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EDUCATIONAL MISMATCH IN ITALIAN AND EUROPEAN LABOUR MARKETS (STARTING FROM THE UK)

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SYNOPSIS

The present doctoral thesis is structured as a collection of three essays.

The first essay, "SOC(HE)-Italy: a classification for graduate occupations" presents the conceptual basis, the construction, the validation and the application to the Italian labour force of the occupational classification termed SOC(HE)-Italy. I have developed this classification under the supervision of Kate Purcell during my period as a visiting research student at the Warwick Institute for Emplyment Research. This classification links the constituent tasks and duties of a particular job to the relevant knowledge and skills imparted via Higher Education (HE). It is based onto the SOC(HE)2010, an occupational classification first proposed by Kate Purcell in 2013, but differently constructed. Page 7.

In the second essay "Assessing the incidence and wage effects of overeducation among Italian graduates using a new measure for educational requirements" I utilize this classification to build a valid and reliable measure for job requirements. The lack of an unbiased measure for this dimension constitutes one of the major constraints to achieve a generally accepted measurement of overeducation. Estimations of overeducation incidence and wage effects are run onto AlmaLaurea data from the survey on graduates career paths. I have written this essay and obtained these estimates benefiting of the help and guidance of Giovanni Guidetti and Giulio Pedrini. Page 83.

The third and last essay titled "Overeducation in the Italian labour market: clarifying the concepts and addressing the measurement error problem" addresses a number of theoretical issues concerning the concepts of educational mismatch and overeducation. Using Istat data from RCFL survey I run estimates of the ORU model for the whole Italian labour force. In my knowledge, this is the first time ever such model is estimated on such population. In addition, I adopt the new measure of overeducation based onto the SOC(HE)-Italy classification. Page 145.

These essays are based onto elaborations on Istat data from the labour force surveys (RCFL) and the survey on Italian professions. Elaborations under my responsibility, usual disclaimers apply. The first two essays are based on AlmaLaurea data from the graduates career paths survey. Usual disclaimers apply.

SOC(HE)-Italy: a classification for graduate occupations

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Abstract. This essay presents an application to the Italian labour force of the British SOC(HE) classification for graduate occupations. In order to achieve this goal, the classification is replicated, using methodology that differs slightly to take account of differences in existing Italian data, to construct SOC(HE)-Italy. This classification allocates each of the official 800 Italian job titles to four occupational categories distinguishing between 'graduate' and 'non-graduate' groups on the basis of their relative levels of knowledge and skills requirements. It is then validated using RCFL and AL data and used to analyze changes in the Italian occupational structure that occurred soon before and after the financial crisis that took place in 2008, and to compare the Italian structural trends and the British ones. This analysis reveals that the decrease in the utilization of highly qualified labour in the Italian labour market started before the beginning of the ongoing recession, which contradicts the findings of analyses reported in pre-existing literature.

JEL classification: I2, J2

Key words: higher education, occupational classification, skills, graduate labour market.

Acknowledgments. This essay has been written relying on elaborations on AlmaLaurea data: we are grateful to Andrea Cammelli, Angelo Di Francia and Silvia Ghiselli for their support and their useful comments and suggestions. We also greatfully thank Pietro Scalisi and Francesca Gallo from Istat, the Isfol personnel and Marco Ruffino for their precious support. We also have utilised data from the Istat survey on Italian professions and from the Istat survey on Italian labour force (RCFL): elaborations on these data have been run under our responsibility. Usual disclaimers apply.

Introduction

In this essay the utilization of highly qualified labour in advanced economies is analyzed both in terms of incidence and in terms of returns to education. The former approach focuses on changes in national occupational structures including investigation of the creation or evolution of new and pre-existing jobs, while the latter emphasize the explanatory role wages play when analyzing the fit between supply of and demand for qualified labour. In Italy, studies on the topic (AlmaLaurea, 2012; Cnel, 2012) directly apply the national occupational classification which is based on the conceptual basis embodied in the Isco88 structure. Following this international standard, Italian occupational groups and job-titles are ranked according to assessment of the level of skill required to undertake them effectively, grouped into eight aggregated skill levels that define eight occupational Major Groups. Changes in the distribution of the employed labour force over these groups are monitored so that, for example, the expansion over time of the first two or three groups is taken to indicate increased demand for highly skilled labour. Although educational qualifications are included in the criteria applied in classifying occupations, neither Isco and the Italian classification refer solely to the knowledge and skills imparted in Higher Education (HE) when establishing the skill level of the professions they rank. Reference is also made to the required work experience and the nature of the tasks and duties typically associated with that job. As a consequence, occupational classifications cannot be applied when trying to distinguish between 'graduate' and 'non-graduate' jobs in order to assess changes in the occupational structure or assess the extent to which graduates are or are not entering appropriate employment for people with their qualifications.

In recognition of the need to monitor the impact of HE expansion and its impact on occupational change and opportunities available to labour market entrants, a new classification of occupations, named SOC(HE) has been developed for the UK by Elias and Purcell (2004; 2013) to investigate the relationship between the knowledge and skills acquired in HE and the jobs they were entering in their early careers. As part of my PhD research, working with Elias and Purcell, I have developed a new measure, SOC(HE)-Italy, based on the original SOC(HE) but differently constructed, to analyze changes that have occurred in the Italian occupational structure between 2004 and 2010 and aiming at a comparison with the trends recorded in the pre-existing literature before and after the financial crisis that took place in 2008. Paragraph §1 introduces SOC(HE) and its conceptual basis along with a brief review of some theoretical issues concerning occupational classifications and their applications. In paragraph §2 we present an in-depth

description of the construction of SOC(HE)-Italy and the relative validation on Istat and AlmaLaurea data. Paragraph §3 contains the analysis of the changes occurred in the Italian occupational structure and a brief comparison with the British case.

1. Classifying occupations and measuring skills

It is hard to evaluate changes in the occupational structure generated by economic growth and technological development without reference to the occupational classifications. These last ones, in turn, are affected and somehow distorted by those same changes they intend to capture, measure or describe. In fact, the advent of knowledge society quickened such transformations with the appearance of new jobs or the alteration of the cognitive contents and the tasks typically associated with some pre-existing professions. More specifically, many jobs traditionally considered as manual labour have come to encompass a number of immaterial tasks with higher levels of skill or knowledge requirements (Kochan et al., 1999). On the other hand, massive updates resulting in radical transformations of these classifications can actually hamper the possibility to build consistent time series and are often opposed by operators, such as employment offices. Strategies to combine these two opposing needs has brought in many cases (Gallo et al., 2007; Elias and Purcell, 2004; 2013) to integrate rather than substituting traditional instruments with new classificatory tools, which were shaped to put in relationship jobs and their relative cognitive contents. Referring to knowledge society and graduates' labour market, the aim is to

> "…put 'the knowledge society' under the microscope by looking at the jobs that graduates do and the knowledge required to do them." (Elias and Purcell, 2013)

Broadly speaking, many attempts were made to synthetize the new occupational and skill structures and the need to make reliable comparisons between countries led to describe few and highly aggregated major groups, anyhow identified. Reich's (1991) "three jobs of the future" are a good example of such aggregations: Americans, according to this view, would have been employed only as "symbolic analysts", in "in-person services" or as "routine production workers". The conceptual basis of these three categories is very close to embody the distinction between different utilizations of knowledge on the job. Especially the first and last category are referred exclusively to the nature of the job and the *type* of utilization of knowledge the job requires. Symbolic analysts are those workers who produce or manipulate knowledge, often exposed to international competition and asked to find

innovative solutions. Routine production workers are, at the other extreme, those employed in routine and non-knowledge intensive tasks, corresponding to the old "blue collar" professions, upgraded and enriched with immaterial tasks as in Kochan et al. (1999) such as data entry, software re-coding, call centers, etc. Unfortunately, the second category of workers, those employed in in-person services, has no relations to knowledge utilization and consequently, cannot be subjected to the analysis we propose. Actually, Reich's intention was to rank jobs by sectors rather than by the use of knowledge and with reference to his three main categories of occupation it is relatively straightforward to identify three sectors ranked by innovativeness and global competition exposure. Following this perspective, Reich could be considered as precursor of Moretti's (2013) "three Americas": the first one (e.g. Silicon Valley) is highly dynamic and innovative and engaged as a forerunner in global competition. At the same time, the concentration of human capital in urban areas will act as a multiplier attracting in-person services, increasing their relative demand and thus raising employment and wages in all sectors; the second (e.g. the old "Rust Belt") is composed of those traditional productions exposed to and beaten by international competitors such as China and Brazil endowed with a relatively cheaper unskilled labour force; the last one is lying in between the two and will end up, sooner or later, getting promoted to the first one or relegated to the second one. All in all, Reich's view appears more evocative of job descriptions based on the relation between jobs and knowledge and it is, interestingly, consistent with recent studies aimed at describing different types of 'knowledge workers'. Brown et al. (2011) classified these as developers, demonstrators and drones: the first and last remarkably close to Reich's symbolic analysts and routine production workers. In fact, developers appear to be all but the most senior managers, researchers and professionals while drones are basically overeducated skilled workers employed in routine but immaterial tasks. However, all of the three knowledge workers share a common conceptual basis that relies in the utilization or dissemination of knowledge itself. Demonstrators are, in fact, defined following the same perspective as communicators or executors of pre-existing knowledge. Nonetheless, this taxonomy appears more oriented towards hiring standards than to the direct linking between knowledge imparted via higher education and knowledge and skills required to carry out a job. This is a limit one must take into account when analyzing graduate jobs because hiring standards may account for credential inflation or signalling rather than for cognitive contents associated with the assigned tasks. Thus, if our purpose is to develop a classification capable of assessing the direct relationship between the knowledge acquired via Higher Education (HE) and the knowledge used on the job, there is no way to avoid reference to the nature of the jobs we are classifying and the

cognitive contents (knowledge, skills and competences) they encapsulate. A job should then be defined as a graduate job only if it generally requires study on an HE undergraduate or higher-level course in order to be able to fulfill the tasks well. This is exactly the starting point from which Elias and Purcell developed the conceptual basis of the UK Standard Occupational Classification for Higher Education, known as SOC(HE), in 2004. SOC(HE) constituted a consistent application of these criteria. It received considerable attention among policy makers, analysts and careers advisers in the UK and its potential has also been explored with reference to Brazil, Portugal and India (Comin et al., 2010; Raffery and Dale, 2008; Basant and Mukhopadhyay, 2009; UUK, 2010; HEFCE, 2011; Figueiredo et al., 2011; Unni and Sarkar, 2011). Application of the original SOC(HE) to very different labour markets with substantially lower HE participation such as Brazil and India revealed the classification's limitations for international comparison and inspired the authors to develop a radically revised version, SOC(HE) 2010. The application of this revised classification to the Italian labour force thus constitutes a testing SOC(HE)2010 as a useful tool for comparative research between countries, as well as a potentially valuable way to investigate change in Italian graduate labour market trends.

1.1 Occupational classifications

Official occupational classifications based on the *International Standard Classification for Occupation* (Isco88 and its last update Isco08), such as the British SOC and the Italian CP, do recognize the need to define a job regardless the employees' characteristics and to link it to some extent to a certain level of skills. According to the International Labour Office (ILO) a job is defined as a set of tasks and duties actually performed or designed to be performed by one person, characterized by a high level of similarity. Since its very first attempts to suggest an international classification, ILO has in fact focused on the nature of the work performed and has gradually shifted the attention on the skills needed to competently perform it rather than on the economic sector of activity (e.g. the NACE sectors) or on the social position employees occupy as these dimensions tend to differ between countries and hamper classifications' comparability. Skills were in turn defined as the ability to carry out the tasks and duties of a particular job, articulated into two different dimensions, namely skill level and skill specialization. (ILO, 1990; 2012). Skill specialization refers to the concerned fields of knowledge and the economic sector. The level of skills required by a particular job refers, on the other hand, to the complexity and range of its constituent tasks and duties and the amount of formal and informal education

and work experience needed to competently perform them. The concept of skill level and its operationalization in the classification Isco88 represents the biggest innovation in ILO proposals and it is considered to be, along with political and historical facts[1], the major source of the increasing consensus and popularity of this international standard.

