Budria, Santiago; Telhado-Pereira, Pedro

Subjective assessment on vocational training activities. A generalized ordered probit approach

Empirical research in vocational education and training 1 (2009) 2, S. 123-144

urn:nbn:de:0111-opus-51618

Empirical Research in Vocational Education and Training 1 (2009) 123-144

Subjective assessment on vocational training activities: a generalized ordered probit approach

Santiago Budría[a,*], Pedro Telhado-Pereira[b]

[a] *University of Madeira and CEEAplA*
[b] *University of Madeira, CEPR, IZA and CEEAplA*

Abstract

In this paper, we use self-assessed data from participants in vocational training in Madeira to investigate what are the determinants of the effectiveness of the training along three dimensions: employment, job-related skills and productivity. We find that respondents score training activities high in every dimension. Moreover, we find that training is more effective among the educated, indicating that vocational training is far from being remedial. We also find that long training programs and training in the area of Tourism are particularly effective. The results, based on a Generalized Ordered Probit, uncover the differential effect that some characteristics have among individuals who report high and low effectiveness scores.

Keywords: training, employment, productivity, job-related skills, generalized ordered probit

1. Introduction

In recent years there has been substantial progress in the task of assessing the impact of training activities on different labour market outcomes, including wages (Lynch, 1992; Pischke, 2001), productivity (Bartel, 1995; Black & Lynch, 1996; Conti, 2005; Van Reenan et al., 2006), employment (Richardson & Van den Berg, 2001; Jespersen et al., 2008) and job-related skills (Fitzenberger & Völterb, 2007). Despite a general conclusion emerges from these studies (i.e., some forms of training among *certain* population groups are rewarded in the labour market), the results are strongly case dependent and can be hardly transferred across countries and across training schemes. In Portugal, existing research has focused on the relation between wages and training (Saraiva, 1999; Hartog et al., 2000; Budría & Pereira, 2007), and has disregarded the dimensions of employability, job-related skills and productivity.

*Address correspondence to: Santiago Budría, Department of Economics, University of Madeira, Rua Penteada 9000-390, Funchal (Portugal). Phone: +351-291 705 055. Fax: +351-291 705 040. E-mail: sbudria@uma.pt. Financial support of the Spanish Ministry of Science and Innovation (Project ECO2008-04321/ECON) is gratefully acknowledged. We thank the Direcção Regional de Formação Profissional in Madeira and, particularly, Maria João Freitas and Ricardo Figueira for providing the dataset. We also thank an anonymous referee for very helpful comments and suggestions.

In this paper we take a step towards filling this gap by exploring the contribution of vocational training to three important aspects in labour markets: i) employment, ii) job-related skills and iii) productivity. Arguably, these dimensions are also relevant for prospective trainees, employers and policy makers. We use the Survey of Insertion, a yearly survey conducted by the Regional Direction of Vocational Training in Madeira (*Direcção Regional de Formação Profissional*) to evaluate the transition to the labour market of participants in vocational training. It contains personal characteristics including gender, educational background, age, and the content and duration of the training activity. Still, the most relevant characteristic of the SI is that it contains a set of three self-assessed questions aimed to evaluate the effectiveness of the training program. Specifically, individuals in the sample are asked to assess the extent to which the training i) contributed to get the job, ii) was related to the job, and iii) raised their productivity in the job. The candidate scores range from '1' (completely disagree) to '4' (completely agree).

Relative to previous work, our analysis presents three main features. First, we explore the effectiveness of training along dimensions i), ii) and iii) simultaneously. This is an important differentiation, insofar as some types of training may raise productivity and provide fundamental skills but fail to attract new employment opportunities. Inversely, some training activities may promote employment but have a null effect on the workers' productivity. That would be the case if, for example, high ability and more committed individuals undertake training activities to signal their higher quality to employers who, in turn, use training participation as a basis for the decision to offer a contract. If these signaling effects are important, it may well be that once employed these workers are more productive due not to their training but to their higher ability. By considering different outcomes simultaneously we examine what forms of training are more effective in a particular dimension.

Second, unlike most other papers, we do not base our analysis on objective labour market measures. Rather, we focus on the individuals' subjective evaluation of the training activities. This approach offers a methodological advantage. The typical problem of isolating the impact of training on a particular outcome (e.g., wages, employment rates, job mobility, job offers) is that it is hard to isolate the pure effect of a given covariate (training) from other unobserved factors that are correlated with training and affect the observed outcome (e.g., ability, motivation, tenure). If individuals who receive training are not a random sample, but selected (or self-selected) because of some unobservable characteristics, then the estimates might be biased. This argument also applies to selection by subject of study: if high ability individuals are more prone to choose a specific area, the returns to training in this particular area will be higher because of the higher ability of the trainees and not only because of the content of the training. Although there exist econometric techniques to deal with selectivity issues, the results are typically sensitive to the quality of the instruments and the specification of the participation equation (Bound et al., 1995). Subjective questions, in turn, provide direct information on the variable under scrutiny, do not require auxiliary distributional assumptions, and have a straightforward interpreta-

tion. Moreover, the returns to training may be obscured if workers from different occupations and employers have different opportunities to reap the benefits of the productivity gains associated with training (Bishop, 1994). If this is the case, asking directly to individuals rather than collecting objective measures may result into a more reliable set of information.

Subjective questions have received increasing attention in the literature, as they offer complementary and sometimes unique perspectives on relevant topics. Psychologists and recently economists have made ample use of individual assessments to study well-being, quality of life, job satisfaction, welfare and educational mismatches in modern societies[1]. Similarly, the use of self-report data is a research paradigm within firms and studies evaluating the extent of knowledge acquisition among participants in industrial training (Rowold, 2007, Velada et al., 2007). Up to now, however, the use of subjective questions is infrequent in research focusing on labour markets and, more specifically, on the effects of vocational education on different employment-related outcomes. This is unfortunate, as self-reported measures of satisfaction given by training participants may go a long way towards fulfilling the OECD's (2006) recommendation of 'evaluating the effectiveness of existing programs' and providing policy makers important clues to improve the national training systems. In order for the training to be effective, post-participation follow-up and feedback from participants is crucial to enable governments and training institutions to improve their own performance. After all, if we sought to know whether the training exercise helps participants learn skills and concepts that are applicable to the workplace or improve their employability, the most evident way is to ask them directly[2].

The third feature of the analysis is the estimation method. We pose that the self-evaluation of the training activity (a categorical outcome that ranges from 1 to 4) is

[1]For a methodological discussion on the scope of this type of questions and a variety of economic applications, see Kahneman et al. (1999); Frey and Stutzer (2002) and, more recently, van Praag and Ferrer-i-Carbonell (2008).

