



**Repositorio Institucional de la Universidad Autónoma de Madrid**

<https://repositorio.uam.es>

Esta es la **versión de autor** del artículo publicado en:

This is an **author produced version** of a paper published in:

Economics of Education Review 62 (2018): 16-34

**DOI:** <http://doi.org/10.1016/j.econedurev.2017.10.006>

**Copyright:** © 2017 Elsevier Ltd. All rights reserved

El acceso a la versión del editor puede requerir la suscripción del recurso

Access to the published version may require subscription

# Competencies, occupational status, and earnings among European university graduates

Maite Blázquez <sup>(\*)</sup>

Ainhoa Herrarte <sup>(\*\*)</sup>

Raquel Llorente-Heras <sup>(\*\*\*)</sup>

Universidad Autónoma de Madrid

## Abstract

While the effect of education and experience on labour market outcomes has been widely studied, the literature that analyses the influence of human capital competencies (talents, skills, and capabilities) is still relatively scarce. Using cross-sectional data from the REFLEX Project, we investigate the effect of personal competencies (both cognitive and non-cognitive) on two labour market outcomes among European university graduates: occupational status and earnings. Our estimates suggest that individuals endowed with a higher level of competencies are more likely to occupy managerial and professional positions and, to a lesser extent, technician jobs. Additionally, they also receive higher wages, but the relation is only significant for men. When we distinguish competencies according to their cognitive or non-cognitive nature, we find that only the latter are significant in explaining occupational status. In contrast, cognitive competencies are more related with wages. As regards the role of specific competencies, our findings suggest that leadership is the most relevant competence for the occupational status of males, especially in managerial positions. In contrast, initiative and enterprise abilities seem to be the most relevant skills for women in such positions. Intelligence produces the highest rewards in terms of earnings among the male subsample, while none of the competencies exerts a significant impact on females' wages.

**Keywords:** competencies, cognitive skills, non-cognitive skills, university graduates, occupational status, wages.

**JEL classification:** I23, J24, J31

(\*) Department of Economic Analysis: Economic Theory and History. Universidad Autónoma de Madrid. Cantoblanco, Madrid 28049 (Spain). email: [maite.blazquez@uam.es](mailto:maite.blazquez@uam.es) . Tel: +34 91 497 29 74

(\*\*) (Corresponding author). Department of Economic Analysis: Economic Theory and History. Universidad Autónoma de Madrid. Cantoblanco, Madrid 28049 (Spain). email: [ainhoa.herrarte@uam.es](mailto:ainhoa.herrarte@uam.es) . Tel: +34 91 497 39 06

(\*\*\*) Department of Economic Analysis: Economic Theory and History. Universidad Autónoma de Madrid. Cantoblanco, Madrid 28049 (Spain). email: [raquel.llorente@uam.es](mailto:raquel.llorente@uam.es) . Tel: +34 91 497 29 61

## 1. Introduction

Traditionally, the effect of human capital on labour market outcomes has been analysed focusing on its quantitative notion: years of formal education and labour market experience. A common finding of the human capital literature refers to the positive returns to education and labour market experience. More educated people, as well as individuals with longer labour market experience, tend to occupy the best jobs<sup>1</sup> (i.e. high-skilled occupations, higher levels of responsibility, higher wages, etc.) and have, in general, higher levels of job satisfaction (García-Aracil and van der Velden, 2008; Verhofstadt et al., 2007; Kucel and Vilalta-Bufí, 2013).

Following the development of the “knowledge-based society”, labour markets are much more complex than in the past. As a result, education has become an incomplete indicator of the stock of human capital insofar as individuals with the same level of education display strong heterogeneity in skills. Apart from education, today’s societies require high levels of specific skills and abilities that allow individuals to adapt to a changing society and perform new tasks. Educational attainment as such may be important, but the driving mechanism behind the effect of education on economic and social characteristics operates through the skills and competencies that these educational qualifications represent (van der Velden, 2013; Hanushek and Woessmann, 2011). In this respect, competencies have gained a relevant position in the analysis of labour market outcomes, as well as in other aspects of life, such as academic performance, risk behaviour, human behaviour, and others (see Heckman et al., 2006). Individuals endowed with specific competencies are highly valued by employers. In particular, leadership skills, the ability to communicate ideas, or the ability to coordinate activities, among many others, could produce differences in workers’ labour outcomes (Mueser, 1979; Kuhn and Weinberger, 2005; Borghans et al., 2008; Salas, 2014).

Specifically, competencies among higher education graduates have received much attention in recent years in both the economics and educational literature (Hartog, 1992, García-Aracil et al., 2004; Allen et al., 2009; Heijke et al., 2003; McGuinness and Sloane, 2011; Cainarca and Sgobbi, 2012, García-Aracil, 2014; McGuinness and Byrne, 2014; Sánchez-Sánchez and McGuinness, 2015; Sgobbi and Suleman, 2013; Vila et al., 2014). This interest stems from the fact that the transition from university to work has become a pivotal phase in graduates’ lives, and it is important to know which competencies will enable them to take advantage of promising job opportunities from both the perspective of the individual and the viewpoint of education policy. In this respect, one of the aims of the Bologna process in creating the European Higher Education Area was the development of specific competencies that allow graduates to improve their employability. This feature has led to

---

<sup>1</sup> See, among many others, ILO (2013), OECD (2012), Murillo et al. (2012), Goos et al. (2009), Bauer (2002), Mora et al. (2000).

significant reforms in the structure of university degrees and to the development of quality assurance systems in an attempt to improve the labour market integration of school leavers in the European Union. Besides their positive effect in the school-to-work transition process, competencies are also likely to influence the future career prospects of workers by increasing productivity and job stability (see García-Aracil et al., 2004).

Many papers in the literature have focused on analysing which types of skills/competencies exert a major influence on the employability of graduates and those that produce higher rewards in terms of earnings. As regards graduates' employability, the literature is controversial about which types of skills have the highest impact on the likelihood of getting a job. Some authors emphasise the role of skills that are transferable across jobs, such as problem-solving skills, interpersonal skills, and the ability to learn (Biesma et al., 2007; Teijeiro et al., 2013), while others point to the importance of occupation-specific technical skills (Mason, 1999; Heijke et al., 2003). A recent work of Humburg and van der Velden (2015) has shown that both types play a role. There is also mixed evidence regarding the wage returns of competencies among graduates. In some cases, technical skills are found to bring the highest rewards for graduates (see Kelly et al., 2010, for the case of Ireland), while other studies point to transferable skills, such as problem-solving and communication, as the most relevant for graduates' earnings (Felstead et al., 2007).

A few papers have also examined the influence of competencies on occupational status among graduates (Heijke et al., 2003; Allen et al., 2009). To the best of our knowledge, however, none of these studies differentiate between cognitive and non-cognitive skills. This paper tries to fill this gap and to contribute to this line of the literature. In particular, the contribution is threefold. First, we analyse to what extent competencies enable graduates to get jobs as managers, professionals, or technicians,<sup>2</sup> and whether differences are observed between cognitive and non-cognitive skills. In this sense, we attempt to address questions such as: Do cognitive (non-cognitive) skills increase the probability of getting managerial (professional/technician) occupations among graduates in Europe? Second, we will examine whether the returns on these three occupations differ depending on the competencies endowment of graduates. In this respect, we attempt to contribute to a better understanding of wage formation among graduates by addressing questions like: Do cognitive (non-cognitive) skills lead to higher wage differentials when the individual is employed in managerial (professional/technician) occupations? Finally, insofar as there may be gender differences regarding

---

<sup>2</sup> John and Thomsen (2014) highlighted that managers and professionals mostly require a university degree, while technicians correspond to the highest form of non-academic training. Other authors, such as Allen et al. (2009), argue that technicians and associate professionals lie on the margins of what could be regarded as the occupational domain of higher education graduates. As a non-negligible percentage of higher education graduates finally end up working as technicians and associate professionals, we also consider the relationship between competencies and these kind of occupations.

occupational status and earnings, we carry out separate estimations for males and females. This allows us to address questions like: Do higher scores in cognitive (non-cognitive) skills increase the likelihood of getting managerial (professional/technicians) occupations among males (females). Is there evidence of some type of gender differences as regards the returns of cognitive (non-cognitive) skills in high-skilled occupations?

The results derived from this analysis might be of special relevance for the design of higher education programmes intended to provide graduates with those competencies that are more highly valued by society and that lead to the most successful labour market entry. Better knowledge of which competencies allow graduates to get a good match in the labour market would be particularly important in the context of the debate about whether university studies should produce “generalists” or “specialists” (van der Velden, 2013). In this sense, our findings would, for instance, help educational institutions to identify the competencies that are most demanded by employers and produce the highest rewards in terms of wages. Moreover, insofar as there is evidence of gender differences regarding the association between competencies and labour market outcomes, such differences should be taken into consideration by policymakers in an attempt to improve gender equality in the labour market.

For the purposes of the paper, we use the REFLEX database, which is a large survey conducted among higher education graduates who earned their degree in 1999/2000. The survey was conducted five years after graduation and includes information about the labour market situation of graduates at that time, as well as retrospective information on their labour market trajectories. It also contains self-assessment information on 19 competencies, which we have categorised into cognitive and non-cognitive skills. For the former we use the well-known Bloom’s Taxonomy (Bloom et al., 1956; Bloom et al., 1964), while we follow the approach of Morrison and Schoon (2013) to identify the non-cognitive skills.

Finally, it is important to note that the effect of graduates’ competencies on labour market outcomes is a contested matter. An important concern is reverse causality (Heineck and Anger, 2010; Bowles et al., 2001). On the one hand, people with higher skills tend to have higher educational attainment and hence higher productivity and higher wages, and are more likely to occupy high-skilled jobs; but on the other hand, attitudes and personality traits may also be influenced by the size of the reward a worker receives (Semykina and Linz, 2007; Goldsmith et al., 2000). The fact that competencies are measured five years after graduation in our data makes reverse causation a potential problem that should be taken into account, as it is likely that part of the skills the graduates had at the time of the interview were acquired on the job. There have been few attempts in the literature to trace the links in the chain of causation. Outside the laboratory, however, it is very difficult to find an exogenous source of variation in individuals’ competencies that is unrelated to

changes in labour market outcomes. One possibility would be to rely on individual fixed effects estimations in order to control for unobserved factors that are likely to co-determine both the dependent and the explanatory variables. Nonetheless, this would require the availability of longitudinal data. Furthermore, an important limitation of this methodology is that the fixed effects estimates would be based exclusively on within-group variations in the variables of interest. Instrumental variables are an alternative road. Unfortunately, this road is also closed to us due to the lack of valid instruments.<sup>3</sup> All in all, our results do not necessarily imply a causal interpretation of the effects of competencies on labour market outcomes, since we cannot preclude the possibility that the causality may run in the opposite direction. Therefore, we have opted for a conservative description of the results.

The main findings of the paper can be summarised as follows. First, graduates scoring high in cognitive and non-cognitive skills end up in managerial, professional and technician positions more easily than those endowed with low levels of such skills. There is also some evidence of a relationship between graduates' competencies and their earnings five years after graduation. Second, occupational status appears to be more related with non-cognitive skills for both males and females, while cognitive skills are more relevant for graduates' earnings, especially among males. Third, although the factor structure of the competencies is quite similar for both males and females, we observe some gender differences when looking at the role of specific competencies on graduates' labour market outcomes. Particularly, of the nine factors identified, leadership is the most related to the occupational status of males and is especially important for managerial positions. In contrast, initiative and enterprise abilities seem to be the most relevant skills for women in these positions. Finally, intelligence produces the highest rewards in terms of earnings among the male subsample, while none of the competencies exerts a significant impact on females' wages.

The paper is organised as follows. The next section contains a review of the economic literature on the relationship between competencies and labour market outcomes. The database and the descriptive analysis are presented in section 3. Section 4 shows the econometric procedure and the main results. Finally, section 5 concludes.

---

<sup>3</sup> As Heckman et al. (2006) noted, another source of reverse causality could arise if the measures of cognitive and non-cognitive skills were influenced by the schooling level at the date of the interview. They concluded that the positive relationship between non-cognitive skills and labour market success still holds when accounting for the bidirectional relationship between skills and education. In our case, this source of endogeneity does not apply since our analysis focuses on graduates.

## 2. Competencies and labour market outcomes: related literature

Evaluating the impact of competencies has become a growing field of interest among labour economists.<sup>4</sup> Studies on this topic can be classified into two main groups. The first group examines the relationship between labour market outcomes and skills depending on their cognitive or non-cognitive nature. A second group focuses on specific competencies regardless of whether they are cognitive or non-cognitive.

In the first type of studies, cognitive skills are defined as conceptual and intellectual skills such as intelligence, knowledge, analytical thinking, mathematics, and reading, among others. Non-cognitive skills comprise many aspects related to specific aptitudes (interpersonal skills, communication skills, social skills, leadership, etc.) as well as personality traits (motivation, perseverance, self-control and self-confidence, charm, etc.). While cognitive skills can be measured by objective tests (IQ and other standardised achievement test scores), non-cognitive skills are much harder to measure and are usually analysed by means of self-reported information. For that reason, most studies have mainly focused on cognitive skills with the general finding that higher levels of these skills are associated with better labour market outcomes such as lower unemployment, higher wages, high-skilled jobs, and others (see, for example, Hansen, 2010; Vignoles et al., 2011; Cameron and Heckman, 1993; Zax and Rees, 2002; and Cawley et al., 2001).

Complementarily, there is a growing literature in labour economics that is conducting pioneering research in order to better understand the effects of non-cognitive skills, especially personality traits, on labour market outcomes once controlling for cognitive ability (Osborne Groves, 2005; Heckman et al., 2006; Mueller and Plug, 2006; Heineck and Anger, 2010).<sup>5</sup> This is motivated by the fact that some personality traits, such as sociability, extraversion, persistence, self-control, responsibility, openness to new experiences, creativity, and flexibility, are linked to greater employability and more successful careers (Costa et al., 1991; Judge et al., 1999 and Heckman and Kautz, 2012). In this line, Heckman et al. (2006) found that skills such as motivation, persistence, and self-confidence are essential in the workplace. Using the German Socio-Economic Panel Study, Heineck and Anger (2010) provided evidence of heterogeneous effects of personality traits on earnings in Germany, but a clear negative impact of external locus of control on the wages of male and female workers.