Table 1.1 Isco88/08 Major Groups and relative Skill Levels

	Major Groups	**Skill Level**	
		Isco88 (source: Elias, 1997)	Isco08 (source: Gallo et al., 2012)
1	Managers	-	3 – 4
2	Professionals	4	4
3	Technicians and associate professionals	3	3
4	Clerical support workers	2	2
5	Service and sales workers	2	-
6	Skilled agricultural, forestry and fishery workers	2	-
7	Craft and related trade workers	2	-
8	Plant and machine operators and assemblers	2	-
9	Elementary occupation	1	1
0	Armed forces	-	1 – 2 – 4

Although skill levels in table 1.1 are referred to Isced categories[2] as suggested by ILO, this doesn't imply that competences needed to carry out jobs encompassed in these Major

[1] Elias (1997) and Gallo and Scalisi (2012) attribute Isco88 success also to the larger involvement of national statistical offices, the adoption by the UK, Australia and EU, the collapse of Soviet Union and the consequent need for Eastern European countries to substitute the obsolete socialist classifications.

[2] Categories displayed in table 1.1 are referred to Isced76 classification that ranks qualifications as follow: Level 1, primary education; Level 2, secondary education; Level 3, Upper secondary

Groups are acquirable only via formal education, as they could be achieved through work experience as well (ILO, 1990). Moreover, skill levels are now further articulated into three operational measures: the nature of the work, the formal educational and vocational qualifications normally required to access the job and the less formal training or work experience. Formal education is neither the only possible measure of skill levels in order to define jobs in Isco08 nor the most important one:

> "The concept of skill level is applied […] giving more emphasis to the first of these operational measures, the nature of the work perfomed, than to the formal and informal education and training requirements." (ILO, 2012)

These circumstances actually limit the extent to which Isco08 structure is capable to proxy the level of utilization in the workplace of knowledge and skills acquired via HE. Many managerial occupations may, for instance, require more work experience than formal education and Major Group No. 1 cannot be thus defined as a group encompassing graduate jobs only. Therefore, there is room and need for new statistical tools to integrate official classifications in order to achieve our goal.

On the other hand, the Italian national statistical institute (Istat) acknowledged starting from the 1990s the developments of the last two Isco iterations and ILO definitions of job, job titles and skills. A job is now more broadly defined as a set of factual working activities performed by one person, entailing a system of knowledge, competences, identity and relationships. The Italian occupational classifications (CP) that followed Isco88 in 1991, 2001 and 2011 embodied the definition of skill and its articulation into skill level and skill specialization, thus applying the Isco conceptual basis. Although Italian CP2011 has less Major Groups compared to Isco08 (Isco Groups 6 and 7 are collapsed into one category), it fully applies the ranking of jobs based on the required level of skill, accounting also for the levels of autonomy and responsibility usually associated with professions, the assigned tasks and the field of specialization; where the first two allocate job titles vertically along the Major Groups and the last defines, horizontally, the relevant field of knowledge or economic sector (Istat, 2001). Since 2006 the Italian classification differs from the International standard in terms of the number of digits (5 rather than 4), with an additional level (named "*categoria*") between the 3-digit level ("occupational units" in Isco08 and "*classi*" in Italian CP) and the job titles, which now come to occupy the 5-digit level. This

education not giving a university degree; Level 4, tertiary education. We kept these categories unaltered although a new version of the classification (Isced1997) is available since 1997 and could be virtually applied to Isco08: this decision reflects the choice to directly compare Isco08 with the older Isco88 build when Isced76 was utilized.

iteration of CP2001 was termed NUP (*Nomenclatura Unità Professionali*) and constituted a basis for the development of the new version of CP, the CP2011. In the same year a study group with members from Istat and the Italian institute for vocational training (Isfol) run the first survey on Italian professions aiming at developing a new tool for linking the knowledge and skills required in a particular job and formal qualifications as articulated in the European Qualification Framework (EQF)[3]. This attempt to link directly the knowledge imparted via formal education and the knowledge used in the work place can be fully ascribed as part of the international debate on the integration of traditional classificatory tools to measure and describe changes in national occupational structures, with a specific focus on graduate jobs (Gallo et al., 2007). The major outcome of this study group consisted in a translation device that referred each of the 800 Italian job titles to a certain EQF level, and this is of much interest with respect to our goal to provide a new statistical tool or classification capable to measure the utilization of highly qualified labour in the labour market.

Before proceeding to present and discuss SOC(HE) and its Italian application it is salutary to consider the theoretical and statistical properties a classification should have in order to guarantee the robustness of the classified data[4].

a) *Reliability*. Information obtained from the same classification process but from different data or in different periods should produce consistent results, within a normal tolerance of statistical variation stemming from sampling procedures;
b) *Validity*. Variables measured in a given sample should therefore reflect the relative values in the population from which they are drawn without systematic bias. If it is known, for instance, from the 2011 census on Italian population that 18.7% of Italian workers are graduating, the corresponding purpose in the sample should not differ from this benchmark in a statistically significant way. These two first properties can be considered as part of a same concept named *technical derivation*: the extent to which methods adopted to obtain information from data are replicable;
c) *Theoretical underpinnings*. A classification should be as coherent as possible in relation to the theoretical concepts it intends to represent.

[3] The European Qualification Framework (EQF) consists in a transnational translation device and was issued by the European Commission in 2008 to make different national qualifications more readable across the continent and "promoting workers' and learners' mobility between countries and facilitating their lifelong learning" (Recommendation 111/2008). It relates all European national qualifications to 8 major levels, referring to knowledges, skills and competences acquired in their relative education/training processes. We will discuss more in depth this device in subparagraph §2.2

[4] Properties listed and summarized in this subparagraph refer to Elias (1997), Elias and McKnight (2001) and Goldthorpe (1988).

d) *Homogeneity/heterogeneity of the categories*. There should be a minimum level of homogeneity *within* the categories identified by the new classification and a reasonable level of heterogeneity *among* them, otherwise it would be hard to extrapolate useful information about patterned social or economic difference or trends..

When considering occupational classification, the consistency of coding procedures of job titles is a major concern. Elias (1997) reported results from seven studies which operated two different coding procedures on the same datasets and investigated the consistency of occupational allocations among these. These recoding studies highlighted how occupational coding can be described as an "inexact process" leading to significant differences according to the different types of coding procedure adopted. Nonetheless, disagreement among coders (or between coding procedures) often occurs at more disaggregated levels, resulting in different codes falling in the same Major Group. As a consequence, levels of agreement consistently increase with the level of aggregation, reporting on average less than 75% workers identically allocated at the 3-digit level (Occupational Units) and more than 85% at the 1-digit level (Major Groups). In the context of transnational comparability, this means that comparisons made at more detailed levels (e.g. 3-digit) are subject to constraints in this reliability and validity while comparing more aggregated levels (e.g. 1 and 2 digit) should benefit of a reasonable trust.

1.2 SOC(HE)

As discussed in Subparagraph §1.1 above, in the course of their research on graduate career paths, Elias and Purcell (2004) developed SOC(HE), an aggregate occupational classification to measure the extent to which highly qualified labour is utilized in the UK labour market. They based this classification on the British Standard Occupational Classification (SOC2000) in order to meet three major needs: referring to the nature of the work performed and its required skill/knowledge level (granted by Isco conceptual basis embodied in SOC); referring data to the national dimension avoiding long and costly additional data collection procedures (and thus relying on Labour Force Surveys data); enabling the construction of time-series indicators to evaluate evolutions in the occupational structure. Basically, building SOC(HE) consisted in allocating the 353 units groups of SOC2000 in two broad categories, "graduate" and "non-graduate" jobs, linking explicitly unit groups to formal qualification thus assessing that their relative tasks and duties required or not knowledge and skills, acquirable via HE only, to be competently performed. In the

first version, termed SOC(HE)2000, the "graduate jobs" category was further disaggregated into four subcategories on the basis of differences between age groups in terms of the share of graduates employed in such unit groups: *traditional graduate jobs*, comprising the established professions for which entrants are normally required to be qualified, such as solicitors, doctors and professors; *modern graduate jobs*, in which graduates have been employed since the educational expansion in the 1960s, such as managerial occupation, IT, Knowledge Intensive Business Services (Kibs) and creative vocational areas; *new graduate jobs*, which entry route has only recently changed and now requires candidates to have a degree, such as marketing and sales managers or physiotherapists; *niche graduate job*, representing the boundary between 'graduate' and 'non-graduate' professions and where the majority of incumbents do not possess a HE title but with stable and increasing niches normally only accessible to specialists trained via HE, like nurses, midwives, hotel managers, etc. This taxonomy, properly validated, allowed to measure with time-series the expansion in the utilization of graduate labour during the 1980s and 1990s. According to SOC(HE)2000, more than 35% of the British labour force was employed in a graduate job in the year 2000, 10% more than in 1975. This increase was due to the stable and consistent growth in jobs belonging to 'modern graduate' and 'new graduate' groups, boosted by technical and organizational change that accompanied the advent of the *knowledge society*.

Despite the above mentioned raised interest and the applications to other national contexts, Elias and Purcell (2013) were concerned about the sustainability over time of such conceptual bases, rooted in statistical thresholds subject to further changes, as graduates continued to crowd the labour market ending up being employed even in jobs and sectors which could hardly be defined as requiring HE preparation. All in all, the operational definitions of the SOC(HE)2000 categories seemed to insufficiently translate the need to focus on the nature of the job and the assigned tasks, capturing market realizations that could account, like in Brown et al. (2011), for hiring standards and qualification inflation as well. Simultaneously, the need to make this analytical method more transferable across nations suggested to base it onto the relationship between "higher education, knowledge development and its labour market application", focusing on the *type* of use of knowledge made on the job post.

Reference was made to three clusters of competence identified in a previous study (Purcell et al., 2004) in which 220 British graduates were interviewed seven years after graduation to assess the nature of their work with respect to tasks, responsibilities, interpersonal

relationships, knowledge and skills. These clusters were termed ‘knowledge’, ‘strategic skills’ and ‘interactive skills’ and re-defined in the new classification as:

a. *Specialist expertise deriving from HE knowledge*. This is basically “detailed knowledge and/or skills for which the normal foundation is an undergraduate degree course and where these are continually being exercised, developed and/or refined in practical and/or theoretical terms”;
b. *Orchestration expertise*. Based on “high-level competence based on knowledge and skills that may have been developed either in HE or through experience (and most often, both of these). It incorporates the ability to draw together knowledge and knowledge-holders, to direct and co-ordinate activities, assess alternatives, evaluate risks and influence or make high-level decisions on the basis of available evidence”;
c. *Communication expertise*. Consisting in knowledge and skills, normally involving well-developed interactive skills, concerned with the exercise of high-level competence in the communication and dissemination of knowledge, ideas and information, between individuals, within groups, or for mass-production or consumption, delivered in person or using digital media.” (Elias and Purcell, 2013)

Each job, at the the 4-digit unit group of SOC2010 was assigned a score on a 1-9 scale for each of these three dimensions, according to the degree of utilization it required of these abilities and considering a minimum score of 6 as indicative of a level of knowledge or skills normally imparted via HE. The scoring methodology can be described as a qualitative job analysis carried out separately by researchers, who then debated and resolved differences where their scores differed on the basis of information contained in the official classifications coding manuals. Unit groups not scored at six on any of the dimensions were classified as non-graduate jobs and those where the score on one or more was six or above were thus allocated to one of the following three occupational categories, according to the highest score or, in the few cases where two were equally high, the one that defined their capacity to do obtain the job. The categories were as follows:

Experts: workers in knowledge-intensive occupations, requiring the utilization and production of specialist HE knowledge and skills. Hiring standards and the capacity to competently perform tasks and duties associated with such jobs, are directly related to possession of specialist knowledge and/or high level skills. Examples include solicitors, civil and mechanical engineers and chemical and physical scientists.

