

# **Education and competence mismatches: job satisfaction consequences for workers**

Lourdes Badillo Amador

*Departamento de Economía*

*Universidad Politécnica de Cartagena*

Ángel López Nicolás

*Departamento de Economía*

*Universidad Politécnica de Cartagena*

Luís E. Vila

*Departamento de Economía Aplicada*

*Universidad de Valencia*

## **ABSTRACT**

The accuracy of the match in the job-worker pairing is analyzed both in terms of education and in terms of qualification using Spanish data from the 2001 wave of the European Community Household Panel (ECHP). Regarding the incidence of mismatch situations, the results suggest that the education match appears to be a rather poor indicator for the qualification match. In addition, ordered discrete choice models reveal that they have different consequences in terms of job satisfaction as well.

### ***Palabras claves:***

education mismatch; competence mismatch; job satisfaction

### ***Clasificación JEL (Journal Economic Literature):***

C13; J24; J28

***Área temática:*** aspectos cuantitativos del fenómeno económico.

## **1. INTRODUCTION**

The abilities, skills, attitudes and knowledge possessed by workers determine their levels of professional competence, which in turn may be lower or higher than those required in their current jobs. When this happens, there is a mismatch in terms of competence in the job-worker pairing: workers are undercompetent when their competence levels are lower than those required in their jobs, and are overcompetent when their competence levels exceed those required in their jobs. Professional competence mismatches are economically relevant since labour productivity, and thus wages, is likely depending on the quality of the fit between workers' capacities and the requirements of the jobs they performs.

In the economic literature, however, a worker's level of formal education is most often used as a proxy for his/her level of professional competence because the latter is presumably more difficult to identify and measure (Borghans, Green and Mayhew, 2001). Although education is not the only mechanism that promotes and develops workers' professional competence, the literature focused specifically on competence mismatches is rather scarce. Indeed, a number of papers deal with competence and educational job-worker mismatches as equivalent phenomena in spite of research showing that educational mismatches appear to be only weakly related to competence mismatches (Allen and van der Velden, 2001; and Badillo-Amador, Garcia-Sanchez and Vila, 2005). Moreover, most papers on job-worker pairing only address the pecuniary consequences of educational mismatches, as it was shown in reviews by Groot and Maassen van den Brink (2000), Hartog (2000) and Rubb (2003). However the non-monetary consequences of both types of mismatches have seldom been explored. In this regard, the job satisfaction consequences of education mismatches have mainly been examined by Hersch (1991), and Battu, Belfield and Sloane (2000). The former found that overeducated workers and undereducated women are less satisfied than those who have the required level of formal education; the latter concluded that adequately educated workers report higher job satisfaction. On the other hand, Allen and van der Velden (2001) and Green and McIntosh (2002) found that competence mismatches reduce the probability of being satisfied, while education mismatches do not affect workers' levels of job satisfaction.

This paper aims to clarify the issue by analyzing the incidence of both educational and competence mismatches in the job-worker pairing, as well as its consequences in terms of job satisfaction in the Spanish labour market.

The paper is divided as follows. Section 2 describes the data and assesses the incidence of both educational and competence mismatches in the Spanish labour market. Section 3 presents the estimation models. In section 4, the results are shown. Finally, section 5 summarizes the main results and puts forward the conclusions and implications of our analysis.

## **2. INCIDENCE OF EDUCATION AND COMPETENCE MISMATCHES**

Our piece of research used Spanish data from the European Community Household Panel (ECHP) for 2001. The sample, containing 4,186 valid records for analysis, included workers aged 17-65 who worked at least 15 hours per week in their main job, and excluded trainees and all non-paid jobs, as well as those workers with missing values in the key variables.

To determine the incidence of competence mismatches, we used workers' self-assessments regarding their job match when they answer to two questions included in the EUHSP questionnaire:

- (i) "Have your studies or your knowledge provided you with the qualifications required to perform your current job?"
- (ii) "Do you think your knowledge or your personal capacities would allow you to perform a more qualified job?"

