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“Labour Market Analysis for European Higher Education”

Discussant : Anneliese Dodds

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**The Payoffs of Competences for Young European Higher
Education Graduates: Effects on Income and Job
Satisfaction**

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Abstract

This paper analyses the relationship between the payoffs of the required, surplus and deficit human capital competences in terms of both graduates' income (monetary payoff) and job satisfaction (non-monetary payoff). Surpluses and deficits in competences were measured asking graduates to evaluate the job they held in terms of the level of competences they thought was required to perform adequately compared to their own acquired level. The results provide strong support for the assumption that the match between individual human capital competences and the characteristics of the job matters. It could be said that the level of competences required in a job does not only state the total amount of graduates' earnings. Because we analyse jobs occupied for recent graduates, salaries are more related to the job itself than to the real performance of individuals. The results relating to job satisfaction shed light on the statement that working in a job that required a high level of competences has a positive effect on the job occupant's satisfaction, but surpluses in competences are an important cause of job dissatisfaction, while the effects of deficits are ambiguous depending of the individual challenge.

1. Introduction

Human capital competences, understood as those talents, skills and capabilities of higher education graduates that contribute to multi-factor productivity gains, are perceived as a key element for sustainable economic growth and development in the globalised economy (Hartog, 1992). Increasingly, policy makers are focusing on the importance of competences. The reason is that workers with sufficient and up-to-date competences are more productive and have more potential to remain employed (Buchel, 2002). Education can widen or

compress ability differences among individuals, resulting in widened or compressed differences in the levels of competences (Ishikawa and Ryan, 2002; Neumark and Wascher, 2003; Tyler, Murnane and Willett, 2003). At a given time, competences can have different value in different jobs (Hartog, 2001). Over time, not only the value of competences but also their contents can change depending on technological and institutional development.

Technological change is deemed to induce upward biases in the demand for competences and hence to be responsible, at least partly, for the increases in wage inequality in more developed countries (Levy and Murnane, 1992; Acemoglu, 1998; Autor, Katz and Krueger, 1998; Berman, Bound and Machin, 1998). The introduction of a new technology changes the nature of work, which affects the importance of various tasks. Some of the competences that workers have accumulated will become less relevant, while others will become more important. This view is the standard for thinking about technological change and “skills” obsolescence and is the logic behind vintage human capital (De Grip, Van Loo and Mayhew, 2002). These changes include increases in both the supply of and demand for highly skilled or educated workers, significant increases in the returns to schooling, and the apparent introduction of non-neutral technology that disproportionately benefits more educated individuals. Therefore, technological change generates a mismatch between the supply and demand for competences and wage inequality results from the inability of the supply side to keep up with demand requirements (Witte and Kalleberg, 1995; Thurow, 1975).

These changes have raised new concerns about the accuracy of the match between higher education and employment of graduates in Europe (Teichler and Kehm, 1995; Witte and Kalleberg, 1995; Heijke, Meng and Ris, 2002). Among these concerns, there are two that focus the attention of researchers. The first one is the identification of those competences that are more relevant to graduates’ professional success (Busato, Prins, Elshout and Hamaker, 2000; Heijke, Meng and Ramaekers, 2002). The second is whether and how these competences are

generated (or may be better promoted) through higher education systems (Dolton and Makepeace, 1990; Pike, 1995; Leckey and McGuiga, 1997; Belfield, Bullock and Fielding, 1999). It is far from easy to give a clear answer to these questions because of the heterogeneity of productivity-enhancing characteristics of graduates.

This research contributes to these discussions. In our sample all individuals have completed higher education, consequently we have tested the assignment theory not with educational level but with human capital competences. We analysed the incidence of different human capital competences in the graduates' payoff both in terms of graduates' income (monetary payoff) and job satisfaction (non-monetary payoff). The objective was to check to what extent human capital competences have similar behaviour to formal education in regard to the influence of the mismatch on the individuals' labour situation. For that purpose, this research tries to answer the following questions:

- Whether and how the graduates' acquired competences match with labour market requirements.
- The payoffs to required, surplus and deficit human capital competences.
- Monetary rewards in terms of income and non-monetary rewards in terms of job satisfaction.

2. Earlier Research

Analysis of the matching between job level and level of education based on the notion of an adequate match as a one-to-one relation is vulnerable to the criticism that this involves a very rigid view of optimal allocation (Jovanovic, 1979, 1984; Barron and Loewenstein, 1985; Topel, 1986; Hartog and Oosterbeek, 1988). In this sense, job level is a variable that measures the complexity of a job, often expressed as the required ability level of a worker and sometimes as

required education (Hartog, 2001). It suggests the existence, for each level of education, of an optimum job level and the implication that allocation to any other job level is necessarily suboptimal, particularly, with respect to under-utilization. If this match is not optimal, additional learning by training and job experience is needed to improve or adjust the initial competencies acquired during education. Indeed, the importance of on-the-job training for improving competences has long been emphasized (Becker, 1964; Mincer, 1974) and there have been many debates on its impact on productivity and wages (Brown, 1989; Lynch, 1992; Acemoglu and Pischke, 1998; Pischke, 2000).

In the absence of data on individual productivities, a major line of research has been developed regarding the effect of education-job mismatches on wages, so-called assignment models. Two basic models have been used to study the wage effects of over- and under-schooling. The most common approach has been to define the number of years of schooling that are ‘adequate’ or ‘required’ for a given job or occupation (denoted as E_r) and if E denotes total years of schooling completed, then years of over-education are given by $E_o = E - E_r$ if $E > E_r$, and on the other hand, years of under-education are defined by $E_u = E_r - E$ if $E < E_r$. The rewards to education are then separated into reward in case of a “proper matching” and corrections for under- and over-education (Hartog and Oosterbeek, 1988). In contrast, the other approach, following Verdugo and Verdugo (1989), define E_r as the range of ‘within +/- one standard deviation of the mean’ educational attainment of full-time workers for each occupation with over-education (OE) and under-education (UE) as dummies indicating deviations from the mean larger than one standard deviation.