Orchestrators (or Strategists): workers often employed in managerial activities and required to orchestrate their knowledge and the knowledge of others to "evaluate information, assess options, plan[s], make decisions and co-ordinate the contributions of others to achieve objectives" (Elias and Purcell, 2013). Managers and directors are Orchestrators, which includes also national and local government senior administrative occupations, senior officers in the police force and in other public sector areas.

Communicators: workers employed in media, advertising and teaching whose major activity consists in transmitting knowledge or information to others. These jobs entail substantial use of interactive skills, were they "interpersonal skills, creative skills or high-level technological knowledge, capacity to access and manipulate information and/or an understanding of how to communicate information effectively to achieve objectives" (*ibid*). The Communicator category includes journalists, actors, public relation professionals and graphic designers.

2. SOC(HE)-Italy: construction and validation

The measure of the degree of utilization of highly qualified labour in the Italian labour market we wanted to develop was subject to a number of caveats:

1. It should relate to both the nature of the work and the required knowledge and skills needed to perform it, assessing the extent to which this knowledge and the skills were normally acquirable via HE; it should not relate to personal characteristics of the job post holders such as age, gender, or to the salary levels and occupation. References to such dimensions can, in fact, divert our focus from the nature of the jobs we want to analyze to a concern with the economics, social or political dynamics of job allocation, where the qualifications candidates are required to possess in order to be appointed, may reflect credential inflation or cultural capital (Bourdieu and Passeron, 1968) rather than job-related variables;
2. Each category should have clear criteria and boundaries, to minimise coding disagreement and achieve an acceptable level of reliability and comparability with the applications of the same criteria to other national labour forces; it should be easy to develop, without the need for additional data collection, based on national microdata with the highest possible degree of reliability. This is crucial for a measurement that allow us to build time-series indicators with reference to each country.

The choice to build an application of SOC(HE)2010 to the Italian labour force is motivated by its conformity to these criteria. Firstly, the SOC(HE)2010 classification is not vulnerable to accusation that supply and demand fluctuations contribute to allocation of jobs to graduate or non-graduate classification to the extent that SOC(HE)2000 was, whereby over-supply of highly qualified labour changed the qualification profile of previously non-graduate jobs. Secondly, the allocation of each of the 800 Italian job titles to one of the four occupation categories of SOC(HE)2010 (Experts, Orchestrators, Communicators and Non Graduate Jobs) make it consistent with the conceptual basis embodied in Isco08 and consequently in the Italian Occupational Classification (CP) in which the ranking of professions is established on the basis of their relative skill level and skill specialization. Thirdly, the allocation to 'graduate' and 'non-graduate' categories makes explicit reference to the formal education required to carry out the tasks and duties associated with the concerned job title enabling us to directly assess which jobs require HE to be competently performed. Finally, data from Italian labour force survey (RCFL) and from AlmaLaurea database (a consortium of 64 Italian universities that surveys graduates career paths) are consistent with the above mentioned needs as they are easily available, referred to the national dimension and code professions utilizing CP2011 and its predecessors CP2001 and NUP, the CP2001 iterated and modified version issued in 2006.

The procedure followed by Elias & Purcell to allocate each SOC2010 unit group to one of the four categories consisted, as noted above, in a qualitative on-desk assessment based on information contained in SOC2010 classification resulting in a score on a 1-9 point scale. This procedure is not feasible when applying SOC(HE) to Italian professions as economic, social and cultural differences greatly limit the extent to which job descriptions are transferable across countries. Moreover, Italian occupational classifications contain less information than the UK SOC as they make no reference at all to the formal or informal education workers in a particular job should possess and this fact could limit the extent of agreement when assessing whether the knowledge and skill utilized in the job place were to be acquired through the HE system. We thus developed an allocation strategy which makes direct reference to the skills and competences that the job-holders need to carry out their job. This arguably constitutes a 'purer' variant of the original Elias and Purcell exercise, uncontaminated by the relationship between knowledge, skills and credentials assumed by

the UK classifiers and researcher bias[5]. We utilized data from the Isfol-Istat survey on Italian professions mentioned in subparagraph §1.1 (Gallo et al., 2007).

2.1 Isfol-Istat survey on Italian professions and variables re-aggregation

In 2006, a study group composed by members from both Isfol and Istat ran the first survey of Italian professions aiming to assess which skills and to what extent were utilized in the labour market/workplace. 16,000 workers were interviewed and asked to assign a score to 255 variables on a 1-100 point scale in terms of complexity of the knowledge, skill or competence associated with the tasks of their particular job. These 255 variables were borrowed from the O*Net[6] taxonomy and covered 7 areas: Knowledge (33 questions), Skills (35 questions), Attitudes (52 questions), Values (21 questions), Working styles (16 questions), Generalized working activities (41 questions) and Working conditions (57 questions). Scores were thus aggregated in the seven clusters and an average score was computed for each of the 800 Italian job titles at a 5-digit level in all of these clusters.

We selected the 109 variables contained in the three areas that described knowledge, skills and tasks/competences (Knowledge, Skills and Generalized working activities) and proceeded to disaggregate them. Thus, we allocated each of these 109 variables to one of the three clusters of competence of the SOC(HE)2010: *Specialist expertise deriving from HE knowledge* (labelled EXP), *Orchestration expertise* (labelled STR) and *Communication expertise* (COM). The results of this aggregation of Knowledge, Skills and Generalized working activities are fully reported in Appendix 1.

[5] Although of course it is susceptible to respondent bias, which might be expected to amplify the extent to which skills are required.

[6] O*Net (Occupational Information Network) is an American on-line occupational database designed in the 1990s to organize, describe and spread data on employment, jobs, skills shortages, professional profiles and individual characteristics facilitating the matching of demanded and supplied skills. O*Net embodies the advantages of SOC classification and the implementation of the system took large account of the indications emerged from the SCAN (Secretary's Commission on Achieving Necessary Skills) works, such as the distinction within the three types (basic, thinking and personal) of *soft skills*: *basic skills* (reading, writing, arithmetic, comprehension and expression), *thinking skills* (creative thinking, problem solving, etc..) and *personal qualities* (responsibility, sociability, etc...). It is divided into six dimensions: *Experience Requirements*, *Occupation Requirements*, *Occupation Specific Information*, *Occupation Characteristics*, *Worker Characteristics* and *Worker Requirements* (see Peterson et al., 1999 and IRSO, 2000).

2.2 EQF Level

By this stage we had some 109 variables with their relative 'complexity score' for each of the 800 job titles. For each profession, we computed a mean of all of these 109 variables. Thus, we selected as 'core variables' only those variables exceeding a standard deviation from this average value.

For instance, for Physical scientists (code 2.1.1.1.1 in the NUP) the threshold of a standard deviation was set at 81.51 and the exceeding selected variables included physics, mathematics, science and mechanics in the EXP cluster; creative thinking and updating and review the relevant knowledge in the STR cluster; and, finally, reading comprehension, speaking and writing in the COM cluster.

We thus computed the average score for the selected variables in each cluster for each job title. Continuing our example run on Physical scientists (2.1.1.1.1) this meant that the three clusters EXP, STR and COM measured respectively 91.29, 86.50 and 87.50.

In order to assess whether these complexity scores represented a skill level acquirable via HE only, we wanted to translate our 1-100 point scale into the 8 levels of the European Qualification Framework[7], in which Level 6 and Level 7 indicate respectively a university degree and a master degree. We borrowed from Isfol/Istat methodology, which postulate a linear progression in skill levels from EQF Level 2 to EQF Level 7 thus running a simple proportion between the two scales.

EQF levels computed accordingly for Physical scientists (2.1.1.1.1) were 7.30 for the EXP cluster, 6.92 for the STR cluster and 7.00 for the COM cluster.

We established as allocation rule to select the highest of these three score (7.30) to represent the job title (EQF Level 7 = Master Degree) and allocated the profession (Physical scientists) in the occupational category corresponding to its relative cluster (Experts).

[7] The 8 EQF levels are summarized in table A.2 in Appendix 2.

Table 2.1 EQF Levels and Occupational category for Physical scientists (2.1.1.1.1) according to SOC(HE)-Italy

NUP Code	Job Title	Experts EQF	Orchestrators EQF	Communicators EQF	Highest EQF Score	Major Group
2.1.1.1.1	Physical scientists	7.30	6.92	7.00	Experts (7.30 = EQF Level 7)	EXP

Appendix 3 contains EQF Levels and SOC(HE)-Italy Occupational Category for each 800 Italian job titles as displayed in the example in Table 2.1. Nonetheless, not all Italian job titles have a corresponding score in all of the three clusters. In fact, for some professions there could be no variables exceeding the standard deviation for a given cluster: Dental technicians (3.2.1.3.2), for instance, do not have a score for the COM cluster.

2.3 Validation on RCFL data and AlmaLaurea survey data

Validating a measure consists in testing whether it is consistent with other measures of the same phenomenon (construct validation) and whether its conceptual basis has been appropriately applied (criterion validation). These tests reflect directly properties listed in subparagraph §1.1.

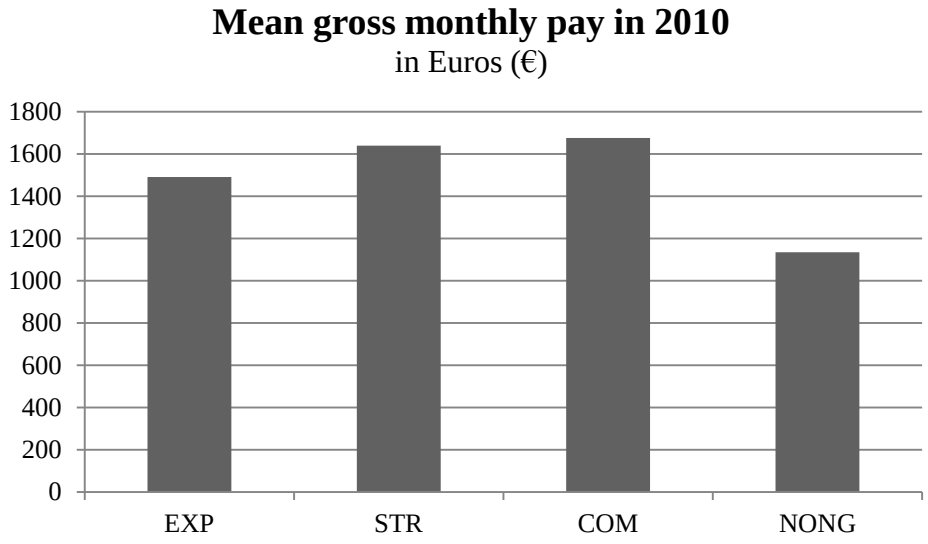
Given that the application of SOC(HE)-Italy requires occupation information contained in official classifications we relied onto two data sources in which the NUP (the iterated and modified version of CP2001) was utilized: the Istat survey on Italian labour force (RCFL) and the AlmaLaurea survey on graduates' occupations (AL). RCFL survey is run by Istat continuously on 250,000 families (more than 600,000 individuals) settled in 1,100 Italian municipalities. RCFL collected occupational information from the resulting stratified sample utilizing CP2001 and NUP in all quarters between 2004 and 2010. To our purposes, individuals in the sample were relevant only if employed and with a valid occupational code: this fact restricted the sample to 58,190 respondants: 34,156 males and 24,034 females. Although there are available data concerning more recent quarters (from 2011 to 2013) our choice is to test our measure on the period 2004-2010 in order to evaluate structural change occurred soon before and after the financial crisis that took place in 2008. Moreover, data collected in quarters from 2011 to 2013 utilized the new CP iteration (CP2011) instead of the NUP, the classification on which Isfol and Istat run their survey on professions in 2006. On the other hand, AlmaLaurea is a consortium of Italian universities that analyses graduates' career paths interviewing them at the time of graduation and then 1,

3 and 5 years later. In our application we must therefore refer to the last cohort whose information is fully available, namely the cohort encompassing individuals who graduated in 2007. The population is composed by those who earned either a master's degree or a five/six-year university degree, such as Law and Medicine respectively, and responded to all of the survey waves up to 2012. This consists in 31,162 graduates from 46 Italian universities. Restricting our sample to relevant respondents (employed individuals with a valid occupation code) we investigated 18,269 graduates.

a. Construct validation

To test the construction of SOC(HE)-Italy we assessed the extent to which workers employed in professions which we ranked as graduate jobs (Experts, Orchestrators and Communicators) appeared to have achieved an earning premium compared to those in non-graduate jobs. The rationale of this test is to compare two alternative definitions of graduate job: a job for which workers must have knowledge and skills imparted via HE (the conceptual basis of our measure) versus a job in which graduates are rewarded for their higher human capital endowment.