As shown in *Figure 1*, respondents who answered 'yes' to both questions were classified as overcompetent, because they had surplus of competence to carry out their current job tasks. On the other hand, workers who answered 'yes' to the first question and 'no' to the second one were classified as adequately competent, since they were not able to perform a more demanding job, their capacities being high enough for their current jobs. Finally, respondents who answered 'no' to the first question were classified as undercompetent, irrespective of their answer to the second question, because they were not provided with the competence required for their current jobs.

<Figure 1 about here>

The educational accuracy in the job-worker pairing was established through the so-called ‘modal’ procedure proposed by Kiker, Santos and De Oliveira (1997). Under this criterion, the level of education required by a given job is defined as the modal education level among workers in the same category of an occupational classification<sup>1</sup>. Thus, a worker is adequately educated, overeducated or undereducated when his/her own level of education is, respectively, equal, higher, or lower than the formal educational mode corresponding to workers in the same job title. *Table 1* describes both education and competence mismatches, as well as the other variables used in this paper.

<Table 1 about here>

*Table 2* shows the distributions of educational and competence job-worker matches. The marginal distributions differ noticeably, and the joint distribution reveals that both classifications are inconsistent to a high extent. In fact, only 36% of workers had the same kind of fit under both classification criteria, as shown in the main diagonal of the table, which displays the proportion of workers who are simultaneously overeducated and overcompetent, undereducated and undercompetent, or adequately educated and adequately competent. The result is consistent with those obtained for Spain by Badillo-Amador, Garcia-Sanchez and Vila (2005) using a different data set, who also reported that the statistical association between both types of matches was very low.

<Table 2 about here>

Consequently, education and competence mismatches appear to be two different phenomena that coexist in the labour market, and should not be treated as equivalents, as was done by most of the previous research.

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<sup>1</sup>. In this study, the used occupational classification is the International Standard Classification of Occupations of 1988 (ISCO88) to two-digit level.

### 3. MODELS

We analyzed the non-monetary consequences of competence and education mismatches by considering three different job satisfaction measures: satisfaction with the job overall (SOJ), with the type of job (STJ), and with the wages earned (SW). Each measure entered as dependent variable in the following three equations:

$$Y_i = \Lambda(\beta_0 + \beta_1 Year\_School_i + \beta_2 OC_i + \beta_3 UC_i + \beta' X_i) + \varepsilon_i \quad (1)$$

$$Y_i = \Lambda(\alpha_0 + \alpha_1 Year\_School_i + \alpha_2 OE_i + \alpha_3 UE_i + \alpha' X_i) + \mu_i \quad (2)$$

$$Y_i = \Lambda(\delta_0 + \delta_1 Year\_Req_i + \delta_2 Year\_OE_i + \delta_3 Year\_UE_i + \delta' X_i) + \pi_i \quad (3)$$

where  $Y_i$  represents the corresponding level of satisfaction (SOJ, STJ or SW) of individual  $i$  on an ordered scale from 1 (very dissatisfied) to 6 (completely satisfied),  $\Lambda(\cdot)$  is the logistic probability function, and  $\varepsilon_i, \mu_i$  and  $\pi_i$  are the independent error terms. Vector  $X$  includes control variables related to the personal characteristics of worker  $i$ , their human capital, labour status, unemployment record and migratory mobility. Equations (1) and (2) studied the effects of mismatches among comparable workers, so equation (1) includes two dummy variables,  $OC_i$  and  $UC_i$ , as explanatory, taking a value of 1 when worker  $i$  is, respectively, overcompetent or undercompetent, and a value of 0 otherwise, and equation (2) included two dummy variables,  $OE_i$  and  $UE_i$ , which take a value of 1 when the worker is overeducated or undereducated, respectively, and a value of 0 otherwise. Additionally, we analyzed the effects of the magnitude of educational mismatches among workers with similar jobs by estimating equation (3), which included the number of years of required education ( $Year\_Req_i$ ), and the additional years of overeducation ( $Year\_OE_i$ ) or the number of years of undereducation ( $Year\_UE_i$ ) corresponding to individual  $i$ , which are determined as follow:

$$Year\_School_i = Year\_Req_i + Year\_OE_i - Year\_UE_i$$

where

$$Year\_OE_i = Year\_School_i - Year\_Req_i \quad \text{if } Year\_School_i > Year\_Req_i$$