Using Swedish longitudinal data, Zetterberg (2005) showed that relative self-esteem is positively correlated with earnings, but the returns are much lower when accounting for individuals' intelligence, family background, and age. Osborne Groves (2005) combined the information of the

---

<sup>4</sup> Although some authors make a distinction between skills and competencies (see, for example, van der Velden, 2013), we follow the majority of the economic literature that uses both terms indistinctly.

<sup>5</sup> The personality literature often uses the so-called 'Five Factor Model' with 5 dimensions (extraversion, agreeableness, conscientiousness, neuroticism, and openness) to study the effects of personality traits on individual behaviour (McCrae and John, 1992; John and Srivastava, 1999; Funder, 2001).

National Longitudinal Survey of Young Women and the National Child Development Study to provide evidence that traits such as locus of control, aggression, and withdrawal are all statistically significant factors in the wage determination of white women, after controlling for cognitive skills. Similarly, Mueller and Plug (2006) analysed the impact of personality on earnings of American high school graduates. The authors found negative returns to agreeableness and neuroticism for men, positive returns to conscientiousness for women, and positive returns to openness for both. Based on British and German data, Borghans et al. (2008) provided further evidence of positive wage effects of interpersonal skills, once accounting for cognitive skills.

The second large group of studies examines the labour market effects of specific competencies regardless of whether they are cognitive or non-cognitive. Most of these studies, which are based on ad hoc survey data, focus on tertiary education graduates. The most relevant ones are the CHEERS Study (Careers after Higher Education – A European Research Survey) and the subsequent REFLEX project (Research into Employment and Professional Flexibility) and the HEGESCO project (Higher Education as a Generator of Strategic Competencies). Using the CHEERS Study, García-Aracil and van der Velden (2008) explored the incidence of different competencies in graduates' payoffs in terms of both income and job satisfaction. They found a positive relationship between wages and participative and methodological competencies. In addition, in line with Allen and van der Velden (2001), they observed that higher requirements in terms of competencies increase graduates' job satisfaction. Sánchez-Sánchez and McGuinness (2015) also analysed the effect of competencies on job satisfaction and wages using the REFLEX database. They found that overskilling in the areas of non-specialist knowledge, analytical ability, knowledge acquisition, alertness to opportunities, idea creation, and language skills all reduced job satisfaction, while surplus skills in time management and the ability to work under pressure raised satisfaction levels. In addition, they observed that overskilling in the areas of non-specialist knowledge and presentation skills resulted in slight wage premiums, while an inability to fully utilise writing skills lowered earnings.

Apart from these international studies, a number of works also provide evidence of non-negligible effects of competencies on graduates' labour market outcomes at the national level. In Ireland, Kelly et al. (2010) found that technical skills generate the highest wage returns (around 4%), while other skills, such as communication, team skills, or leadership skills do not have an effect on graduates' earnings. In contrast, other works have highlighted skills that are transferable across jobs as being the most important determinants of graduates' earnings. For instance, for the UK, Felstead et al. (2007) found that problem-solving, communication, and persuasion skills are rewarded over and above the premium of education and training. Sgobbi and Suleman (2013) analysed data from a survey among retail bankers in Portugal to test the impact of 22 job-specific skills on wages. They



found that the range and the quality of provided skills significantly affect earnings in the Portuguese banking industry.

Although wages and job satisfaction have been the most frequently analysed issues, some studies have focused on other labour market outcomes such as employment probabilities and the types of positions occupied by tertiary education graduates. With respect to the former, there is no consensus among researchers about which types of skills are the most valued by employers. Some authors emphasise the importance of skills that are transferable across jobs, such as problem-solving skills, interpersonal skills, and the ability to learn. For instance, Biesma et al. (2007) found that problem-solving skills, creativity, and interpersonal skills are more important than flexibility and public health knowledge for employability among Dutch master-level graduates in the field of public health. Using a specific survey conducted among Spanish university graduates and firms, Teijeiro et al. (2013) showed that only the proximity of systemic skills, such as the ability to learn or the ability to work independently, influence the probability of employment. In contrast, other works point to the importance of occupation-specific technical skills for graduates' employability. Mason (1999), for example, identified work readiness – the knowledge, skills, and commercial understanding which make graduates deployable soon after hiring – as one of the most important factors for the employability of engineering and science graduates in the UK. In the same line, Heijke et al. (2003) showed that a high level of field-specific skills is positively related to graduates' chances of finding a job that matches their field of study. More recently, the work of Humburg and van der Velden (2015) has provided evidence that both types of skills play a role. On the one hand, professional expertise is a type of skill that strongly influences employers' hiring decisions, thus supporting the findings of previous studies that point to the importance of occupation-specific skills. On the other hand, they showed that interpersonal skills have a large impact on graduates' chances of getting hired.

Finally, other papers have investigated the relationship between competencies and occupational status in an attempt to determine which competencies are associated with high-skilled jobs. Using data from the HEGESCO project for Slovenia, Turkey, Lithuania, Poland, and Hungary, Allen et al. (2009) found that the ability to use computers and the Internet, the ability to use time efficiently, and the ability to work productively with others are the competencies which are most often required in high-skilled occupations. In the same line, Heijke et al. (2003) used a survey of Dutch higher education graduates to show that occupation-specific competencies positively influence the likelihood of being employed in occupations within their field of study, while generic competencies (learning and analytical and problem-solving abilities) exert a positive influence on the probability of being employed in occupations that do not fully match the educational field.<sup>6</sup>

---

<sup>6</sup> Other papers have also provided evidence on the impact of non-cognitive skills on occupational status for the whole population regardless of educational level (Ham et al., 2009; John and Thomsen, 2014, among others).

Summing up, empirical evidence suggests that human capital competencies should be taken into account when analysing labour market outcomes, especially among graduates. In general, there exists a positive relationship between the endowment of explicit competencies, employability, earnings, and job quality. Nevertheless, the literature on the specific effects of competencies is quite heterogeneous, as the classifications of competencies differ depending on the country and on the dataset used.

### **3. Data and descriptive analysis**

#### **3.1. Dataset and self-assessed measures of competencies**

We use microdata from the REFLEX project, which involves 15 European countries<sup>7</sup> and Japan. The main objective of the project is to determine the degree to which higher education equips graduates with the competencies demanded by the modern knowledge society. The main part of the project consists of a large-scale survey conducted among 70,000 higher education graduates, resulting in 35,968 respondents.<sup>8</sup> In each country, a representative sample was drawn from the universe of all graduates from tertiary-type A education programmes (ISCED 5A) who earned their degree in the 1999/2000 academic year.

The survey provides the largest existing international comparative graduate database. It was carried out in 2005, so it contains information about the labour market situation of graduates five years after graduation, as well as retrospective information about their labour market trajectories from 2000 to 2005. In particular, the questionnaire collects information regarding educational experiences before and during higher education, the transition to the labour market, characteristics of the first job and of the current job, assessment of required and acquired skills, evaluation of the educational programme, work orientations, and some sociobiographical information.<sup>9</sup> It also includes self-assessed information on a set of 19 specific competencies extracted from the question: “How do you rate your own level of competence?”. The answer to this question takes discrete values from 1 (very low) to 7 (very high). Our analysis thus relies on a subjective appraisal of graduates’ competencies. The literature is controversial regarding the validity of self-reported measures as they are subject to high measurement errors. Nonetheless, while other methods such as testing and assessment might be well suited to measuring skills in the cognitive domain, they are limited in their use for

---

<sup>7</sup> Austria, Germany, Belgium, Spain, Estonia, Finland, France, Holland, Italy, Norway, Portugal, the United Kingdom, the Czech Republic, and Switzerland. Although Sweden and Switzerland are included in the Reflex project, the original microdata do not include these two countries.

<sup>8</sup> See Table 1.1. of Allen and van der Velden (2011) for an overview of the number of available respondents and the response percentage per country.

<sup>9</sup> Gender, year of birth, country of birth of graduates and their parents, country of residence at age 16 and during study programme, household composition (living alone, with a partner, with parents, etc.), having children or not and children’s ages, and parents’ education.

measuring other skills such as non-cognitive skills. As respondents are probably the best informants about their own skills, self-assessment can reveal information on this type of skills that cannot be directly tested or observed by outsiders. Moreover, testing and assessment are time consuming and therefore pose limits to the number of skills that can be assessed. Many works in the literature have pointed out these and other advantages of self-assessed measures (Richter and Johnson, 2001; Connally et al., 2002; Allen and van der Velden, 2005, among others). As pointed out by Richter and Johnson (2001), the main advantages of self-assessments include the fact that they are relatively easy to administer to large samples, can be administered simultaneously in different locations, provide responses that are easily quantifiable and thus analysable, and are relatively inexpensive to produce. Furthermore, for the particular case of skills measures, they highlight that self-assessments require less time than testing. In the same line, Connally et al. (2002) pointed out that higher order competencies are difficult to assess using direct observation. This implies that self-assessment need not only be regarded as a last resort when other methods are not feasible, but may have substantive advantages in its own right. More recently, Humburg and van der Velden (2015) showed that within countries, self-assessments do a good job in predicting skills differences across fields of study and also in predicting the effect of skills on earnings.<sup>10</sup> All in all, we can say that although self-assessment as a way of measuring 'hidden' characteristics of individuals such as skills has its drawbacks, the method is popular and widely used. Furthermore, given that sufficient care is taken in both the collection and the use of the data, the benefits of using self-assessments should almost certainly outweigh the disadvantages.<sup>11</sup>

For the purposes of the paper, we restrict the analysis to European graduates aged 30-35 years old.<sup>12</sup> The reason is twofold. First, we partially rule out the concern about the stability of non-cognitive skills. It is generally accepted that the stability of non-cognitive skills, especially personality traits, increases with age. Older groups exhibit higher test-retest correlations and more stable mean levels of personality (Kogan, 1990; Roberts and DelVecchio, 2000). A factor that facilitates increasing personality consistency with age is the process of developing, committing to, and maintaining an identity (Roberts et al., 2008). Identity development facilitates personality consistency by providing clear reference points for making life decisions. In particular, some authors have claimed that

---

<sup>10</sup> Self-assessed information has also been used in other fields. For instance, most of the literature on health and well-being relies on self-report surveys to provide valid measures on individual health (see Jones and Wildman, 2008; Benzeval et al., 2001; Blázquez et al., 2014, among others) and well-being (see Ferrer-i-Carbonell, 2005; Blázquez and Budría, 2014, among others).

<sup>11</sup> Nevertheless, we are aware that the greatest disadvantage of self-assessment as a method of obtaining data is the greater likelihood of measurement error. Different methods have been proposed in the literature to address this problem. As pointed out by Allen and van der Velden (2005), *ex ante* expert anchoring is probably the most widespread technique. Unfortunately, our dataset does not allow us to apply this technique. An alternative road is instrumental variables. Regrettably, this road is closed to us due to the lack of valid instruments. Thus, we recognise that our results should be interpreted with caution.

<sup>12</sup> We have eliminated Japan due to relevant differences between its labour market and cultural characteristics with respect to European countries.

personality traits remain stable from the age of 30 onwards (Costa and McCrae, 1988, McCrae and Costa, 1994; Terracciano et al., 2006). Thus, the choice of this subsample partially overcomes the potential problems of reverse causality surrounding the relationship between graduates' competencies and labour market outcomes. Second, since one of the aims of the paper is to analyse the relationship between competencies and occupational status, and insofar as managerial positions usually require previous labour market experience, we allow all graduates to have accumulated such experience.

### **3.2 Descriptive analysis**

We limit our sample to graduates who were employed as salaried workers at the time of the interview and who reported information on the 19 competencies and on wages. In order to obtain representative samples for each country, we use the sampling weights provided by the Reflex survey. The final subsample consists of 7,586 higher education graduates aged between 30 and 35 years old. Table 1 reports the sample characteristics for the main variables. As can be seen, the majority of respondents are female (53.1%), 64.2% of graduates are cohabiting (married or not), and 29.5% have children. Nearly 65% of the sample had completed a long higher education programme that provided direct access to doctoral studies, and 56.7% had participated in internships. Regarding the field of study, the majority of respondents (33%) earned a degree in social sciences, business, and law, while 19.5% studied engineering, manufacturing, and construction. Of the total, 7.5% of the graduates were employed as managers at the time of the interview, while 65% occupied professional positions and 18.7% were employed as technicians and associate professionals. Finally, the descriptive analysis reveals some gender differences, with women being underrepresented in managerial positions (5.3% in contrast to the figure of 10.1% corresponding to male graduates).

**Table 1. Main characteristics of the sample**

	Total		Men		Women	
	N	%	N	%	N	%
<b>Total</b>	7,586	100%	3,558	46.9%	4,029	53.1%
<b>Personal characteristics</b>						
Cohabiting	4,870	64.2%	2,214	62.2%	2,656	65.9%
With children	2,237	29.5%	1,019	28.6%	1,218	30.2%
<b>Programme and student's characteristics</b>						
Programmes with direct access to doctorate	4,958	65.4%	2,315	65.1%	2,644	65.6%
High academic achievement: above average grades	3,207	42.3%	1,606	45.2%	1,601	39.7%
Internship	4,298	56.7%	1,865	52.4%	2,433	60.4%
<b>Programme's field of study</b>						
Education	792	10.4%	180	5.1%	612	15.2%
Humanities and arts	673	8.9%	173	4.9%	500	12.4%
Social sciences, business, and law	2,504	33.0%	1,143	32.1%	1,360	33.8%
Science, mathematics, and computing	755	9.9%	442	12.4%	313	7.8%
Engineering, manufacturing, and construction	1,480	19.5%	1,131	31.8%	349	8.7%
Agriculture and veterinary	199	2.6%	114	3.2%	85	2.1%
Health and welfare	1,014	13.4%	294	8.3%	720	17.9%
Services	171	2.2%	81	2.3%	90	2.2%
<b>Occupation</b>						
Employed as legislators, senior officials, and managers	571	7.5%	358	10.1%	212	5.3%
Employed as professionals	4,930	65.0%	2,330	65.5%	2,600	64.5%
Employed as technicians	1,421	18.7%	623	17.5%	799	19.8%
Employed in other occupations	665	8.8%	247	6.9%	418	10.4%
<b>Country</b>						
Italy	842	11.1%	387	10.9%	455	11.3%
Spain	916	12.1%	392	11.0%	524	13.0%
France	212	2.8%	86	2.4%	126	3.1%
Austria	697	9.2%	341	9.6%	356	8.8%
Germany	765	10.1%	417	11.7%	349	8.7%
Netherlands	811	10.7%	399	11.2%	412	10.2%
United Kingdom	86	1.1%	44	1.2%	43	1.1%
Finland	921	12.1%	425	11.9%	496	12.3%
Norway	979	12.9%	431	12.1%	548	13.6%
Czech Republic	881	11.6%	466	13.1%	415	10.3%
Portugal	132	1.7%	50	1.4%	81	2.0%
Belgium	89	1.2%	35	1.0%	54	1.3%
Estonia	254	3.3%	85	2.4%	169	4.2%

For the purposes of the paper, we group the 19 competencies into two categories: cognitive and non-cognitive.<sup>13</sup> Nevertheless, to the best of our knowledge there does not exist a common standardised classification of the 19 competencies included in the REFLEX project.<sup>14</sup> The criteria we follow in this paper is based on the so-called Bloom's Taxonomy, which has had an important influence on classifications of skills and competencies. This taxonomy was initially developed by

<sup>13</sup> See Appendix A for details regarding the classification of competencies and Appendix B for the corresponding frequency distribution.