Figure 2.1 Mean gross monthly pay for SOC(HE)-Italy groups
(Source: our elaborations on Istat RCFL data)



On average, workers employed in one of the three graduate jobs categories earned 1,602€ per month compared to 1,135 € earned by those employed in the non-graduate group. Communicators appeared to achieve the highest earnings (1,676 € mean gross pay per month): apparently 47.7% more than non-graduate occupations, Experts achieved least with an average of 1,491€: a premium of 31.4%. Finally, Orchestrators earned 44.4% more than those employed in non-graduate occupations (1,639 € on average).

To test whether these differences in means were statistically significant we estimated two specifications of a semi logarithmic wage equation model in which the natural logarithm of the gross monthly pay (lnW) relates to being employed in one of the four groups (Experts, Orchestrators, Communicators and Non-graduates). Specification (2) in Table 2.3 includes additional controls (gender, age, job tenure, economic sector and territorial district) omitted in specification (1)[8]. Both specifications include dummy variables for being employed in Experts, Orchestrators and Communicators, omitting the dummy variable for Non-graduates occupations which are thus adopted as benchmark.

Table 2.2 Earning premia in 2010 for Experts, Orchestrators and Communicators (source: our elaborations on Istat RCFL data, controls omitted in table, see Appendix 4)

	(1)	(2)
	lnW	lnW
Experts	0.2884***	0.2082***
	(0.0056)	(0.0044)
Orchestrators	0.3475***	0.2858***
	(0.0218)	(0.0167)
Communicators	0.4010***	0.2535***
	(0.0072)	(0.0058)
N	42720	42720
R^2	0.108	0.479
adj. R^2	0.1082	0.4786

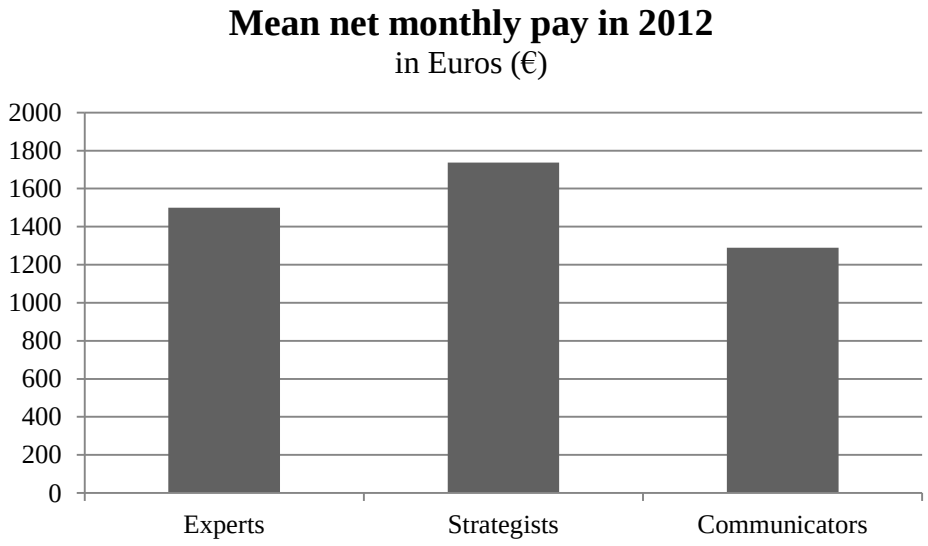
Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; Omitted variable: Non-graduates jobs

Earnings premia are significant and range from 28.84% to 40.10% in specification (1) where only dummy variables associated with the SOC(HE)-Italy groups are included in the

[8] For complete model and variables descriptions see Appendix 4.

regression model and decrease to 20.82% - 28.58% when adding further controls in specification (2)[9]. We can conclude that there is a relationship between pay and the high levels of knowledge and skills encompassed in the SOC(HE)-Italy occupational groups for graduate jobs. In other words, our definition is consistent with the alternative definition of graduate job and the construct is valid. Furthermore, it is worth noting how Orchestrators earn the highest premium after controls, reflecting the higher wages for Communicators in specification (1) attributable to other individual (age, gender, work experience) or job (economic sector and territorial district) characteristics. This fact is consistent with empirical evidence from AlmaLaurea data on mean net monthly pay, in which Communicators earn, on average, less than any other occupational group (and also consistent with the analyses conducted by Elias and Purcell of recent UK graduates who entered the labour market in 2009-10). In the workforce as a whole, the distribution of Orchestrators is skewed towards the upper age ranges, whereas that of Communicators to the lower end, whereas the distribution of Experts comes closer to that of the labour market as a whole.

Figure 2.2 Mean net monthly pay for SOC(HE)-Italy groups
(Source: our elaborations on AL data)



[9] Regressors associated with dummy variables representing employment in our four occupational groups, given the semi logarithmic nature of the model, are to be interpreted as the percentage variation of the gross monthly pay as consequence of being employed in such occupational groups. The dummy variable associated with being employed in non-graduate jobs (NON-G) is omitted in both specifications for collinearity reasons. Thus, parameters associated with Experts, Orchestrators and Communicators come to represent the percentage difference of the relative gross monthly pay and the mean gross monthly pay of workers employed in non-graduate jobs.

b. Criterion validation

AlmaLaurea (AL) data are also important when validating the criteria of SOC(HE)-Italy. In fact, questionnaires utilized in AL survey include at least three questions explicitly linked to the conceptual basis of the classification. These are question A16 ("Do you make use of the skills acquired in your Master degree course in your current job?"), A17 ("Is the master degree you hold required for your current job?") and A17LS ("Are knowledge and skills acquired during your Master degree course useful to competently perform your current job?").

Table 2.3 Responses to question A16 aggregated by SOC(HE)-Italy groups (source: our elaborations on AL 2012 survey data)

A16 "Do you make use of the skills acquired in your Master degree course in your current job?"				
	Experts	Orchestrators	Communicators	Non-Graduates
Yes, a lot	74	46	69,5	48,7
Yes, a bit	19,6	42,7	21,6	33,5
Not at all	6,4	11,3	8,9	17,8

As shown in Table 2.3, graduates in AL survey who have been allocated to the three graduate job groupings of the SOC(HE) stated that they were making use of the skills acquired via HE in the 91% of cases on average, ranging from 88.7% (Orchestrators) to 93.6% (Experts). This result is well above the corresponding outcome for those employed in non-graduate jobs (82.2%), among which almost one in five complained about the poor utilization of his/her skills in the workplace (17.8%). These findings are reinforced by evidence from Table 2.4 that summarizes respondents' self-assessment on the appropriateness of their Master degree with respect to their current job.

When focusing on qualification requirements, the gap between graduate and non-graduate jobs is even larger when considering the difference in means. In fact, individuals employed in the Non-Graduate group stated their educational title was required, legally or actually, in only 43.1% of cases, compared to the higher average propensity (57.7%) in the other three groups.

Table 2.4 Responses to question A17 aggregated by SOC(HE)-Italy groups (source: our elaborations on AL 2012 survey data)

A17 "Is the master degree you hold required for your current job?"	Experts	Orchestrators	Communicators	Non-Graduates
Yes, it is legally required to be hired	55,4	13,9	50,5	24,6
It isn't legally required but in fact it is	16,8	25,1	11,6	18,5
It is not required but still it is useful	22,8	52,7	30,2	42,9
It is neither required nor useful	4,9	8,2	7,6	13,9

Not surprisingly, there is a vast gradient in terms of responses between different graduate groups as only 39% of Orchestrators tend to consider their qualification as needed for their current job. This share is even lower than that recorded for Non-graduates and this could be due to the fact that professions dealing with 'orchestration expertise' have only recently started to employ graduates, being the relative hiring standards oriented more towards working experience than to formal education, as above argued. On the other hand, this group has the highest share of workers considering a Master's degree as useful on the job, re-equilibrating the final evidence of only 8.2% stating to be not requiring or using their skills, compared to 13.9% of those in Non-graduate jobs.

Table 2.5 Responses to question A17LS aggregated by SOC(HE)-Italy groups (source: our elaborations on AL 2012 survey data)

A17LS "Are knowledge and skills acquired during your Master degree course useful to competently perform your current job?"	Experts	Orchestrators	Communicators	Non-Graduates
Having a Master degree is fundamental to carrying out my job	31,3	16	17,4	17,8
Having a Master degree is useful in carrying out my job	47,1	56,3	50,7	44,9
An undergraduate course would be sufficient preparation to carrying out my job	16	18,9	21,4	21,2
To perform my job secondary education qualifications are sufficient	5,4	8,7	10,2	16,2

When reference is made to both knowledge and skills, all of the three ‘graduate jobs’ groups report low proportions of workers stating they are underutilizing knowledge and skills acquired during HE (equal to or below 10%) while those in ‘non-graduate’ occupations report one out of six workers in such situation. All in all, graduates surveyed by AlmaLaurea who were employed in SOC(HE)-Italy ‘graduate occupation’ groups, report a higher propensity to utilize skills acquired in HE, to be hired in more demanding and better paying jobs than those in the ‘non-graduate’ category and, finally, are less likely to be under-employed 5 years after graduation. Together, these findings constitute a consistent endorsement of the classification.

3. Labour market trends: the evolution of the Italian occupational structure measured with SOC(HE)-Italy

Having established that SOC(HE)-Italy is a valid measure for the utilization in the labour market of knowledge and skills mainly imparted via HE and that it may be relied upon to distinguish and classify graduate and non-graduate jobs, it can be applied to the Italian labour force to assess its structural trends. Before doing this, it is useful to describe recent trends for both employment and unemployment. Fig. 3.1 shows, in thousands, the total employment and the total unemployment between 2004 and 2010. It is noticeable how the total unemployment reaches its minimum and starts increasing in 2007, one year before the total employment reaches its peak. This fact can be explained by a significant increase in the total active population with new entrants experiencing difficulties finding a first job, as highlighted by Cnel (2012).