[2]Behind the evaluation provided by a person, lies a cognitive assessment of to what extent the training activity is judged in a favourable way. Our position is that individuals can provide such an assessment accurately. We are aware, however, that subjective questions may depend on a number of distorting factors related to individual differences including cognitive ability, personality traits, circumstances, aspirations and comparisons with others. If these factors are important, subjective evaluations may contain a great deal of noise relative to the signal value, and the resulting estimations should be interpreted skeptically. However, much research in the field of psychology and economics has demonstrated that the influence of these factors is limited, and that self-reported data pass a number of validation tests. First, there is consistent evidence that subjective measures of satisfaction and well being are related (and in the expected direction) to a number of objective indicators including physical health and longevity (Danner et al., 2001) and suicide rates and macroeconomic fluctuations (Di Tella et al., 2003). Secondly, subjective evaluations show a reasonable amount of internal consistency and temporal reliability: they correlate well with one another and with alternative methods of measurement, including ratings made by family and friends (Sandvik et al., 1993) and a vast array of psychological and psychosocial indicators (Cacioppo et al., 2008). Thirdly, if self-reported data were mere noise, they should be independent from other indicators that are directly related to internal satisfaction. Still, the available evidence shows that facet-specific satisfactions in the job are related in a meaningful way to productivity, establishment performance, absenteeism, quits and labour turnover (Clark, 1999; Wegge et al., 2007; Sousa-Poza & Sousa-Poza, 2007)

a function of observable characteristics, including age, formal education, gender and the type and duration of the training program. A first empirical strategy to estimate this model consists on adopting a standard ordered response model which takes into account the discreteness of the dependent variable. This was the approach adopted in an earlier work (Budría & Pereira, 2009). However, the marginal probabilities given by standard models may not extract all the potential information contained in the data, as the relative impact of two given covariates on the dependent variable is assumed to be constant across the outcome distribution (Stewart, 2005; Boes & Winkelmann, 2006). In our setting, this assumption corresponds to assuming that the ratio of marginal probability effects of two distinct variables (tertiary education and gender, for instance) is the same across outcomes. This may be inappropriate, insofar as there is no presumption that the relative contribution of each variable holds constant across segments of the outcome distribution. To avoid these restrictions, in this paper we adopt a Generalized Ordered Probit model (GOP, henceforth) in which all the parameters are outcome-specific. This refinement allows for a more flexible characterization of the marginal probability effects across the distribution of effectiveness scores. The main advantage of the GOP model over a Standard Ordered Probit (SOP, henceforth) is that it allows us to explore whether or not those factors that put a worker in the upper range of the outcome distribution are the same as those other that put a worker in the lower range of the distribution.

The rest of the paper is organized as follows. Section 2 briefly describes the vocational training system in Madeira. Section 3 presents the dataset and reports summary statistics of the estimating sample. Section 4 introduces the econometric model. Section 5 examines the individuals' self-assessment regarding the effectiveness of training in promoting employment, job-related skills and productivity. The results shed light on the contribution of the different training programs to employment, and uncover important differences across groups of workers. Section 6 discusses the findings of the paper and outlines some theoretical implications. Section 7 contains the concluding remarks.

2. The vocational training system in Madeira

Vocational training programs in Madeira are financed by the Regional Government and co-financed by the European Social Fund. They consist of technical, professional and technological courses directed towards two main population groups. The first target group is youths in the educational system, namely in primary and secondary education. The "Alternative curricula" courses give right to a Level-2 professional certificate, have a duration of between 1000 and 2000 hours and are equivalent to primary education. Secondary education is divided into an academic and a vocational path, where the vocational path consists on a 3-year programs giving right to a Level-3 professional certificate. Upon completion of the program and the realization of a final exam, students gain access to university.

The second target group is composed by individuals outside the education sys-

tem. In this case, a variety of programs and courses are offered, depending on the education background and professional skills of each specific group. Specifically, training courses can be divided into four different categories. First, training for individuals without compulsory education who have no competences to go directly to a professional course. The duration of these courses ranges from 600 to 800 hours. Upon completion, students obtain a Level-1 professional certificate which gives access to secondary education. The second category is aimed to individuals either with compulsory education or without compulsory education who have proved competences through a test. These courses have a duration of between 1500 and 4500 hours and give right to a Level-2 professional certificate (equivalent to primary education). Thirdly, training for individuals with compulsory education (4500 hours) and secondary education (1500 to 1800 hours). This training scheme gives a Level-3 professional certificate. Finally, the fourth category comprises post-secondary school training courses, aimed to people with Level-3 certificates. Training courses directed to individuals outside de education system can be organized by the Regional Government, a professional school, an economic organization and a firm. They can be on-the-job or externally attended, and are certified in all cases.

In this paper we will focus on training activities directed to individuals outside the education system. This choice, partly motivated by data limitations, is intended to avoid conflating training schemes directed towards different population groups.

3. The data

The Survey of Insertion is a yearly survey conducted by the Regional Direction of Vocational Training in Madeira (*Direcção Regional de Formação Profissional*) to evaluate the transition to the labour market of participants in vocational training. In each year, a sample of some 500 individuals that completed a training program in the region is interviewed. Most of them belong to the second target group (individuals outside the education system), the fraction of the first group (individuals in the education system) being relatively low. This is the reason why in this paper we only consider training schemes directed to the second target group. Interviews, conducted in July and August, take place two years after completion of the program, and are conducted only among individuals that were not employed during the training. Participants are asked to report information on their educational background, age, and content and duration of the training activity. They are also asked to report their employment status in three different dates: one month, one year and two years after exit from training. Those who declare to be employed in the time of the survey (84.7% of the sample) are asked to assess the extent to which the training i) contributed to get the job, ii) was related to the job, and iii) raised their productivity in the job. The choice of a two-year period is based on the assumption that this time provides a sufficient ground to evaluate the effectiveness of the training program.

For the present study, we use pooled data from the waves 2000 to 2005. After restricting the sample and dropping observations with missing values, we retain 1,621

individuals. In Table 1 we present the summary statistics. Women account for a large fraction of the sample (57.7%, against 42.3% of men). Most individuals in the sample have primary education (44.9%) or less (34.0%), while the fraction of individuals with university education is rather low (2.8%). Most individuals are aged between 21 and 25 years (49.5%), although a substantial fraction of the sample is aged below 21 years (31.5%). Vocational training in Madeira covers a variety of courses. We have grouped these courses into eight areas: Tourism; Accounting, Business & Administration; Agricultural Production & Food industry; Environment & Urbanism, Civil Construction; Electronics & Energy; Applied Computer Sciences; and the residual category 'Others'. Not surprisingly, in Madeira the most demanded courses are those in Tourism (27.7%). Accounting, Business & Administration (18.6%) is, after Tourism, the most popular area, while Agricultural Production & Food industry (2.8%) Environment & Urbanism (4.0%) are seldom demanded. The miscellaneous category 'Others' accounts for 29.1% of the total sample[3].

In the literature, the research on incidence, extent and impacts of training is biased towards participation versus non-participation in training, while corresponding results for the role of the training intensity are mostly lacking. Interestingly, our dataset includes information on the duration of the program. As Table 1 shows, the average duration of the training programs was 2,320 hours. Finally, we find that a remarkable large proportion of working individuals (44.2%) has a permanent contract in the current job.