<sup>14</sup> There are some exceptions. Salas (2014) explicitly refers to the non-cognitive characteristics of specific interpersonal competencies such as making meaning clear to others or the ability to work productively with others, while cognitive competencies include the ability to write and speak in a foreign language or knowledge of other fields or disciplines. Using a survey on the Russian economy with the same 19 competencies included in the REFLEX database, Bydanova (2006) proposed an explicit classification divided into cognitive and non-cognitive competencies.

Bloom et al. (1956) in the context of learning objectives in education and classifies skills into three domains: cognitive (mental skills), affective (attitudes), and psychomotor (physical skills). In line with this definition, we have classified the following competencies as cognitive: mastery of own field or discipline; knowledge of other fields or disciplines; analytical thinking;; ability to rapidly acquire new knowledge; alertness to new opportunities; ability to use computers and the Internet; ability to come up with new ideas and solutions;<sup>15</sup> ability to write reports, memos, or documents; ability to write and speak in a foreign language; and willingness to question your own and others' ideas.

We do not find a single definition for non-cognitive competencies in the literature (see Bydanova, 2006, for a detailed review of different criteria). In general terms, non-cognitive skills include interpersonal skills, persistence, communication skills, and other “soft” skills, such as personality traits, goals, motivations, and preferences (Heckman and Kautz, 2012). In a recent review of the literature on the different definitions and measures of non-cognitive skills, Morrison and Schoon (2013) stated that “the term non-cognitive skills refers to a set of attitudes, behaviours, and strategies that are thought to underpin success in school and at work”. Specifically, they identified 8 types of non-cognitive skills: self-perceptions, motivation, perseverance, self-control, meta-cognitive strategies, social competencies, resilience and coping, and creativity. We rely on Morrison and Schoon's (2013) approach to identify non-cognitive competencies among the 19 competencies included in the REFLEX database. These include the ability to negotiate effectively; ability to perform well under pressure; ability to coordinate activities; ability to work productively with others; ability to mobilise the capacities of others; ability to make your meaning clear to others; ability to assert your authority; ability to present products, ideas, or reports to an audience; and ability to use time efficiently.

A first look at the descriptive data suggests some interesting issues. First, managerial and professional occupations, as well as technicians, are associated with higher self-assessed levels of competencies (see Table C1 in Appendix C). This general pattern is common for both women and men, although women tend to score higher in non-cognitive skills, while men display higher levels of cognitive skills. In analysing differences across gender and occupations, we observe that males occupying managerial positions report 7.4% and 8.9% higher levels of cognitive and non-cognitive competencies, respectively, than those in the category of “other occupations”. These differences are larger for women (8.6% and 9.4%, respectively). Regarding professionals, the corresponding difference in cognitive competencies is 5.7% for men, while women exhibit a slighter difference in

---

<sup>15</sup> The “ability to come up with new ideas and solutions” could be classified as both a cognitive and non-cognitive skill. Morrison and Schoon (2013) highlighted that there is some debate over whether creativity is an aspect of intelligence or a personality trait, and included creativity among non-cognitive skills. The REFLEX project highlights that this competence “refers to the innovative abilities of graduates”, and explicitly states that it “refers to the cognitive component of creativity”. For this reason, we have decided to include it among cognitive skills (see Appendix A for details).

this case (3.6%). Graduates working as technicians also report higher levels in skills than the rest of the occupations, but the differences are much smaller, especially for women. When looking at the specific competencies, we observe that some stand out over others. The cognitive skills that display the highest mean values in the three occupational categories are those related to the ability to use computers and the Internet. Among non-cognitive abilities, the ability to coordinate activities is the most prominent for managers, while the ability to work productively with others is the most relevant for professionals and technicians. These results are similar for both women and men.

Second, graduates endowed with higher levels of either cognitive or non-cognitive competencies earn higher wages (see Table C2 in Appendix C).<sup>16</sup> In addition, for both types of competencies the wage premium is higher for men. Nonetheless, interesting gender differences are worth mentioning when looking across occupations. In all cases, the wage premium associated to competencies among men appears to be higher for cognitive competencies, while in the case of women this is only true for those working as managers. For instance, among men employed as professionals, the wage premium associated to cognitive competencies is 8.3%, while the wage premium corresponding to non-cognitive competencies is 6%. For females, the corresponding values are 2.8% and 6.1% for cognitive and non-cognitive skills, respectively. Finally, it should be noted that for males the highest reward in terms of wages is observed among technicians. This is true for both cognitive and non-cognitive skills, with wage premiums of 14.4% and 11.3%, respectively. Among females, the highest rewards of cognitive skills corresponds to managerial positions (6.6%), while non-cognitive competencies exhibit the maximum value among professional occupations (6.1%).

In a nutshell, the descriptive analysis suggests that human capital competencies are significantly associated with occupations and wages among graduates. However, it is likely that other personal and job characteristics also influence this relationship. Using econometric techniques based on multinomial logit models and OLS regressions, the next section aims to account for these factors and provide more accurate evidence of the relationship between competencies and occupations and between competencies and wages among European graduates.

#### **4. The role of competencies on labour market outcomes of European university graduates**

Our empirical analysis starts with the relationship between competencies and the probability of being employed as managers, professionals, or technicians. In a second stage we examine the impact of competencies on earnings.

---

<sup>16</sup> A distinction is made between individuals who have a level of competence  $i$  higher than the mean value of that competence among employees ( $C_i > \bar{C}_i$ ), and those who have a level of competence  $i$  below or equal to the mean value.

Occupational probabilities are estimated using a multinomial logit model where we define a categorical dependent variable  $y_i$  that takes the values 1, 2, 3 or 4 depending on if the graduate  $i$  is employed as a manager, professional, technician, or in another occupational group<sup>17</sup>, respectively. We take this last category as the reference group. With respect to earnings, our dependent variable is the natural logarithm of hourly wages ( $w_i$ ). In this case we adopt an OLS approach to estimate separate wage equations for graduates employed as managers and professionals, and those employed as technicians and associate professionals. Both  $y_i$  and  $w_i$  are assumed to be a function of human capital competencies ( $C_i$ ), personal characteristics ( $X_i$ ), and other factors ( $Z_i$ ) that comprise both programme and job characteristics, as well as country variables to control for economic differences and dissimilarities in labour market institutions. In both cases, we perform separate estimations for men and women.

Our main interest focuses on the effects of  $C_i$ . As the influence of competencies is actually the result of a combination of different abilities, some of which are highly correlated, we have condensed all the competencies into nine factors. In order to obtain these factors, we have applied a factor analysis for separate subsamples of men and women on the 19 competencies using the principal-component factor method. Once the factors are obtained and rotated, each factor is related with some specific competencies or skills (see Table 2). Therefore, the estimations include these nine factors as explanatory variables ( $C_i^{F1}, C_i^{F2}, \dots, C_i^{F9}$ ). The first thing to be noted is that the factor structure is very similar in the male and female subsamples. A second aspect to highlight is that some factors are mainly correlated with non-cognitive competencies. This is the case of *leadership* and *teamwork*, while others are more related to cognitive competencies (*creativity and innovative, intelligence, knowledge, new technologies, and foreign languages*). Only two factors comprise both types of competencies: *initiative and enterprise* and *communication*.

In both estimation equations, vector  $X_i$  contains gender, age, and household characteristics. The education programme characteristics (programme level, academic achievement, participation in internships, and field of education), which are included in vector  $Z_i$ , are also common for both equations. However, the set of job characteristics differs. We include the number of jobs since graduation, occupation at first job, a dummy to indicate whether the current job coincides with the first job, tenure, a dummy for being employed in the public sector, and firm size as determinants of occupational probabilities. In the wage equations we consider the following as explanatory factors that capture job characteristics: some characteristics referring to the first job (hourly wage and a dummy to indicate whether the current job coincides with the first job), having supervisory tasks, number of jobs

---

<sup>17</sup> Clerks, Service workers and shop and market sales workers, Skilled agricultural and fishery workers, Craft and related trades workers, Plant and machine operators and assemblers and Elementary occupations.



since graduation, working in the public or private sector, having a part-time job, type of contract, firm size, tenure, and controls for the economic sector. Finally, in order to control for specific economic characteristics and the features of labour market institutions across countries, we include aggregate data of GDP per capita and the OECD strictness of employment protection index<sup>18</sup> in both equations, as well as regional dummies for Nordic, Eastern, Southern, and Central European countries (see Table E1 in Appendix E).

**Table 2. Type of competencies and factor description by gender**

Competencies	Type:	Factor description	
		Men	Women
Ability to mobilise the capacities of others	Non-cognitive	Leadership (Factor 1)	Leadership (Factor 1)
Ability to make your meaning clear to others	Non-cognitive		
Ability to assert your authority	Non-cognitive		
Ability to negotiate effectively	Non-cognitive	Initiative and enterprise (Factor 2)	Initiative and enterprise (Factor 2)
Ability to perform well under pressure	Non-cognitive		
Alertness to new opportunities	Cognitive		
Ability to coordinate activities	Non-cognitive	Teamwork (Factor 3)	Teamwork (Factor 3)
Ability to use time efficiently	Non-cognitive		
Ability to work productively with others	Non-cognitive		
Ability to come up with new ideas and solutions	Cognitive	Creative and innovative (Factor 5)	Creative and innovative (Factor 4)
Willingness to question your own and others' ideas	Cognitive		
Ability to present products, ideas, or reports to an audience	Non-cognitive	Communication (Factor 6)	Communication (Factor 5)
Ability to write reports, memos, or documents	Cognitive		
Analytical thinking	Cognitive	Intelligence (Factor 4)	Intelligence (Factor 6)
Ability to rapidly acquire new knowledge	Cognitive	Intelligence (Factor 4)	Intelligence (Factor 6)
Knowledge of other fields or disciplines (*)	Cognitive	Knowledge (Factor 7)	Intelligence (Factor 6)
Mastery of your own field or discipline (**)	Cognitive	Intelligence (Factor 4)	Knowledge (Factor 7)
Ability to use computers and the Internet	Cognitive	New technologies (Factor 8)	New technologies (Factor 8)
Ability to write and speak in a foreign language	Cognitive	Foreign languages (Factor 9)	Foreign languages (Factor 9)

(\*) Included in Intelligence factor for women and in Knowledge factor for men.

(\*\*) Included in Knowledge factor for women and in Intelligence factor for men.

Total explained variance: 72.66% (men) and 72.45% (women)

Varimax rotation with Kaiser standardisation. See rotation matrix in Tables D2 and D3 (Appendix D).

Cronbach's alphas in factor analysis: Men: F1 (0.74); F2 (0.68); F3 (0.69); F4 (0.67); F5 (0.68); F6 (0.61). Women: F1 (0.72); F2 (0.65); F3 (0.69); F4 (0.70); F5 (0.61); F6 (0.63).

#### **4.1 The role of competencies on occupational probabilities**

The estimation results for the probability of being employed in a specific occupation are presented in Table 3, where the coefficients, standard errors and average partial effects (APE)<sup>19</sup> are shown.

For expositional purposes, we first briefly describe the main effects of personal characteristics and other factors, and then move on to the effects of competencies. As can be seen, the likelihood of being

<sup>18</sup> This is a synthetic indicator of the strictness of regulation on dismissals and the use of temporary contracts. Specifically, we include the strictness of employment protection – individual and collective dismissals (regular contracts) – and compute its mean value for the period 2000-2005.

<sup>19</sup> In a multinomial logit model, the partial effect of a variable  $X$  in the alternative  $j$  indicates the increase/decrease in the estimated probability for that category taking as a reference the other categories as a whole. Hence, the partial effect of a variable  $X$  in the alternative  $j$  does not need to have the same sign as the corresponding estimated coefficient.

employed in managerial and especially in professional occupations is higher among graduates who have studied a second-level programme (which allows direct access to a doctoral programme). Specifically, men who have studied a long programme have a probability of being employed as professionals that is 9.5 percentage points (pp) higher than other graduates. In the case of women, the average marginal probability is slightly lower (7.1 pp). High academic achievement and participation in internships during the education programme do not seem to play a role in determining occupational status. In line with previous literature,<sup>20</sup> our results reveal that being employed as managers, professionals, or technicians in the first job after graduation significantly influences the professional careers of individuals insofar as it improves the chances of getting a position of this type in the future. Finally, remaining in the first job 5 years after graduation reduces the probability of occupying professional, technician, and, particularly, managerial positions.