Figure 3.1 Total employment and total unemployment between 2004 and 2010, in thousands (Source: our elaborations on I.Stat data)

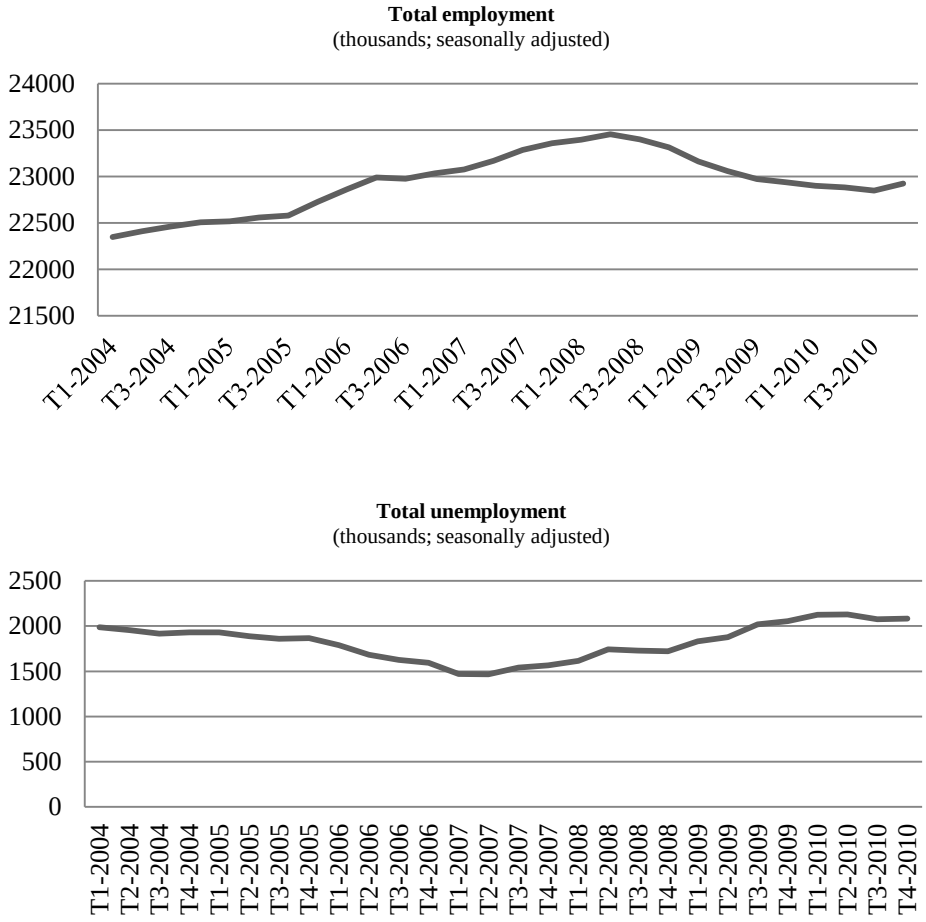
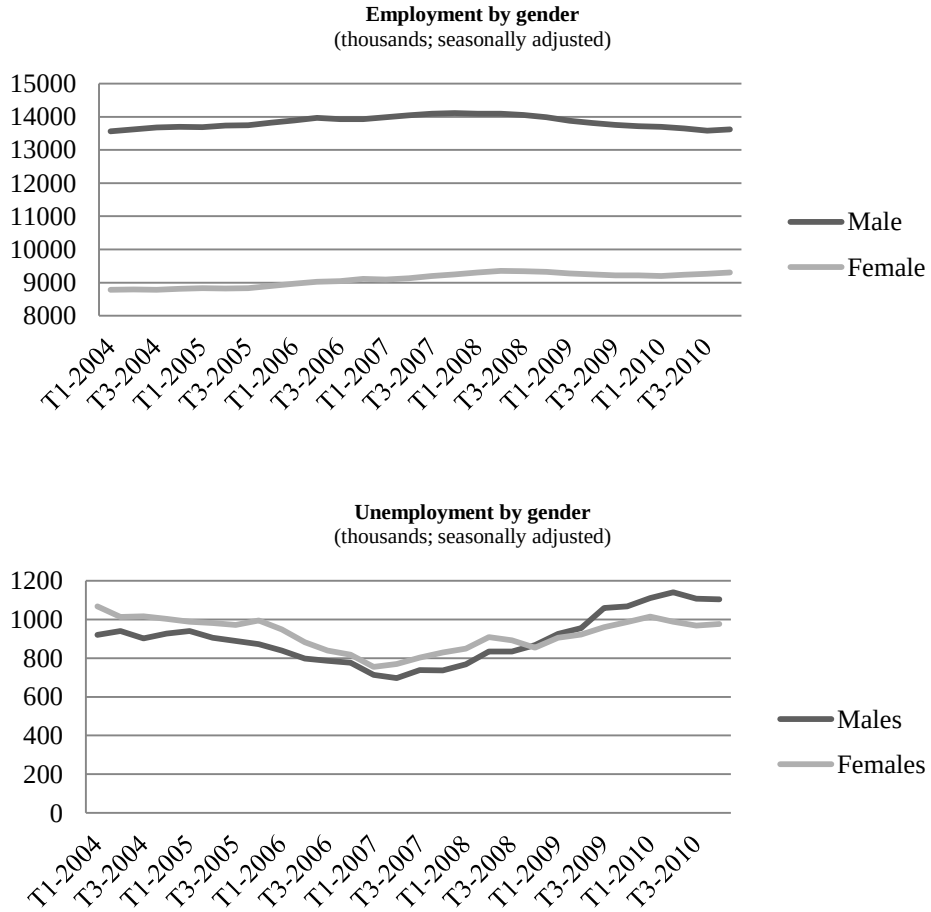


Fig. 3.2 shows employment and unemployment by gender. Female workers seem to have better performed than men soon after the crisis by increasing rather than decreasing both their participation in the labour market and the total number of employed employees. Moreover, females unemployment increased at a lower rate compared to that of men since 2007, leading to a dramatic overtaking between the end of 2008 and the beginning of 2009. This fact has been termed "the additional worker phenomen" by Cnel (2012), pointing out how the recession has forced many previously inactive women to enter the labour market because of the worsening budget constraints of their relative households[10].

Figure 3.2 Employment and unemployment by gender between 2004 and 2010, thousands (Source: our elaborations on I.Stat data)



[10] This is especially true in the south of Italy, where the participation of women in the labour market has always been poor.

Table 3.1 shows percentages of the four occupational categories in the years from 2004 to 2010. Graduate jobs tend to have increased their relative share up until 2007 when a break takes place: from this peak (32.72%) graduate jobs as defined by SOC(HE) decrease until the end of the period where they come to represent a share of the labour force which is more or less equal to its starting value (29%). This trend is consistent to a certain degree with previous studies that employed different definitions of 'graduate jobs', such as the reports issued by Cnel (2012) and AlmaLaurea (2012). But still there are two significant differences. First: the SOC(HE)-Italy measurement for graduate occupations lies between the two. This is reassuring if we assume that estimates by Cnel and AlmaLaurea were respectively upward and downward biased, given that they ranged between 33.8% - 37.3% and 17% - 19%. Nonetheless, Cnel and AlmaLaurea based their measures on NUP classification as we did but in these cases the NUP was not deconstructed, with their component criteria disaggregated as we have done above. NUP occupational groups were taken *per se* as a proxy for the utilization of skills and labelled as 'high', 'medium' and 'low' skilled professions. As occupational groups in the NUP do not account for formal education only (as argued in subparagraph §1.1) but also for work experience and other job characteristics, we can conclude that Cnel and AlmaLaurea actually measured something different from what we did. Second: when comparing the three time-series built onto SOC(HE), Cnel and AlmaLaurea indicators it is worth noting that the first two reach their peaks in 2007 while AL reaches its peak in 2008. In other words, our measure reinforces the evidence highlighted by Cnel (2012) that the downturn in the Italian graduate labour market preceded the financial crisis that took place in 2008. It is not clear, however, whether the following recession has just exacerbated a decreasing trend or whether it has hampered the possibilities of a full recovery that may have taken place *ceteris paribus* in more propitious circumtances.

Figure 3.1 Evolution of Italian occupational structure by SOC(HE)-Italy groups (2004-2010) (source: our elaborations on Istat RCFL data)

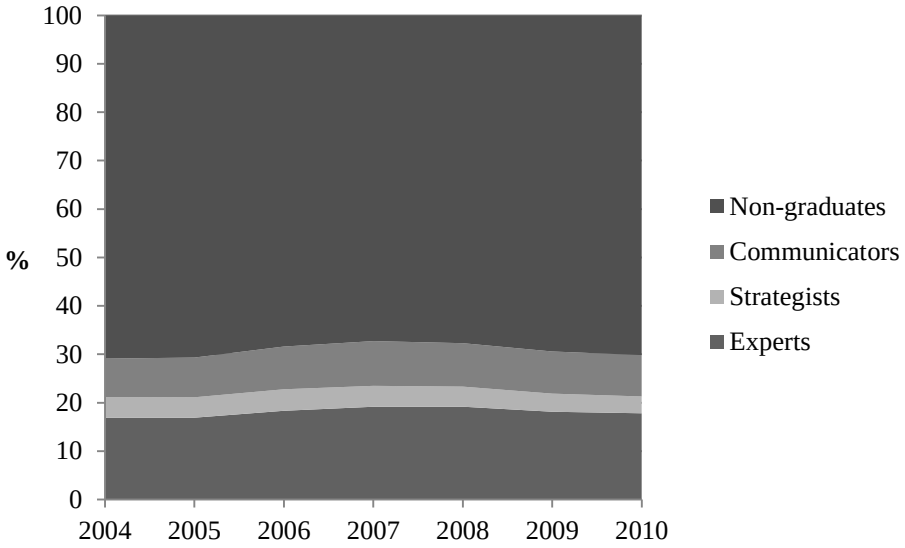


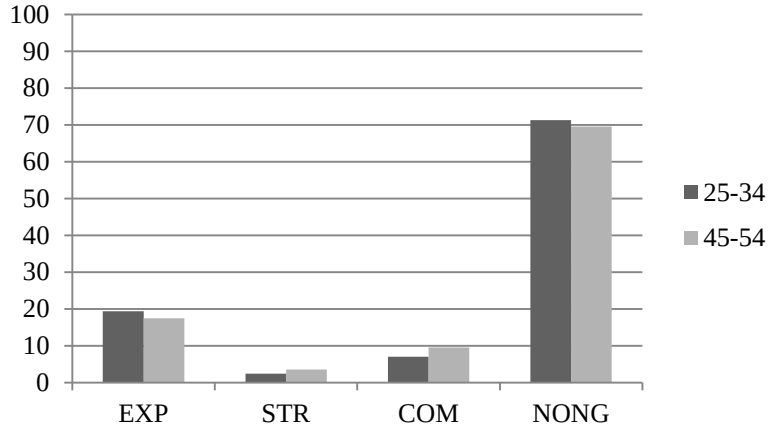
Table 3.1 Occupational structure by SOC(HE)-Italy, 2004-2010 (Source: our elaborations on Istat RCFL data)

%	2004	2005	2006	2007	2008	2009	2010
Experts	16,9	16,9	18,33	19,16	19,17	18,13	17,81
Orchestrators	4,24	4,22	4,44	4,32	4,15	3,74	3,48
Communicators	7,96	8,2	8,83	9,24	8,97	8,71	8,54
Non-graduates	70,9	70,68	68,4	67,28	67,71	69,42	70,17
Total	100	100	100	100	100	100	100

By disaggregating the graduate jobs into Experts, Orchestrators and Communicators it can be shown, not surprisingly, that Experts are the biggest graduates group and possibly the major group responsible for both the increase pre 2007 (from 16.9% to 19.16%) and the decrease that took place afterwards (from 19.17% to 17.81%). Orchestrators remained virtually unaltered up to 2008 (ranging between 4.22% and 4.44%) then decreased to their minimum at the end of the period (3.48%), reaching for first their peak in 2006 and then starting decreasing. Communicators reached their peak in 2007 (9.24%) and the first to start descending the following year, anticipating the decreasing trend of the other two groups. When comparing these three groups by age (Fig. 3.2), it is noticeable how Experts have a higher proportion of workers belonging to the youngest age group (25-34) than the other two graduate job groupings. This result is important as it shows how the occupational group (Experts) that loss the biggest amount of job posts after the peak, is the youngest group of all. This means that new graduates experienced difficulties entering the labour market as the

set of professions in which they were traditionally hired went through a period of stagnation (2004-2010) while the share of workers holding a degree on the total labour force increased from 14% to 17.3% in the period 2004-2011(source: Cnel, 2012).