According to those models, individuals working in jobs for which a higher level is required (under-education) often earn more than individuals with the same level of education working in jobs for which their own level is required, but less than individuals with the level of education actually required in such jobs (Duncan and Hoffman, 1981; Hartog and Oosterbeek, 1988; Cohn and Khan, 1995; Cohn,

1992). Conversely, individuals working in jobs for which a lower level of education than their own is required (over-education) are often found to earn less than individuals with the same level of education working in jobs for which their own level is required (adequate education), but more than individuals working in an equivalent job with the level of education actually required. The wage effects of over-education are usually stronger than the wage effects of under-education.

Hartog (1988) shows how the probability of reaching a higher job level appears highest for individuals whose earnings gain across job levels is greatest. The higher the job level, the more individuals want to be compensated for further increasing complexity. Similarly, at higher wage levels, individuals are less reluctant to take on more demanding jobs. Other authors suggest a positive relationship between job level and job satisfaction (Robie et al., 1998). Higher-level jobs tend to be more complex and have better working conditions, pay, promotion prospects, supervision, autonomy, and responsibility (Cranny et al., 1992). Additionally, during the last two decades, economists have made much progress in understanding that monetary incentives are important, but there are also powerful non-monetary motives that provide incentives individuals to perform a specific job task (Fehr and Falk, 2002; Igalens and Roussel, 1999). Tasks that are inherently satisfying create an intrinsic reward for those performing them.

A number of economic and other social science studies on subjective utility from working find out that higher levels of education are unambiguously associated with higher levels of satisfaction (Ross and Van Willingen, 1997; Hartog and Oosterbeek, 1998). However, there are several investigations that support the negative effects of perceived over-qualification on job satisfaction dimensions (Johnson and Johnson, 2000; Hartog, 2000). Other studies suggest that over-schooling negatively affects job satisfaction (Warr, 1992; Blanchflower and Oswald, 1992; Clark and Oswald, 1996; Clark 1996). As Hartog (2000) pointed

out the educational mismatches can thus be explained by differences in the shares of complex jobs and skilled workers.

3. Descriptive Analysis and Empirical Specification

3.1. Acquired and Required Competences

The data used in this paper was taken from a major representative survey comparing the situation of graduates from higher education institutions. More than 36,000 graduates holding a first higher education degree from twelve countries were surveyed about four years after graduation (graduates from 1995 were surveyed in 1999). The study, named CHEERS (Careers after Higher Education – A European Research Survey), included graduates from several European countries (Schomburg and Teichler, 2003; Teichler, 2003).

The CHEERS database addressed information with respect to 36 different items representing demands for and supplies of competences. Graduates were asked to indicate on an ordered scale ranking from 1 (not at all) to 5 (to a very high extent), the extent to which they had a given competence at time of graduation (the acquired level of competence) and the extent to which this given competence was required in their current work (the required level of competence). A description of the 36 items is shown in Table 1. The acquired level of competences offers evidence about the graduates' self-assessment on the level of competences built up during one's higher education and the level of competences required offers self-report measures about graduates' immediate job situation. The use of such criteria has the advantage of obtaining information from the closest source to the actual job situation, taking account of all specific circumstances. Nevertheless, compared to the use of grading by job analysts, it lacks uniform instructions and measurements and may produce biased results on several accounts. Also, respondents may be inclined to picture a desired situation (like holding a job requiring higher levels of competence) rather than the true situation. Finally, graduates' judgments about their grading assessment of their jobs were

probably influenced by changes in graduates' work experience from the time of graduation (1995) to the time of the survey (1999). Hence, the required competences may be biased upwards, although this is by no means certain.

Table 1. Descriptive Statistics for Competences (*ordered by largest difference*).

Items	Acquired		Required		Difference
	Mean	Std. Dev.	Mean	Std. Dev.	(acq- req)
Negotiating	2.58	1.05	3.66	1.15	-1.08
Planning, coordinating and organising	3.11	1.05	4.11	0.95	-1.00
Taking responsibilities, decisions	3.38	1.02	4.23	0.88	-0.85
Time management	3.30	1.04	4.14	0.87	-0.84
Computer skills	2.97	1.14	3.80	1.12	-0.83
Working under pressure	3.53	1.08	4.29	0.89	-0.76
Economic reasoning	2.75	1.14	3.50	1.20	-0.75
Leadership	2.83	1.06	3.57	1.14	-0.74
Problem-solving ability	3.62	0.90	4.30	0.79	-0.68
Oral communication skills	3.62	0.99	4.30	0.83	-0.68
Applying rules and regulations	2.95	1.09	3.59	1.12	-0.64
Assertiveness, decisiveness, persistence	3.50	0.99	4.14	0.84	-0.64
Initiative	3.51	0.98	4.11	0.89	-0.60
Working in a team	3.65	1.04	4.19	0.93	-0.54
Understanding complex social, organisational and technical systems	2.79	1.02	3.32	1.17	-0.53
Documenting ideas and information	3.28	1.05	3.81	1.05	-0.53
Accuracy, attention to detail	3.70	0.98	4.14	0.86	-0.44
Reflective thinking, assessing one's own work	3.52	0.94	3.95	0.91	-0.43
Working independently	3.95	0.95	4.33	0.86	-0.38
Adaptability	3.74	0.94	4.11	0.83	-0.37
Creativity	3.38	1.04	3.72	1.09	-0.34
Fitness for work	3.62	1.06	3.90	1.04	-0.28
Getting personally involved	3.79	0.96	4.07	0.92	-0.28
Analytical competencies	3.68	0.91	3.95	0.96	-0.27
Cross-disciplinary thinking/knowledge	3.39	0.88	3.65	1.01	-0.26
Field-specific knowledge of methods	3.41	1.00	3.67	1.14	-0.26
Tolerance, appreciating of different points of view	3.70	0.95	3.96	0.92	-0.26
Loyalty, integrity	3.83	1.05	4.06	0.93	-0.23
Written communication skills	3.85	0.90	4.06	0.96	-0.21
Critical thinking	3.76	0.94	3.90	0.96	-0.14
Power of concentration	3.95	0.85	4.05	0.84	-0.10
Broad general knowledge	3.70	0.82	3.62	1.00	0.08
Manual skills	2.96	1.21	2.88	1.34	0.08
Field-specific theoretical knowledge	3.82	0.93	3.68	1.13	0.14
Learning abilities	4.18	0.76	4.03	0.90	0.15
Foreign language proficiency	3.06	1.11	2.90	1.38	0.16