Moving on to the effect of competencies, our results reveal that, overall, both specific cognitive and non-cognitive competencies are strongly associated with the probability of occupying managerial and professional positions. These findings are in line with some previous studies providing empirical evidence that both types of skills play a role in occupational status (Heckman et al., 2006). These authors showed that both cognitive and non-cognitive skills increase the probability of getting white collar occupations, and that the effect of cognitive skills is slightly larger than that of non-cognitive skills. We obtain a similar result when looking at professionals. However, a stronger association is observed between managerial positions and non-cognitive skills than between managerial positions and cognitive skills. This result may be partially explained by the fact that our analysis focuses on higher education graduates who, overall, are endowed with high levels of cognitive skills. Finally, there is hardly any relationship in our data between competencies and the probability of being employed as technicians and associate professionals.

All in all, although we cannot derive causal effects on the impact of cognitive and non-cognitive skills on individual occupational status, our results suggest the need to take into account the effect of both types of skills when analysing individual labour market outcomes. The existing literature has mainly highlighted the importance of cognitive skills, mainly due to the lack of data on non-cognitive skills. Nonetheless, our results suggest that controlling for this type of skills is important when analysing the determinants of occupational status because the corresponding effects of cognitive competencies would otherwise be overestimated.

Focusing on the specific competencies, our empirical results are in line with other studies that have already highlighted the relevance of specific non-cognitive skills (especially personality traits) in developing a successful career as managers (Nieken and Störmer, 2010; Moutafi et al., 2007; John and

---

<sup>20</sup> See, among many others, Brunner and Kuhn (2010), von Wachter and Bender (2008), Oyer (2006, 2008), Stevens (2007), Raaum and Roed (2006), Burgess et al. (2003), Neumark (2002), and Gardecki and Neumark (1998).

Thomsen, 2014; Ham et al., 2016). In particular, we find that skills related with *leadership* abilities appear to have a positive influence on the probability of working as managers and professionals, with the effect being especially relevant for managerial positions. Although leadership is positively related with the likelihood of being employed as managers for both men and women, the association seems to be stronger among men. More specifically, a one standard deviation increase in leadership skills increases the marginal probability that males are employed as managers (as compared to the rest of occupational categories) by 3 pp, while this same figure is 1.5 pp for women. Additionally, while leadership is the most relevant competence for males in managerial positions, this is not the case for women, for whom initiative and enterprise abilities (which comprise both cognitive and non-cognitive abilities) display a stronger association with such occupations. This finding might be partially explained by the existence of gender differences in leadership style.<sup>21</sup> Finally, it is worth mentioning that leadership has a positive and significant association with the three occupations analysed among male graduates, while it appears to be only related with managerial positions in the case of women.

We do not find a significant impact of non-cognitive competencies related to *teamwork* in explaining the occupational status of university graduates. Thus, our results suggest that not all types of non-cognitive skills are relevant in explaining their labour market outcomes.

As we mentioned above, there are two factors that comprise both cognitive and non-cognitive skills: initiative and enterprise, and communication. Graduates who score high in *initiative and enterprise* abilities are more likely to be employed as managers, while the effect is not significant for professional and technician positions. Although the marginal effect is higher for men than for women, as we pointed out before these skills are the most significant for women in explaining the probability of getting managerial positions. Specifically, a one standard deviation increase in initiative and enterprise skills is associated to a 1.9 pp increase in women's probability of being employed as managers, while the corresponding figure for leadership competencies is 1.5 pp. With respect to *communication* abilities, we observe a positive association between this type of skills and the likelihood of getting managerial positions only for females, with the marginal effect being quite modest (0.8 pp).

---

<sup>21</sup> A vast amount of literature in the fields of management, psychology, and sociology has focused on whether women's comparative lack of success in attaining high positions could somehow be related to differences in their leadership style. Nevertheless, the studies report a number of contradictory findings (see Moran, 1992 and Clisbee, 2005 for a review).

**Table 3. Competencies and the probability of being employed as managers, professionals, and technicians. Multinomial logit models.**

	Men						Women					
	Managers		Professionals		Technicians		Managers		Professionals		Technicians	
	Coeff.	APE	Coeff.	APE	Coeff.	APE	Coeff.	APE	Coeff.	APE	Coeff.	APE
Age	-0.017 (0.069)	0.004	-0.077 (0.057)	-0.005	-0.069 (0.061)	-0.001	0.089 (0.069)	0.004	0.008 (0.046)	0.001	-0.035 (0.049)	-0.005
Cohabiting	0.449* (0.243)	0.013	0.361* (0.199)	0.028	-0.036 (0.215)	-0.031	0.441* (0.233)	0.018	0.005 (0.159)	-0.015	0.041 (0.166)	0.000
Children	0.327 (0.280)	0.019	0.054 (0.248)	-0.012	0.043 (0.264)	-0.004	-0.524** (0.245)	-0.007	-0.385** (0.178)	-0.003	-0.449** (0.192)	-0.015
Second -level program	0.768*** (0.241)	-0.002	1.065*** (0.200)	0.095	0.150 (0.210)	-0.061	0.634** (0.254)	0.002	0.786*** (0.174)	0.071	0.166 (0.184)	-0.043
High acad. achievement	-0.032 (0.223)	-0.003	0.063 (0.191)	0.020	-0.173 (0.206)	-0.019	-0.103 (0.218)	-0.011	0.179 (0.156)	0.016	0.139 (0.164)	0.003
Internships	-0.251 (0.237)	0.005	-0.380* (0.201)	-0.022	-0.269 (0.217)	0.003	0.181 (0.238)	0.004	0.069 (0.163)	-0.013	0.241 (0.167)	0.018
≥ 3 employers	-0.623** (0.282)	-0.010	-0.503** (0.228)	-0.002	-0.571** (0.240)	-0.012	-0.532** (0.250)	0.001	-0.718*** (0.180)	-0.052	-0.357* (0.189)	0.018
Manager (1 <sup>st</sup> job)	4.506*** (0.493)	0.176	2.310*** (0.460)	0.003	1.341*** (0.512)	-0.082	4.080*** (0.470)	0.094	2.411*** (0.398)	0.132	0.864* (0.512)	-0.114
Prof. (1 <sup>st</sup> job)	3.192*** (0.340)	-0.005	4.079*** (0.269)	0.294	1.521*** (0.303)	-0.155	2.852*** (0.311)	-0.012	4.166*** (0.217)	0.364	1.299*** (0.244)	-0.182
Techn. (1 <sup>st</sup> job)	2.543*** (0.362)	0.011	2.282*** (0.283)	-0.046	3.704*** (0.286)	0.155	2.263*** (0.324)	-0.002	2.382*** (0.216)	0.007	3.366*** (0.215)	0.159
Continues at 1 <sup>st</sup> job	-1.393*** (0.277)	-0.050	-0.769*** (0.243)	-0.002	-0.521** (0.253)	0.019	-1.934*** (0.278)	-0.045	-1.085*** (0.189)	-0.048	-0.519*** (0.195)	0.039
Ln (GDP)	-0.533 (0.890)	-0.171	2.444*** (0.776)	0.295	0.962 (0.848)	-0.056	-1.046 (0.877)	-0.057	0.903 (0.655)	0.254	-1.536** (0.683)	-0.212
Employment protection	-0.230 (0.276)	-0.044	0.369* (0.214)	0.016	0.744*** (0.225)	0.047	-0.538* (0.304)	-0.022	0.027 (0.211)	0.032	-0.186 (0.212)	-0.016
Leadership	0.623*** (0.114)	0.030	0.206** (0.088)	-0.014	0.169* (0.093)	-0.006	0.376*** (0.117)	0.015	0.053 (0.069)	0.000	-0.052 (0.070)	-0.012
Initiative & enterprise	0.374*** (0.111)	0.027	-0.027 (0.090)	-0.023	0.012 (0.093)	-0.002	0.483*** (0.109)	0.019	0.019 (0.068)	-0.015	0.057 (0.069)	0.000
Teamwork	0.122 (0.105)	0.007	0.007 (0.085)	-0.012	0.109 (0.089)	0.008	-0.092 (0.103)	-0.004	0.018 (0.068)	0.009	-0.051 (0.072)	-0.006
Creative & innovative	0.210* (0.108)	0.005	0.168** (0.085)	0.009	0.048 (0.089)	-0.009	0.539*** (0.113)	0.015	0.215*** (0.068)	0.000	0.172** (0.072)	-0.002
Communication	0.094 (0.109)	0.005	0.047 (0.087)	0.005	-0.060 (0.092)	-0.009	0.240** (0.105)	0.008	0.078 (0.070)	0.004	-0.006 (0.071)	-0.008
Intelligence	-0.018 (0.114)	-0.003	0.036 (0.092)	0.006	0.002 (0.096)	-0.002	0.190* (0.113)	0.010	-0.069 (0.072)	-0.010	-0.057 (0.076)	-0.003
Knowledge	0.090 (0.121)	0.005	0.009 (0.099)	-0.008	0.072 (0.105)	0.005	-0.165* (0.096)	-0.003	-0.098 (0.069)	-0.001	-0.093 (0.073)	-0.001
New technologies	-0.049 (0.109)	-0.001	-0.026 (0.087)	0.005	-0.094 (0.092)	-0.006	-0.189* (0.112)	-0.003	-0.176** (0.075)	-0.015	-0.033 (0.078)	0.011
Foreign languages	-0.181* (0.103)	-0.013	0.046 (0.083)	0.025	-0.157* (0.084)	-0.014	0.250** (0.106)	0.005	0.168** (0.069)	0.005	0.129* (0.071)	-0.001

\*\*\* Significant at 99% level, \*\* Significant at 95% level, \* Significant at 90% level.

Number of observations: Men (3,558), Women (4,029).

Weighted data. Estimations include a constant term. Robust standard errors are shown in parentheses.

Further variables included in the estimations: dummies for firm size, dummies for tenure, dummy for working in the public sector, dummies for field of education, and regional dummies (east, south, north). See Appendix E.

The remaining factors (i.e. creative and innovative, intelligence, knowledge, new technologies, and foreign languages) comprise only cognitive skills. For both males and females *creativity and innovative*

abilities display a positive and significant relation with the likelihood of being employed as professionals, and especially as managers. Although the nature of the competencies is not directly comparable, these results are, to some degree, in line with other studies which provide evidence that managers and professionals are more likely to be open to new experiences and adapt quickly to new technologies (Ham et al., 2016; and Nieker and Stormer, 2010). Additionally, it should be noted that these skills appear to be more relevant for women than for men. Specifically, an increase in one standard deviation in creativity and innovative competencies increases the probability of women being employed as managers by 1.5 pp, while the figure is only 0.5 pp for males. For females we also observe a slightly positive association between *intelligence* abilities and managerial positions, although the effect is only significant at the 90% level. In contrast, females exhibit a negative association between competencies related to *new technologies* and the probability of being employed as managers and professionals.

Finally, competencies related to *foreign languages* are only significant in explaining females' occupational status. In particular, a one standard deviation increase in these skills increases the probability of women occupying managerial and professional positions by 0.5 pp.

Overall, two important insights can be derived from our estimations. First, despite the fact that both cognitive and non-cognitive skills are, on the whole, associated with the positions occupied by university graduates in Europe, and especially with the probability of working as managers, some appear to be more relevant than others. Second, there are non-negligible gender differences as regards the relationship between competencies and graduates' occupational status. In particular, leadership skills are clearly those which are more related to managerial positions among males. For females, in contrast, initiative and enterprise abilities, which comprise both cognitive and non-cognitive skills, are the most relevant in such occupations. Additionally, our empirical estimations for women reveal an assorted number of competencies that are positively associated with their occupational status. More specifically, the competencies of intelligence, communication abilities, and knowledge of foreign languages that comprise cognitive skills also play a relevant role in females' probability of working as managers. Among men, however, scoring high in such competencies does not seem to be related with the probability of occupying highly-skilled positions. In sum, these findings would suggest that labour markets in Europe are more demanding with women, who overall need to cover a wider range of human capital competencies than men in order to reach managerial positions. This could partially explain the fact that women still remain under-represented in high level positions.

#### 4.2 The role of competencies on earnings

Table 4 shows the estimation results of wage equations separately for males and females and for the three occupational categories considered in our analysis. We will first discuss the effects of personal characteristics and other factors related to the educational programme, characteristics of the first job after graduation and current job characteristics, and then move on to the effects of competencies. Having studied a second-level higher education programme increases graduates' salaries by about 3-6% compared to those with a first-level programme, with the effect being especially significant for women. Graduates whose grades are higher than the mean earn about 3-4% more, although the effect is only significant for those employed as professionals. For the three occupational groups, wage at first job displays a positive and very significant influence on current wages. In contrast, graduates who remain in the first job five years after graduation are found to earn lower wages. Supervisory responsibilities seem to be associated with higher wages, especially for men in managerial and professional positions. Graduates working as professionals in the public sector are found to earn lower wages compared to those employed in the private sector, with the effect being especially notable for males. Finally, our results suggest that holding a permanent contract is, overall, related with higher wages, although the effect is only statistically significant for men and women in professional occupations and men working as technicians.

Moving on to the analysis of the estimated coefficients of competencies, some points are worth mentioning. First, unlike what occurred with the determinants of occupational status, non-cognitive abilities seem to bear no direct relationship with hourly wages. Only *leadership* appears to be positively associated with graduates' earnings, which is somewhat in line with previous works (Mueser, 1979; and Kuhn and Weinberger, 2005).

In contrast, cognitive skills seem to play a slightly more relevant role in explaining earnings of European graduates. In particular, our results support the well-known positive relationship between *intelligence* and earnings (see Judge et al., 2009; Ceci and Williams, 1997; Gottfredson, 1997; Mueller and Plug, 2006, among many others).<sup>22</sup> In our estimations, however, this positive association is only significant for the male subsample, and especially for those employed in managerial positions, for whom a one standard deviation increase in this type of competencies raises hourly wages by 6.2%. For women, in contrast, intelligence abilities are not related at all with their earnings.

---

<sup>22</sup> Most empirical evidence on this issue is based on test scores, and the usual explanation for this positive correlation is that intelligence increases school attendance: intelligent people have higher levels of educational attainment, which allow them to get better jobs and earn higher wages.