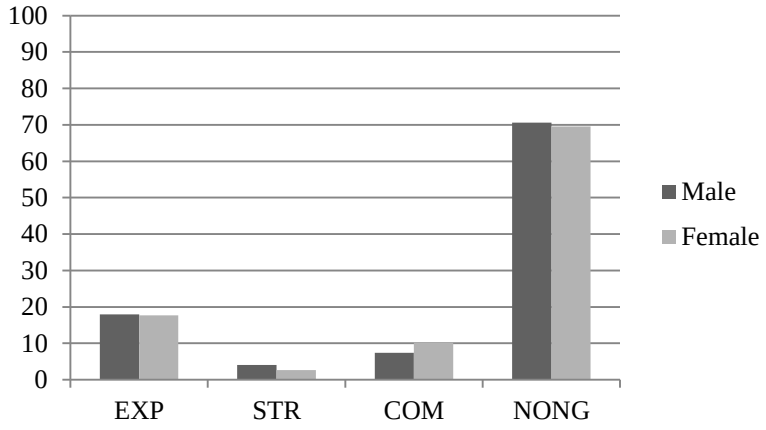
Figure 3.2 SOC(HE) groups by age in 2010 (source: our elaborations on Istat RCFL data)



An additional source of concern with respect to young graduates entering the labour market comes from the proportion of young workers employed in Non-graduate SOC(HE) group. More than two out of three workers aged between 25 and 34 years old are employed in such jobs and this propensity is even higher compared to that of the age group 45-54 in which the share of those holding a degree is sensibly lower.

Figure 3.3 shows the proportion of employees in occupation by SOC(HE)-Italy and gender. Communicators is the only occupational category with a higher proportion of female than male employees. Significantly, this category recorded at the end of the period a higher occupation rate (8.54%) compared to that in 2004 (7.96%), as Experts did (17.81% and 16.9%, respectively). However, in this last case the proportion of female employees was almost equal to that of males, suggesting that male graduates' employment rate has decreased to a relatively greater extent than that of their female counterparts. In fact, female graduates were less likley to be in Non-graduate jobs and more likely to be employed as Communicators. This last observation could be attributable to the high proportions of females traditionally employed in primary and secondary education (see Appendix 3 for the allocation of these professions in Communicators group).

Figure 3.3 SOC(HE) groups by gender in 2010 (source: our elaborations on Istat RCFL data)



Transnational comparability

SOC(HE)-Italy has essentially the same conceptual basis as the UK SOC(HE)2010, the same four occupational groups and the same three clusters of competence upon which these are drawn. Nonetheless, the two measures are based on significantly different sources, which may limit the extent to which their respective findings can be compared. The Italian measure can be described as mixed-methods assessment in which both the workers' self-assessment and occupational information resulting from official classifications play a role. On the other hand, the UK classification is based wholly on systematic qualitative assessment of officially-constructed job-evaluations based on workers' accounts of what they were required to do in the course of their jobs and the qualifications they needed. Some very similar jobs (like managers in manufacturing and construction) have been allocated to different groups when comparing Italy and the UK: it is not clear, however, to what extent these differences are attributable to the different technical processes through which the two measures have been built or, on the other hand, whether jobs are differently constructed or the divisions of labour among jobs vary in the different national contexts. In the case of directors and managers in manufacturing (SOC code 1122; NUP code 1.2.1.2.0 and 1.2.2.1.0) and construction (SOC 1123; NUP 1.2.1.3.0 and 1.2.2.2.0), these are classified as Orchestrators in the original SOC(HE) and as Experts in SOC(HE)-Italy[11]. This different allocation might be explained both referring to differences in the two classifications and to the higher level of bureaucracy and complexity in the Italian legal and tax system. This

[11] More precisely, Italian NUP distinguishes between directors and managers. This is why there are 4 Italian codes associated with just two British ones. Three out of four codes have been allocated in the Experts group (managers in manufacturing and directors and managers in construction), while le remaining one (directors in manufacturing) are allocated to the Strategists/Orchestrators group.

complexity would require individuals running big businesses to have better understanding of and a higher confidence with these dimensions in spite of the ability to manipulate and coordinate the activities and knowledge. Moreover, Italian managers might be hired senior on the basis of their relative work experience rather than looking at formal educational titles.

Figure 3.4 Key indicators on SMEs in the non-financial business economy, 2005 (Source: Eurostat, 2008)

				(% share of SMEs in national total)		
	Number of enterprises (thousands)	Number of persons employed (thousands)	Value added (EUR billion)	Number of enterprises	Number of persons employed	Value added
EU-27	19.602	85.000	3.090	99,8	67,1	57,6
IT	3.819	12.182	420	99,9	81,3	70,9
UK	1.535	9.636	501	99,6	54,0	51,0

On the other hand, the analysis we make with SOC(HE)-Italy and the analysis made by Elias and Purcell (2013) highlight similar findings and the few differences in these findings are consistent with already known structural differences among the two countries. First, Non-graduate jobs are substantially the majority in both national labour forces. Italy has a higher proportion of workers employed in these jobs (70% against 60%), consistently with pre-existing evidences from AlmaLaurea (2012). Second, the Experts group employed similar shares of employees (18% and 20%) on the total labour force. Third, the Orchestrators group was significantly bigger in the UK (12%) compared to the Italian correspondent group (4% on average between 2004 and 2010). This is not surprising given the reported higher proportion of employees employed in managerial occupations in the UK compared to other EU countries and the higher tendency of British workers compared to any other EU nationality to report they are employed in such jobs (Elias and McKnight, 2001). Additionally, it is worth noting how Italy and the UK differ greatly in terms of both industries and firms size: as Figure 3.4 shows, more than 80% of the Italian labour force is employed in SMEs while this proportion in the UK is just over the 50%. The two shares are respectively well over and well under the EU mean value, which makes the difference between the two even more remarkable. Italian SMEs are often family businesses and might be less likely to hire employees in managerial occupations. Finally, Orchestrators are rewarded with the highest earning premium in both Italy and the UK, although graduate earnings premia in Italy have been significantly lower in Italy (25% on average) than in the UK (35% on average). This last evidence reinforces estimates on Italian graduates' earnings

run onto AL data, in which recent graduates working abroad appeared to have enjoyed higher premia than their Italian-based peers (AlmaLaurea, 2012).

Conclusion

Recent developments in occupational classifications have shifted the focus of the relative conceptual basis from industries and economic sectors to skill levels. The rationale for this has been to provide policy-makers with classifications with the potential to monitor and measure the degree to which investment in national skills development and, in particular, the extent to which knowledge and skills, were being required and utilised in 'the knowledge society'. However, the operational definition of skill and skill levels adopted by the ILO do not refer to formal education only. This has limited the reliability and validity of such classifications when trying to define and measure the utilization of highly qualified labour in national economies and across different economies. Attempts were made to develop new taxonomies either by integrating or substituting existing official classifications and capture the ongoing changes in occupational structure concerning the utilization of knowledge and skills imparted in HE, which was expanding, with increasing levels of participation, in virtually all economies. Among these, Elias and Purcell's SOC(HE) has attracted the interest of both analysts and policy makers in the UK and abroad. We decided to develop an application of this classification for the Italian labour force because its conceptual basis is fully consistent with our purpose to better understand these structural changes. Moreover, SOC(HE) has a number of compelling characteristics: it is easy to build as it is based on official classifications and doesn't require additional time-consuming data entry; being based on official classifications it allows the construction of time-series indicators with which it is possible to assess the trends of interest; having been already applied in another European country it allowed to a certain extent comparisons between this country, namely the UK, and Italy. In order to allocate each of the 800 Italian job titles into 'graduate' and 'non-graduate' groups, we attached three EQF levels to them, borrowing from the methodology followed by Isfol/Istat in their 2006 survey on Italian professions. These three EQF levels represented the formal education level required in each of the SOC(HE) constituent clusters of experience to carry out a particular job. The highest of these three was then taken to be most representative of the knowledge and skills that were axiomatic to being able to accomplish the tasks and duties associated with that job, and

determined its allocation into one of the three graduate jobs groupings: Experts, Orchestrators and Communicators.

After having validated SOC(HE)-Italy on RCFL and AL data, we mapped Italian labour forces from 2004 to 2010 and assessed change over the period, notably two major trends: the increase in the share of those employment in highly-skilled professions up to 2007 and the decrease of this share subsequently. Highly skilled job as defined by SOC(HE)-Italy employed, throughout all the years of the period, a share of the total labour force that differed significantly from pre-existing studies on the topic. To be precise, the SOC(HE)-Italy measure lies between the upper boundary represented by Cnel estimates and the lower boundary marked by AL estimates. The observation of poor performance after the recession that followed the financial crisis in 2008 is consistent with pre-existing work on Italian labour force and graduates' career paths. The novelty of this analysis consists in highlighting how the share of workers employed in graduate jobs (i.e. the demand for graduate labour) began to decline in the same year that the recession started, in 2008, while the participation ration of one graduate group (Orchestrators) anticipated this decline in 2007. This is in contradiction with some previous analyses, according to which this decline begun only in 2008 as direct consequence of the economic downturn. It is not clear, however, to which extent the recession has accelerated changes that would have occurred anyway or whether it has hampered the possibilities of recovery. There is no doubt that austerity measures adopted by successive Italian government (such as the headcount freeze started in 2009 for public administrations, schools and universities) have directly affected graduates' labour market entry options by restricting access to traditional sources of employment for young Italian graduates.

Comparisons between the UK and Italy must be regarded as indicative rather than statistically robust, given that the two utilized measures are based on somewhat different source data. However, the analysis of the Italian labour force produced relatively similar patterns of graduate labour market distribution and change to those observed in the UK labour force over the same period. All in all, we conclude that these two measures allow us to make consistent and more reliable qualitative comparisons between the two countries than has been possible with by simply using existing occupational classifications and their use, separately and for comparative purposes, advances our understanding of change in demand for knowledge and skills, nationally and potentially, internationally.

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APPENDIX 1

Table A.1 The 109 O*Net variables of the Isfol-Istat survey regrouped in the SOC(HE)2010 clusters of competence

Variable name in Isfol/Istat Survey	Label	Description	Cluster
B1a	Amministrazione e gestione di impresa	Conoscenza dei principi e dei metodi che regolano l'impresa e la sua gestione relativi alla pianificazione strategica, all'allocazione delle risorse umane, finanziarie e materiali, alle tecniche di comando, ai metodi di produzione e al coordinamento delle persone e delle risorse	STR
B2a	Lavoro d'ufficio	Conoscenza delle procedure amministrative e d'ufficio, dei programmi di elaborazione di testi, delle tecniche di gestione di archivi e di basi di dati oppure della stenografia e delle regole di trascrizione o di altre procedure e linguaggi previsti dal lavoro d'ufficio	EXP
B3a	Economia e contabilità	Conoscenza dei principi e delle pratiche di economia e contabilità	EXP
B4a	Commercializzazione e vendita	Conoscenza dei principi e dei metodi per presentare, promuovere, vendere prodotti o servizi. Comprende la definizione di strategie e delle tattiche di marketing, la loro presentazione, le tecniche di vendita e di controllo	COM
B5a	Servizi ai clienti e alle persone	Conoscenza dei principi e delle procedure per fornire servizi ai clienti e alle persone. Comprende la valutazione dei bisogni del cliente, il raggiungimento degli standard di qualità e la valutazione della soddisfazione della clientela	STR
B6a	Gestione del personale e delle risorse umane	Conoscenza dei principi e delle procedure per il reclutamento, la selezione, la formazione, la retribuzione del personale per le relazioni e le negoziazioni sindacali e per la gestione di sistemi informativi del personale	EXP
B7a	Produzione e processo	Conoscenza delle materie prime, dei processi di produzione, delle tecniche per il controllo di qualità	EXP
B8a	Produzione alimentare	Conoscenza delle tecniche e delle attrezzature necessarie alla semina, alla coltivazione e alla raccolta di prodotti alimentari (vegetali ed animali) destinati al consumo, comprese quelle relative alla conservazione/stoccaggio	EXP
B9a	Informatica ed elettronica	Conoscenza dei circuiti elettronici, dei processori, dei chips delle attrezzature elettroniche, dell'hardware e dei software dei computer, compresa la conoscenza dei pacchetti applicativi e dei linguaggi di programmazione	EXP
B10a	Ingegneria e tecnologia	Conoscenza delle applicazioni pratiche delle scienze ingegneristiche e della tecnologia. Comprende l'applicazione di principi, di tecniche, di procedure e l'uso di strumenti per progettare e produrre diversi beni o servizi	EXP
B11a	Progettazione tecnica	Conoscenza delle tecniche di progettazione, degli strumenti e dei principi utilizzati nella esecuzione di progetti tecnici di precisione, di progetti di dettaglio, di disegni e di modelli	EXP