On average, graduates reported having lower levels of competence than is required for their jobs. Nevertheless, there are five items that received high assessments concerning the list of acquired competences: foreign language proficiency, learning abilities, field-specific theoretical knowledge, manual skills and broad general knowledge. It must be pointed out that there is an apparent surplus of general competences such as learning abilities, field-specific theoretical knowledge and broad general knowledge.

Table 2 indicates for each item the percentages of graduates that declared having surpluses or deficits in the acquired competences. Each individual is classified according to whether he/she reported having a higher level of competence than is required for the job (surplus in competences), lower than is required (deficit in competences), or the same as the required level.

Table 2. Distribution of Graduates According to Match Between Acquired and Required Level of Competences (*rows add 100*).

Items	Similar (%)	Surplus (%)	Deficit (%)
Negotiating	26	9	65
Planning, coordinating and organising	28	7	65
Taking responsibilities, decisions	31	9	60
Time management	33	8	59
Computer skills	32	12	56
Working under pressure	35	10	55
Leadership	32	14	55
Problem-solving ability	38	8	54
Economic reasoning	33	14	53
Oral communication skills	38	9	53
Initiative	37	11	52
Assertiveness, decisiveness, persistence	37	11	52
Documenting ideas and information	36	14	50
Applying rules and regulations	39	13	48
Understanding social, organisational/ technical systems	39	14	47
Working in a team	42	12	46
Reflective thinking, assessing one's own work	42	14	44
Accuracy, attention to detail	43	14	44
Creativity	39	18	42
Field-specific knowledge of methods	36	25	40
Adaptability	47	14	40
Working independently	48	13	39
Cross-disciplinary thinking/knowledge	43	18	38
Tolerance, appreciating of different points of view	44	18	38
Analytical competencies	47	17	37
Fitness for work	47	16	37
Getting personally involved	46	17	37
Written communication skills	44	19	36
Critical thinking	43	22	35
Loyalty, integrity	51	17	32
Field-specific theoretical knowledge	36	35	29
Power of concentration	52	20	28
Foreign language proficiency	37	36	27
Broad general knowledge	47	28	25
Manual skills	48	28	23
Learning abilities	54	27	20

The lowest value of 26 percent of correspondence between acquired and required competences corresponds to negotiating. This competence also identifies the highest deficit rate (65 percent) correspondingly. In other words, negotiating is the ability specified by 26 percent of the graduates as one, which they possess to roughly the extent, as it is required of them. But 65 percent expressed that more of this competence is required. On the opposite side of the list is the competence learning abilities. For this competence, 5 out 10 graduates (54 percent) said that

availability and requirement is almost identical. Rather similar is the positive value for power of concentration (52 percent) and loyalty and integrity competences (51 percent), however 3 out of 10 (32 percent) already found also a deficit. The competence “foreign language proficiency” is interesting: 37 percent had found a relative correspondence, 36 percent a surplus and 27 percent a deficit. Such larger surpluses were found also for field-specific theoretical knowledge (35 percent), broad general knowledge (28 percent), manual skills (28 percent) and learning abilities (27 percent). In order to get on a step in identification of the most important acquired and required competences, a further analysis is carried out in the next section.

3.2. Classification of Competences

Discussions on the relevance of some human capital competences relative to others often emphasize the importance of certain knowledge, skills and abilities to carry out an occupation (Hartog, 2001). Some labour market parties too easily relate the skills needed to function in a job and to achieve a high salary with what initial education should generate. Bishop (1995) strongly advocates that education should focus on occupation-specific skills rather than on general academic skills. Other authors argue that for higher education graduates vocational and academic education in higher education institutions are complements rather than substitutes for higher education graduates who enter the labour market. They found that students, who took four full-year vocational courses and eight full-year academic courses in their final three years, earned substantially more, immediately after graduating, than students who took twelve academic courses (Kang and Bishop, 1989).

Heijke, Meng and Ramaekers (2002) distinguish three groups of competences, those acquired in school which are of direct use in later work, those acquired in school which facilitate acquiring new competences after graduation from school, and those competences acquired mainly in a working context. Kellermann (2003) classifies the competences according to five groups, featuring

an “academic personality”, general-academic (represented through the competence broad general knowledge), scientific-operative (represented through accuracy, attention to detail), personal-professional (represented through field-specific knowledge of methods), social-reflexive (represented through leadership) and physiological-handicraft (represented through manual skills). Bunk (1994) aggregates the competences into four different groups: specialised, methodological, participative and socio-individual. Other classifications are made according to the data availability (Allen and van der Velden, 2001). Thus, there is not a general agreement about classifying competences and economics theory does not already provide a clear classification of competences.