The participants' self-assessment

The Survey of Insertion asks individuals to self-evaluate several aspects of the training program. The key questions are:

- **(Q1)** *Has the vocational training program helped you to obtain your current job?*
- **(Q2)** *Was the vocational training program related to your current job?*
- **(Q3)** *Has the vocational training program improved your productivity at your current job?*

where the candidate answers range from '1' (completely disagree) to '4' (completely agree). We use Q1, Q2 and Q3 to examine to what extent training contributes to employment, provides skills that later on are used in the job, and raises productivity. We also examine how these effects differ between individuals with different observable characteristics and between training programs. As a limitation, the above questions are answered only by those individuals who were employed in the time of the survey (two years after the training). Thus, we cannot evaluate the training activities for shorter time spans[4].

[3]This category includes all courses that account for less than 3% of the total sample. It includes Social Service, Insurance Techniques, Clothing Industry, Information & Communication, Furniture Industry, Beauty Care, Training for Trainers, Vehicle Mechanics and Nursery.

[4]The pattern of early career histories is diverse among young people, and some individuals may switch jobs frequently during the first months of job search. In our analysis, we have pooled together individuals

Table 1: Summary statistics (%)

Gender	
Men	42.3
Women	57.7
Education level	
Less than primary education	34.0
Primary education	44.9
Secondary education	18.3
Tertiary education	2.8
Age	
< 21	31.5
21 – 25	49.5
> 25	18.9
Training Program	
Tourism	27.7
Accounting, Business & Administration	18.6
Agricultural Production & Food industry	2.8
Environment & Urbanism	4.0
Civil Construction	7.6
Electronics & Energy	5.1
Applied Computer Sciences	5.1
Others	29.1
Training Duration (hours)	
Average hours	2,320
Type of contract in current job	
Permanent contract	44.2
Non-permanent contract	55.8

Admittedly, Q2 cannot be regarded as a direct question on the skills acquired through training. However, it can be interpreted as an assessment on the quality of the match between the content of the training and the skills required in the job, as individuals whose training does not relate to the job can hardly have acquired the necessary skills and competencies in the training. This question, moreover, closely resembles other survey questions that are typical in the emerging literature on skills and educational mismatches[5].

who were in their first job after training (86.3% of the sample) and individuals who had had two or more jobs (13.7%). Admittedly, these two groups of workers may be inclined to respond differently, as the contribution of past training activities to the current job may differ depending on the number of jobs that the individual has had. Thus, for example, training may facilitate the access to a first job that may act as a stepping-stone to other jobs for which the skills acquired in the training are not needed anymore. Still, in results not reported here, we found that restricting the sample to individuals in their first job does not significantly change the results.

[5] See, for instance, Alba-Ramírez & Blázquez (2002), Wasmer et al. (2007) and Budría & Moro-Egido (2008). Here, the key questions are 'To what extent is your formal training or education related to your current job?' and 'Have you had formal training or education that has given you skills needed for your

4. The model

The individual assessment on the effectiveness of the training activity is assumed to be a function of a latent variable E* that is not measured. This variable is continuous and has several threshold points that determine the observed value of E. Specifically,

$$E = j \quad \text{if and only if} \quad \delta_{j-1} \leq E_i^* < \delta_j \quad j = 1, 2, \ldots, J \tag{1}$$

where $\delta_0, \delta_1, \ldots, \delta_J$ are threshold parameters which discretize the real line represented by E^* into $J = 4$ categories. As usual, E^* is assumed to be a function of observable characteristics

$$E^* = X'\beta + e \tag{2}$$

where X is a vector of explanatory variables, including education, gender, age, type and length of the training program, and the type of job contract hold by the individual[6]. Eq. (2) can be estimated using a Standard Ordered Probit that accounts for the discreteness and ordering of the dependent variable. In this case, the impact of a particular covariate m on the probability of outcome j (i.e., the marginal probability effect, MPE) is given by

$$MPE_{jm}(x_m) = \frac{\partial Pr[E = j]}{\partial x_m} = \Big[f(\delta_{j-1} - X'\beta) - f(\delta_j - X'\beta)\Big]\beta_m \tag{3}$$

where $f(z)$ is the normal density function and x_m denotes the m-th element in X. As noted by Boes and Winkelmann (2006), a shortcoming of this approach is that it imposes an implicit cardinalization such that the ratio of MPEs of two distinct covariates on the same outcome, i.e. the relative marginal probability effects, is constant across the outcome distribution

$$\frac{MPE_{jl}(x_l)}{MPE_{jm}(x_m)} = \frac{\beta_l}{\beta_m} \tag{4}$$

for all $j = 1, \ldots, 4$. To overcome this restriction, we switch to a generalized version of the probit model where the threshold parameters are modeled as a function of the model covariates, $\delta_i = \bar{\delta}_j + X'y_j$[7]. In this case, the MPEs are allowed to differ across the outcome distribution, as they are given by

$$MPE_{jm}(x_m) = \frac{\partial Pr[E = j]}{\partial x_m} = f(\delta_{j-1} - X'\beta_{j-1})\beta_{j-1,m} - f(\delta_j - X'\beta_j)\beta_{j,m} \tag{5}$$

where β_j is the vector of coefficients for outcome j and $\beta_{j,m}$ is its m-th element.

present type of work?'.

[6]To highlight the main relationships contained in the data, we do not include interaction terms between the different covariates.

[7]This estimating strategy corresponds, thus, to the general threshold model described in Boes and Winkelmann (2006). There exist, however, alternative generalizations, including the random coefficients, the finite mixture and the sequential model.

5. Empirical results

The overall evaluation of the training programs made by training participants is fairly good. This can be seen in the first column of Table 2, where we report the average response in the 1-4 scale provided by the trainees. The three dimensions are scored high on average (3.31, 3.13 and 3.32, respectively), indicating that training completers more than agree that training improves the chances of having a job, is related to future jobs and raises one's productivity. These three items are therefore highly related[8]. In the remaining columns we provide the precise distribution of the responses. As much as 59.8% of the sample workers 'completely agree' that training was useful to obtain the job, while an additional 23.1% 'agree'. In contrast, only 10.9% of the total sample 'completely disagree' with this statement. Similarly, 78.5% and 85.4% of the respondents 'agree' or 'completely agree' with the second and third evaluation questions, respectively. Again, the proportion of individuals who less than agree along these two dimensions is relatively low (21.6% and 14.6%, respectively).

Table 2: Average evaluation of training activities and distribution of responses (%)

	Average Score	1– Completely Disagree	2– Disagree	3 – Agree	4 – Completely agree
Helped to obtain current job	3.31	10.9	6.2	23.1	59.8
Related to current job	3.13	12.7	8.9	30.5	48.0
Increased productivity in current job	3.32	6.9	7.7	31.5	53.9

Next, we turn to the regression analysis. The estimates, reported in Table 3, are based on the SOP model and provide an initial description of the determinants of the effectiveness of training. Each column in the table corresponds to one of the dimensions investigated in the paper. The reference individual is a male worker, aged below 21, with less than primary education, with a temporary contract, and with training in the miscellaneous category 'others'.