**Table 4. Competencies and hourly wages across occupations. OLS estimations.**

	Men			Women		
	Managers Coeff.	Professionals Coeff.	Technicians Coeff.	Managers Coeff.	Professionals Coeff.	Technicians Coeff.
Age	0.022** (0.010)	0.018*** (0.004)	-0.004 (0.009)	0.011 (0.014)	0.007 (0.005)	0.012 (0.009)
Cohabiting	0.005 (0.037)	0.056*** (0.016)	0.038 (0.031)	0.036 (0.056)	0.053*** (0.016)	0.038 (0.029)
Children	0.009 (0.035)	-0.006 (0.016)	0.026 (0.037)	-0.076 (0.059)	-0.067*** (0.017)	-0.050 (0.032)
Second -level programme	-0.063* (0.035)	0.030* (0.017)	0.024 (0.033)	0.002 (0.053)	0.061*** (0.018)	0.026 (0.032)
High academic achievement	0.002 (0.030)	0.038*** (0.014)	0.038 (0.030)	0.072 (0.049)	0.032** (0.014)	0.041 (0.027)
Internships	-0.092*** (0.033)	0.009 (0.016)	-0.010 (0.033)	0.054 (0.054)	0.006 (0.017)	0.000 (0.032)
Continues working at first job	-0.091** (0.038)	-0.067*** (0.016)	-0.068** (0.035)	-0.040 (0.065)	-0.004 (0.017)	-0.094*** (0.033)
(Ln) Wage at first job	0.306*** (0.039)	0.141*** (0.013)	0.211*** (0.034)	0.324*** (0.062)	0.080*** (0.010)	0.076*** (0.018)
Supervisory tasks	0.108** (0.053)	0.044*** (0.015)	0.036 (0.032)	0.075 (0.077)	0.030* (0.016)	0.041 (0.030)
3 or more employers	-0.008 (0.039)	0.004 (0.018)	-0.034 (0.035)	-0.009 (0.055)	-0.024 (0.017)	-0.015 (0.031)
Public sector	-0.063 (0.046)	-0.067*** (0.017)	-0.017 (0.039)	0.036 (0.051)	-0.034** (0.016)	0.023 (0.031)
Part time	0.122 (0.197)	0.222*** (0.031)	0.102 (0.067)	-0.028 (0.086)	0.195*** (0.018)	0.100*** (0.039)
Permanent contract	0.024 (0.054)	0.099*** (0.018)	0.114*** (0.038)	0.091 (0.068)	0.096*** (0.017)	0.029 (0.032)
Ln (GDP)	0.032 (0.148)	0.071 (0.065)	0.052 (0.150)	0.148 (0.211)	0.230*** (0.065)	0.538*** (0.124)
Employment protection	0.036 (0.047)	0.080*** (0.021)	0.021 (0.046)	0.100 (0.063)	0.102*** (0.021)	0.033 (0.033)
Leadership	0.020 (0.018)	0.008 (0.007)	0.034** (0.014)	-0.005 (0.026)	0.026*** (0.007)	0.015 (0.013)
Initiative & enterprise	-0.006 (0.019)	0.009 (0.007)	0.020 (0.014)	0.034 (0.029)	0.000 (0.007)	0.004 (0.014)
Teamwork	-0.008 (0.017)	-0.001 (0.007)	-0.012 (0.015)	-0.018 (0.027)	-0.011 (0.007)	-0.003 (0.013)
Creative & innovative	0.022 (0.016)	-0.018*** (0.007)	-0.022 (0.015)	-0.008 (0.028)	-0.014** (0.007)	-0.003 (0.013)
Communication	0.026 (0.017)	-0.014** (0.007)	0.015 (0.014)	0.020 (0.026)	0.004 (0.007)	-0.005 (0.012)
Intelligence	0.062*** (0.018)	0.014** (0.007)	0.034** (0.015)	0.014 (0.027)	0.000 (0.007)	-0.006 (0.014)
Knowledge	-0.009 (0.018)	0.001 (0.007)	0.011 (0.015)	-0.014 (0.026)	0.003 (0.007)	0.011 (0.012)
New technologies	0.011 (0.017)	-0.006 (0.007)	0.033** (0.016)	-0.013 (0.025)	0.005 (0.007)	-0.007 (0.014)
Foreign languages	0.010 (0.015)	-0.005 (0.007)	0.032** (0.013)	0.036 (0.024)	0.002 (0.007)	0.020 (0.014)
Number of obs	291	1,792	469	171	1,981	602

\*\*\* Significant at 99% level, \*\* 95%, \* 90%.

Weighted data. All equations include a constant term. Standard errors are shown in parentheses.

The Czech Republic is not included due to the lack of information on wages at first job.

Further variables included in the estimations: dummies for firm size, dummies for tenure, dummies for economic sector, dummies for field of education, and regional dummies. See Appendix E.

Scoring high in *language* skills is associated with higher wages among men employed as technicians. In particular, a one standard deviation increase in these competencies increases the wages of this group of workers by 3.2%. Although the existing evidence on the returns to foreign language knowledge is mixed, our results are in line with Williams (2006), who estimated a multilingualism wage effect of 5-

10% for European workers, and with other papers focusing on a single country (Shapiro and Stelcner, 1997; Klein, 2003; Ginsburgh and Prieto-Rodríguez, 2007; and Di Paolo and Tunsel, 2015).

According to the canonical model in Acemoglu and Autor (2010), where technology is assumed to take a factor-augmenting form that increases workers' skills and consequently produces a skill premium, we find a positive association between competencies related with *new technologies* and hourly wages. Nonetheless, this relation appears to be only significant for male graduates working as technicians and associate professionals.

These results are in line with previous works (Heineck and Anger, 2010) providing evidence that cognitive skills mainly affect the wages of male but not female workers. Thus, it seems that the positive effect that cognitive skills exert on females' labour market outcomes is in terms of occupational status – a higher probability of getting managerial positions – and not in terms of earnings. Actually, our results suggest that a wide list of competencies are positively associated with the probability that a woman will end up working as manager, but none of the nine identified competencies seem to be rewarded in terms of wages. A similar result could also be extrapolated for women employed as professionals or technicians.

Unlike García-Aracil and van der Velden (2008), who found that participative competencies (which comprise some aspects of initiative and enterprise) are linked to higher wages among graduates, we find a positive but non-significant relationship between initiative and enterprise and wages. Similarly, teamwork and communication skills do not seem to be rewarded in terms of wages, a result that is line with the study of Kelly et al. (2010) for Ireland. Finally, in line with García-Aracil and van der Velden (2008), we do not find evidence of higher earnings among graduates who score high in knowledge skills.

Summing up, our results suggest that overall competencies have a positive and very significant association with the labour market outcomes of higher education graduates in Europe.

## **5. Summary and conclusions**

Most of the literature analysing labour market outcomes has concentrated mainly on traditional human capital predictors such as education, experience, or job-specific training. Nonetheless, scholars have begun to question whether education continues to provide the skills that are most demanded in today's labour markets. This was motivated by the fact that graduates are now expected to be competent in a broad range of areas, comprising both field-specific and generic skills. As a consequence, more attention has been paid in recent years to the importance of various types of human capital competencies as an effective tool to improve graduates' chances of a smooth transition to the labour market.



This paper has aimed to shed more light on these issues. In particular, we have attempted to contribute to the existing literature by examining the relationship of both cognitive and non-cognitive competencies with graduates' occupational status and wage formation. In addition, we have aimed to provide evidence of gender differences in these relationships. For this purpose, we have used microdata from the REFLEX database that contains information on young European graduates who were interviewed five years after graduation.

Although our results should be interpreted cautiously insofar as we cannot derive causal effects on the relationship between the competencies and labour market outcomes of European graduates, some relevant issues can be highlighted. Non-cognitive skills appear to be much more associated with graduates' occupational status, especially with managerial occupations, than cognitive skills. Gender differences become apparent when looking at the specific competencies: leadership abilities seem to be more important among males working as managers, while females employed in such positions display higher levels of initiative and enterprise skills. In addition, it should be noted that the variety of competencies that are relevant for women in order to be employed as professionals, and especially as managers, is broader than that for men, thus suggesting that the labour market is tougher with regard to women's competencies and skills. In contrast, cognitive abilities seem to be more rewarded in terms of earnings. Again, our results provide evidence of differences between males and females. Competencies associated to intelligence are associated with higher wages in the three occupational groups considered in our analysis only for males. Other types of cognitive abilities are also related to higher earnings among males employed as technicians and associate professionals. This is the case of new technologies and foreign language skills. In contrast, none of the identified factors that comprise cognitive abilities are statistically associated with women's wages.

These results are of special relevance for both educational institutions and students who should work together in fostering those competencies that are most in demand and/or are most often in shortage. On the one hand, higher education systems could, for instance, promote more innovative educational methods that combine lectures with group assignments in order to more effectively develop those competencies that are more demanded by employers and produce the highest rewards in terms of wages. On the other hand, and given the heterogeneity and changing nature of the productivity-enhancing characteristics of graduates, it is important that they know which competencies are more valuable for employers in order to facilitate their educational choices and the acquisition of those skills that will enable them to take advantage of promising job opportunities. All these findings should be considered in order to design the best policies for improving the school-to-work transition process of graduates in Europe. Moreover, and for the purpose of improving labour market equity, policymakers should take into account the existence of gender differences as regards the association between competencies and labour market outcomes.

Finally, although our results point out that some specific competencies are associated with the labour market outcomes of graduates, it is necessary to highlight that they are based on self-assessment information and hence could be biased by some kind of measurement error. Taking into account the enormous effort made by European governments to ensure that university graduates acquire the necessary competencies, a similar effort should be made to collect more objective and comparable data that enable researchers to better identify those competencies that are more likely to improve their labour market outcomes. At the moment, very few international comparative projects have attempted to obtain information about competencies and much more research should be done in this area.

### **Acknowledgements**

The authors wish to thank the REFLEX project for granting access to their data. The authors are grateful to the Editor and to two anonymous reviewers for their constructive comments on previous versions of this manuscript and suggestions for improvement. Any errors are our own.

## Appendix A. Classification of competencies

**Table A1. Classification of cognitive and non-cognitive competencies**

	<b>Bloom's Taxonomy</b>	<b>Morrison and Schoon (2013)</b>	<b>Our classification applying Bloom's Taxonomy and Morrison and Schoon</b>	<b>Similarities with other authors' classifications</b>
Mastery of your own field or discipline	Cognitive domain (knowledge)	-	Cognitive	Bydanova (2006) Salas (2014)
Knowledge of other fields or disciplines	Cognitive domain (knowledge)	-	Cognitive	Bydanova (2006) Salas (2014)
Analytical thinking	Cognitive domain (analysis)	-	Cognitive	Bydanova (2006) Shmatko (2013)
Ability to rapidly acquire new knowledge	Cognitive domain (knowledge and comprehension)	-	Cognitive	Bydanova (2006)
Ability to negotiate effectively	-	Social skills (social competencies)	Non-cognitive	Bydanova (2006)
Ability to perform well under pressure	-	Resilience and coping skills	Non-cognitive	Bydanova (2006)
Alertness to new opportunities	Cognitive domain (synthesis)	-	Cognitive	-
Ability to coordinate activities	-	Social skills (social competencies)	Non-cognitive	Bydanova (2006)
Ability to use time efficiently	-	Meta-cognitive strategies	Non-cognitive	Bydanova (2006)
Ability to work productively with others	-	Social skills (social competencies)	Non-cognitive	Salas (2014)
Ability to mobilise the capacities of others	-	Leadership skills (social competencies)	Non-cognitive	Bydanova (2006)
Ability to make your meaning clear to others	-	Communication (social skills – social competencies)	Non-cognitive	Bydanova (2006) Salas (2014)
Ability to assert your authority	-	Leadership skills (social competencies)	Non-cognitive	Bydanova (2006)
Ability to use computers and the Internet	Cognitive domain (knowledge and application)	-	Cognitive	Shmatko (2013)
Ability to come up with new ideas and solutions	Cognitive domain (application and synthesis)	Creativity	Cognitive	Shmatko (2013) REFLEX (2004)
Willingness to question your own and others' ideas	Cognitive domain (evaluation)	-	Cognitive	Bydanova (2006)
Ability to present products, ideas, or reports to an audience	-	Communication (social skills – social competencies)	Non-cognitive	Bydanova (2006)
Ability to write reports, memos, or documents	Cognitive domain (comprehension)	-	Cognitive	-
Ability to write and speak in a foreign language	Cognitive domain (knowledge and comprehension)	-	Cognitive	Salas (2014) Shmatko (2013)