Since competences are connected with a meaningful connotation, we tried to make the data more transparent and to overcome the multicollinearity problem found among the long list of 36 competences available in our sample. For that purpose, we applied a factor analysis to the list of required competences, whereas the individual was more likely to refer to his/her actual job content. Factor analysis provides orthogonal factor scores completely uncorrelated with each other. It does not allow us to attribute cause and effect. It does, however, permit us to classify the competences into main categories. A principal components analysis yielded eight factors with an eigenvalue greater than one (9.47, 1.98, 1.91, 1.45, 1.34, 1.15, 1.08, 1.03). These eight factors accounted for the 53.9 percent of the overall variance (i.e., 26.3 percent, 5.5 percent, 5.3 percent, 4.0 percent, 3.7 percent, 3.2 percent, 2.9 percent and 2.8 percent of the variance, respectively). These percentages represent the proportion of the total unit variance of each item, which is explained by each factor, after allowing for the contributions of the other factors. Loadings on each factor for each item were used to create a factor score individually for all respondents, that is, the 36 item scores for each respondent were reduced to 8 factor scores, and high scores tended to be associated with other high scores. The eight factors were labelled as: participative (F1), methodological (F2), specialised (F3), organisational (F4), applying-rules (F5), physical (F6),

generic (F7) and socio-emotional competences (F8). The sign of the factor scores F4 will be reversed for ease of interpretation (see Table 3).

Table 3. Rotated Factor Matrix for Required Competences

Items	F1	F2	F3	F4	F5	F6	F7	F8
Planning, coordinating and organizing	0.49	0.42	0.03	-0.09	0.19	0.08	0.23	0.10
Negotiating	0.61	0.19	-0.10	-0.10	0.25	-0.04	0.13	0.07
Initiative	0.59	0.15	0.09	-0.21	-0.23	0.08	0.17	0.29
Assertiveness, decisiveness, persistence	0.58	-0.01	0.10	-0.37	-0.03	-0.01	0.13	0.17
Getting personally involved	0.44	-0.09	0.10	-0.32	-0.14	0.02	0.19	0.23
Leadership	0.70	0.13	0.08	0.08	0.05	0.12	0.12	0.19
Taking responsibilities, decisions	0.72	0.01	0.15	-0.14	0.06	0.08	0.13	0.16
Foreign language proficiency	0.06	0.48	-0.01	-0.06	-0.41	0.01	0.09	-0.04
Computer skills	-0.04	0.69	-0.03	-0.16	-0.03	-0.10	0.08	0.05
Understanding social, organisational/ technical systems	0.22	0.59	0.06	0.04	0.13	0.07	0.27	0.05
Economic reasoning	0.42	0.46	-0.06	-0.07	0.32	-0.07	0.05	-0.06
Documenting ideas and information	0.19	0.47	0.20	-0.20	0.01	-0.10	0.24	0.19
Problem-solving ability	0.34	0.41	0.30	-0.31	-0.03	0.01	0.08	0.15
Analytical competencies	0.13	0.47	0.40	-0.29	-0.10	-0.14	0.12	0.17
Field-specific theoretical knowledge	0.03	-0.02	0.84	-0.10	0.08	0.05	0.09	0.00
Field-specific knowledge of methods	0.07	0.06	0.85	-0.06	0.03	0.08	0.05	0.04
Learning abilities	0.02	0.34	0.26	-0.42	-0.11	0.04	0.21	0.29
Working under pressure	0.35	0.28	-0.02	-0.48	0.14	0.21	-0.08	0.07
Accuracy, attention to detail	0.02	0.12	0.13	-0.70	0.17	0.12	0.01	0.11
Time management	0.38	0.15	-0.01	-0.49	0.20	0.01	0.06	0.11
Working independently	0.35	0.07	0.09	-0.45	-0.19	0.25	0.19	-0.16
Power of concentration	0.16	0.08	0.18	-0.67	-0.03	0.03	0.14	0.15
Applying rules and regulations	0.14	0.07	0.21	-0.15	0.70	0.06	0.15	0.11
Creativity	0.33	0.17	0.13	-0.13	-0.36	0.26	0.32	0.22
Fitness for work	0.19	0.00	0.02	-0.31	0.15	0.54	0.22	0.05
Manual skills	0.05	-0.09	0.14	-0.05	-0.02	0.78	0.06	0.16
Broad general knowledge	0.14	0.11	0.05	-0.03	0.05	0.20	0.72	0.06
Cross-disciplinary thinking/knowledge	0.14	0.25	0.15	0.02	0.08	0.13	0.67	0.04
Critical thinking	0.28	0.05	0.26	-0.31	-0.20	-0.05	0.35	0.31
Oral communication skills	0.39	-0.02	0.03	-0.24	0.05	-0.08	0.48	0.21
Written communication skills	0.15	0.17	0.13	-0.36	0.00	-0.21	0.54	0.11
Reflective thinking, assessing one's own work	0.24	0.10	0.27	-0.30	-0.08	0.08	0.30	0.34
Working in a team	0.21	0.25	0.04	-0.02	0.03	0.24	0.02	0.64
Adaptability	0.25	0.08	-0.01	-0.20	0.08	0.14	0.00	0.65
Loyalty, integrity	0.19	-0.13	-0.01	-0.28	0.22	-0.08	0.19	0.45
Tolerance, appreciating of different points of view	0.27	-0.07	0.09	-0.10	0.05	0.02	0.36	0.57

Participative competences are held by those who are able to contribute towards constructing the working environment at their own workplace and beyond, can plan ahead, assume tasks, take decisions and are willing to assume responsibility (Table 4). *Methodological competences* are held by those who are

able to react to problems they are set and to deviations from the norm in a manner that is appropriate, using the procedure expected, who can apply experience gained to find sensible solutions to other problems. *Specialised competences* are held by those who are able to carry out activities and tasks in their field of work in a responsible and competent manner and possess the required knowledge and skills to do so. *Organisational competences* are held by those who are able to work under pressure, with attention to detail and independently (the original factor scores are reversed for ease of interpretation). *Applying-rules competences* refer to applying rules and regulations, and is negative related to creativity. *Physical competences* contain items related with manual skills and fitness for work. *Generic competences* can be defined as those competences that can be applied across a broad range of context. This indicates that the term generic competences includes more than just general knowledge in a strict sense, but also includes critical thinking and oral and written communications skills. *Socio-emotional competences* are held by those who are able to work cooperatively with others and who show team-oriented behaviour and interpersonal understanding.

