop a model that captures both of the above effects simultaneously, and test its implications empirically.

[1] Youth living arrangements refer to joint decisions on accomodation, fertility and labour market participation of young adults.

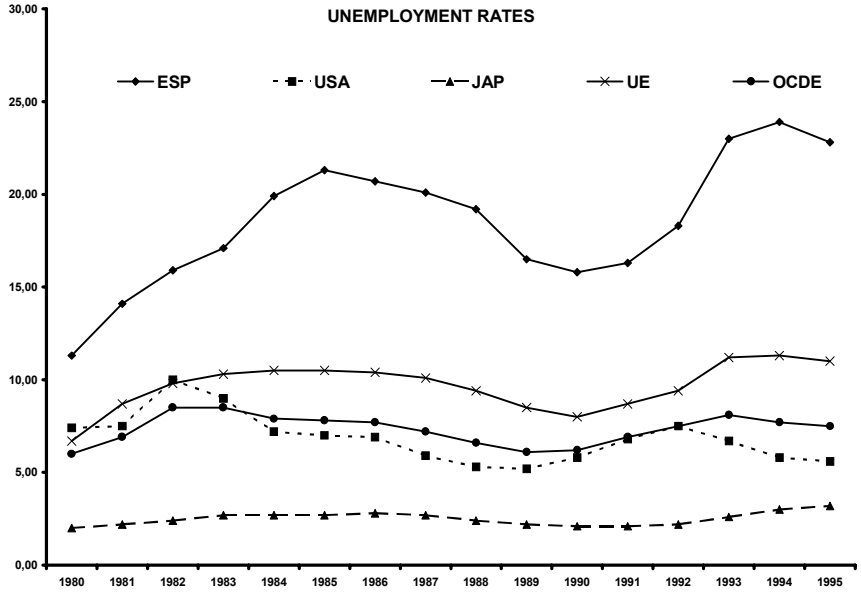


Figure 1: Comparison of Unemployment across OECD Countries. Sources: OECD, INE.

1.2 Spanish Unemployment

In this paper, this theory is tested using regional data on Spain. There are two main reasons for this choice. First, the Spanish unemployment rate has been high and volatile. Figure 1 compares the evolution of the Spanish rate 1980-1995 with those of other major developed countries. As the figure reveals, even by European standards, the Spanish rate has been high and volatile.

As additional evidence, in Figure 2 we compare the distribution of regional unemployment rates in Spain with the other European regions in 1990[2]. In Spain, the region with the highest rate was Andalucia (26.1%). The lowest was La Rioja (7.4%). In contrast, considering all the other European Regions, the region with the highest unemployment was Calabria in Italy (21.9%) while the lowest was Luxembourg (1.6%). Second, regional variations in unemployment rates are huge in Spain. The variance of the cross-sectional distribution of regional unemployment in Spain is twice that of the European

[2]European regions excludes Spain in Figure 2.

	Spanish Regions	Eruropean Regions
Maximum	26.10	21.90
Minimum	7.40	1.60
Mean	15.46	7.41
Standard Error	5.48	3.78
No. Observations	17	129

Figure 2: Distribution of Regional Unemployment in 1990. Source: Regio-Ecostats.

Regions and, comparing among countries, only Italy presents a higher cross-sectional variance of regional unemployment. If the unemployment rate were low, stable over time and similar across regions, it would be difficult to detect any significant effect on enrolment at the regional level. In that sense, this unfortunate feature of the Spanish labor market gives us a golden opportunity for investigation.

In summary, the Spanish data, with so much variation in unemployment rates both over time and across regions, offer an ideal location for investigating the effect of unemployment on school enrolment. It is our view that, if we cannot not find any significant effect of unemployment on enrolment in these data, we could not hope to find it elsewhere.

1.3 Summary of Findings

Our main empirical findings can be summarized as follows. We use two different specifications. First, we include regional fixed effect terms in our estimation of the relationship between the unemployment rate and the enrolment rate. We find that unemployment rate for non-graduates has a positive effect on enrolment, while the effect of unemployment for graduates is negative. As we will argue, this finding establishes the presence of the investment effect mentioned above. Second, when we include time instead of regional, fixed effect terms in the regression, we find that both types of unemployment rates have negative effects. We will see that this evidence is consistent with the presence of a major wealth effect of unemployment. This means that financial market imperfections matter for enrolment decisions. Combin-

ing these two results, we conclude that both types of effects are important determinants of enrolment. Our third finding is that the average regional educational attainment has a significantly positive effect on enrolment. As we will see later, this finding reinforces the evidence in favor of a wealth effect.

The rest of the paper is organized as follows. In section 2, we develop a theoretical model that incorporates these two effects. Section 3 develops the empirical analysis and the data. The results are presented in Section 4. Section 5 concludes.

2 Theoretical Model of Enrolment Decision

In this section, we develop a theoretical model of enrolment decision. This model captures the two effects of unemployment discussed in the introduction, namely the investment effect and the wealth effect. The investment effect arises from the fact that the unemployment rate for non-graduates reduces the opportunity cost of education. Also, if unemployment is serially correlated, today's unemployment for graduates affects people's expectation for the future and thus the expected returns to education. The wealth effect, on the other hand, stems from the assumption that the young cannot borrow freely in the capital market, and therefore have to rely on financial aid from the parents. The amount of this financial aid varies with parental wealth, which in turn depends on the past and current unemployment rate. Our argument suggests that the latter effect, if present, should result mainly from the long run average unemployment, and its short run fluctuations should not be so important. This is indeed the assumption we intend to use to identify the two types of effects of unemployment separately from the data.

2.1 Structure of the Model

Let population be composed of a continuum of households that consist of a parent and a child. Households can be indexed on the interval $(0, 1)$ by a parameter (i) which identifies the child's ability. Each child lives for two periods, period 1 and 2. Children are born at the legal working age and they have a common minimum level of education at the time of birth. In period 1, they have to decide whether to be enrolled in further education or

not. Since all individuals are potential workers at birth, if they decide not to go on studying then they start participating in the labour market as non-graduates. It is assumed that both activities require the whole endowment of time so that studying and working cannot be chosen together. Participation in the labour market does not automatically guarantee earnings: any potential worker faces a positive probability of being unemployed. In period 2, there is no opportunity for education. In this period the household dissolves and all the children join the labour market irrespective of the educational level. Here, again, they are subject to the possibility of being unemployed.