Despite the evaluation of training activities is on average good, there exist significant differences across groups of workers. Probably, the most remarkable finding is the complementarity between formal schooling and training. The results in the first column of Table 3 show that having secondary or tertiary education raises the score on employability significantly, indicating that workers with these qualifications find the training particularly useful to obtain a job. Moreover, a glance to the second and third columns shows that individuals with a higher education level are more inclined

[8] All the inter-item correlations were found to be between 0.70 (employment and productivity) and 0.75 (relation to current job and productivity)

Table 3: Effectiveness of the training program – SOP model

	Helped to obtain current job	Related to current job	Increased productivity in current job
Primary education	0.127*	0.067	-0.019
	(1.710)	(0.940)	(-0.260)
Secondary education	0.623**	0.733***	0.485***
	(4.800)	(5.910)	(3.880)
Tertiary education	0.682***	0.977***	0.898***
	(3.000)	(4.320)	(3.810)
20 < Age = 25	-0.032	-0.028	0.052
	(-0.440)	(-0.410)	(0.730)
Age > 25	-0.266***	0.001	-0.002
	(-2.950)	(0.010)	(-0.020)
Female	0.106	0.034	0.113*
	(1.520)	(0.520)	(1.670)
Tourism	0.112**	0.074*	0.028
	(1.990)	(1.791)	(1.330)
Accounting, Business & Administration	-0.086	-0.253***	-0.083
	(-0.860)	(-2.700)	(-0.860)
Agricultural Production & Food industry	-0.170	-0.430**	-0.310*
	(-0.900)	(-2.400)	(-1.720)
Environment & Urbanism	0.235	-0.031	-0.040
	(1.330)	(-0.190)	(-0.250)
Civil Construction	0.093	-0.144	0.036
	(0.680)	(-1.120)	(0.270)
Electronics & Energy	-0.038	-0.008	-0.102
	(-0.240)	(-0.050)	(-0.680)
Applied Computer Sciences	-0.753***	-0.617***	-0.454***
	(-5.020)	(-4.220)	(-3.070)
Duration	0.039***	0.043***	0.042***
	(3.950)	(4.480)	(4.340)
Duration squared (x 1000)	-0.001***	-0.001***	-0.001***
	(-3.370)	(-3.890)	(-3.650)
Permanent contract	0.301***	0.319***	0.306***
	(4.740)	(5.270)	(4.940)
Average Score	3.31	3.13	3.32
Log likelihood	-1638.1	-1838.2	-1677.2
Pseudo R2	0.046	0.048	0.042
No. of Observations	1,621	1,621	1,621

Note: i) * denotes significant at the 10% significance level, ** denotes significant at the 5% significance level, *** denotes significant at the 1% significance level; ii) z-values are in parantheses; iii) The reference individual is a male worker, aged below 21, with less than primary education, with a temporary contract, and with training in the miscellaneous category 'others'; iv) The results are controlling for year fixed effects.

to believe that the training activity is related to their current job, and that they are more productive due to the training program. The estimates of having secondary and tertiary education on these scores range from 0.485 to 0.977, and are statistically significant at the 1% significance level. In contrast, individuals with primary education or less find the vocational training less effective in every dimension. All in all, the results indicate that, relative to the educated, the low-educated get a worse match between the skills acquired through training and the skills needed to either obtain or perform a job.

The results for the remaining variables are as follows. Age is an additional determinant of the contribution of training to employment. Specifically, we find that relative to younger individuals, those aged above 25 find the training program less effective when it comes to obtain a job. The estimated coefficient, -0.266, is statistically significant, but turns to non-significant when we switch to columns two and three. Regarding job-related skills and productivity, therefore, we do not detect significant differences across age groups.

As regards gender differences, we find that upon the employment dimension training among men is as effective as among women. Still, the impact of training on productivity is higher among women (0.113), a result that can be interpreted as some evidence that women tend to obtain a better match between the job requirements and the skills acquired through training.

In the previous section we reported that training programs in the area of Tourism were the most demanded. The results in Table 3 suggest that this may be due to the positive evaluation of these courses. Specifically, we find that individuals who completed a program in Tourism feel that their investment significantly contributed to obtain their current job. Moreover, employment does not come at the expense of a bad job match. Participants in Tourism report that the program was related to the job or, to put it different, that they access jobs that are related to the skills acquired in the training. Still, this effect is significant only at the 10% significance level. The last column suggests that participants in Tourism programs are inclined to belief that the training activity raised their productivity, but the effect fails to be statistically significant. Regarding the remaining courses, we find that Applied Computer Sciences shows the worst results. Individuals from this area find the training less valuable in every dimension, and the estimates are significant at the 1% significance level. We also find that individuals from Accounting, Business & Administration and Agricultural Production & Food industry tend to find jobs that are less related to the vocational program. In the case of Agricultural Production & Food industry this translates into a lower productivity in the job, relative to the other areas.

The duration of the training activity is positively related to the probability of finding a job, the quality of the match between the training content and the job, and productivity. This result matches a priori expectations, as individuals from longer training schemes are more likely to have acquired skills and competencies that later on allow them to access certain occupations and be more productive in their jobs.

As an additional finding, we note that the type of contract in the job is closely

related to the perceived effectiveness of training. According to the results, training attenders benefit from additional opportunities of being offered a permanent contract (0.301). This finding suggests that in the regional labour market employers may be using training as a screening device to hire workers permanently. It may well be that high ability and more committed individuals undertake training activities to signal their higher quality to the regional employers who, in turn, use the training experience as a basis for the decision to offer a permanent contract. Still, the mechanism operating here is not a pure signal effect. There is also a human capital effect, as those with a permanent contract obtain jobs that are more related to the vocational course (0.319) and, probably as a consequence, end up being more productive in their jobs (0.306)[9].

6. Results from the GOP model

We now turn to investigate whether the relative impact of the different covariates differs across segments of the score distribution. We are tempted to lucubrate that if a variable has a positive impact on the overall score attributed to training, it must decrease the probability of reporting a low score as well as increase the probability of reporting a high score. However, it may be the case that only one these two effects is present, as some characteristics that are relevant to account for a specific outcome may be largely irrelevant to account for the remaining outcomes. A feature of the GOP model is that it allows us to explore these differential effects and, thus, ascertain whether there exist asymmetric effects taking place across the distribution.