Table 4. Categories of Competences.

<i>Participative</i>	<i>Methodological</i>
Planning, coordinating and organising Negotiating Initiative Assertiveness, decisiveness, persistence Getting personally involved Leadership Taking responsibilities, decisions	Foreign language proficiency Computers skills Understanding social, organisational/technical systems Economic reasoning Documenting ideas and information Problem-solving ability Analytical competencies
<i>Specialised</i>	<i>Organisational</i>
Field-specific theoretical knowledge Field-specific knowledge of methods	Learning abilities Working under pressure Accuracy, attention to detail Time management Working independently Power of concentration
<i>Applying-rules</i>	<i>Physical</i>
Applying rules and regulations Low requirement of creativity	Fitness for work Manual skills
<i>Generic</i>	<i>Socio-emotional competences</i>
Broad general knowledge Cross-disciplinary thinking/knowledge Critical thinking Oral communications skills Written communications skills	Reflective thinking, assessing one's own work Working in a team Adaptability Loyalty, integrity Tolerance, appreciating of different point of view

In addition to the identification of the most important acquired and required competences, we are in particular interested in the return of human capital competences on the labour market in terms of both graduates' income and job satisfaction. For income, we follow the job-matching theory, expecting more demanding jobs have higher incomes; income premiums for surpluses and income penalties for deficits in competences. For job satisfaction, we perform the same analysis, but we expect different results: working in a job that required a high level of competences has a positive effect on job occupant's satisfaction, but surpluses in competences are an important cause of job dissatisfaction, while the effects of deficits are ambiguous depending of the individual challenge. As mentioned above, we applied factor analysis to the required competences. This yielded eight factors. To define deficits and surpluses, we used the same factor loadings for acquired competences and we calculated the difference. As both acquired and required competences were standardised before applying factor analysis, the resulting differences referred to relative differences.

To analyse the effects of these eight-competence-categories requirements, surpluses and deficits on graduates' income and job satisfaction, we estimated a conventional earning regression for income and an ordered probit regression for job satisfaction. To facilitate a comparison of both effects, two specifications were estimated. First, we assess a model containing indicators of the required level of competences, with control variables personal characteristics, job characteristics, occupational titles, fields of study, dummies for each country and for the distinction between university institutions and other higher education institutions (Model I). Then, in order to ascertain to what extent surpluses and/or deficits in competences have effects on income and job satisfaction, we added indicators of mismatches according to the required competences for the job (Model II).

As job main attributes, we used working hours and the size of firms. As public sector employment, full-time jobs and permanent contracts have specific

characteristics that many people consider desirable, we also included a dummy variable for each of them. The six dummies representing the occupational titles were: legislators, senior officials and managers; professionals; technicians and associate professionals; clerks; service workers and, shop and market workers; skilled agricultural and fishery workers, and elementary occupations.

In addition to the effects of a mismatch between acquired and required level of competences, we also took into account the effects of graduating in a specific field of study. We used dummies for eight different fields of study: Education, Humanities, Social Sciences, Law, Natural Sciences, Mathematics, Medical Sciences and Engineering. Personal characteristics such as age and gender were also included as control variables.

We made the distinction between university institutions and other higher education institutions to test possible differences between the effects of both types of institutions on the career of graduates. For a more detailed analysis, we also used dummies for each European country included in our sample: Italy, Spain, France, Germany, Austria, The Netherlands, United Kingdom, Finland, Sweden, Norway and the Czech Republic. Descriptive statistics for all these variables are reported in Table 5.

Table 5. Descriptive Statistics.

<i>Variable</i>	Mean	Std. Dev.	Min.	Max.
Female	0.50	0.50	0	1
Age	29.14	2.42	26	35
Hours worked per week	37.20	7.33	10	60
Private sector	0.70	0.46	0	1
Size firm: small	0.22	0.41	0	1
Full-time job	0.89	0.31	0	1
Permanent contract	0.78	0.42	0	1
Legislators, senior official and managers	0.09	0.28	0	1
Professionals	0.54	0.50	0	1
Technicians and associate professionals	0.15	0.36	0	1
Clerks	0.03	0.18	0	1
Service workers	0.01	0.10	0	1
Elementary workers	0.18	0.11	0	1
Education	0.05	0.23	0	1
Humanities	0.12	0.33	0	1
Social Sciences	0.31	0.46	0	1
Law	0.07	0.26	0	1
Natural Sciences	0.09	0.29	0	1
Mathematics	0.06	0.23	0	1
Medical Sciences	0.08	0.27	0	1
Engineering	0.22	0.41	0	1
Universities	0.76	0.42	0	1