We further assume that, in the first period of life, the child receives financial aid from the parent. The amount of this transfer is a decision of parents. There is no parental assistance in period 2. In the literature on school enrolment decisions, these kind of intergenerational transfers have been introduced by Rosenzweig (1990), Rosenzweig and Wolpin (1993, 1994), and Ermisch (1996). These authors have justified theoretically and empirically the need to include these transfers in the analysis, especially when it comes to studying human capital investment during young adulthood.

2.2 Parental Decision

In this part of the model, we employ a simplified version of that in Ermisch (1996). He models a strategic interaction between a parent and a child. Parents choose their own consumption and transfers so as to maximize the utility of the household:

$$U_h = \ln C_{p1} + \frac{1}{1+\rho} \ln C_{p2} + \frac{1}{1+\gamma} \ln C_{1i} \tag{1}$$

where C_{pt} for $t = 1, 2$ is parental consumption, ρ is the rate of time preference, γ is the discount factor attached to the child in period 1, C_{1i}. The household's optimization problem is subject to the following budget constraints:

$$\begin{aligned} C_{p1} + \frac{1}{1+r} C_{p2} + T_i &= W \\ y_i + T_i &= C_{1i} \end{aligned} \tag{2}$$

In the above, r is the interest rate, and T_i stands for the transfer. Also, y_i stands for individual income of the child when young, which as we will see, is

positive only if she chooses to be an non-graduate worker and she effectively gets a job. Finally, W stands for parental wealth.

Parents maximize the household's utility (1) choosing C_{pt} for $t = 1, 2$ and T_i subject to the constraints in (2). For the purpose of this paper, all we need to know is the amount of the intergenerational transfer T_i resulting from the optimization problem:

$$T_i = \beta W - (1 - \beta)\, y_i \tag{3}$$

with

$$\beta = \frac{(1+\rho)}{(1+\rho)(1+\gamma) + (1+\rho) + (1+\gamma)}; \quad 0 < \beta < 1$$

Therefore the transfer is a weighted average of parental wealth and of income of the child when she is young[3]. The richer the parents, the larger is the transfer. The lower the personal income of the child, the larger is the transfer. These predictions are consistent with the existing evidence on intergenerational transfers.

Consumption of the child in period 1 is determined by the intergenerational transfer and her own income in that period. Given the intergenerational transfer in (3), the consumption of the child in the first period turns out to be a fraction of overall household income:

$$C_{1i} = \beta\,(W + y_i) \tag{4}$$

2.3 Life Time Utility of a Child

Now we turn to the decision of the child as to whether to go to school in the first period. It is assumed that this decision is taken after observing the unemployment rates for both non-graduates and graduates in this period, but before observing the rates that will prevail in the future. Upon entering the labor market each entrant faces a non-zero probability of being unemployed. If she has not gone to school, this probability is equal to the unemployment rate for non-graduates in that period. If she is in the second period of her

[3]The intergenerational transfer will be positive if $\frac{W}{y_i} > \frac{1-\beta}{\beta}$. Assuming that parental wealth exceeds the individual income of the child, i.e. that $\frac{W}{y_i} > 1$, then $\rho > -2$ ensures that the transfer is positive.

life and went to school in the past, then the probability is equal to the unemployment rate for graduates[4]. Note that, in period 1, she has to decide whether to go into the labor market without knowing the actual employment status she will be in upon entering the market: all she knows is the probability of being unemployed. The decision therefore, reduces to choosing what to do in the first period in order to maximize expected lifetime utility. All children have the same utility function which is additively separable between the two periods of life:

$$U(C_{1i}, C_{2i}) = E \ln C_{1i} + \frac{1}{1+\rho} E \ln C_{2i} \ , \tag{5}$$

where C_{1i} and C_{2i} stand for individual consumption in first and second period respectively, while E denotes expectation conditional on the information available at the beginning of period 1, and ρ is a positive constant discount rate. To focus on the human capital investment decision we neglect the possibility of savings for children. Therefore consumption equals income in each period.

We move now to specify income for children in each period. When employed, an non-graduate worker receives a wage equal to w_N, although unemployment can occur with probability p_1. Since all non-graduates are alike in terms of education we assume that their wage is constant and independent of ability. Under unemployment non-graduates receive no labour income in the first period. The alternative to entering the labour market is to participate in education. Studying precludes children from working, and it does not yield any return during the schooling period. Hence prospective graduates get no labour income in the first period. Given these assumptions, consumption in the first period is

$$C_{1i} = \begin{cases} \beta (W + w_N) & \text{with probability } (1 - p_1) \text{ if } i = \text{non-graduate} \\ \beta W & \text{with probability } p_1 \text{ if } i = \text{non-graduate} \\ \beta W & \text{with probability 1 if } i = \text{graduate} \end{cases}$$

In the second period the household dissolves and all children enter the labour market. The wage for non-graduates is the same as in the first period, w_N. A graduate worker's wage varies with her ability. A more able child would earn more if employed as a graduate. The wage for a graduate worker

[4]There is wide evidence that education reduces the probability of unemployment and its duration. See Nickell (1979, 1987), Mincer (1991), Kettunen (1994) and Harris (1997)

whose ability is equal to i is denoted by w_{Gi}. This ability is known to the child at the time of birth. In order to focus on the effects of unemployment we assume that these wages are constant over time so that expected income varies only due to changes in employment. In period 1, if a child goes to school or goes into the labor market and does not obtain a job, she receives no income other than parental assistance. In period 2, we assume that she is eligible for unemployment benefit if unemployed[5]. Unemployment benefit is equal to a fraction ϕ of the wage earned if employed ($0 < \phi < 1$). We denote the unemployment rate for non-graduates and graduates in period 2 by p_2 and q_2, respectively. Then the expected life time utility for those who decide to "work" in period 1, U_W, is

$$\begin{array}{c} U_W = (1-p_1)\cdot\ln(\beta\cdot W + w_N) + p_1\cdot\ln(\beta\cdot W) \\ +\frac{1}{1+\rho}\cdot E\left[(1-p_2)\cdot\ln(w_N) + p_2\cdot\ln(\phi\cdot w_N)\right]. \end{array} \tag{6}$$