Source: Own elaboration

## Appendix B. Frequency distribution across competencies

**Table B1. Frequency distribution across competencies by gender, percentages**

		Competencies values						
		1	2	3	4	5	6	7
C1. Mastery of your own field or discipline	Men	0.1%	0.5%	2.6%	11.6%	35.4%	39.4%	10.3%
	Women	0.4%	0.7%	3.2%	14.1%	34.6%	35.6%	11.3%
C2. Knowledge of other fields or disciplines	Men	0.9%	3.0%	11.8%	30.1%	33.7%	17.2%	3.2%
	Women	1.3%	5.3%	16.3%	32.1%	28.9%	13.2%	2.9%
C3. Analytical thinking	Men	0.3%	0.8%	3.0%	11.4%	26.5%	39.2%	18.7%
	Women	1.2%	2.2%	6.6%	18.1%	27.1%	31.4%	13.4%
C4. Ability to rapidly acquire new knowledge	Men	0.0%	0.4%	2.1%	9.7%	25.8%	40.5%	21.5%
	Women	0.2%	0.3%	1.7%	9.5%	24.2%	40.5%	23.5%
C5. Ability to negotiate effectively	Men	1.9%	4.9%	11.7%	23.1%	27.1%	22.5%	8.8%
	Women	2.5%	5.8%	13.2%	22.6%	24.6%	21.7%	9.6%
C6. Ability to perform well under pressure	Men	0.4%	1.2%	3.1%	11.0%	25.2%	39.9%	19.2%
	Women	1.0%	1.8%	4.3%	12.1%	23.9%	36.0%	20.9%
C7. Alertness to new opportunities	Men	1.0%	2.5%	7.1%	20.5%	31.8%	27.0%	10.1%
	Women	1.2%	2.8%	6.7%	20.6%	29.9%	27.9%	11.0%
C8. Ability to coordinate activities	Men	0.4%	1.0%	3.9%	13.8%	29.3%	36.2%	15.4%
	Women	0.4%	0.9%	3.1%	11.1%	23.5%	39.0%	22.1%
C9. Ability to use time efficiently	Men	0.3%	1.4%	6.5%	16.3%	32.5%	30.1%	12.9%
	Women	0.3%	0.7%	3.6%	11.9%	26.1%	35.1%	22.3%
C10. Ability to work productively with others	Men	0.3%	0.9%	3.5%	9.4%	26.0%	42.6%	17.3%
	Women	0.4%	0.8%	1.7%	8.2%	22.3%	41.6%	25.2%
C11. Ability to mobilise the capacities of others	Men	0.9%	2.7%	9.3%	20.9%	32.5%	25.9%	7.8%
	Women	1.3%	3.3%	7.3%	21.9%	30.9%	25.2%	10.2%
C12. Ability to make your meaning clear to others	Men	0.3%	0.9%	4.4%	12.5%	31.3%	37.2%	13.5%
	Women	0.4%	0.8%	3.7%	13.0%	29.0%	36.4%	16.5%
C13. Ability to assert your authority	Men	1.5%	3.9%	12.0%	21.9%	32.1%	21.9%	6.6%
	Women	2.1%	5.3%	11.9%	23.3%	28.3%	21.5%	7.7%
C14. Ability to use computers and the Internet	Men	0.1%	0.6%	1.3%	5.6%	14.5%	35.7%	42.3%
	Women	0.4%	1.2%	3.1%	10.2%	19.7%	35.7%	29.8%
C15. Ability to come up with new ideas and solutions	Men	0.2%	0.5%	3.0%	11.9%	30.6%	37.1%	16.7%
	Women	0.6%	1.3%	4.5%	15.8%	32.0%	32.7%	13.1%
C16. Willingness to question your own and others ideas	Men	0.2%	0.7%	3.3%	12.6%	26.5%	37.7%	19.0%
	Women	0.6%	1.5%	4.4%	15.7%	29.3%	32.6%	15.9%
C17. Ability to present products, ideas, or reports to an audience	Men	1.6%	4.6%	9.5%	17.0%	26.9%	27.6%	12.7%
	Women	2.8%	6.0%	9.1%	19.2%	25.3%	25.1%	12.5%
C18. Ability to write reports, memos, or documents	Men	0.5%	1.9%	5.6%	12.9%	26.2%	35.8%	17.1%
	Women	1.0%	1.9%	4.5%	12.5%	23.8%	34.7%	21.5%
C19. Ability to write and speak in a foreign language	Men	5.0%	8.8%	11.7%	18.1%	20.4%	22.9%	13.2%
	Women	7.6%	10.0%	11.7%	18.0%	18.2%	18.4%	16.1%

## Appendix C. Descriptive data on competencies, occupations, and hourly wages

**Table C1. Competencies across occupations by gender**

	Men							Women						
	Mean	S.D.	Mean value of competencies across occupations					Mean	S.D.	Mean value of competencies across occupations				
			Managers	Professionals	Technicians	Other Occup.				Managers	Professionals	Technicians	Other Occup.	
<b>Total</b>	5.25	0.69	5.47	5.26	5.17	5.06 ***		5.20	0.72	5.52	5.23	5.11	5.07 ***	
<b>Cognitive competencies</b>	<b>5.34</b>	<b>0.70</b>	<b>5.46</b>	<b>5.38</b>	<b>5.21</b>	<b>5.08 ***</b>		<b>5.19</b>	<b>0.75</b>	<b>5.47</b>	<b>5.22</b>	<b>5.09</b>	<b>5.04 ***</b>	
Mastery of your own field or discipline	5.41	0.96	5.37	5.45	5.33	5.26 **		5.34	1.04	5.30	5.38	5.28	5.25 *	
Knowledge of other fields or disciplines	4.57	1.14	4.76	4.55	4.57	4.51		4.33	1.21	4.66	4.33	4.29	4.25	
Analytical thinking	5.55	1.09	5.64	5.63	5.35	5.26 ***		5.15	1.29	5.44	5.20	5.01	5.02 **	
Ability to rapidly acquire new knowledge	5.68	1.01	5.81	5.69	5.64	5.52 ***		5.73	1.02	5.93	5.73	5.69	5.71	
Alertness to new opportunities	5.01	1.24	5.39	5.01	4.91	4.67 ***		5.03	1.28	5.55	5.05	4.93	4.82 ***	
Ability to use computers and the Internet	6.10	1.01	6.11	6.18	5.88	5.87 ***		5.74	1.18	6.01	5.72	5.76	5.69	
Ability to come up with new ideas and solutions	5.50	1.05	5.65	5.53	5.41	5.24 ***		5.28	1.15	5.69	5.30	5.17	5.16 **	
Willingness to question your own and others' ideas	5.54	1.10	5.65	5.57	5.45	5.26 ***		5.33	1.19	5.59	5.36	5.25	5.16 ***	
Ability to write reports, memos, or documents	5.38	1.23	5.48	5.43	5.24	5.11 ***		5.46	1.28	5.74	5.52	5.30	5.30 ***	
Ability to write and speak in a foreign language	4.62	1.69	4.74	4.72	4.33	4.16 ***		4.49	1.82	4.83	4.63	4.20	4.03 ***	
<b>Non-cognitive competencies</b>	<b>5.16</b>	<b>0.81</b>	<b>5.48</b>	<b>5.14</b>	<b>5.12</b>	<b>5.03 ***</b>		<b>5.22</b>	<b>0.82</b>	<b>5.57</b>	<b>5.24</b>	<b>5.13</b>	<b>5.10 ***</b>	
Ability to negotiate effectively	4.71	1.39	5.21	4.63	4.75	4.70		4.64	1.47	5.19	4.62	4.65	4.52 *	
Ability to perform well under pressure	5.56	1.12	5.85	5.56	5.43	5.42 **		5.48	1.26	5.87	5.50	5.36	5.37 *	
Ability to coordinate activities	5.41	1.12	5.85	5.37	5.37	5.24 **		5.62	1.12	6.02	5.66	5.48	5.42 ***	
Ability to use time efficiently	5.21	1.17	5.30	5.19	5.24	5.21		5.58	1.13	5.59	5.56	5.57	5.66	
Ability to work productively with others	5.57	1.08	5.65	5.56	5.59	5.44 *		5.77	1.05	5.90	5.77	5.73	5.74	
Ability to mobilise the capacities of others	4.90	1.24	5.37	4.85	4.89	4.78 *		4.94	1.29	5.44	4.99	4.80	4.68 ***	
Ability to make your meaning clear to others	5.39	1.09	5.61	5.38	5.40	5.10 ***		5.45	1.12	5.64	5.45	5.39	5.49	
Ability to assert authority	4.71	1.30	5.13	4.67	4.69	4.62		4.66	1.39	5.19	4.67	4.52	4.53 **	
Ability to present products, ideas, or reports to an audience	4.97	1.42	5.31	5.01	4.70	4.77 **		4.83	1.51	5.35	4.89	4.69	4.47 ***	

Note: Competencies take discrete values from 1 (very low) to 7 (very high).

\*\*\* Significant at 99% level, \*\* at 95% level, \* at 90% level.

Statistical differences are tested based on the chi-square test for differences between managers, professionals, and technicians as a whole and the rest of occupations.

**Table C2. Mean hourly wages across competencies by gender and occupations. PPP euros**

	Men									Women										
	Managers			Professionals			Technicians			Managers			Professionals			Technicians				
	Individ. with $C_i > \bar{C}_i$	Individ. with $C_i \leq \bar{C}_i$	Gap (%)	Individ. with $C_i > \bar{C}_i$	Individ. with $C_i \leq \bar{C}_i$	Gap (%)	Individ. with $C_i > \bar{C}_i$	Individ. with $C_i \leq \bar{C}_i$	Gap (%)	Individ. with $C_i > \bar{C}_i$	Individ. with $C_i \leq \bar{C}_i$	Gap (%)	Individ. with $C_i > \bar{C}_i$	Individ. with $C_i \leq \bar{C}_i$	Gap (%)	Individ. with $C_i > \bar{C}_i$	Individ. with $C_i \leq \bar{C}_i$	Gap (%)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)		
Total	17.39	16.29	6.8%	15.20	13.99	8.6%	***	13.94	12.22	14.1%	***	15.20	14.44	5.3%	13.40	12.82	4.5%	***		
Cognitive competencies	17.53	16.23	8.0%	*	15.15	13.99	8.3%	***	13.99	12.23	14.4%	***	15.30	14.36	6.6%	13.32	12.95	2.8%	*	
Mastery of your own field or discipline	17.47	16.68	4.7%		15.05	14.28	5.4%	***	13.76	12.55	9.7%	***	14.90	15.06	-1.1%	13.52	12.79	5.8%	***	
Knowledge of other fields or disciplines	17.36	16.63	4.4%		14.79	14.56	1.6%		13.43	12.67	6.0%	*	15.22	14.71	3.4%	13.09	13.18	-0.7%		
Analytical thinking	17.61	16.15	9.0%	**	15.07	14.09	7.0%	***	13.72	12.44	10.2%	***	15.23	14.70	3.6%	13.37	12.94	3.4%	**	
Ability to rapidly acquire new knowledge	17.34	16.50	5.1%		15.00	14.16	5.9%	***	13.29	12.76	4.1%		15.03	14.88	1.0%	13.13	13.15	-0.1%		
Alertness to new opportunities	17.37	15.78	10.0%	*	15.34	13.23	16.0%	***	13.76	11.75	17.1%	***	14.91	15.37	-3.0%	13.34	12.69	5.1%	***	
Ability to use computers and the Internet	17.31	16.15	7.2%		14.78	14.25	3.7%	*	13.22	12.75	3.7%		14.74	15.64	-5.7%	13.02	13.35	-2.4%		
Ability to come up with new ideas and solutions	16.96	17.22	-1.5%		15.01	14.29	5.1%	***	13.68	12.45	9.8%	***	14.96	15.04	-0.5%	13.01	13.25	-1.8%		
Willingness to question your own and others' ideas	17.36	16.65	4.3%		14.72	14.63	0.6%		13.22	12.91	2.4%		14.65	15.46	-5.3%	12.96	13.31	-2.6%	*	
Ability to write reports, memos, or documents	17.41	16.63	4.7%		14.68	14.68	0.0%		13.07	13.10	-0.2%		14.57	15.66	-7.0%	13.19	13.06	1.0%		
Ability to write and speak in a foreign language	17.86	15.96	11.9%	***	15.26	13.82	10.5%	***	14.17	12.10	17.1%	***	15.38	14.35	7.2%	13.55	12.63	7.3%	***	
Non-cognitive competencies	17.47	16.20	7.8%	*	15.14	14.28	6.0%	***	13.86	12.45	11.3%	***	15.03	14.90	0.9%	13.52	12.74	6.1%	***	
Ability to negotiate effectively	17.08	17.03	0.3%		14.68	14.67	0.1%		13.14	13.01	1.0%		15.14	14.59	3.8%	13.11	13.17	-0.4%		
Ability to perform well under pressure	17.49	16.00	9.3%	**	15.39	13.65	12.7%	***	13.70	12.39	10.5%	***	15.59	13.76	13.3%	**	13.69	12.40	10.4%	***
Ability to coordinate activities	16.89	17.45	-3.2%		15.04	14.32	5.0%	***	13.74	12.43	10.5%	***	14.99	14.99	0.0%	13.38	12.73	5.1%	***	
Ability to use time efficiently	16.70	17.35	-3.8%		14.77	14.61	1.1%		13.10	13.08	0.2%		14.94	15.06	-0.8%	13.33	12.88	3.5%	**	
Ability to work productively with others	16.94	17.26	-1.9%		14.91	14.35	3.9%	**	13.17	12.94	1.8%		14.97	15.03	-0.4%	13.22	12.97	1.9%		
Ability to mobilise the capacities of others	17.20	16.51	4.2%		15.04	14.04	7.1%	***	13.34	12.60	5.9%	*	15.02	14.85	1.2%	13.36	12.68	5.3%	***	
Ability to make your meaning clear to others	16.58	17.72	-6.4%	*	14.87	14.48	2.7%	*	13.37	12.78	4.7%		15.13	14.75	2.6%	13.33	12.93	3.1%	**	
Ability to assert authority	17.18	16.70	2.8%		15.11	14.07	7.4%	***	13.57	12.40	9.4%	***	14.72	15.75	-6.5%	13.29	12.93	2.7%	*	
Ability to present products, ideas, or reports	17.49	15.54	12.6%	**	15.08	13.79	9.4%	***	13.61	12.38	9.9%	***	15.17	14.40	5.4%	13.42	12.62	6.4%	***	

\*\*\* Significant at 99% level, \*\* at 95% level, \* at 90% level.

Statistical differences are tested based on variance analysis.

Wages have been deflated using the PPP index included in the REFLEX database.