4. Estimation Results

4.1. *Effects of Competences on Income*

Table 6 shows the results for a conventional earning regression (natural logarithm of income). Model I shows that 39 percent of the income differences can be explained by the variables in the model. This seems low, but one should bear in mind the relative homogeneity of the group in terms of basic human capital aspects. There were in fact differences among the competence-categories considered. We observe that participative and methodological competences seemed to be much more important than the rest of competences in order to explain income differences. One standard deviation increase in the required level of participative competences yielded an income increase of some 6 percent and a similar increase in the required level of methodological competences yielded an income increase of some 5 percent. Generic and socio-emotional competences had a similar and smaller effect on income increase. With respect to specialised competences, the income analysis shows that the required level does not have a

significant effect. This latter result must be carefully interpreted, due to the fact that we included in our analysis occupational titles as control variables. A separate analysis (not shown here) without considering occupational titles showed a significant positive effect of specialized competences on income. Therefore, the analysis shown in Table 6 indicates the effect of specialised competences on job performance is mediated by the type of jobs. On the other hand, applying-rules and physical competences had a negative effect on income. In the case of physical competences, one is tempted to guess that jobs that required manual skills and fitness for work were not typical graduates' jobs and consequently salaries were lower. Similarly, jobs that required rigid application of rules and a low level of creativity were also more likely to be found at a lower level. Finally, organisational competences had a negative effect. This might indicate that these competences are not rewarded in the first years of their professional careers.

In Model II, indicators of competences mismatches were added to the earning equation. This slightly improves the model fit, resulting in an adjusted R-squared of 0.40. We observe that some competences increase their weight like methodological competences, and others decrease their weight such as generic and socio-emotional competences.

About the effect of the mismatches, there was a significant positive effect of surpluses in methodological competences, which confirms the prediction that methodological competence pay off even when they were not required. The predicted negative effect of deficits in this competence was also observed. However, the predictions of assignment theory and the results obtained in earlier research, where the effects of surpluses in competences are considerably greater than those for deficits, were not confirmed in our results. Each additional standard deviation surplus in methodological competences yielded an income increase of some 1 percent. Each additional standard deviation deficit in methodological competences led to a decrease in income of 3 percent.

Table 6. OLS Parameter Estimates for Annual Gross Income. European Countries.

	Model I		Model II	
	Coeff.	t-values	Coeff.	t-values
<i>Competences Required</i>				
Participative	0.058***	19.125	0.057***	14.084
Methodological	0.049***	15.334	0.063***	15.351
Specialised	0.002	0.742	-0.007*	-1.715
Organisational	-0.010***	-3.176	-0.008**	-2.048
Applying-rules	-0.012***	-3.978	-0.025***	-6.344
Physical	-0.036***	-11.096	-0.038***	-9.579
Generic	0.013***	4.312	-0.003	-0.622
Socio-emotional	0.010***	3.246	0.001	0.205
<i>Surplus of Competences</i>				
Participative	--	--	0.006	1.078
Methodological	--	--	0.012**	2.170
Specialised	--	--	-0.019***	-3.680
Organisational	--	--	0.003	0.619
Applying-rules	--	--	-0.019***	-3.211
Physical	--	--	-0.009*	-1.663
Generic	--	--	-0.020***	-3.907
Socio-emotional	--	--	-0.020***	-3.875
<i>Deficit of Competences</i>				
Participative	--	--	0.006	1.406
Methodological	--	--	-0.034***	-5.843
Specialised	--	--	-0.004	-0.776
Organisational	--	--	0.004	0.865
Applying-rules	--	--	0.021***	4.148
Physical	--	--	-0.006	-0.971
Generic	--	--	0.017***	3.130
Socio-emotional	--	--	0.005	0.981
<i>Personal Characteristics</i>				
Female	-0.064***	-10.786	-0.063***	-10.483
Age	0.012***	8.116	0.012***	8.193
<i>Job Characteristics</i>				
Hours worked per week	0.259***	19.021	0.258***	18.985
Private sector	0.071***	10.743	0.070***	10.528
Small firm	-0.145***	-20.734	-0.143***	-20.583
Full-time job	0.261***	22.521	0.261***	22.484
Permanent contract	0.127***	17.290	0.126***	17.219
<i>Occupational titles</i>				
Legislators, senior official and managers (ref. Elementary occupations)	0.190***	16.446	0.184***	15.921
Professionals	0.139***	16.282	0.137***	15.970
Technicians and associate professionals	0.088***	8.318	0.088***	8.277
Clerks	-0.012	-0.832	-0.014	-0.951
Service workers	-0.014	-0.582	-0.011	-0.488
<i>Field of Studies</i>				
Education (ref. Engineering)	-0.074***	-5.378	-0.063***	-4.536
Humanities	-0.128***	-12.220	-0.120***	-11.240
Social Sciences	-0.038***	-4.705	-0.033***	-4.019
Law	-0.108***	-8.732	-0.091***	-7.206
Natural Sciences	-0.084***	-7.663	-0.078***	-7.089
Mathematics	0.086***	6.590	0.078***	5.978
Medical Sciences	0.067***	5.495	0.081***	6.564
<i>Universities vs. H.E. Institutions</i>				
Intercept	1.687***	26.573	1.707***	26.671
<i>Observations</i>	24,414		24,414	
<i>Adjusted R-squared</i>	0.39		0.40	

* Significant at 10% level; ** significant at 5% level; *** significant at 1% level (effects of country dummies not shown).

Other results were contrary to what we would expect on the basis of assignment theory – wages premiums for surplus and wage penalties for deficit in competences. Having a higher level of specialised, applying-rules, generic and socio-emotional competences than the job required had a negative effect on income. This is likely to be the result of the presence of strong deficits in other competences not considered in our analysis, e.g. extra-curricula competences, and these deficits in unmeasured competences were highly correlated with surpluses in measured competences. Especially in the case of specialized competences this might be a valid explanation of the negative effect of a surplus. If someone works in a job outside his/her field of study, then he/she will experience a surplus of specialised competences and a deficit of the competences needed in this other area of work. If these other competences are not measured, then the surplus of specialised competences will show a negative sign. On the other hand, surpluses and deficits in participative and organisational competences appeared to have no effect at all on income.