Note that the expectation operator E is retained in the third term above because p_2 is not known in period 1. The above equation can be rewritten as

$$\begin{array}{c} U_W = (1-p_1)\cdot\ln(\beta\cdot W + w_N) + p_1\cdot\ln(\beta\cdot W) \\ +\frac{1}{1+\rho}\cdot\left[\ln(w_N) - E\left(p_2\right)\cdot\psi\right], \end{array} \tag{7}$$

where

$$\psi \equiv -\ln\phi > 0.$$

Suppose now that the unemployment rate for non-graduates p_t follows an AR(1) process with a constant term, so that

$$E\left(p_2 - \overline{p}\right) = \lambda_p\cdot\left(p_1 - \overline{p}\right), \text{ where } 0 < \lambda_p < 1,$$

where $\overline{p}$ is the mean of the process p_t, which is a positive constant[6]. Introduce

[5] We assume away the presence of unemployment benefit in period 1 for the sake of simplicity. We could introduce it with some complication in notation.

[6] For example, if p_t follows

$$p_{t+1} = \lambda_p\cdot p_t + \widetilde{p} + u_t$$

where $\widetilde{p}$ is a positive constant and u_t is a mean zero disturbance term, then

$$\overline{p} = \frac{\widetilde{p}}{1-\lambda_p}.$$

the following new notation, $\widehat{p} \equiv p_1 - \overline{p}$, and rewrite (7)

$$\begin{array}{c} U_W = (1-p_1)\cdot \ln(\beta \cdot W + w_N) + p_1 \cdot \ln(\beta \cdot W) \\ +\frac{1}{1+\rho} \cdot \left[\ln(w_N) - (\overline{p} + \lambda_p \cdot \widehat{p}) \cdot \psi\right]. \end{array} \tag{8}$$

Next we consider the expected lifetime utility of a child with ability i who decides to "study" in period 1:

$$U_{S_i} = \ln(\beta \cdot W) + \frac{1}{1+\rho} \cdot E\left[(1-q_2) \cdot \ln(w_{Gi}) + q_2 \cdot \ln(\phi \cdot w_{Gi})\right]. \tag{9}$$

Reordering we get

$$U_{S_i} = \ln(\beta \cdot W) + \frac{1}{1+\rho} \cdot \left[\ln(w_{Gi}) - E\left(q_2\right) \cdot \psi\right]. \tag{10}$$

Assuming correspondingly that q_t also follows an AR(1) process, of the form,

$$E\left(q_2 - \overline{q}\right) = \lambda_q \cdot \left(q_1 - \overline{q}\right), \text{ where } 0 < \lambda_q < 1,$$

and introducing a similar notation for graduates' unemployment, $\widehat{q} \equiv q_1 - \overline{q}$, the expected life time utility of a student (10) is:

$$U_{S_i} = \ln(\beta \cdot W) + \frac{1}{1+\rho} \cdot \left[\ln(w_{Gi}) - (\overline{q} + \lambda_q \cdot \widehat{q}) \cdot \psi\right]. \tag{11}$$

2.4 Enrolment Decision

At the beginning of period 1, each child compares the utility she would get under each alternative in order to decide whether to go to school or to go directly into the labor market. Those who find $U_W < U_{S_i}$ would go to school, while those who find the opposite would go directly into the labor market. Given that the utility of a child who decides to go to school is increasing in ability there will be some children for whom going to school does not pay off because they lose more than what they are able to earn. Only those children with ability above a certain threshold would go to school. Denote the ability of a threshold child, who is indifferent between studying and working, by i^*. Then, $U_W = U_{S_{i^*}}$. Children with an ability parameter lower than i^* will join the labour market directly and those with ability parameter higher than

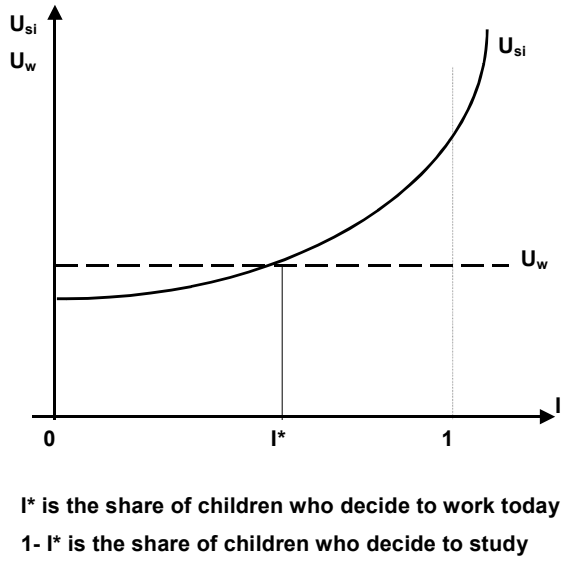


Figure 3: The Education Participation Decision.

the threshold will enrol in further education. The threshold ability will be determined by the condition:

$$\begin{array}{c} \ln\left(\frac{w_N}{w_{Gi^*}}\right) = (1+\rho)\cdot(1-\overline{p}-\widehat{p})\cdot\ln\frac{\beta\cdot W}{\beta\cdot W+w_N} \\ +\psi\cdot\left[(\overline{p}+\lambda_p\cdot\widehat{p})-(\overline{q}+\lambda_q\cdot\widehat{q})\right]. \end{array} \tag{12}$$

Consider the following relation between graduates' wages and ability:

$$w_{Gi} = w_G\cdot e^{\theta\cdot(i-0.5)},$$

where w_G is a positive constant. Then, the fraction of children above the threshold who decide to go into further education is

$$\begin{array}{c} 1-i^* = 0.5+\frac{1}{\theta}\cdot\ln\left(\frac{w_G}{w_N}\right)-\frac{1+\rho}{\theta}\cdot(1-\overline{p}-\widehat{p})\cdot\ln\frac{\beta\cdot W+w_N}{\beta\cdot W} \\ +\frac{\psi}{\theta}\cdot\left[(\overline{p}+\lambda_p\cdot\widehat{p})-(\overline{q}+\lambda_q\cdot\widehat{q})\right]. \end{array} \tag{13}$$

We assume an interior solution as in Figure 3.