## Appendix D. Factor analysis

**Table D1. Factor analysis. Principal component factors method**

Factor	Men			Women		
	Eigenvalues	Explained variance (%)	Cumulative explained variance (%)	Eigenvalues	Explained variance (%)	Cumulative explained variance (%)
1	6.59	34.68	34.68	6.45	33.93	33.93
2	1.49	7.82	42.50	1.34	7.04	40.96
3	1.12	5.91	48.41	1.10	5.78	46.74
4	0.98	5.17	53.58	0.95	5.01	51.75
5	0.85	4.48	58.07	0.91	4.78	56.53
6	0.83	4.39	62.45	0.82	4.30	60.83
7	0.75	3.96	66.41	0.79	4.17	65.00
8	0.70	3.70	70.12	0.72	3.78	68.78
9	0.67	3.54	73.66	0.70	3.68	72.45
10	0.61	3.19	76.85	0.65	3.45	75.90
11	0.58	3.04	79.89	0.62	3.26	79.16
12	0.54	2.83	82.72	0.60	3.16	82.32
13	0.53	2.79	85.51	0.56	2.97	85.28
14	0.52	2.74	88.25	0.54	2.82	88.10
15	0.51	2.70	90.95	0.52	2.74	90.84
16	0.48	2.52	93.47	0.46	2.42	93.26
17	0.44	2.32	95.79	0.44	2.33	95.60
18	0.41	2.15	97.94	0.44	2.30	97.90
19	0.39	2.06	100	0.40	2.10	100

**Table D2. Rotated factor loadings (Varimax rotation with Kaiser standardisation). Men.**

Men	Factors								
	1	2	3	4	5	6	7	8	9
Mastery of your own field or discipline	.231	.040	.124	.469	-.127	.133	.457	.375	-.193
Knowledge of other fields or disciplines	.078	.151	.089	.165	.166	.070	.868	.017	.111
Analytical thinking	.109	.063	.097	.773	.257	.084	.148	.060	.125
Ability to rapidly acquire new knowledge	.089	.272	.193	.652	.201	.112	.100	.129	.121
Ability to negotiate effectively	.415	.629	.022	.096	.046	.196	.187	-.093	-.041
Ability to perform well under pressure	.171	.625	.311	.360	.005	.026	-.136	.151	.060
Alertness to new opportunities	.110	.698	.186	.047	.316	.056	.183	.081	.156
Ability to coordinate activities	.307	.417	.515	.126	.075	.188	.152	.063	-.011
Ability to use time efficiently	.017	.277	.704	.284	-.065	.216	.090	.042	-.083
Ability to work productively with others	.288	.013	.734	.081	.268	.020	.010	.098	.165
Ability to mobilise the capacities of others	.584	.181	.457	-.080	.272	.019	.141	.012	.167
Ability to make your meaning clear to others	.727	.040	.203	.260	.150	.168	.021	.079	.092
Ability to assert authority	.754	.347	.098	.066	.052	.086	.063	.027	-.047
Ability to use computers and the Internet	.025	.055	.087	.139	.190	.094	.030	.892	.140
Ability to come up with new ideas and solutions	.147	.282	.112	.201	.617	.122	.206	.334	.061
Willingness to question your own and others' ideas	.175	.084	.126	.256	.777	.189	.039	.062	.000
Ability to present products, ideas, or reports to an audience	.365	.247	.014	.083	.234	.567	.106	.037	.264
Ability to write reports, memos, or documents	.087	.067	.199	.130	.130	.866	.054	.108	.067
Ability to write and speak in a foreign language	.065	.077	.068	.142	.025	.147	.065	.119	.908

Shaded cells indicate highest correlations

**Table D3. Rotated factor loadings (Varimax rotation with Kaiser standardisation). Women.**

Women	Factors								
	1	2	3	4	5	6	7	8	9
Mastery of your own field or discipline	.126	.090	.131	.145	.130	.098	.848	.098	.009
Knowledge of other fields or disciplines	.163	.168	.004	.152	-.016	.525	.483	-.143	.281
Analytical thinking	.054	.061	.107	.162	.169	.832	.039	.135	.038
Ability to rapidly acquire new knowledge	.078	.311	.268	.103	.135	.523	.175	.333	.009
Ability to negotiate effectively	.408	.600	-.021	.092	.218	.293	-.032	-.072	-.085
Ability to perform well under pressure	.209	.665	.269	-.017	.032	.071	.149	.221	.103
Alertness to new opportunities	.007	.662	.182	.488	.091	.056	.060	-.049	.185
Ability to coordinate activities	.111	.429	.464	.148	.343	.143	.224	.039	.007
Ability to use time efficiently	.058	.306	.663	-.031	.175	.054	.262	.213	-.107
Ability to work productively with others	.231	.058	.783	.238	.015	.125	-.036	-.016	.110
Ability to mobilise the capacities of others	.515	.136	.426	.411	.040	.127	-.040	-.173	.166
Ability to make your meaning clear to others	.737	.039	.291	.108	.184	.106	.092	.141	.032
Ability to assert authority	.757	.279	.026	.167	.140	.008	.168	.065	.006
Ability to use computers and the Internet	.086	.067	.060	.237	.111	.155	.047	.819	.164
Ability to come up with new ideas and solutions	.162	.234	.122	.677	.241	.155	.176	.246	-.027
Willingness to question your own and others' ideas	.226	.016	.133	.699	.200	.176	.118	.181	-.002
Ability to present products, ideas, or reports to an audience	.243	.181	.037	.292	.705	.073	.082	-.035	.098
Ability to write reports, memos, or documents	.104	.055	.146	.101	.769	.163	.072	.183	.166
Ability to write and speak in a foreign language	.036	.085	.038	.013	.205	.081	.047	.153	.898

Shaded cells indicate highest correlations

**Table D4. Factor descriptions**

	Men	Women
Factor 1	Leadership	Leadership
Factor 2	Initiative and enterprise	Initiative and enterprise
Factor 3	Teamwork	Teamwork
Factor 4	Intelligence (*)	Creative and innovative
Factor 5	Creative and innovative	Communication
Factor 6	Communication	Intelligence (*)
Factor 7	Knowledge (**)	Knowledge (**)
Factor 8	New technologies	New technologies
Factor 9	Foreign languages	Foreign languages

(\*) Includes analytical thinking, ability to rapidly acquire new knowledge, and mastery of your own field or discipline for men, and analytical thinking, ability to rapidly acquire new knowledge, and knowledge of other fields or disciplines for women.

(\*\*) Includes knowledge of other fields or disciplines for men and mastery of your own field or discipline for women



## Appendix E. Variables

**Table E1. Description of variables**

Variable	Definition
Occupation	= 1 if employed in managerial positions (legislators, senior officials, and managers) = 2 if employed in professionals positions (professionals) = 3 if employed in jobs as technicians and associate professionals = 4 if employed in jobs as clerks; service workers, and shop and market sales workers; skilled agricultural and fishery workers; craft and related trades workers; plant and machine operators and assemblers; elementary occupations.
Ln (wage)	Natural logarithm of the hourly wage expressed in PPP euros. We use hourly gross earnings in the current job truncated by the maximum hours declared by individuals in the REFLEX database.
Female	= 1 if female
Age	Age (30 to 35 years)
Cohabiting	= 1 if cohabiting with partner
Children	= 1 if has 1 or more children
Second-level programme	= 1 if studied a second-level programme (long programme providing direct access to doctorate)
High academic achievement	= 1 if declares that his/her grades compared to other students were much (5) or quite (4) higher on a 1-5 point scale.  Graduates are asked to answer two questions regarding their grades: 1) "What was your average grade when you finished this study?" and 2) "How do you rate this grade compared to other students that graduated from your study programme?". The graduates can respond to this second question on a 1-5 point scale, where 1 indicates "much lower than average" and 5 indicates "much higher than average". The variable we include in the models as "high academic achievement" is a dummy variable that takes the value of 1 if the individual responds 5 or 4 to this question, while it is zero otherwise.
Internships	= 1 if declares having participated in one or more work placements/internships as part of the study programme
Number of jobs since graduation	= 1 if has had 3 or more jobs since graduation
Occupation at first job	Included in estimations as dummy variables: <ul style="list-style-type: none"> <li>• Manager</li> <li>• Professional</li> <li>• Technicians</li> <li>• Other occupations</li> </ul>
First job	= 1 if continues working in the first job
Public sector	= 1 if working in the public sector
Firm size	Number of workers in the firm. Included in estimations as dummy variables: <ul style="list-style-type: none"> <li>• &lt; 10 workers (reference)</li> <li>• 10-49 workers</li> <li>• 50-99 workers</li> <li>• 100-249 workers</li> <li>• 250-999 workers</li> <li>• ≥ 1000 workers</li> </ul>
Number of unemployment spells	Included in estimations as dummy variables: <ul style="list-style-type: none"> <li>• None (reference)</li> <li>• 1 time unemployed</li> <li>• 2 times unemployed</li> <li>• ≥ 3 times unemployed</li> </ul>
(Ln) First job wage	Natural logarithm of the hourly wage at first job after graduation expressed in PPP euros
Current job = First job	= 1 if continues in the first job
Supervisory tasks	= 1 if has supervisory tasks
Part-time job	= 1 if working in a part-time job
Permanent contract	= 1 if has a permanent contract in the current job

Variable	Definition
Tenure	Number of years employed in current job. Included in estimations as 4 dummies: <ul style="list-style-type: none"> <li>• &lt; 1 year (reference)</li> <li>• 1 to 2 years</li> <li>• 3 to 5 years</li> <li>• ≥ 6 years</li> </ul>
Field of education	Included in estimations as dummy variables: <ul style="list-style-type: none"> <li>• Social sciences, business, and law (reference)</li> <li>• Education</li> <li>• Humanities and arts</li> <li>• Science, mathematics, and computing</li> <li>• Engineering, manufacturing, and construction</li> <li>• Agriculture and veterinary science</li> <li>• Health and welfare</li> <li>• Services</li> </ul>
Economic activity	Included in estimations as dummy variables: <ul style="list-style-type: none"> <li>• Agriculture</li> <li>• Industry</li> <li>• Construction</li> <li>• Services (reference)</li> </ul>
Region	Included in estimations as dummy variables: <ul style="list-style-type: none"> <li>• Nordic countries (Finland and Norway)</li> <li>• Southern countries (Italy, Spain, and Portugal)</li> <li>• Eastern countries (Estonia and Czech Republic)</li> <li>• Central countries and the UK (France, Germany, Belgium, the Netherlands, Austria, and the United Kingdom) (reference category)</li> </ul>
GDP per capita	GDP per capita (Current prices, euros PPS). Mean value period 2000-2005. Aggregate data at country level Source: Eurostat
Employment protection	OECD employment protection index. Mean value period 2000-2005. Aggregate data at country level Source: OECD

## References

- Acemoglu, D., and Autor, D. (2010). "Skills, Tasks and Technologies: Implications for Employment and Earnings", NBER Working Paper No. 16082.
- Allen, J., and van der Velden, R. (2001). "Educational Mismatches versus Skill Mismatches: Effects on Wages, Job Satisfaction, and On-the-Job Search", *Oxford Economic Papers*, 53(3), 434-52.
- Allen, J., and van der Velden, R. (2005). "The Role of Self-Assessment in Measuring Skills", REFLEX Working paper 2. Maastrich: ROA.
- Allen, J., and van der Velden, R. (2011). *The Flexible Professional in the Knowledge Society. New Challenges for Higher Education*. Higher Education Dynamics vol. 35. Dordrecht: Springer.
- Allen, J., Coenen, J., Humburg, M., Pavlin, S., Robert, P., Svetlik, I., and Van der Velden, R. (2009). *Competencies and Early Labour Market Careers of Higher Education Graduates*. University of Ljubljana, Faculty of Social Sciences, Ljubljana: Slovenia.
- Bauer, T.K. (2002). "Educational mismatch and wages: A panel analysis", *Economics of Education Review*, 21 (3), 221–229.
- Benzeval, M., Judge, K., and Shouls, S. (2001). "Understanding the relationship between income and health: how much can be gleaned from cross-sectional data?", *Social Policy and Administration*, 35 (4), 376-96.
- Biesma, R.G., Pavlova, M., van Merode, G.G., and Groot, W. (2007). "Using conjoint analysis to estimate employers preferences for key competencies of master level Dutch graduates entering the public health field", *Economics of Education Review*, 26 (3), 375–386.
- Blázquez, M., Cottini, E., and Herrarte, A. (2014). The socioeconomic gradient in health: How important is material deprivation? *Journal of Economic Inequality*, 12 (2), 239-264.
- Blázquez, M., and Budría, S. (2014). "Deprivation and subjective well-being: Evidence from panel data", *Review of Income and Wealth*, 60 (4), 655-682.
- Bloom, B.S., Engelhart, M.D., Furst, E.J., Hill, W. H., and Krathwohl, D.R. (1956). *Taxonomy of educational objectives: the classification of educational goals*. Book 1: Cognitive domain. New York: David McKay Company.

- Bloom, B.S., Mesia, B.B., and Krathwohl, D.R. (1964). Taxonomy of educational objectives: the classification of educational goals. Book 2: The affective domain. New York: David McKay Company.
- Borghans, L., Weel, B., and Weinberg, B.A. (2008). "Interpersonal Styles and Labor Market Outcomes", *Journal of Human Resources*, 43 (4), 815-858.
- Bowles, S., Gintis, H., and Osborne, M. (2001). "The Determinants of Earnings: A Behavioral Approach", *Journal of Economic Literature*, 39 (4), 1137-1176.
- Brunner, B., and Kuhn, A., (2010). "The Impact of Labor Market Entry Conditions on Initial Job Assignment, Human Capital Accumulation, and Wages". IZA DP No. 5360.
- Burgess, S., Propper, C., Rees, H., and Shearer, A. (2003). "The class of 1981: the effects of early career unemployment on subsequent unemployment experiences", *Labour Economics*, 10 (3), 291-309.
- Bydanova, E. (2006). "Employment of Higher Education Graduates in Russia", Ph.D. thesis, Universite de Bourgogne, Dijon, France.
- Cainarca, G.C., and Sgobbi, F. (2012). "The return to education and skills in Italy", *International Journal of Manpower*, 33 (2), 187-205.
- Cameron, S. V., and Heckman, J. (1993). "The nonequivalence of high school equivalents," *Journal of Labor Economics*, 11 (1), 1-47.
- Cawley, J. Heckman, J., and Vytlačil, E. (2001). "Three observations on wages and measured cognitive ability", *Labour economics*, 8 (4), 419-442.
- Ceci, S. J., and Williams, W. M. (1997). "Schooling, Intelligence, and Income", *American Psychologist*, 52 (10), 1051-1058.
- Clisbee, M. (2005). "Gender Differences in Leadership Style: A Literature Analysis", *Journal of Women in Educational Leadership*, 135. <http://digitalcommons.unl.edu/jwel/135>
- Connally, J., Jorgensen, K., Gillis, S., and Griffin, P. (2002). An Integrated Approach to the Assessment of Higher Order Competencies. Paper presented at the Australian Association for Research in Education Annual Conference, Brisbane, Australia, December 2002.