The results of the GOP estimation are reported in Tables 4, 5 and 6. The figures in column j represent the MPEs of the different covariates on outcome j or, to put it different, the marginal effects of the independent variables on the probability of observing outcome $E = j$. Interestingly, we find that education is relatively more relevant in the upper than in the lower segments of the dependent variable. In the last column of Table 4 we find that the probability of reporting $E = 4$ increases by 25.7 percentage points (pp) when the individual has secondary education and by as much as 37.8 pp when he/she has tertiary education. These effects, however, are not mirrored by the estimates in $E = 1$. In this case, the coefficient of tertiary education fails to be statistically significant, while the coefficient of secondary education is relatively low and significant only at the 10% significance level. Somewhat unexpected, thus, the positive effect of education in $JS = 4$ is not compensated by a proportional negative effect in JS=1. For tertiary education, this compensation takes

[9]These figures do not necessarily reflect causality. It may be the case that respondents with a permanent contract are more satisfied with their training due to unobserved factors including realized aspirations and self-fulfillment. If these reverse-causality effects are present, we should interpret the results as mere correlations. We must note however that the information given by respondents relies on an assessment of a counterfactual situation where they do not receive training. There is no presumption that individuals with a permanent contract are less likely than average to provide an accurate evaluation of the true effects of their training.

place in $JS = 3$ indeed, where the estimated coefficient, -0.391, is almost identical (but with opposite sign) to the 0.387 found in $JS = 4$.

In the previous section we found that having tertiary and secondary education significantly raised the perception of individuals regarding the contribution of the training course to employment. The results from the GOP model show that this effect is due to the fact that the highest evaluations are typically made by educated individuals. In other words, people with secondary and tertiary education are much more likely than the rest to give the maximum score to training, while they are overall less likely to tick the remaining answers. This observation suggests that the complementarity of training and education acts, therefore, by improving the chances that an individual is completely satisfied with his/her training activity. In turn, a glance to the first column of Table 4 shows that having tertiary education does not prevent trained individuals from reporting the lowest satisfaction level.

Similarly, we find that women are 4.9 pp less likely to be in the lowest category of the outcome distribution. In turn, we cannot reject the hypothesis that the probability of reporting the highest effectiveness score is the same among men and women. A similar reasoning applies to the duration of the training activity. Having participated in a long program significantly raises the probability of reporting the highest score but, in turn, does not prevent an individual from reporting the lowest score.

It is interesting to note that while the results for education, gender and training duration point to important asymmetries, other variables exhibit quite homogeneous effects. This is the case of age>25, where the estimate in $JS = 1$ (0.078) almost mirrors the effect in $JS = 4$ (-0.109).

In Tables 5 and 6 we find similar results, with the relative importance of some covariates differing across segments of the outcome distribution. This can be seen by comparing the magnitude and statistical significance of the estimates reported in the first and last columns of the Tables. Again, differences in education are quantitatively more relevant in the upper range of the score distribution. Similarly, certain programs including Accounting, Business & Administration, Agricultural Production & Food industry and Applied Computer Sciences exert a significant effect on the probability of reporting either $E = 3$ or $E = 4$. However, they are largely unrelated to the probability of observing $E = 1$ and $E = 2$. Given these asymmetric effects, it is not surprising that the likelihood ratio test reported in the bottom part of Tables 4, 5 and 6 rejects the SOP model in favor of the GOP model.

Table 4: Marginal probability effect on the worker's evaluation – Contribution to employment (GOP model)

	1	2	3	4
Primary education	-0.024	0.008	-0.043	0.059
	(-0.880)	(0.370)	(-1.470)	(1.830)
Secondary education	-0.103*	-0.060	-0.094*	0.257***
	(-1.830)	(-1.350)	(-1.700)	(4.610)
Tertiary education	-0.014	0.026	-0.391***	0.378***
	(-0.180)	(0.430)	(-4.920)	(3.620)
20 < Age ≤ 25	0.025	-0.010	-0.005	-0.010
	(0.950)	(-0.460)	(-0.170)	(-0.340)
Age > 25	0.078***	-0.005	0.036	-0.109***
	(2.640)	(-0.220)	(1.020)	(-2.790)
Female	-0.049**	0.026	-0.005	0.029
	(-2.050)	(1.520)	(-0.180)	(0.950)
Tourism	-0.024*	0.032	0.053	0.061*
	(-1.740)	(1.360)	(1.630)	(1.660)
Accounting, Business & Administration	-0.065	0.015	0.125***	-0.075*
	(1.540)	(0.470)	(3.090)	(-1.790)
Agricultural Production & Food industry	0.011	0.067	-0.014	-0.064
	(0.180)	(1.450)	(-0.220)	(-0.790)
Environment & Urbanism	-0.109	0.042	-0.009	0.076
	(-1.630)	(0.860)	(-0.140)	(1.020)
Civil Construction	-0.111*	-0.026	0.167***	-0.030
	(-1.940)	(-0.680)	(2.770)	(-0.520)
Electronics & Energy	-0.063	-0.005	0.140**	-0.072
	(-1.100)	(-0.130)	(2.230)	(-1.080)
Applied Computer Sciences	0.084	0.060	0.232***	-0.376***
	(1.560)	(1.420)	(3.580)	(-5.600)
Duration	-0.006	-0.005	-0.006	0.016***
	(-1.520)	(-1.530)	(-1.560)	(3.810)
Duration squared (x 1000)	0.057	0.082*	0.097	-0.235***
	(0.960)	(1.750)	(1.530)	(-3.370)
Permanent contract	-0.066***	-0.021	-0.030	0.117***
	(-2.500)	(-1.080)	(-1.110)	(4.200)
Log-likelihood	-1607.864			
LR test aginst SOP model	60.48***			
No. of Obs.	1,621			

Note: i) * denotes significant at the 10% significance level, ** denotes significant at the 5% significance level, *** denotes significant at the 1% significance level; ii) z-values are in parentheses; iii) The reference individual is a male worker, aged below 21, with less than primary education, with a temporary contract, and with training in the miscellaneous category 'others'; iv) The results are controlling for year fixed effects.

Table 5: Marginal probability effect on the worker's evaluation – Contribution to skills (GOP model)