2.5 Implications

Let us summarize the implications of the previous analysis. In the **short run**, in which the mean unemployment rates $\overline{p}$ and $\overline{q}$ can be treated as constants, changes in enrolment over time are affected by temporary variations in unemployment, given by the deviations $\widehat{p}$ and $\widehat{q}$. A deviation of the non-graduates' unemployment above its long run value, $\widehat{p} > 0$, has two positive effects on enrolment. First, it encourages enrolment through lowering the opportunity cost of education. This effect is captured by the third term in (13). Second, by suggesting that employment prospects for non-graduates are low, enrolment will increase as people pursue the better labour market prospects of graduates. This is an indirect effect on the benefits of education and is given by the fourth term in (13). Turning to graduates, an increase in the unemployment rate of graduates above its long run value, $\widehat{q} > 0$, decreases enrolment by limiting employment prospects in the future. Hence, the short run effects should be the different for the two unemployment rates. While the non-graduates' unemployment has positive effects on enrolment, the effect of unemployment for graduates is negative.

In the **long run**, the effects of $\widehat{p}$ and $\widehat{q}$ will be washed away, on average, and enrolment will be determined by the permanent components of unemployment, $\overline{p}$ and $\overline{q}$. At a first glance, from expression (13), the effects of these two terms do not seem to differ too much from those of the temporary ones. However, there are additional effects from these permanent components. We argue that these permanent components of unemployment affect parental wealth, W, negatively[7]. As enrolment is increasing in this variable, these second effects are negative for both graduates and non-graduates. This is the **wealth effect** of unemployment. Due to the wealth effect, the overall long run effects are unambiguously negative for graduates' unemployment, while the effects are ambiguous for non-graduates' unemployment.

Our enrolment equation also implies that enrolment depends positively on the relative wage of graduates to non-graduates, w_G/w_N which measures the returns to schooling. Finally, as enrolment is increasing in parental wealth, W, we also expect that the level of education of the parents would play a

[7]Think about the average parental wealth as represented by a fraction of the long run distribution of working time of the labour force. Then parental wealth would be:

$$W = \varphi \{sg \cdot (1 - \overline{q}) + sn \cdot (1 - \overline{p})\}$$

where sg and sn are the shares of graduate and non-graduate workers in the labour force.

role[8] and thus include this variable in the empirical analysis. Some might argue that parental income (proxied by, for example, current regional income) would be a superior indicator for W. However, the literature has revealed that the intergenerational transfers do not always take a pecuniary form. Rather, they often take the form of corresidence[9], social class[10] or family background[11], variables which are related to wealth but not necessarily to actual income. In the light of this evidence parents with higher education should be capable to give bigger transfers of whichever type to their children, hence we expect parental education to have a positive impact on enrolment. Note that this effect is present only when the wealth effect on enrolment is present. Thus, testing for the importance of parental education serves to test the validity of theories that suppose that only the investment motive drives enrolment decision against that of theories that stress the wealth effect.

2.6 How to test the Implications

In the next section, we test the implications of the above model using panel data for Spanish regions. We make the following identifying assumptions. First, the permanent components of unemployment rate, $\overline{p}$ and $\overline{q}$, are region specific constants. They could vary across regions but they are constant through time. Thus by including region specific fixed effect terms into the empirical specification, these long run effects of unemployment are purged from the data. By regressing the regional enrolment rate on regional unemployment rates for both graduates and non-graduates, together with regional dummies, we can identify effects of short run fluctuations in unemployment, corresponding to $\widehat{p}$ and $\widehat{q}$. The second identifying assumption is that these temporary components in unemployment, $\widehat{p}$ and $\widehat{q}$, vary in the same way over time due to nation wide business cycles in all the regions. This means that, by including time specific fixed effect terms, these short run effects of unemployment are purged from the data. Thus, by estimating the same

[8] If, as in the previous footnote, we represent parental wealth as a fraction of the long run distribution of working time, the educational attainment of the working population determines parental wealth together with the long run components of unemployment.

[9] See Rosenzweig (1990), Rosenzweig and Wolpin (1993) and Ermisch (1996), Card and Lemieux (1997).

[10] See Whithfield and Wilson (1991)

[11] See Altonji and Dunn (1996)

model with time dummies, we can identify the effects of long run variations in unemployment, corresponding to $\overline{p}$ and $\overline{q}$. In these regressions, we will also include the relative wages of graduates to non-graduates, as well as a measuere of the average educational attainment of the population in the region. The latter variable is meant to capture the effects of parental wealth.

3 Empirical Analysis

We apply this analysis to a panel of university enrolment across regions in Spain. The Spanish case displays some features which are consistent with the assumptions underlying our theoretical model. As Spanish youth tend to stay living in and from the parental household longer than in other European countries[12], the costs of education is almost the opportunity cost alone. This is consistent with the specification in our model. Also, in Spain, parents pay accommodation, subsistence and even registration fees. This feature is consistent with the assumption of the existence of intergenerational transfers.

Since our objective is to explain the higher education participation decision, our dependent variable will be enrolment at university. We do not deal with enrolment decisions for lower education institutions for the following reasons. During the time span we are considering the minimum legal age for starting work in Spain was 16 years, whereas the decision to enter university was taken at the age of 18 or higher. However there was no educational qualification finishing at the age of 16, which implies that those who did not wait until they were 18, left school before finishing secondary education. Since school dropout decisions are qualitatively different from decisions about what to do after finishing the compulsory education, we analyze the university participation.

Following our theoretical model we estimate a fixed effect dummy variable model (Judge et al.,1985) with time and regional effects using several specifications. We want to investigate primarily the effects of unemployment on the education decision. In particular, we expect different measures of unemployment to have different effects on enrolment. For the same dependent variable we will include as explanatory variables non-graduates and graduates' unemployment (NUN and GUN, respectively), the natural logarithm of wage ratio (LWR), and a measure of the average education of the population

[12]See Fernández and Ruiz-Castillo (1998)

in the region (AVE). As explained above we interpret the specification with fixed regional effects as capturing the short run effects while the specification with fixed time effects represents the long run.