$$Year\_OE_i = 0, \text{ otherwise}$$

$$Year\_UE_i = Year\_Req_i - Year\_School_i \quad \text{if } Year\_School_i < Year\_Req_i$$

$$Year\_UE_i = 0, \text{ otherwise}$$

Coefficient estimates in ordered discrete choice models indicate the direction of changes in probability for the extreme levels of satisfaction when the explanatory variables are altered, but not for the intermediate categories of the dependent variable. In addition, the estimates do not show the size of such variations. Accordingly, we calculated the predicted probability distributions of satisfaction for a reference individual<sup>2</sup>, as well as the predicted distributions when the competence match and the educational match variables are altered.

## 4. RESULTS

*Table 3* shows the predicted probability distributions of job satisfaction associated to competence mismatches. In general, mismatched workers, both by surplus and by shortage, were less likely to be completely satisfied with their overall job, with the type of job they had, and with their wages than otherwise comparable workers who were adequately competent. The negative effects of competence mismatches on job satisfaction were more severe for undercompetent workers than for overcompetent ones.

<*Table 3* about here>

*Table 4* show the predicted probability distributions of job satisfaction related to education mismatches. The level of satisfaction for overeducated workers did not differ significantly from that corresponding to adequately matched comparable workers. However, undereducated workers were more likely to be completely satisfied with their overall job and with the type of job they had than workers with similar characteristics, including the same level of formal education, who were adequately educated. On the other hand, the results showed that additional years of required education did not influence workers' probabilities of being completely satisfied with their overall job or wage, although they increased satisfaction

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<sup>2</sup>. The reference individual is a non-single man who is a wage-earner with a ten-year plus tenure in a full time job in the private services industry. He has not been unemployed for 12 months in the past five years, was born in Spain and works in the same region he was born in. He is well matched competence-wise and his formal education (in equations (1) and (2)), the level of education required in his job (in equation (3)), work experience, working hours, hourly wage and number of unemployment episodes are the sample mean values.

with their type of job. The years of educational surplus had no significant effects on any satisfaction dimension analyzed. So, overeducated workers did not differ from their adequately educated co-workers regarding job satisfaction. The years of undereducation increased the probabilities of being completely satisfied with the overall job and with the wages earned from this job. Therefore, undereducated workers are in general more likely to be completely satisfied with their jobs than their co-workers who have the required education.

<Table 4 about here>

## **5. CONCLUSIONES**

This paper analyzes the incidence, and job satisfaction consequences of educational and competence job-worker mismatches in the Spanish labour market. Our purpose is not only to study this subject, but also to evince that both types of job-worker matches are different phenomena and therefore, they should not be treated as equivalents, as has occurred mostly in previously literature.

By looking at the joint distribution of educational and competence match classifications, we find that only 36% of workers were similarly classified under both criteria, which implies that education and competence mismatches are rather different aspects of the accuracy of the job-worker pairing. Moreover, the consequences of both types of mismatches for workers appear to be different in terms of job satisfaction.

Specifically, our results suggest: 1) competence mismatches reduce workers' job satisfaction, which implies that both overcompetence and undercompetence are undesirable situations from workers' viewpoint; 2) among comparable workers, the educational mismatches are at least as satisfactory as the adequate education match among comparable workers, since educational mismatches have a neutral effect, in the case of overeducation, or even a positive effect, in the case of undereducation, on job satisfaction; 3) educational mismatches have neutral or even positive effects on job satisfaction for workers in jobs with similar educational requirements. Specifically, the years of overeducation have a neutral effect on satisfaction, while the years of undereducation have, in general, a positive effect, probably as a consequence of the relatively higher wages earned.

To summarize, the general implications of our analysis are that the research strategy of using educational mismatches as a proxy for the study of competence mismatches, as seen in current literature, may not be accurate because they appear as two different phenomena of labour market. In fact, competence mismatches are a more relevant problem for workers than educational mismatches: job satisfaction consequences are negative for both overcompetent and undercompetent workers, while these consequences may be even positive for educationally mismatched workers.