	1	2	3	4
Primary education	-0.043	0.002	0.035	0.005
	(-1.420)	(0.100)	(1.120)	(0.160)
Secondary education	-0.192***	-0.070	-0.027	0.289***
	(-2.890)	(-1.280)	(-0.460)	(5.390)
Tertiary education	-0.165	0.045	-0.317***	0.437***
	(-1.520)	(0.460)	(-4.040)	(4.340)
20 < Age ≤ 25	-0.025	0.027	0.034	-0.036
	(0.860)	(1.190)	(1.120)	(-1.150)
Age > 25	-0.047	0.024	0.058	-0.035
	(-1.280)	(0.830)	(1.410)	(-0.860)
Female	0.000	-0.013	-0.011	0.023
	(0.010)	(-0.580)	(-0.350)	(0.770)
Tourism	0.021	0.012	-0.010	0.123**
	(0.610)	(0.420)	(-0.290)	(1.900)
Accounting, Business & Administration	-0.041	0.000	0.240***	-0.199***
	(-0.910)	(0.000)	(5.120)	(-4.660)
Agricultural Production & Food industry	0.136*	0.009	0.023	-0.169**
	(1.940)	(0.150)	(0.280)	(-1.960)
Environment & Urbanism	0.003	-0.084*	0.110	-0.028
	(0.040)	(-1.760)	(1.370)	(-0.390)
Civil Construction	0.004	-0.019	0.106*	-0.090
	(0.070)	(-0.490)	(1.900)	(-1.560)
Electronics & Energy	0.014	-0.027	0.013	0.000
	(0.240)	(-0.620)	(0.210)	(-0.010)
Applied Computer Sciences	0.112*	0.061	0.144*	-0.318***
	(1.780)	(1.110)	(1.950)	(-4.550)
Duration	-0.010***	-0.005	-0.002	0.017***
	(-2.420)	(-1.530)	(-0.360)	(3.870)
Duration squared (x 1000)	0.120**	0.100*	0.000	-0.230***
	(1.980)	(1.860)	(0.010)	(-3.240)
Permanent contract	-0.096***	-0.014	-0.020	0.129***
	(-3.250)	(-0.590)	(-0.680)	(4.760)
Log-likelihood	-1791.132			
LR test aginst SOP model	94.14***			
No. of Obs.	1,621			

Note: i) * denotes significant at the 10% significance level, ** denotes significant at the 5% significance level, *** denotes significant at the 1% significance level; ii) z-values are in parantheses; iii) The reference individual is a male worker, aged below 21, with less than primary education, with a temporary contract, and with training in the miscellaneous category 'others'; iv) The results are controlling for year fixed effects.

Table 6: Marginal probability effect on the worker's evaluation – Contribution to productivity (GOP model)

	1	2	3	4
Primary education	-0.015	-0.025	0.086**	-0.046
	(-0.680)	(-1.160)	(2.660)	(-1.420)
Secondary education	-0.145***	-0.041	-0.048	0.138***
	(-2.630)	(-0.800)	(0.800)	(2.590)
Tertiary education	-0.028	-0.156**	-0.183**	0.368***
	(-0.390)	(-2.260)	(-2.00)	(3.630)
$20 < \text{Age} \leq 25$	0.004	-0.001	-0.032	0.028
	(0.200)	(-0.030)	(-1.040)	0.910)
Age > 25	-0.025	0.007	0.041	-0.023
	(-0.840)	(0.230)	(1.010)	(-0.580)
Female	-0.039**	-0.013	-0.028	0.024
	(-1.940)	(-0.650)	(0.940)	(0.800)
Tourism	-0.001	-0.014	0.042	0.026
	(-0.060)	(-0.570)	(1.170)	(0.700)
Accounting, Business & Administration	-0.019	-0.006	0.086**	-0.061
	(-0.580)	(-0.200)	(1.930)	(-1.440)
Agricultural Production & Food industry	-0.056	0.123*	0.130	-0.197**
	(-0.840)	(1.670)	(1.560)	(-2.340)
Environment & Urbanism	-0.042	0.017	0.075	-0.050
	(-0.790)	(0.330)	(1.030)	(-0.690)
Civil Construction	0.002	-0.030	0.017	0.010
	(0.060)	(-0.790)	(0.310)	(0.180)
Electronics & Energy	-0.026	0.000	0.135**	-0.108
	(-0.570)	(-0.010)	(2.040)	(-1.590)
Applied Computer Sciences	-0.041	0.124**	0.166**	-0.249***
	(-0.740)	(2.110)	(2.370)	(-3.700)
Duration	-0.002	-0.005*	-0.013***	0.020***
	(-0.710)	(-1.790)	(-2.900)	(4.740)
Duration squared (x 1000)	0.021	0.071	0.200***	-0.295***
	(0.420)	(1.440)	(2.760)	(-4.170)
Permanent contract	-0.066***	-0.024	-0.027	0.117***
	(-2.630)	(-1.000)	(-0.920)	(4.310)
Log-likelihood	-1648.00			
LR test aginst SOP model	58.41***			
No. of Obs.	1,621			

Note: i) * denotes significant at the 10% significance level, ** denotes significant at the 5% significance level, *** denotes significant at the 1% significance level; ii) z-values are in parantheses; iii) The reference individual is a male worker, aged below 21, with less than primary education, with a temporary contract, and with training in the miscellaneous category 'others'; iv) The results are controlling for year fixed effects.

7. Discussion

According to Human Capital Theory (Becker, 1964), individuals may raise their productivity by investing in education. However, while the positive effects of formal schooling on earnings, employment and productivity have been widely documented in the literature, the labour market implications of training and vocational education are less clear cut. There is evidence pointing to beneficial effects of training activities on unemployment duration, productivity and wages (Richardson & van den Berg, 2001; Conti, 2005; Van Reenan et al., 2006). Still, evaluation studies of public training programs in OECD countries often report that adult and vocational training have little directly measurable labour market effects, failing to attract earnings returns and new employment opportunities (Fitzenberger & Prey, 2000; Martin & Grubb 2001; Machin & Vignoles, 2005).

The results in this paper provide further support to the Human Capital Theory. We showed that vocational training may importantly improve the labour market prospects of individuals, providing job-related skills, enhancing productivity and bringing new employment opportunities. The divergence with previous research may be due to at least three factors. First, there is evidence to suggest that educational differences should be explicitly taken into account. The results reported in the OECD's (2004) *Employment Outlook* provide only limited evidence at the international level and no evidence in the Portuguese case that training participation decreases the probability of unemployment (pp. 196). This evidence, however, is obtained aggregating individuals across education levels or, to put it different, obscured by heterogeneous effects. Our results indicate that the contribution of training to productivity and employment may be not an independent effect, but the outcome of a positive interaction between schooling and training. Specifically, the observation that educated individuals benefit to a larger extent from training activities suggests that vocational training acts by fostering the effects of formal schooling rather than by replacing limited or outdated education. Once educational differences are explicitly taken into account, the estimated effects can be remarkably large among specific groups. This result warns training practitioners and researchers in the field that the interaction between schooling and training should be explicitly taken into account for the design of effective training schemes.

Second, in some countries the proliferation of vocational qualifications and schools may have lowered the average quality of training attenders and weakened the signal of what students who go through a vocational program learn. To some degree, this mechanism may be operating in those countries where vocational schemes fail to be effective. In Madeira Island, in turn, the public provision of vocational training is highly centralized at the regional level, which has resulted in a relatively small number of vocational paths, a clearer mapping between the regional labour market needs and vocational courses, and a wider recognition by regional employers. Screening and signaling effects are more likely to operate in this particular context, providing training completers with useful labour market credentials.

Third, in Portugal the returns to education are remarkably large (Martins & Pereira, 2002), partly due to the low educational attainment and training participation of the labour force[10]. The fact that vocational training completers benefit from better opportunities in Madeira Island than in other countries is consistent with this pattern.