3.1 The Data

The database includes fifteen regions of Spain across ten years. Due to data limitations two of the official Spanish regions (Castilla la Mancha and La Rioja) had to be removed from the database. The time range extends from 1983 to 1992 both inclusive. The dependent variable is the enrolment rate in university in the current year and the data were obtained from Education Statistics published by the Office for National Statistics (INE). To control for restrictions in enrolment due to entrance limitations applied in some universities in Spain, a parallel dependent variable was used in alternative estimations. This variable which we call potential entrants contains all students who passed the compulsory selection exam, and who therefore were entitled to enter university in the current year. This data was also collected from the statistics published by INE. The unemployment rates for different educational degrees were obtained from the Human Capital Database from IVIE (1995). We have regional data on unemployment for two types of workers, those with and those without university degree. The same data base was used to construct the measure of the average education of the population in the region. A wage series for different educational attainments at the regional level was not available for the whole time range we are considering. There are some data in the Wages Survey published by the Spanish Ministry of Labour, but not at the regional level. This left us with two options, either to remove some years from our data base or to estimate the wage premium for the whole period with the data we had at hand. The last option was the one we used because we did not wish to lose any data points from our data set which is not particularly large to begin with. Furthermore our main goal is not to control for the role of wages in schooling decisions which has been extensively proved relevant in previous literature. The precise way we constructed these series and the sources are contained in the Data Appendix. Figure 4 shows basic descriptive statistics for the series we used. All variables have been successfully tested to be significantly different across regions.

SERIES	Mean	Std Error	Maximum	Minimum
Enrolment Rate	0.065	0.021	0.115	0.026
Non-grad. Unemployment	0.185	0.054	0.318	0.093
Graduate Unemployment	0.146	0.042	0.271	0.031
Wage Premium	0.430	0.082	0.623	0.276
Average Education	2.583	0.153	2.951	2.260
Potential Entrants	0.052	0.016	0.093	0.026

Figure 4: Descriptive statistics. Data on fifteen regions from 1983 to 1992 inclusive.

4 Results

For the same dependent variable, enrolment rate in university, the various explanatory variables were included in the regression gradually to distinguish the effect of each of them separately and especially the consequences of including two measures of unemployment. Consider Figure 5 with fixed regional effects which we interpret as the short run specification.

Both measures of unemployment exhibit the expected signs in columns (2) to (8), and they are significant in most of the cases. This confirms that over time these two measures of unemployment capture different and meaningful effects on the education participation decision. Including the wage premium does not rule out the relevance of both measures of unemployment although the wage premium explains enrolment better than unemployment[13]. The average education of the population is always significant independently of the specification chosen. This variable has a strong positive effect on the enrolment rate while it makes the wage premium become insignificant. This effect of the average education of the population on the significance of the wage ratio is due to the implicit effect of the human capital stock of the labour force on the wage premium[14]. *Column* (8) displays results consistent with our theoretical predictions. Both unemployment rates have a significant impact on the enrolment rate showing opposite effects. Therefore we conclude that there is an investment effect of unemployment on the education participation

[13]See Frederiksson(1997).

[14]The actual correlation between the log of the wage premium and the average education of the population in the region is -0.127.

FIXED REGIONAL EFFECTS DUMMY VARIABLE MODEL* Dependent Variable: Enrolment Rate in University								
	SPECIFICATION							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NUN	-0.114 (0.044)		0.091 (0.049)	0.008 (0.024)		0.059 (0.029)	0.148 (0.035)	0.060 (0.032)
GUN		-0.279 (0.039)	-0.336 (0.04)		-0.059 (0.027)	-0.098 (0.033)	-0.090 (0.041)	-0.096 (0.034)
LWR							0.404 (0.035)	0.008 (0.059)
AVE				0.115 (0.006)	0.106 (0.006)	0.106 (0.006)		0.104 (0.013)
ADJ R^2	0.65	0.73	0.74	0.90	0.90	0.90	0.86	0.90

*Standard Errors in Parethesis

Figure 5: Short run specification

decision of the type we proposed: non-graduates' unemployment encourages enrolment while graduates' unemployment discourages enrolment.

Consider Figure 6 with fixed time effects which we interpret as the long run specification. Non-graduates' unemployment has a negative effect on enrolment through a negative wealth effect while again the average education of the population displays a strong positive impact on enrolment also through a wealth effect. Concerning graduates' unemployment, we expected it to have a negative impact on enrolment due to the wealth effect. However, it appears to have a significantly positive effect on the dependent variable. Also, we get a strange negative effect of the wage premium in the absence of the average education variable in *Column* (7). We conjectured that there are some regional effect not captured in our theory of school enrolment which may be driving this result. From inspection of scatter plots of which a sample can be found in Appendix B, we found that the Balearic Islands display a very low enrolment rate relative to their graduates' unemployment. This is not so surprising, given the special position of these Islands among the Spanish regions. The fact that tourism is the main economic activity in the region together with the fact that they are islands makes it very expensive to pursue higher education for the residents. There is always the possibility

FIXED TIME EFFECTS DUMMY VARIABLE MODEL* Dependent Variable: Enrolment Rate in University								
	SPECIFICATION							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NUN	-0.113 (0.029)		-0.127 (0.030)	-0.058 (0.022)		-0.073 (0.022)	-0.101 (0.030)	-0.074 (0.023)
GUN		0.051 (0.041)	0.088 (0.040)		0.080 (0.030)	0.099 (0.029)	0.052 (0.041)	0.100 (0.031)
LWR							-0.061 (0.020)	0.001 (0.016)
AVE				0.101 (0.009)	0.109 (0.009)	0.102 (0.009)		0.102 (0.010)
ADJ R^2	0.27	0.20	0.29	0.59	0.59	0.62	0.33	0.61

*** Standard errors in parenthesis.**

Figure 6: Long run specification

of working in the thriving tourism sector, and this increases the opportunity cost of studying. In addition, there is only one university in each of the two island regions in Spain (Balearic and Canary Islands) which do not offer a wide range of courses. Therefore many people have to go to the mainland to study. This increases directly the cost of education.