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Figure 1

Identification of Competence Match

		( i )	
		Yes	No
( ii )	Yes	Overcompetent	Undercompetent
	No	Adequately competent	Undercompetent

**Table 1. Sample Means and Standard Deviation**

Variables	Definition	Mean	Standard deviation
<i>Education &amp; qualification match</i>			
OC	Dummy variable, 1 if worker is overcompetent, 0 otherwise	0.35	0.48
UC	Dummy variable, 1 if worker is undercompetent, 0 otherwise	0.45	0.50
OE	Dummy variable, 1 if worker is overeducated, 0 otherwise	0.34	0.47
UE	Dummy variable, 1 if worker is undereducated, 0 otherwise	0.28	0.45
Year_Req	Number of years of required education in a job	9.63	3.56
Year_OE	Number of years of overeducation in a job	1.22	2.14
Year_UE	Number of years of undereducation in a job	0.90	1.71
<i>Personal characteristics</i>			
Female	Dummy variable, 1 if female, 0 otherwise	0.35	0.48
Single	Dummy variable, 1 if single, 0 otherwise	0.31	0.46
<i>Human capital</i>			
Experience	Number of years of potential work experience (age-education-6)	22.52	12.51
Tenure shorter than 1 year	Dummy variable, 1 if tenure is lower than 1 year, 0 otherwise	0.16	0.36
Tenure between 1 and 5 years	Dummy variable, 1 if tenure is between 1 and 5 years, 0 otherwise	0.38	0.49
Tenure between 6 and 10 years	Dummy variable, 1 if tenure is between 6 and 10 years, 0 otherwise	0.12	0.32
Year_School	Number of years of formal education completed	9.95	4.03
<i>Labor status</i>			
Self-employed	Dummy variable, 1 if self-employed, 0 otherwise	0.16	0.37
Working hours per week	Average number of working hours per week	42.12	9.85
Part-time job	Dummy variable, 1 if part-time job, 0 otherwise	0.06	0.23
Public sector job	Dummy variable, 1 if job in the public sector, 0 otherwise	0.18	0.39
Agriculture job	Dummy variable, 1 if agriculture job, 0 otherwise	0.06	0.24
Manufacturing job	Dummy variable, 1 if manufacturing job, 0 otherwise	0.33	0.47
W	Hourly wage	5.87	3.93
<i>Unemployment &amp; migration</i>			
Unemployed for 12 months	Dummy variable, 1 if worker unemployed for 12 months in the last 5 years, 0 otherwise	0.17	0.37
Unemployed episodes	Number of unemployment episodes in the last 5 years	0.77	1.63
Regional migration	Dummy variable, 1 if worker was not born in the region where he/she lives	0.19	0.39
Lived abroad but returned	Dummy variable, 1 if worker born in Spain, lived abroad, and come back, 0 otherwise	0.02	0.14
International in migrant	Dummy variable, 1 if worker is a foreign immigrant, 0 otherwise	0.02	0.13
<i>Job satisfaction</i>			
SOJ	Ordered variable from 1 (very dissatisfied) to 6 (completely satisfied) to indicate the satisfaction with overall job		
degree 1		0.02	0.15
degree 2		0.06	0.24
degree 3		0.16	0.36
degree 4		0.26	0.44
degree 5		0.38	0.48
degree 6		0.12	0.33
STJ	Ordered variable from 1 (very dissatisfied) to 6 (completely satisfied) to indicate the satisfaction with type of job		
degree 1		0.02	0.15
degree 2		0.05	0.23
degree 3		0.13	0.34
degree 4		0.26	0.44
degree 5		0.36	0.48
degree 6		0.17	0.37
SW	Ordered variable from 1 (very dissatisfied) to 6 (completely satisfied) to indicate the satisfaction with wage		
degree 1		0.07	0.26
degree 2		0.15	0.36
degree 3		0.27	0.45
degree 4		0.28	0.45
degree 5		0.18	0.38
degree 6		0.04	0.19

**Table 2. Marginal and Joint Distributions of Competence and Education Matches (Percentage)**

	Overeducated	Undereducated	Adequately educated	Competence match
Overcompetent	13.9	8.1	12.6	34.6
Undercompetent	13.9	13.7	17.4	45.0
Adequately competent	6.0	5.9	8.5	20.4
<i>Educational match</i>	33.8	27.7	38.5	100.0