B12a	Edilizia e costruzioni	Conoscenza dei materiali, dei metodi e degli strumenti usati nella costruzione e nella riparazione di case, edifici o altre strutture come autostrade e strade	EXP
B13a	Meccanica	Conoscenza delle macchine e delle attrezzature, compresa la loro progettazione, il loro uso, la loro riparazione e manutenzione	EXP
B14a	Matematica	Conoscenza dell'aritmetica, dell'algebra, della geometria, del calcolo, della statistica e delle loro applicazioni	EXP
B15a	Fisica	Conoscenza dei principi e delle leggi della fisica, delle loro interrelazioni e delle loro applicazioni per capire la dinamica dei fluidi, dei materiali e dell'atmosfera e le strutture e i processi meccanici, elettrici, atomici e subatomici	EXP
B16a	Chimica	Conoscenza della composizione, della struttura e delle proprietà delle sostanze, dei processi e delle trasformazioni chimiche sottostanti; ciò comprende l'uso dei prodotti chimici, la conoscenza delle loro interazioni, dei segnali di pericolo, delle tecniche di produzione dei prodotti chimici e dei metodi di bonifica	EXP
B17a	Biologia	Conoscenza degli organismi animali e vegetali, dei loro tessuti, delle cellule, delle loro funzioni, interdipendenze e delle loro interazioni con l'ambiente	EXP
B18a	Psicologia	Conoscenza del comportamento e delle prestazioni umane, delle differenze individuali nelle attitudini, nella personalità e negli interessi, dei meccanismi di apprendimento e di motivazione, dei metodi della ricerca psicologica e della valutazione e del trattamento dei disordini comportamentali ed affettivi	EXP
B19a	Sociologia e antropologia	Conoscenza del comportamento e delle dinamiche di gruppo, delle influenze e tendenze sociali, delle migrazioni umane, dell'etnicità	EXP
B20a	Geografia	Conoscenza dei principi e dei metodi per descrivere e rappresentare la terra, il mare e le masse d'aria, comprese le loro caratteristiche fisiche, le collocazioni, le interrelazioni e la distribuzione di piante, animali e gli insediamenti umani	EXP
B21a	Medicina e odontoiatria	Conoscenza delle informazioni e delle tecniche necessarie a diagnosticare e a curare ferite, malattie e deformità del corpo umano, compresa la conoscenza dei sintomi, delle cure alternative, delle proprietà e delle interazioni dei farmaci e delle cure preventive	EXP
B22a	Terapia e consulenza psicologica	Conoscenza dei principi, dei metodi e delle procedure per la diagnosi, il trattamento e la riabilitazione delle disfunzioni mentali e fisiche e per la consulenza e la guida nelle carriere	EXP
B23a	Istruzione e formazione	Conoscenza dei principi e dei metodi per la progettazione formativa e curricolare, per l'insegnamento e l'addestramento collettivo ed individuale, per la misurazione degli effetti della formazione	EXP
B24a	Lingua italiana	Conoscenza della struttura e dei contenuti della lingua italiana oppure del significato e della pronuncia delle parole, delle regole di composizione e della grammatica	EXP
B25a	Lingua straniera	Conoscenza della struttura e dei contenuti di una lingua straniera oppure del significato e della pronuncia delle parole, delle regole di composizione e della grammatica	EXP

B26a	Arte	Conoscenza della teoria e delle tecniche necessarie a comporre, produrre e realizzare musica, danza, arti visuali, drammi e sculture	EXP
B27a	Storia e archeologia	Conoscenza degli eventi storici e delle loro cause, degli indicatori e degli effetti sulle civilizzazioni e sulle culture	EXP
B28a	Filosofia e teologia	Conoscenza dei diversi sistemi filosofici e delle diverse religioni, dei principi di base, dei valori, dell'etica, dei modi di pensare, dei costumi, delle pratiche e del loro impatto sulla cultura	EXP
B29a	Protezione civile e sicurezza pubblica	Conoscenza delle più importanti attrezzature, delle politiche, delle procedure e delle strategie per promuovere effettive operazioni di sicurezza locale e nazionale per la protezione delle persone, delle informazioni, della proprietà e delle istituzioni	EXP
B30a	Legislazione e istituzioni	Conoscenza delle leggi, delle procedure legali, dei regolamenti, delle sentenze esecutive, del ruolo delle istituzioni e delle procedure politiche di una democrazia	EXP
B31a	Telecomunicazioni	Conoscenza delle trasmissioni, della radiodiffusione e delle modalità di connessione e controllo dei sistemi di telecomunicazioni	EXP
B32a	Comunicazione e media	Conoscenza della produzione dei mezzi di comunicazione, delle tecniche e dei metodi per diffondere informazioni, dei mezzi alternativi per informare e intrattenere in modo scritto, orale e visivo	EXP
B33a	Trasporti	Conoscenza dei principi e dei metodi per trasportare persone o beni con mezzi aerei, ferroviari, navali o stradali; comprende le conoscenze necessarie per calcolare i costi e i benefici dei mezzi di trasporto	EXP
C1a	Comprendere testi scritti	Comprendere frasi e paragrafi scritti in documenti relativi al lavoro	COM
C2a	Ascoltare attivamente	Fare piena attenzione a quello che altri stanno dicendo, soffermandosi per capirne i punti essenziali, ponendo domande al momento opportuno ed evitando interruzioni inappropriate	COM
C3a	Scrivere	Comunicare efficacemente per iscritto ed in modo appropriato rispetto alle esigenze dei destinatari.	COM
C4a	Parlare	Parlare ad altri per comunicare informazioni in modo efficace	COM
C5a	Matematica	Usare la matematica per risolvere dei problemi.	EXP
C6a	Scienze	Applicare regole e metodi scientifici per risolvere problemi.	EXP
C7a	Pensiero critico	Usare la logica e il ragionamento per individuare i punti di forza e di debolezza di soluzioni, conclusioni o approcci alternativi ai problemi.	STR
C8a	Apprendimento attivo	Comprendere le implicazioni di nuove informazioni per la soluzione di problemi presenti, futuri e per i processi decisionali	STR
C9a	Strategie di apprendimento	Selezionare ed utilizzare metodi e procedure formative appropriate per apprendere o insegnare ad apprendere	EXP
C10a	Monitorare	Monitorare e valutare le prestazioni lavorative personali, di altre persone o di organizzazioni per migliorarle o correggerle	EXP

C11a	Percezione sociale	Comprendere le reazioni degli altri e il perchè reagiscano in determinati modi	COM
C12a	Coordinarsi con gli altri	Coordinare le proprie azioni a quelle degli altri	STR
C13a	Persuadere	Persuadere gli altri a cambiare opinioni o comportamenti	COM
C14a	Negoziare	Discutere e trattare con gli altri per trovare un accordo e cercare di ricomporre opinioni diverse	COM
C15a	Istruire	Insegnare ad altri come fare determinate cose	COM
C16a	Orientamento al servizio	Cercare in modo attivo soluzioni per soddisfare le esigenze degli altri	COM
C17a	Risolvere problemi complessi	Identificare problemi complessi e raccogliere le informazioni utili a valutare possibili opzioni e trovare soluzioni	STR
C18a	Analisi delle fasi operative	Analizzare le caratteristiche e i requisiti di strumenti, servizi o prodotti necessari alla realizzazione di un progetto	STR
C19a	Progettazione tecnologica	Produrre o adattare attrezzature e tecnologie per far fronte ai bisogni degli utenti	EXP
C20a	Selezionare strumenti	Individuare gli strumenti necessari per lo svolgimento di un lavoro.	NON-G
C21a	Installare	Installare attrezzature, macchine, cavi o programmi applicando le specifiche tecniche	NON-G
C22a	Programmare	Scrivere programmi per computer per vari scopi	EXP
C23a	Controllo di qualità	Condurre test ed ispezioni su prodotti, servizi o processi per valutarne la qualità o le prestazioni	EXP
C24a	Sorvegliare macchine	Controllare misure di livello, quadranti o altri indicatori per assicurarsi del corretto funzionamento di una macchina	NON-G
C25a	Far funzionare e controllare	Controllare le operazioni e l'attività di attrezzature e sistemi	NON-G
C26a	Manutenzione	Effettuare manutenzioni ordinarie sulle attrezzature e definire quando e che tipo di manutenzione è necessaria	NON-G
C27a	Risolvere problemi	Determinare le cause di errori di funzionamento e decidere cosa fare per risolverli	NON-G
C28a	Riparare	Riparare macchinari o sistemi usando le attrezzature opportune	NON-G
C29a	Analizzare sistemi	Determinare come dovrebbe funzionare un “sistema” (ovvero macchine, fabbriche, organizzazioni, ambienti) e come cambiamenti ambientali, operativi o di situazione possano influire sui suoi risultati	EXP
C30a	Valutare sistemi	Identificare misure o indicatori delle prestazioni di un sistema (ovvero macchine, fabbriche, organizzazioni, ambienti) e le azioni necessarie per migliorarle o correggerle in relazione agli obiettivi del sistema stesso	EXP
C31a	Valutare e decidere	Valutare i costi e i benefici di possibili azioni per scegliere la più opportuna	STR

C32a	Gestire il tempo	Gestire il proprio tempo e quello altrui	STR
C33a	Gestire risorse finanziarie	Determinare quanto denaro sia necessario spendere per fare un lavoro e contabilizzare le spese	STR
C34a	Gestire risorse materiali	Ottenere ed occuparsi dell'uso appropriato di attrezzature, strumenti e materiali necessari a svolgere un lavoro	STR
C35a	Gestire risorse umane	Motivare, far crescere e dirigere il personale e individuare il personale più adatto ad un lavoro	STR
G1a	Raccogliere informazioni	Osservare, ricevere o ottenere in qualunque altro modo informazioni da fonti rilevanti	STR
G2a	Identificare oggetti, azioni ed eventi	Identificare informazioni catalogando, valutando e riconoscendo differenze e similarità	EXP
G3a	Controllare processi, materiali o ambienti circostanti	Controllare e rivedere informazioni provenienti da materiali, dagli eventi o dall'ambiente per individuare o valutare problemi	EXP
G4a	Ispezionare attrezzature, strutture o materiali	Ispezionare attrezzature, strutture o materiali per individuare cause di errore, o altri problemi o difetti	EXP
G5a	Stimare le caratteristiche quantificabili di prodotti, eventi o informazioni	Stimare misure, distanze e quantità o determinare tempi, costi, risorse o materiali necessari per svolgere una determinata attività lavorativa.	EXP
G6a	Valutare la qualità di oggetti, servizi o persone	Stimare il valore, l'importanza o la qualità di cose o persone	EXP
G7a	Valutare informazioni per determinare la conformità agli standard	Utilizzare informazioni rilevanti e pareri individuali per determinare se eventi o processi sono conformi a standard, leggi o regolamenti	EXP
G8a	Elaborare informazioni	Compilare, codificare, classificare, calcolare, tabulare, esaminare o verificare informazioni o dati	EXP
G9a	Analizzare dati o informazioni	Identificare le relazioni, le ragioni o i fatti sottostanti ad informazioni disaggregando informazioni o dati in parti separate	EXP
G10a	Prendere decisioni e risolvere problemi	Analizzare informazioni e valutare risultati per scegliere la soluzione migliore e per risolvere problemi	STR
G11a	Pensare in modo creativo	Sviluppare, progettare o creare nuove applicazioni, idee, relazioni e nuovi sistemi e prodotti (compresi i contributi artistici)	EXP
G12a	Aggiornare e usare conoscenze di rilievo	Mantenersi aggiornati sui cambiamenti tecnici e applicare nuove conoscenze	EXP
G13a	Mettere a punto obiettivi e strategie	Stabilire obiettivi di lungo periodo e specificare le strategie e le azioni per raggiungerli	STR
G14a	Pianificare il lavoro e le attività	Programmare eventi, piani e attività o il lavoro di altre persone	STR
G15a	Organizzare, pianificare e dare priorità al lavoro	Mettere a punto specifici obiettivi e programmare il lavoro definendo priorità	STR
G16a	Svolgere attività fisiche generali	Svolgere attività fisiche che richiedono di muovere l'intero corpo o un notevole uso delle braccia e delle gambe, come arrampicarsi, salire scale, stare in equilibrio, camminare, piegarsi e manipolare materiali	NON-G
G17a	Maneggiare e muovere oggetti	Usare mani e braccia per maneggiare, installare, posizionare e muovere materiali o per manipolare oggetti	NON-G