To take these special features into account, in Figure 7 we present the results of the time effect dummy variable model including a dummy for each of the island regions, DBAL for the Balearic Islands and DCAN for the Canary Islands. The unemployment rate for graduates turns out to have a negative but insignificant effect while the unemployment rate for non-graduates and the average education of the population maintain their expected significant impact on enrolment. The wage ratio still appears to have a negative effect on enrolment in column (7). Following the same strategy as before, we observed that the region Extremadura showed an extremely low enrolment rate in the presence of the second highest wage ratio. Appendix C shows the results of estimation including a dummy for Extremedura DEXT together with the previous ones. The wage premium becomes insignificant while all other variables maintain the expected sign[15].

[15]In fact if a dummy for Murcia is also included in the long run specification together

FIXED TIME EFFECTS DUMMY VARIABLE MODEL* Dependent Variable: Enrolment Rate in University								
	SPECIFICATION							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NUN	-0.144 (0.028)		-0.136 (0.029)	-0.087 (0.022)		-0.087 (0.022)	-0.115 (0.029)	-0.087 (0.022)
GUN		-0.101 (0.046)	-0.065 0.044		-0.025 (0.034)	-0.007 (0.034)	-0.089 (0.043)	-0.007 (0.034)
LWR							-0.053 (0.018)	0.000 (0.014)
AVE				0.091 (0.008)	0.098 (0.008)	0.091 (0.008)		0.091 (0.009)
DBAL	-0.034 (0.005)	-0.034 (0.007)	-0.039 (0.006)	-0.026 (0.004)	-0.023 (0.005)	-0.027 (0.005)	-0.038 (0.006)	-0.027 (0.005)
DCAN	-0.011 (0.005)	-0.024 (0.006)	-0.015 (0.006)	-0.009 (0.004)	-0.015 (0.004)	-0.009 (0.004)	-0.013 (0.005)	-0.009 (0.004)
ADJ R^2	0.43	0.35	0.43	0.69	0.65	0.68	0.46	0.68

*Standard errors in parenthesis.

Figure 7: Corrected long run specification

Finally, one could argue that effective enrolment may not be the best measure of the demand for university places. The use of potential entrants as the dependent variable instead of effective enrolment could improve the specification in a variety of ways. First of all this variable is not restricted because of university entrance limitations. Second, the series for potential entrants does not include people aged over 25 years whose decision to go into further education is qualitatively different from those coming from high school. Finally since potential entrants includes only students coming from high school with the intention to enter university, it avoids the problem of people working and enrolling in higher education at the same time. None of these types of measurement error is serious in the case of Spain. The series of effective entrants (in head counts) lies above potential entrants for

with the previous ones the wage premium shows up positive and insignificant, although the Murcia dummy itself is not significant in most of the specifications.

all regions for almost all the years. This probably implies that, despite the presence of entry restrictions in some careers, the capacity of the university exceeds the potential number of entrants coming from high school each year. Also, the proportion of students older than 25 years does not reach five per cent of potential entrants in each year. Therefore the exclusion of these students does not introduce a big change in the measured variables. In fact the expected improvement in measuring the dependent variable does not show up in better results, as Appendix D suggests.

5 Conclusion

This paper attempts to estimate whether the evolution of the labour market as shown in the rate of unemployment plays a role in the decision to enter university in Spain. A model of school enrolment shows the precise manner in which unemployment constrains the education participation decision. We postulate the existence of two different effects of unemployment on enrolment. On the one hand an investment effect which changes directly the costs and the benefits of education. On the other hand a wealth effect which works under an imperfect capital market by forcing potential students to depend on the parental wealth to enrol in higher education. Then we applied the analysis to university enrolment in Spain. The findings show that labour market conditions have an impact on the decision to enter university in Spain and in particular there is evidence for both of these effects. In the short run, higher observed rates of unemployment for non-graduates encourage enrolment by lowering the opportunity cost of education and worsening the employment prospects for non-graduates relative to graduates. Higher observed rates of unemployment for graduates discourage enrolment by lowering expected benefits of education. These two represent the investment effect of unemployment. In the long run, any type of unemployment discourages enrolment through lowering parental wealth, part of which is the only income of students. This is the wealth effect of unemployment.

We also find that the average education of the population is one of the main determinants of enrolment. This result coincides with that obtained by Cecilia Albert (1997) who estimates a logit model of the demand for higher education in Spain. She remarks that the most relevant variable in explaining higher education participation is the educational attainment of

the father. Also, Martinez and Ruiz-Castillo (1998) find that the probability of having young dependents studying depends positively on the educational attainment of the parents. We claim that this strong dependence of enrolment on parental income reinforces the evidence in favor of a wealth effect of unemployment in addition to the usual investment effect.

In the light of the evidence presented in the paper, we can interpret the seemingly contradictory evidence on the effect of unemployment on enrolment decisions. Card and Lemieux (1997) find that in the short run favourable labour market conditions pull students out of schooling (Table 9, column 3), while when considering the changes on enrolment over time (Table 10) labour market conditions do not explain enrolment well. These findings are consistent with our story on the effects of labour market conditions on enrolment decisions. Micklewright et al. (1990), find a positive effect of parental unemployment and of current regional unemployment on *school leaving*, both being clear wealth effects. Withfield and Wilson (1991), however get a positive effect of unemployment on education participation[16], capturing therefore the investment effect not found by Micklewright et al. Frederiksson (1997) carries out a similar analysis to ours. Although the effects of unemployment are very small in his model, he effectively obtains a negative effect of white collar unemployment rate combined with a positive effect of the youth unemployment rate, suggesting once more the presence of an investment effect.

References

[1] Albert Verdu, Cecilia (1997); "La demanda de Educación Superior en Espana: Diferencias por sexo", *Información Comercial Espanola: Mujer y Economia* 760.

[2] Altonji, J.G. and Dunn, T.A (1996); "The Effects of Family Characteristics on the Return to Education", *The Review of Economics and Statistics* 78(4).

[3] Becker, G. S. (1976); "The Economic Approach to Human Capital Behaviour", The University of Chicago Press.

[16] They explicitly acknowlege in the conclusion that their results oppose those of Micklewright et al.