In theoretical discussions about the relation between education and training, the question of complementarity or substitutability between these two different forms of human capital is frequently raised. If training is more effective among the educated, then an expansion in training provision may deteriorate the labour market position of already disadvantaged individuals. On the other hand, if training acts as a substitute of formal schooling existing differences in labour market performance and productivity between educated and uneducated workers could be ameliorated. The results in this paper give support to the complementarity hypothesis, thus warning that equality of training provision may result into further labour market inequalities. Lynch (1992) for the US, Blundell et al. (1999) for the UK and Brunello (2004) for Europe as a whole report similar findings.

To provide a closer look to the complementarity between education and training, in Table 7 we conducted a set of independent SOP regressions by training area. The estimates correspond to the coefficient of a dummy variable that takes the value 1 if the individual has secondary or tertiary education, zero otherwise[11]. The first row contains the results for the pooled sample, while the remaining rows show how this effect varies when the estimating sample is restricted to a particular training group. Due to the small number of observations within the groups, in these cases the estimated coefficients tend to be less statistically significant. We detect some differences across groups. The education effect is particularly large among individuals from Electronics & Energy and Other areas when it comes to either obtain a job (0.944 and 0.558, respectively) or obtain a job related to the training (0.637 and 0.752). Similarly, having formal qualifications is particularly relevant for the acquisition of job-related skills and productivity among workers from Civil Construction (0.772 and 0.354, respectively). Only in two areas, Tourism and Environment & Urbanism, education appears to negatively affect the labour market outcome.

A natural question is, thus, what factors may explain the relation between training and education observed in most areas. To our eyes, there are at least two mechanisms that may account for this fact. First, schooling plays a particularly important role during the screening process of recent school-leavers, who unlike more experienced workers normally do not possess productivity signals other than their education. Therefore, we expect that those with a higher level of schooling tend to benefit from additional opportunities after completion of the training. Second, it

[10] In Portugal, only 27.6% of the adult population (25-64 years old) has completed upper secondary education, while in Europe as a whole (EU-25) this proportion rises to 69.7%. Similarly, training participation in Portugal is 3.8%, against 10.1% in EU-25 (Eurostat, 2007).

[11] We do not differentiate between secondary and tertiary education due to small cell size within the various training groups.

Table 7: The education effect by training area (SOP model)

	Helped to obtain current job	Related to current job	Increased productivity in current job	No. of Obs.
Pooled sample	0.613***	0.772***	0.671***	1,621
Tourism	-0.210	-0.196	-0.257*	449
Accounting, Business & Administration	0.014	0.066	-0.032	302
Agricultural Production & Food industry	-	-	-	46
Environment & Urbanism	-1.120*	-0.411	0.393	64
Civil construction	0.091	0.772***	0.354*	124
Electronics & Energy	0.944***	0.637*	0.419	82
Applied Computer Sciences	-0.003	0.459	0.159	82
Others	0.558***	0.752***	0.638***	472

Note: i) * denotes significant at the 10% significance level, ** denotes significant at the 5% significance level, *** denotes significant at the 1% significance level; iii) The reference individual in each training area is a male worker, aged below 21, with less than secondary education and with a temporary contract; iv) The results are controlling for year fixed effects.

has been documented that mental ability and motivation are strong determinants of the extent of knowledge acquisition among training participants, and that these factors are closely related to the individual's educational attainment (Cannon-Bowers et al., 1995; Colquitt et al., 2000). It is likely, therefore, that the higher capacity of knowledge acquisition of the educated leads them to increased productivity and more occupational opportunities.

8. Conclusions

Understanding and improving the process of knowledge transfer and labour market integration has become a primary concern for training practitioners, governments and researchers. In this paper, we investigated how training activities in the Portuguese region of Madeira contribute to employment, job-related skills and productivity. Our results were based on the participant's self evaluation of the training programs. The average score in every dimension was fairly high, indicating that the beneficial effects of training are widely recognized among participants. We found that more educated individuals find the training program more effective in every dimension. We also reported that women tend to benefit more from the productivity gains acquired through training, and that the perceived effectiveness of training depends on the content and duration of the program.

Using a Generalized Ordered Probit, we found evidence to suggest that these effects cannot be well described in an average sense. There exist some asymmetric effects taking place across the distribution of responses. More specifically, we found that the positive average effect that education has on the perceived effectiveness of

the training is due to a relatively large proportion of educated individuals reporting the highest effectiveness level. In turn, differences in education are less relevant to explain why some workers are completely dissatisfied with the usefulness of the training program.

All in all, our results warn policy makers that vocational training is far from being remedial, at least in Madeira Island. Current vocational training is not a substitute of formal schooling. The strong complementarity between schooling and training found in the data suggests that training schemes oriented to the less educated may be less effective than previously thought. In an earlier work (Budría & Pereira, 2007), we reported that in Portugal less educated workers earned a higher wage premium from training activities, and concluded that training had a remedial nature. The results in this paper suggest that this is not the case when it comes to employment opportunities, job-related skills and productivity. If policy makers are concerned with promoting employment among the less favoured in the labour market, the existing training schemes should be redesigned in order to amend the educational and skills limitations that some training participants exhibit from the start. In this respect, training aimed to acquire general skills and competencies rather than specific knowledge may be of particular importance.

Finally, we showed that training provides individuals with skills that later on are required to either obtain or perform a job. This result indicates that policies aimed to encourage and increase the overall participation in training may importantly reduce the extent of skills mismatches by aligning the workers' skills with the realities and needs of the labour market. These achievements are particularly relevant in contemporary labour markets, to the extent that skills mismatches have been recognized as a source of wage and productivity losses for the economy as well as for the individual (Hartog, 2000; McGuinness, 2006). Still, the quality of the match between the requirements of the job and the skills acquired through training importantly differs across groups of workers. Here, again, the emphasis should be placed on the less educated, among which the quality of the match was found to be lower. Clearly, future research should examine the generalizability of our results to other regions and training schemes.

References

Alba-Ramírez, A. & Blázquez, M. (2002). Types of job match, overeducation, and labour mobility in Spain. In F. Büchel, A. de Grip and A. Meitens (Eds.) *Overeducation in Europe: Current Issues in Theory and Policy*. Cheltenham, UK: Edward Elgar Publishing.

Bartel, A.P. (1995). Training, wage growth, and job performance: evidence from a company database. *Journal of Labour Economics*, 13, 401–425.

Becker, G. (1964). *Human Capital: A theoretical and empirical analysis with special reference to education*. New York: Columbia University Press.

Bishop, J. (1994). The impact of previous training on productivity and wages. In L. Lynch (Ed.) *Training and the Private Sector: International Comparisons*. Chicago: The University of Chicago Press.

Black, S. & Lynch, L. (1996). Human-capital investments and productivity. *American Economic Review*, 86, 263-267.

Blundell, R., Dearden, L. & Sianesi, B. (1999). Human capital investment: The returns from education and training to the individual, the firm and the economy. *Fiscal Studies*, 20(1), 1-23.