**Table 3. Competence Match: Predicted Probabilities by Degree of Satisfaction from Job Satisfaction Equation 1**

	Dependent variable: SOJ					
	1	2	3	4	5	6
<i>Reference individual</i>	0.015	0.038	0.115	0.235	0.437	0.160
Year_School + std.e.	0.017	0.043	0.129	0.250	0.420	0.141
OC	0.019	0.047	0.138	0.258	0.408	0.130
UC	0.030	0.072	0.189	0.288	0.336	0.086
	Dependent Variable: STJ					
	1	2	3	4	5	6
<i>Reference individual</i>	0.012	0.030	0.084	0.214	0.415	0.245
Year_School	-	-	-	-	-	-
OC	0.017	0.042	0.112	0.253	0.391	0.185
UC	0.027	0.063	0.157	0.292	0.336	0.125
	Dependent Variable: SW					
	1	2	3	4	5	6
<i>Reference individual</i>	0.057	0.131	0.277	0.313	0.186	0.037
Year_School	-	-	-	-	-	-
OC	0.074	0.159	0.299	0.289	0.151	0.028
UC	0.081	0.170	0.306	0.279	0.140	0.026

Notes: The reference individual is a non-single man who is a wage-earner with a ten-year plus tenure in a full time job in the private services industry. He has not been unemployed for 12 months in the past five years, was born in Spain and works in the same region he was born in. He is well matched competence-wise and his formal education, work experience, working hours, hourly wage and number of unemployment episodes are the sample mean values. (-) No significant effect ( $p > 0.05$ ).

**Table 4. Education Match: Predicted Probabilities by Degree of Satisfaction from Job Satisfaction Equations**

	Dependent Variable: SOJ											
	Equation 2						Equation 3					
	1	2	3	4	5	6	1	2	3	4	5	6
<i>Reference Individual</i>	0.023	0.056	0.156	0.268	0.382	0.115	0.023	0.056	0.156	0.268	0.382	0.115
Year_School	-	-	-	-	-	-						
OE	-	-	-	-	-	-						
UE	0.020	0.049	0.140	0.257	0.403	0.131						
Year_Req							-	-	-	-	-	-
Year_OE = 1							-	-	-	-	-	-
Year_UE = 1							0.022	0.055	0.153	0.266	0.386	0.117
	Dependent Variable: STJ											
	Equation 2						Equation 3					
	1	2	3	4	5	6	1	2	3	4	5	6
<i>Reference Individual</i>	0.020	0.049	0.127	0.265	0.372	0.168	0.019	0.047	0.123	0.261	0.376	0.173
Year_School + std.e.	0.018	0.043	0.114	0.252	0.385	0.188						
OE	-	-	-	-	-	-						
UE	0.016	0.039	0.107	0.242	0.393	0.202						
Year_Req + std.e.							0.017	0.041	0.109	0.246	0.391	0.197
Year_OE = 1							-	-	-	-	-	-
Year_UE = 1							-	-	-	-	-	-
	Dependent Variable: SW											
	Equation 2						Equation 3					
	1	2	3	4	5	6	1	2	3	4	5	6
<i>Reference Individual</i>	0.075	0.160	0.299	0.287	0.150	0.028	0.076	0.161	0.300	0.286	0.149	0.028
Year_School	-	-	-	-	-	-						
OE	-	-	-	-	-	-						
UE	-	-	-	-	-	-						
Year_Req							-	-	-	-	-	-
Year_OE = 1							-	-	-	-	-	-
Year_UE = 1							0.073	0.157	0.297	0.290	0.154	0.029

Notes: The reference individual is a non-single man who is a wage-earner with a ten-year plus tenure in a full time job in the private services industry. He has not been unemployed for 12 months in the past five years, was born in Spain and works in the same region he was born in. He is well matched education-wise and his formal education (in equation 2), years of required education (in equation 3), work experience, working hours, hourly wage and number of unemployment episodes are the sample mean values. (-) No significant effect (p>0.05).