[4] Betts, J.R. and Mcfarland, L. L. (1995); "Safe Port in a Storm. The impact of Labour Market Conditions on Community College Enrolments", *Journal of Human Resources* 30(4).

[5] Card D. and Lemieux, T. (1997); "Adapting to Circumstances: The Evolution of Work, School, and Living Arrangements Among North American Youth", *NBER Working Paper #6142.*

[6] Dolton, P. (1992); "The Market for Qualified Manpower in the UK", *The Oxford Review of Economic Policy* 8(2).

[7] Ermisch, J. (1996); "Parental Support for Human Capital Investment by Young Adults", *CEPR Discussion Paper* #1536, December 1996.

[8] Frederiksson, P. (1997); "Economic Incentives and the Demand for Higher Education", *Scandinavian Journal of Economics* 99(1).

[9] Freeman R. B. (1986); "Demand for Education" *Handbook of Labor Economics.* Vol I, edited by O. Ashenfelter and R. Layard. Elsevier Science.

[10] Harris, M.H. (1996); "Modelling the Probability of Youth Unemployment in Australia", *Economic Record* 72(217).

[11] Judge,G.; Hill,C. ; Grifftiths,W.; Lee,T. (1985) "The theory and Practise of Econometrics", New York: Wiley.

[12] Kettunen, J. (1994); "The effects of Education on the Duration of Unemployment"; *Labour* 8 (2).

[13] Kodde, D.A (1988); "Unemployment Expectations and Human Capital Formation", *European Economic Review* 32(9).

[14] Martinez, M. and Ruiz-Castillo, J. (1998); "The Decisions of Spanish Youth: A Cross-section Study" *Estudios sobre la Economia Española.* FEDEA.

[15] Micklewright, J. ; Pearson, M. and Smith, S. (1990); "Unemployment and Early School Leaving", *Economic Journal*; 100(400) Supplement.

[16] Mincer J. (1974); "Schooling, Experience and Earnings" *NBER.* New York.

[17] (1991); "Education and Unemployment *NBER Working Paper #3838.*

[18] Nickell, S. (1979a); "Education and Lifetime Patterns of Unemployment", *Journal of Political Economy*; 87 no 5(2).

[19] Nickell, S. (1979b); "Estimating the Probability of Leaving Unemployment", *Econometrica* 47(5).

[20] Rees, D. I. and Mocan, N. H. (1997); " Labour Market Conditions and the High School Dropout Rate: Evidence from New York State", *Economics of Education Review* 16(2).

[21] Rosenzweig, M. R. (1990); "Population Growth and Human Capital Investments: Theory and Evidence", *Journal of Political Economy* 98(5).

[22] Rosenzweig, M. R and Wolpin, K. I. (1993); "Intergenerational Support and the Life-Cycle Incomes of Young Men and Their Parents: Human Capital Investments, Corresidence and Intergenerational Financial Transfers", *Journal of Labor Economics* 11(1).

[23] (1994); "Parental and Public Transfers to Young Women and Their Children", *American Economic Review* 84(5).

[24] Willis, R. and Rosen, S. (1979); "Education and Self Selection", *Journal of Political Economy* 87(5).

[25] Withfield K. and Wilson, R. A. (1991); "Staying on in Full Time Education: The Educational Participation of 16-year-olds", *Economica* 58.

6 Appendix A: Data Description

We describe the process of construction of the variables used in the empirical analysis. In parenthesis we put the data sources.

- **Enrolment Rate**: New entrants into university in the current year (INE) as a fraction of the population aged 19 to 24 years (REGIO-ECOSTATS) in each region.

- **Potential Entrants**: Number of students who passed the compulsory selection exam in the current year (INE) as a fraction of the population aged 19 to 24 years (REGIO-ECOSTATS).

- **Unemployment Rates**: Share of the labour force considered as unemployed in the Spanish Labour Force Survey (Encuesta de Poblacion Activa). The series for different educational levels were constructed from the data base on Human Capital (IVIE). The category *non-graduates* includes individuals in the labour force who did not have a university degree in the current year. They have up to 14 years of schooling. The category *graduates* includes individuals in the labour force who have university degree in the current year. They have at least 15 years of schooling. The shares were computed over the labour force in the corresponding group. Thus, the unemployment rate of the *non-graduates* was computed with respect to the share of the *non-graduates* in the labour force whereas the unemployment of the *graduates* was computed with respect to the share of the *graduates* in the labour force.

- **Wage Ratios**: Data on wages across professional categories which can be interpreted as *non-graduates* and *graduates* is published for the whole of Spain in the Wages Survey (Encuesta de Salarios-INE). From 1989 onwards, these data appears disaggregated across regions in Spain. To overcome this lack of data, we estimated the wage premium in the following way. We define the ratio of wages in region r at year t as

$$\omega\left(r,t\right)=\frac{W_{grad}\left(r,t\right)}{W_{non-grad}\left(r,t\right)}$$

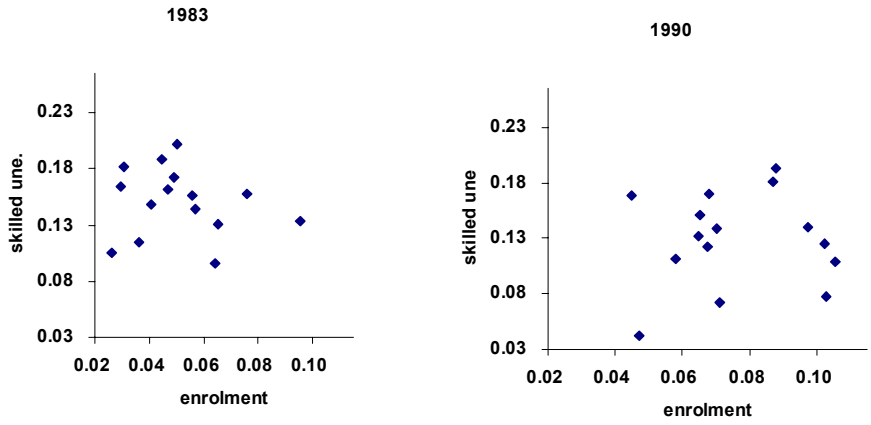
We had data on wages for the whole of Spain for the time range we consider (1983 to 1992), but we had data across regions only for 1989 to 1992. With this data we computed the following estimator:

$$E\left[\omega\left(r,t\right)\right]=\left(\frac{R\left(r\right)}{R\left(spain\right)}\right)\ \omega\left(spain,t\right)\ ;i=1...15,\ t=1983...1992$$