Similar results were found for the rest of the key variables considered in both Model I and Model II. Consistent with other work in this area, we found that female graduates earned less than their male counterparts, and that age (capturing work experience) had a positive effect. On the other hand, those working in a private sector, or with permanent contracts earned more compared to those working in public sectors or with temporary contracts. Positive effects were also found in full-time jobs and in the number of hours worked, and a negative effect for those working in small firms.

With respect to occupational titles, both models provide evidence suggesting that individuals working in more demanding jobs had higher incomes. Legislators, senior officials, managers, professionals, technicians and associate professionals earned more than their counterparts at elementary occupations. When we explore the segmentation of the different educational fields, we note that graduates in Education, Humanities, Social Science, Law and Natural Sciences

earned less with respect to the reference category (Engineering). However, Mathematics (data processing and computer specialists included) and Medical Sciences graduates earned more. One is tempted to guess that there was a high likelihood for those graduates from Mathematics, Medical Sciences and Engineering to work inside their own educational domain and therefore, they benefited from a income premium (due to their adequate competence match). Finally, having followed university education rather than other higher education institutions yielded an increase in income of around 3 percent.

4.2. Effects of Competences on Job Satisfaction

The effects of competences mismatches on job satisfaction are shown in Table 7. To reflect the ordinal character of answers on job satisfaction, we used the ordered probit model. Maximum-likelihood estimation of the models was carried out using the Newton-Raphson algorithm based on second derivatives (Green, 1997). To facilitate a comparison of income effects, the same set of independent variables has been included. Annual gross income itself has also been included as an additional control variable.

Model I shows that job satisfaction was strongly influenced by the required level of competences. We observe that a high requirement in generic, participative, specialised, organisational and socio-emotional competences have a positive effect on job satisfaction. However, the opposite effect was found for applying-rules competences.

As before, Model II includes the indicators of mismatches in competences. Again, the accurate match between competences acquired and competences required in the job, raised job satisfaction significantly. As we expected, graduates who reported a surplus of competences were dissatisfied compared to those with the right competences for the job. The exception was surplus in methodological (that also provided higher income) and organisational competences. This means that those who were more than able to react to problems they were set and to deviations from the norm in a manner that was appropriate, using the procedure expected, who could apply experience gained to find sensible solutions to other problems were more satisfied than if they felt that their competences just matched their jobs. In addition, with respect organisational competences, it could be said those graduates who were well-able to contribute towards constructing the working environment at their own workplace and beyond, can plan ahead, assume organisational tasks, take decision and be willing to assume responsibility were more satisfied than if they felt that their competences just matched their jobs. On the other hand, deficits in applying-rules competences generate dissatisfaction, but deficits in specialised, organisational, generic and socio-emotional competences increase satisfaction, probably due to the fact that these deficits were viewed as personal challenge.

With respect to the rest of the control variables, we found similar results in both models. As conventional literature predicted, there was a negative effect from age (Clark et al., 1996). As one might expect, income had quite a strong effect on job satisfaction, and graduates working in a small firm and holding a permanent contract were also more satisfied. Public sector workers were more satisfied than private sector ones.

With respect to occupational titles, both models provide evidence that individuals working in a more complex job were more satisfied. Legislators, senior officials, managers, professionals, technicians and associate professionals were more satisfied than their counterparts in elementary occupations. It could be said that higher-level jobs tend to be more complex and have better working conditions, pay, promotion prospects, supervision, autonomy and responsibility, and all these characteristics are associated with job satisfaction.

On the other hand, graduates in Humanities, Social Sciences and Law were less satisfied in their jobs with respect to the reference category (Engineering). Mathematics graduates were the most satisfied in their jobs. Finally, having followed university education rather than other higher education institutions increased the level of job satisfaction.

Table 7. Ordered Probit Estimates for Job Satisfaction. European countries.

	Model I		Model II	
	Coeff.	Sig.	Coeff.	Sig.
<i>Competences Required</i>				
Participative	0.169***	21.609	0.166***	15.901
Methodological	0.058***	7.072	0.075***	7.072
Specialised	0.153***	19.192	0.133***	12.030
Organisational	0.105***	13.303	0.096***	9.860
Applying-rules	-0.093***	-11.576	-0.072***	-7.089
Physical	0.017**	2.077	0.003	0.282
Generic	0.193***	24.366	0.129***	12.451
Socio-emotional	0.127***	15.851	0.102***	10.094
<i>Surplus of Competences</i>				
Participative	--	--	-0.015	-1.094
Methodological	--	--	0.039***	2.709
Specialised	--	--	-0.009	-0.678
Organisational	--	--	0.025*	1.911
Applying-rules	--	--	0.008	0.493
Physical	--	--	-0.032**	-2.280
Generic	--	--	-0.101***	-7.843
Socio-emotional	--	--	-0.036***	-2.665
<i>Deficit of Competences</i>				
Participative	--	--	-0.011	-0.956
Methodological	--	--	-0.001	-0.035
Specialised	--	--	0.038***	3.165
Organisational	--	--	0.060***	4.540
Applying-rules	--	--	-0.033***	-2.602
Physical	--	--	0.004	0.252
Generic	--	--	0.040***	2.759
Socio-emotional	--	--	0.026**	2.068
<i>Personal Characteristics</i>				
Female	-0.003	-0.210	-0.009	-0.585
Age	-0.038***	-10.259	-0.037***	-9.936
<i>Job Characteristics</i>				
Annual gross income	0.331***	20.167	0.325***	19.744
Hours worked per week	0.045	1.294	0.051	1.443
Private sector	-0.172***	-10.142	-0.170***	-9.934
Small firm	0.094***	5.235	0.093***	5.150
Full-time job	0.026	0.860	0.023	0.763
Permanent contract	0.125***	6.650	0.120***	6.394
<i>Occupational titles</i>				
Legislators, senior official and managers (ref. Elementary occupations)	0.176***	5.947	0.173***	5.804
Professionals	0.212***	9.682	0.211***	9.583
Technicians and associate professionals	0.134***	4.945	0.136***	5.024
Clerks	-0.075**	-1.977	-0.081**	-2.123
Service workers	0.023	0.396	0.020	0.332
<i>Field of Studies</i>				
Education (ref. Engineering)	-0.033	-0.924	-0.014	-0.392
Humanities	-0.112***	-4.180	-0.068***	-2.497
Social Sciences	-0.056***	-2.701	-0.061***	-2.866
Law	-0.096***	-3.034	-0.095***	-2.936
Natural Sciences	0.005	0.183	0.016	0.553
Mathematics	0.139***	4.142	0.121***	3.599
Medical Sciences	-0.044	-1.410	-0.034	-1.089
<i>Universities vs. H.E. Institutions</i>	0.090***	5.088	0.100***	5.618
<i>Observations</i>	24,414		24,414	
<i>LR $\chi^2(39)$; LR $\chi^2(55)$</i>	4,178.40		4,339.65	
<i>Log likelihood</i>	-30,991.35		-30,910.73	