- Costa Jr., P.T., and McCrae, R.R. (1988). "Personality in adulthood: A six-year longitudinal study of self-reports and spouse ratings on the NEO Personality Inventory", *Journal of Personality and Social Psychology*, 54 (5), 853-863.
- Costa Jr., P.T., McCrae, R.R., and Dye, D.A. (1991). "Facet scales for agreeableness and conscientiousness: a revision of the NEO Personality Inventory", *Personality and Individual Differences*, 12 (8), 887-898.
- Di Paolo, A., and Tansel, A. (2015). "Returns to Foreign Language Skills in a Developing Country: The Case of Turkey", *Journal of Development Studies*, 51 (4), 407-421.
- Eisinga, R., Grotenhuis Mt. and Pelzer B. (2013). "The reliability of a two-item scale: Pearson, Cronbach, or Spearman-Brown?", *International Journal of Public Health*, 58 (4), 637-642.
- Felstead, A., Gallie, D., Green, F. and Zhou, Y. (2007). Skills at work, 1986 to 2006. Universities of Oxford and Cardiff, ESRC Centre on Skills, Knowledge and Organisational Performance.
- Ferrer-i-Carbonell, A. (2005). "Income and well-being: An empirical analysis of the comparison income effect", *Journal of Public Economics*, 89 (5-6), 997-1019.
- Funder, D. (2001). "Personality", *Annual Review of Psychology*, 52 (1), 197-221.
- García-Aracil, A. (2014). "Are graduates well-equipped for the labour market?", *Investigaciones de Economía de la Educación*, 9, 817-829.
- García-Aracil, A., Mora, J.G. and Vila, L.E. (2004). "The rewards of human capital competences for young European higher education graduates", *Tertiary Education and Management*, 10 (4), 287-305.
- García-Aracil, A. and Van der Velden, R. (2008). "Competencies for young European higher education graduates: labor market mismatches and their payoffs", *Higher Education* 55 (2), 219-239.
- Gardecki, R. and Neumark, D. (1998). "Order from chaos? The effects of early labor market experiences on adult labor market outcomes", *Industrial and Labor Relations Review*, 51(2), 299-322.
- Ginsburgh, V. and Prieto-Rodríguez, J. (2007). "La prima salarial de las lenguas extranjeras en el mercado de trabajo español", *Cuadernos económicos de ICE*, 74, 129-146.
- Goldsmith, A., Veum, J., and Darity, W. (2000). "Working hard for the money? Efficiency wages and worker effort", *Journal of Economic Psychology*, 21 (4), 351-385.

- Goos, M., Manning A., and Salomons, A. (2009). "Job Polarization in Europe", *American Economic Review: Papers and proceedings*, 99 (2), 58-63.
- Gottfredson, L.S., (1997). "Why g Matters: The Complexity of Everyday Life", *Intelligence*, 24 (1), 79-132.
- Ham, R., Junankar, P.N., Wells, R. (2009). Occupational Choice: Personality Matters. IZA Discussion Paper Series, No. 4105, Bonn, Germany.
- Ham, R., Junankar, P.R., and Wells, R. (2016). "An examination of personality in occupational outcomes: antagonistic managers, careless workers and extraverted salespeople", *Applied Economics*, 48 (7), 636-651.
- Hansen, J. (2010). How Does Academic Ability Affect Educational and Labour Market Pathways in Canada. OECD Education Working Papers, No. 30, OECD Publishing.
- Hartog, J. (1992). Capabilities, allocation and earnings. Boston: Kluwer.
- Hanushek, E.A., and Woessmann, L. (2011). The economics of international differences in educational achievement, in E.A. Hanushek, S. Machin and L. Woessmann (Eds.), *Handbook of the Economics of Education*, North Holland, Amsterdam, Vol. 3, 89-200.
- Heckman, J., Stixrud, J., and Urzua, S., (2006). "The effects of cognitive and non-cognitive abilities on labour market outcomes and social behaviour", *Journal of Labour Economics*, 24 (3), 411-482.
- Heckman, J.J., and Kautz, T. (2012). "Hard Evidence on Soft Skills", IZA DP No. 6580.
- Heijke, H., Meng, C., and Ris, C. (2003). "Fitting to the job: the role of generic and vocational competencies in adjustment and performance", *Labour Economics*, 10 (2), 215-229.
- Heineck, G., and Anger, S. (2010). "The returns to cognitive abilities and personality traits in Germany", *Labour Economics*, 17 (3), 535-546.
- Humburg, M., and van der Velden, R. (2015). "Self-assessments or tests? Comparing cross-national differences in patterns and outcomes of graduates' skills based on international large-scale surveys", *Studies in Higher Education*, 40 (3), 482-504.
- International Labour Organization (ILO) (2013). *Global Employment Trends for Youth 2013: A generation at risk*. Geneva: International Labour Office.

- John, O., and Srivastava, S. (1999). The Big Five Trait Taxonomy: History, Measurement, and Theoretical Perspectives. In *Handbook of Personality: Theory and Research*, eds. Oliver John and Lawrence Pervin, 102-138. New York: Guilford Press.
- John, K., and Thomsen, S. L. (2014). "Heterogeneous returns to personality: the role of occupational choice", *Empirical Economics*, 47 (2), 553-592.
- Jones, A., and Wildman, J. (2008). "Health, income and relative deprivation: Evidence from the BHPS", *Journal of Health Economics*, 27 (2), 308-324.
- Judge, T.A., Higgins, C.A., Thoresen, C.J., and Barrick, M.R. (1999). "The Big Five personality traits, general mental ability, and career success across the life span", *Personnel Psychology*, 52 (3), 621-652.
- Judge, T. A., Hurst, C., and Simon, L.S. (2009). "Does it pay to be smart, attractive, or confident (or all three)? Relationships among general mental ability, physical attractiveness, core self-evaluations, and income", *Journal of Applied Psychology*, 94 (3), 742-755.
- Kelly, E., O'Connell, P. J., and Smyth, E. (2010). "The economic returns to field of study and competencies among higher education graduates in Ireland", *Economics of Education Review*, 29 (4), 650-657.
- Klein, R., Spady, R., and Weiss, A. (1991). "Factors Affecting the Output and Quit Propensities of Production Workers", *Review of Economic Studies*, 58 (5), 929-953.
- Klein, C. (2003). "La Valorisation des Compétences Linguistiques sur le Marché du Travail Luxembourgeois", Cahier PSELL No 139. CEPS/INSTEAD, Luxemburg.
- Kogan, N. (1990). Personality and aging. In J. E. Birren and K. W. Scheie (Eds.), *Handbook of the psychology of aging* (pp. 330-346). San Diego: Academic Press.
- Kucel, A., and Vilalta-Bufí, M. (2013). "Job satisfaction of university graduates", *Revista de Economía Aplicada*, XXI (61), 29-55.
- Kuhn, P., and Weinberger, C. (2005). "Leadership Skills and Wages", *Journal of Labor Economics*, 23 (3), 395-436.
- Mason, G. (1999). The Labour Market for Engineering, Science and IT Graduates: Are There Mismatches Between Supply and Demand, Research Report No. 112. London, Department for Education and Employment.

- McCrae, R., and John, O. (1992). "An Introduction to the Five-Factor Model and Its Applications", *Journal of Personality*, 60 (2), 175-215.
- McCrae, R.R., and Costa Jr., P.T. (1994). "The stability of personality: Observations and evaluations", *Current Directions in Psychological Science*, 3 (6), 173-175.
- McGuinness, S., and Byrne, D. (2014). Examining the Relationships between Labour Market Mismatches, Earnings and Job Satisfaction among Immigrant Graduates in Europe. IZA Discussion Papers No. 8440.
- McGuinness, S., and Sloane P.J. (2011). "Labour Market Mismatch Among UK Graduates: An Analysis Using REFLEX Data", *Economics of Education Review*, 30 (1), 130-145.
- Mora, J., García-Montalvo, J., and García-Aracil, A. (2000). "Higher education and graduate employment in Spain", *European Journal of Education*, 35 (2), 229-237.
- Moran, B. (1992). "Gender Differences in Leadership", *Library Trends*, 40 (3), 475-491.
- Morrison Gutman, L., and Schoon, I. (2013). The impact of non-cognitive skills on outcomes for young people. Institute of Education, University of London.
- Moutafi, J., Furnham, A., and Crump, J. (2007). "Is managerial level related to personality?", *British Journal of Management*, 18 (3), 272-280.
- Mueller, G., and Plug, E., (2006). "Estimating the effects of personality on male and female earnings", *Industrial and Labour Relations Review*, 60 (1), 3-22.
- Mueser, P. (1979). "The Effects of Non-cognitive Traits". Chapter 5 in *Who Gets Ahead? The Determinants of Economic Success in America* by Jencks et al., 122-158. New York: Basic Books.
- Murillo, I.P., Rahona-López, M., and Salinas-Jiménez, M. (2012). "Effects of educational mismatch on private returns to education: An analysis of the Spanish case (1995–2006)", *Journal of Policy Modeling*, 34 (5), 646-659.
- Neumark, D. (2002). "Youth labor markets in the United States: Shopping around vs. Staying put", *Review of Economics and Statistics*, 84 (3), 462-482.
- Nieken, P., and Störmer, S. (2010). "Personality as Predictor of Occupational Choice: Empirical Evidence from Germany", *Diskussionspapiere des Schwerpunktes Unternehmensführung am Fachbereich BWL*, 8/ 2010.
- OECD (2012). *Education at a Glance 2012: OECD Indicators*. Paris: OECD Publishing.



- Osborne Groves, M.A., (2005). "How important is your personality? Labour market returns to personality for women in the US and UK", *Journal of Economic Psychology*, 26 (6), 827-841.
- Oyer, P. (2006). "Initial Labor Market Conditions and Long-Term Outcomes for Economists", *The Journal of Economic Perspectives*, 20 (3), 143-160.
- Oyer, P. (2008). "The Making of an Investment Banker: Stock Market Shocks, Career Choice, and Lifetime Income", *The Journal of Finance*, 63 (6), 2601-2628.
- Raaum, O., and Roed, K. (2006). "Do Business Cycle Conditions at the Time of Labor Market Entry Affect Future Employment Prospects?", *The Review of Economics and Statistics*, 88(2), 193-210.
- REFLEX (2004). Glossary Master questionnaire REFLEX version 14-12-2004.
- Richter, L., and P.B. Johnson (2001). "Current Methods of Assessing Substance Use: A Review of Strengths, Problems, and Developments", *Journal of Drug Issues*, 31 (4), 809-832.
- Roberts, B. W., and DelVecchio, W. F. (2000). "The rank-order consistency of personality traits from childhood to old age: A quantitative review of longitudinal studies", *Psychological Bulletin*, 126 (1), 3-25.
- Roberts, B. W., Wood, D., and Caspi, A. (2008). The development of personality traits in adulthood. In O. P. John, R. W. Robins, and L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (3rd ed., pp. 375–398). New York, NY: Guilford Press.
- Salas Velasco, M. (2014). "Do higher education institutions make a difference in competence development? A model of competence production at university", *Higher Education* 68 (4), 503-523.
- Sánchez-Sánchez, N., and McGuinness, S. (2015). "Decomposing the impacts of overeducation and overskilling on earnings and job satisfaction: an analysis using REFLEX data", *Education Economics*, 23 (4), 419-432.
- Semykina, A., and Linz, S.J. (2008). "Attitudes and performance: An analysis of Russian workers", *The Journal of Socio-Economics*, 37(2), 694-717.
- Sgobbi, F., and Suleman, F. (2013). "A methodological contribution to measuring skill (mis)match", *The Manchester School*, 81 (3), 420-437.
- Shapiro, D., and Stelcner, M. (1997). "Language and Earnings in Quebec: Trends over Twenty Years, 1970-1990", *Canadian Public Policy / Analyse de Politiques*, 23 (2), 115-140.

- Shmatko, N. (2013). "What Engineer's competencies for innovation market?". Proceedings of the International Conference on Advances in Social Science, Management and Human Behaviour 2013, 56-51.
- Semykina, A., and Linz, S.J. (2007). "Gender differences in personality and earnings: Evidence from Russia", *Journal of Economic Psychology*, 28 (3), 387–410.
- Stevens, K. (2007). "Adult Labour Market Outcomes: the Role of Economic Conditions at entry into the labour market", Mimeo, University College London.
- Teijeiro, M., Rungo, P. and Freire, M.J. (2013). "Graduate competencies and employability: The impact of matching firms' needs and personal attainments", *Economics of Education Review*, 34, 286-295.
- Terracciano, A., Costa, P.T., and McCrae, R.R. (2006). "Personality plasticity after age 30", *Personality and Social Psychology Bulletin*, 32 (8), 999-1009.
- Van Der Velden, R. (2013). Measuring competencies in higher education: what next?. In S. Blömeke, O. Zlatkin-Troitschanskaia, C. Kuhn and J. Fege (Eds.). *Modeling and Measuring Competencies in Higher Education Tasks and Challenges*. Sense Publishers.
- Verhofstadt, E., De Witte, H., and E. Omeij (2007). "Higher educated workers: better jobs but less satisfied?", *International Journal of Manpower*, 28 (2), 135-151.
- Vignoles, A., De Coulon, A., and Marcenaro-Gutierrez, O. (2011). "The value of basic skills in the British Labour Market", *Oxford Economic Papers*, 63 (1), 27-48.
- Vila, L.E., Pérez, P.J., and Coll-Serrano, V. (2014). "Innovation at the workplace: Do professional competencies matter?", *Journal of Business Research*, 67 (5), 752-757.
- von Wachter, T., and Bender, S. (2008). Do Initial Conditions Persist between Firms? An Analysis of Firm-Entry Cohort Effects and Job Losers Using Matched Employer-Employee Data. In S. Bender, J. Lane, K. L. Shaw, F. Andersson, and T. von Wachter (Eds), *The Analysis of Firms and Employees. Quantitative and Qualitative Approaches* (pp. 135-162). National Bureau of Economic Research.
- Williams, D.R. (2006). The Economic Returns to Multiple Language Usage in Western Europe. IRISS Working Paper 2006-07, CEPS/INSTEAD, Differdange, Luxembourg.
- Zax, J. S., and Rees D.I. (2002). "IQ, academic performance, environment and earnings", *The Review of Economics and Statistics*, 84 (4), 600-616.

Zetterberg, J. (2005). Swedish evidence on the impact of cognitive and non-cognitive ability on earnings – an extended pre-market factor approach. Working Paper Series. IFAU – Institute for Labour Market Policy Evaluation. N° 2005:16.