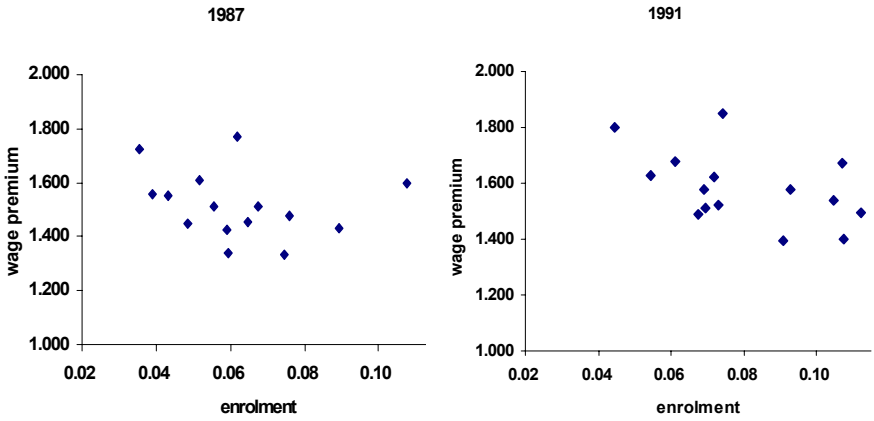
where $R(r)$ is the average of $\omega(r,t_1)$ for $t_1 = 1989...1995$; $\omega(spain,t)$ is the wage premium for the whole country at time t; and $R(spain)$ is the average of $\omega(spain,t_2)$ for $t_2 = 1983...1995$.

- **Average Education Index**: Using the same data on Human Capital (IVIE) we computed an index of the average educational level of the population by assigning an integer to each educational level (there are five educational levels in this Data Base) and averaging the resulting sum over the population in the region. We used an arbitrary increasing integer because we do not have the average years of schooling corresponding to each educational level. Furthermore the broad educational levels considered in the Human Capital Database include a very heterogeneous group of people, counting all those who have completed the educational level as defined by the Spanish Educational System. Since the Average Education of the Population is controlling for the effect of parental wealth on enrolment, and since educational attainment is positively related to income, we believe that a simple non decreasing transformation of the educational attainment of the population in the region will capture this positive impact of education on enrolment.

7 Appendix B: Scatter Plots



Scatter Plots of Enrolment and Skilled Unemployment. The Region with lowest levels of both is Baleares



Scatter Plots of Enrolment and the Wage Premium. The region with higest skill premium and lowest enrolment is Extremadura.

8 Appendix C: Long run specification

FIXED TIME EFFECTS DUMMY VARIABLE MODEL* Dependent Variable: Enrolment Rate in University								
	SPECIFICATION							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NUN	-0.085 (0.030)		-0.078 (0.031)	-0.073 (0.024)		-0.072 (0.024)	-0.078 (0.030)	-0.072 (0.024)
GUN		-0.073 (0.042)	-0.058 (0.041)		-0.022 (0.033)	-0.009 (0.033)	-0.071 (0.042)	-0.002 (0.034)
LWR							-0.024 (0.019)	0.010 (0.016)
AVE				0.086 (0.009)	0.087 (0.009)	0.086 (0.009)		0.087 (0.009)
DBAL	-0.032 (0.005)	-0.034 (0.006)	-0.037 (0.006)	-0.026 (0.004)	-0.025 (0.005)	-0.027 (0.005)	-0.37 (0.006)	-0.027 (0.005)
DCAN	-0.017 (0.005)	-0.025 (0.005)	-0.019 (0.005)	-0.011 (0.004)	-0.016 (0.004)	-0.011 (0.004)	-0.018 (0.006)	-0.012 (0.004)
DEXT	-0.024 (0.005)	-0.030 (0.005)	-0.023 (0.005)	-0.007 (0.004)	-0.013 (0.004)	-0.007 (0.004)	-0.020 (0.006)	-0.008 (0.005)
ADJ R^2	0.49	0.47	0.49	0.69	0.67	0.69	0.49	0.69

*** Standard errors in parenthesis.**

Corrected long run specification including a dummy for Extremadura

9 Appendix D: Potential Entrants

FIXED REGIONAL EFFECTS DUMMY VARIABLE MODEL* Dependent Variable: Potential Entrants in University								
	SPECIFICATION							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NUN	-0.048 (0.044)		0.144 (0.047)	-0.043 (0.022)		0.094 (0.26)	0.186 (0.031)	0.108 (0.029)
GUN		-0.237 (0.038)	-0.322 (0.028)		-0.037 (0.025)	-0.098 (0.030)	-0.076 (0.036)	-0.086 (0.031)
LWR							0.39 (0.03)	0.066 (0.054)
AVE				0.108 (0.005)	0.101 (0.006)	0.099 (0.006)		0.085 (0.012)
ADJ R^2	0.69	0.76	0.77	0.92	0.92	0.93	0.90	0.93

*Standard Errors in Parethesis

Short run specification with potential entrants as dependent variable

FIXED TIME EFFECTS DUMMY VARIABLE MODEL* Dependent Variable: Potential Entrants in University								
	SPECIFICATION							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NUN	-0.107 (0.031)		-0.123 (0.031)	-0.061 (0.023)		-0.081 (0.022)	-0.103 (0.031)	-0.078 (0.023)
GUN		-0.051 (0.042)	0.090 (0.041)		0.088 (0.030)	0.112 (0.029)	-0.055 (0.041)	0.105 (0.030)
LWR							-0.071 (0.022)	-0.012 (0.016)
AVE				0.105 (0.009)	0.113 (0.009)	0.107 (0.009)		0.105 (0.009)
ADJ R^2	0.22	0.16	0.24	0.58	0.59	0.62	0.30	0.62

*Standard Errors in Parethesis

Long run specification with potential entrants as denpendent variable.