Boes, S. & Winkelmann, R. (2006). Ordered response models. *Advances in Statistical Analysis*, 90(1), 167-181.

Bound, J., Jaeger, D. & Baker, R. (1995). Problems with instrumental variables estimation when the correlation between the instruments and the endogenous explanatory variable is weak. *Journal of the American Statistical Association*, 90, 443-450.

Brunello, G. (2004). On the complementarity between education and training in Europe. In Checchi, D. & Lucifora, C. (Eds.) *Education, Training and Labour Market Policies in Europe*. Hampshire: Palgrave Macmillan.

Budría, S. & Moro-Egido, A. (2008). Education, educational mismatch, and wage inequality: Evidence for Spain. *Economics of Education Review*, 27(3), 332-341.

Budría, S. & Pereira, P.T. (2007). The wage effects of training in Portugal: Differences across skill groups, genders, sectors, and training types. *Applied Economics*, 39, 787-807.

Budría, S. & Pereira,P.T. (2009). The contribution of vocational training to employment, job-related skills and productivity: Evidence from Madeira Island. *International Journal of Training and Development*, 13(1), 53-72.

Cacioppo, J., Hawkley, L.C., Kalil, A., Hughes, M.E., Waite, L. & Thisted, R.A. (2008). Happiness and the invisible threads of social connection: The Chicago Health, Aging and Social Relations Study. In M. Eid and R.J. Larsen (Eds.) *The Science of Subjective Well-Being*. New York: The Guilford Press.

Cannon-Bowers, J.A., Salas, E., Tannenbaum, S. & Mathieu, J.E. (1995). Toward theoretically based principles of training effectiveness: a model and initial empirical investigation. *Military Psychology*, 7, 141–164.

Clark, A.E. (1999). Are wages habit-forming? Evidence from micro data. *Journal of Economic Behavior and Organization*, 39, 179-200.

Colquitt, J.A., LePine, J.A. & Noe, R.A. (2000). Toward an integrative theory of training motivation: a meta-analytic path analysis of 20 years of research. *Journal of Applied Psycology*, 85, 678-707.

Conti, G. (2005). Training, productivity and wages in Italy. *Labour Economics*, 12(4), 557-576.

Danner, D., Snowdon, D.A. & Friesen, W.V. (2001). Positive emotions in early life and longevity: Findings from the nun study. *Journal of Personality and Social Psycology*, 80, 804-813.

Di Tella, R., MacCulloch, R.J. & Oswald, A. (2003). The Macroeconomics of happiness. *The Review of Economics and Statistics*, 85(4), 809-827.

Eurostat. (2007). *Structural indicators*. Retrieved 2009 from http://epp.eurostat.ec.europa.eu.

Fitzenberger, B. & Prey, H. (2000). Evaluating public sector sponsored training in East Germany. *Oxford Economic Papers*, 52(3), 497-520.

Fitzenberger, B. & Völterb, R. (2007). Long-run effects of training programs for the unemployed in East Germany. *Labour Economics*, 14(4), 730-755.

Frey, B. & Stutzer, A. (2002). *Happiness and economics: How the economy and institutions affect human well-being*. Princeton: Princeton University Press.

Hartog, J. (2000). Mismatch and earnings: Where are we, where should we go. *Economics of Education Review*, 19, 131-147.

Hartog, J., Pereira, P.T. & Vieira, J.C. (2000). Vocational training and earnings in Portugal. *Economia*, 24, 1-24.

Jespersen, S.T, Munch, J. & Skipper, L. (2008). Costs and benefits of Danish active labour market programmes. *Labour Economics*, 15(5), 859-884.

Kahneman, D., Diener, E. & Schwarz, N. (1999). *Well-Being: The foundations of hedonic psychology*. New York: Russell Sage Foundation.

Lynch, L. (1992). Private sector training and its impact on the earnings of young workers. *American Economic Review*, 82(1), 299-312.

Machin, S.J. & Vignoles, A. (Eds.). (2005). *What's the good of education? The economics of education in the UK*. Princeton: Princeton University Press.

Martin, J.P. & Grubb, D. (2001). What works and for whom: A review of OECD countries' experience with active labour market policies. *Swedish Economic Policy Review*, 8(2), 9-56.

Martins, P.S. & Pereira, P.T. (2002). *Education and earnings in Portugal*. Bank of Portugal Conference Proceedings 2002.

McGuinness, S. (2006). Overeducation in the labour market. *Journal of Economic Surveys*, 20(3), 387-418.

OECD (2004). *Employment Outlook*. Paris: OECD.

OECD (2006). *Economic Survey of Portugal, 2006* (OCDE Policy Briefs).Retrieved October 5, 2007 from http://www.OCDE.org/dataOCDE/62/28/36497355.pdf.

Pischke, J-S. (2001). Continuous training in Germany. *Journal of Population Economics*, 14(3), 523-548.

Richardson, K. & van den Berg, G.J. (2001). The effect of vocational employment training on the individual transition rate from unemployment to work. *Swedish Economic Policy Review*, 8, 175-213.

Rowold, J. (2007). Individual influences on knowledge acquisition in a call center training context in Germany. *International Journal of Training and Development*, 11(1), 21-34.

Sandvik, E., Diener, E. & Seidlitz, L. (1993). Subjective well-being: The convergence and stability of self-report measures. *Journal of Personality*, 61, 317-342.

Saraiva, A. (1999). Incidência e Impacto Salarial da Formação Profissional em Portugal (Extent and Wage Impact of Training in Portugal). *Economia*, 22, 27-43.

Sousa-Poza, A. & Sousa-Poza, A. (2007). The effect of job satisfaction on labor turnover by gender: An analysis for Switzerland. *The Journal of Socio-Economics*, 36(6), 895-913.

Stewart, M. (2005). A comparison of semiparametric estimators for the ordered response model. *Computational Statistics & Data Analysis*, 49(2), 555-573.

Van Praag, B.M.S. & Ferrer-i-Carbonell, A. (2008). *Happiness quantified: A satisfaction calculus approach* (Revised Edition). Oxford, UK: Oxford University Press.

Van Reenan, J., Reed, H. & Dearden, L. (2006). The impact of training on productivity and wages: evidence from British panel data. *Oxford Bulletin of Economics and Statistics*, 68(4), 397–421.

Velada, R., Caetano, A., Michel, J.W., Lyons, B.D. & Kavanagh, M.J. (2007). The effects of training design, individual characteristics and work environment on transfer of training. *International Journal of Training and Development*, 11(4), 282-294.

Wasmer, E., Fredriksson, P., Lamo, A., Messina, J. & Peri, G. (2007). *The macroeconomics of education in Europe*. Oxford, UK: Oxford University Press.

Wegge, J., Schmidt,K-H., Parkes, C. & Van Dick, R. (2007). Taking a sickie: Job satisfaction and job involvement as interactive predictors of absenteeism in a public organization. *Journal of Occupational and Organizational Psychology*, 80(1), 77-89.