* Significant at 10% level; ** significant at 5% level; *** significant at 1% level (effects of country dummies not shown).

5. Conclusions

In this chapter we have analysed the relationship between the payoffs of the required, surplus and deficit human capital competences in terms of both graduates' income (monetary payoff) and job satisfaction (non-monetary payoff). In assignment theory the two concepts educational and competences mismatches are assumed to be closely related: educational mismatches imply competences mismatches, which in turn have an effect on income. Due to the fact that all individuals, in our sample, had completed higher education, we analysed the incidence of different human capital competences in graduates' payoffs. Surpluses and deficits in competences were measured asking graduates to evaluate the job they held in terms of the level of competences they thought was required to perform adequately compared to their own acquired level.

Eight different categories of competences were explored, namely participative, methodological, specialised, organisational, applying-rules, physical, generic and socio-emotional competences to give a more detailed analysis of the different roles and payoffs of the competences in the labour market. Other variables such as personal characteristics, job characteristics, occupational titles, field of study and the distinction of graduates from university institutions versus those from other higher education institutions have also been considered. Control variables for the eleven European countries of our sample were also taken into account.

The results provide strong support for the assumption that the match between individual human capital competences and the characteristics of the job matters. Employers often forced to base wages on easily observable characteristics of jobs, rather than on individual performance. From such a perspective, based on the so-called assignment theory where education mismatches imply competences mismatches, the observed income differences could be accounted for by the fact that both the formal education of employees and the required education for the job are frequently incorporated in income scales as determined in collective

bargaining agreements. The differences may not reflect individual differences in productivity, but rather the value assigned to education and job categories in such agreements. Therefore, it could be said that the level of competences required in a job does not only state the total amount of graduates' earnings.

Our findings about income rewards suggest that those jobs with higher requirement of participative and methodological competences were the best paid. On the contrary, jobs with higher requirements of organisational, applying-rules and physical competences were the worst paid. The explanation for the case of physical competences is evident: they are under-qualified jobs. With respect to specialised competences, it is ironic, though not surprising, that jobs where specialised competences (that is, field specific knowledge) were highly required but not better paid. It is likely that these are more traditional jobs, in many cases in the public sector, having lower salaries at least at the beginning of the career. In summary, we observe that the monetary award of jobs depended more on competences related to the capacity of the individual to manage a complex situation with leadership and personal involvement than to the specific knowledge needed in the jobs. Attitudes towards work (instead of knowledge) were the most awarded characteristics in the labour market for young graduates.

In addition, analysing competences mismatches, we found that the surplus of methodological competences had a positive effect on income and the deficit of these competences had a negative effect. This was the only competence that seemed to behave as predicted by the assignment theory – wages premiums for surpluses and wage penalties for deficits in competences. The rest of the competences had a different and non-systematic behaviour. Specially significant was the case of generic competences: a surplus was penalised and a deficit awarded. One explanation could be that the assignment theory is not true for competences (all or part of them). Another possibility is that, because we were analysing jobs occupied for recent graduates, salaries were more related to the job itself than to the real performance of individuals. This would explain that the

results for the required competences were the expected, but results for mismatches were erratic. Another alternative explanation could be that our operationalisation of competences mismatches was inadequate. Improving this type of analysis of competences with better data and measures is clearly an important aim for future research.

Our results relating to job satisfaction shed light on the statement that working in a job that required a high level of competences had a positive effect on the job occupant's satisfaction. Nevertheless, this was not true for all types of competences, the exception being applying-rules competences. Competences surplus were an important cause of job dissatisfaction, the exception being the methodological and organisational competences. Deficits in specialised and generic competences apparently produce satisfaction. This is probably due to the type of jobs where these competences are more required (scientists, medicine and so on), or probably due to the personal challenge.

Finally, consistently with earlier work in this area, we found that female graduates earn less, but they were as satisfied as their male counterparts on their jobs. In addition, European young graduates earn more with permanent and full-time jobs in the private sector and large firms, although they preferred public sector and small firms. Nevertheless, a good salary was the capital factor for increasing job satisfaction. Higher-level jobs were related to both high-income and high-level of satisfaction. Fields such as Mathematics, Engineering and Medical Sciences generated high incomes and job satisfaction. Having followed university education rather than other higher education institutions increase both income and job satisfaction.

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