G18a	Gestire macchine e processi	Usare sia i meccanismi di controllo che l'attività fisica diretta per manovrare macchine o processi (esclusi i computer e i veicoli)	NON-G
G19a	Lavorare con i computer	Usare computer e sistemi informatici (software ed hardware) per programmare, scrivere software, regolare funzioni, inserire dati, o elaborare informazioni	EXP
G20a	Manovrare veicoli, mezzi meccanici o attrezzature	Far funzionare, manovrare, guidare o pilotare veicoli o attrezzature meccaniche come carrelli elevatori, veicoli da trasporto, aeromobili o battelli	NON-G
G21a	Scrivere bozze, stendere note e specifiche tecniche per componenti o attrezzature	Produrre documentazione, istruzioni dettagliate, disegni o specifiche per spiegare come sono costruiti, assemblati, modificati, mantenuti o usati periferiche, componenti, attrezzature o strutture	COM
G22a	Riparare e fare manutenzione di attrezzature meccaniche	Fare manutenzione, riparare, regolare e provare macchine, periferiche, parti mobili e attrezzature meccaniche (non elettroniche)	NON-G
G23a	Riparare e fare manutenzione di attrezzature elettroniche	Fare manutenzione, riparare, regolare, calibrare, mettere a punto o provare macchine, periferiche e attrezzature elettroniche (non meccaniche)	NON-G
G24a	Documentare, registrare informazioni	Inserire, trascrivere, registrare, immagazzinare o conservare informazioni in forma scritta, elettronica o magnetica	EXP
G25a	Interpretare il significato delle informazioni	Interpretare o spiegare il significato di informazioni ed il loro possibile utilizzo	COM
G26a	Comunicare con superiori, colleghi o subordinati	Fornire informazioni ai superiori, ai colleghi e ai subalterni, per telefono, in forma scritta, via e-mail o personalmente	COM
G27a	Comunicare con persone esterne all'organizzazione	Comunicare con persone esterne all'organizzazione, rappresentare la stessa verso i clienti, il pubblico, le amministrazioni ed altre entità esterne, personalmente, in forma scritta, per telefono o via e-mail.	COM
G28a	Stabilire e mantenere relazioni interpersonali	Creare rapporti di lavoro costruttivi e cooperativi e mantenerli nel tempo.	COM
G29a	Assistere e prendersi cura di altri	Fornire assistenza personale, attenzione medica, supporto emotivo o altre cure personali ad altri (colleghi, clienti, pazienti)	COM
G30a	Vendere merci o influenzare altri	Convincere altre persone ad acquistare merci o beni o a far loro cambiare idea o comportamenti	COM
G31a	Risolvere controversie e negoziare con altre persone	Gestire lamentele, negoziare, calmare dispute e risolvere conflitti	COM
G32a	Lavorare a contatto diretto con il pubblico o esibirsi	Esibirsi per il pubblico o occuparsi direttamente del pubblico. Comprende servire i clienti in pubblici esercizi o negozi e ricevere clienti o ospiti	COM
G33a	Coordinare il lavoro e le attività di altri	Far in modo che i componenti di un gruppo lavorino insieme per realizzare i compiti assegnati	STR
G34a	Far crescere e attivare gruppi di lavoro	Incoraggiare e far crescere la fiducia reciproca, il rispetto e la cooperazione fra i membri di un gruppo.	STR
G35a	Formare ed insegnare	Identificare i bisogni formativi di altre persone, mettere a punto programmi o corsi formali di istruzione o formazione e insegnare o istruire altre persone	COM
G36a	Guidare, dirigere e motivare i subalterni	Guidare e dirigere i subalterni definendo gli standard nelle prestazioni e il controllo delle stesse	STR
G37a	Addestrare e far crescere altre persone	Identificare i bisogni di crescita di altre persone e addestrare, far da guida o aiutare altre persone a	COM

		migliorare le proprie conoscenze e capacità	
G38a	Fornire consulenze e suggerimenti ad altre persone	Fornire linee guida e suggerimenti qualificati alla dirigenza o ad altri gruppi su questioni tecniche o relative a sistemi o processi	NON-G
G39a	Svolgere attività amministrative	Svolgere compiti amministrativi quotidiani, come gestire archivi e sbrigare pratiche	NON-G
G40a	Reclutare il personale	Reclutare, intervistare, selezionare, assumere e promuovere impiegati in un'organizzazione	STR
G41a	Monitorare e controllare risorse	Monitorare e controllare risorse e supervisionare le attività di spesa	STR

APPENDIX 2

Table A.2 EQF Framework (source: http://ec.europa.eu/education/lifelong-learning-policy/eqf_en.htm)

Level	Knowledge	Skills	Competence	Example
Level 1	Basic general knowledge	basic skills required to carry out simple tasks	work or study under direct supervision in a structured context	
Level 2	Basic factual knowledge of a field of work or study	basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools	work or study under supervision with some autonomy	lower secondary school
Level 3	Knowledge of facts, principles, processes and general concepts, in a field of work or study	a range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information	take responsibility for completion of tasks in work or study; adapt own behaviour to circumstances in solving problems	
Level 4	Factual and theoretical knowledge in broad contexts within a field of work or study	a range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change; supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities	Lower middle school
Level 5	Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge	a comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems	exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others	Higher middle school
Level 6 (HE)	Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles	advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study	manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts; take responsibility for managing professional development of individuals and groups	Honours bachelor degree, vocational university German State-certified Engineer, Business Manager and Designer (Fachhcochschule) Bachelor, City and Guilds, Graduateship(GCGI)

Level 7 (HE)	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research; Critical awareness of knowledge issues in a field and at the interface between different fields	specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields	manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches; take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams	Masters, vocational university (Fachhcochschule) Masters, City and Guilds (MCGI)
Level 8 (HE)	Knowledge at the most advanced frontier of a field of work or study and at the interface between fields	the most advanced and specialised skills and techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice	demonstrate substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work or study contexts including research	Doctorate Awards - Fellowship

APPENDIX 3

Table A.3 EQF Levels and SOC(HE)-Italy groups per job title

Code	Job Title	EXP cluster	STR Cluster	COM Cluster	EQF Level	SOC(HE)-Italy Group
1.1.1.1.0	Membri di organismi di governo e di assemblee nazionali con podestà legislativa e regolamentare	6,96	6,63	6,47	7	EXP
1.1.1.2.0	Membri di organismi di governo e di assemblee regionali con podestà legislativa e regolamentare	6,36	6,02	6,47	6	COM
1.1.1.3.0	Membri di organismi di governo e di assemblee provinciali con podestà legislativa e regolamentare	6,04	5,92	6,28	6	COM
1.1.1.4.0	Membri di organismi di governo e di assemblee sub-provinciali e comunali con podestà legislativa e regolamentare	5,8	5,87	5,95	6	COM
1.1.2.1.0	Ambasciatori, ministri plenipotenziari ed altri dirigenti della carriera diplomatica	-	6,88	7,11	7	COM
1.1.2.2.1	Commissari di governo, prefetti e vice prefetti	6,7	6,51	6,67	7	EXP
1.1.2.2.2	Capi e vice capi della Polizia di Stato, questori ed alti responsabili della sicurezza pubblica	6,85	6,67	6,61	7	EXP
1.1.2.2.3	Segretari generali e responsabili del controllo e della gestione nella amministrazione pubblica	6,28	6,35	6,4	6	COM
1.1.2.3.1	Dirigenti degli uffici scolastici territoriali	6,14	6,12	6,14	6	COM
1.1.2.3.2	Sovraintendenti al patrimonio culturale nazionale	6,08	6,26	6,24	6	STR
1.1.2.4.1	Direttori generali, dipartimentali ed equiparati delle amministrazioni dello Stato, delle aziende autonome, degli enti pubblici non economici e degli enti locali	6,72	6,92	6,92	7	STR
1.1.2.4.2	Direttori delle istituzioni scolastiche, delle università e degli enti di ricerca	6,43	6,32	6,54	6	COM
1.1.2.4.3	Direttori generali ed equiparati delle istituzioni sanitarie	6,6	6,65	6,48	7	STR
1.1.2.5.1	Dirigenti ed equiparati delle amministrazioni dello stato, delle aziende autonome, degli enti pubblici non economici e degli enti locali	6,04	6,1	6,19	6	COM
1.1.2.5.2	Dirigenti ed equiparati delle istituzioni scolastiche, delle università e degli enti di ricerca	7,09	7,1	7,03	7	STR
1.1.2.5.3	Dirigenti ed equiparati delle istituzioni sanitarie	6,48	6,44	6,44	6	EXP
1.1.3.1.0	Dirigenti della magistratura ordinaria	6,34	6,2	6,59	6	COM
1.1.3.2.0	Dirigenti della magistratura amministrativa e delle giurisdizioni speciali	6,67	6,26	6,55	6	EXP
1.1.4.1.1	Dirigenti dei partiti politici	5,52	5,68	5,96	6	COM
1.1.4.1.2	Dirigenti di sindacati e altre organizzazionei a tutela di interessi economici	6,16	6,27	6,54	6	COM

1.1.4.2.0	Dirigenti di associazioni di interesse nazionale o sovranazionale in ambito umanitario, culturale e scientifico	5,92	5,95	6,18	6	COM
1.2.1.1.0	Imprenditori e amministratori di aziende private nell'agricoltura, nelle foreste, nella caccia e nella pesca	5,14	5,05	4,91	5	NON-G
1.2.1.2.0	Imprenditori e amministratori di aziende privati nell'industria in senso stretto	6	6,19	6,02	6	STR
1.2.1.3.0	Imprenditori e amministratori di aziende private nelle costruzioni	5,76	5,7	5,57	6	EXP
1.2.1.4.0	Imprenditori e amministratori di aziende private nel commercio	5,88	5,6	5,56	6	EXP
1.2.1.5.0	Imprenditori e amministratori di aziende private negli alberghi e pubblici esercizi	5,36	5,8	5,49	6	STR
1.2.1.6.0	Imprenditori e amministratori di aziende private nei trasporti e comunicazioni	5,68	5,72	5,57	6	STR
1.2.1.7.0	Imprenditori e amministratori di aziende private nei servizi per le imprese, bancari e assimilati	5,92	6,14	5,94	6	STR
1.2.1.8.0	Imprenditori e amministratori di aziende private nei servizi alle persone, di pulizia e assimilati	5,68	5,57	5,55	6	EXP
1.2.1.9.0	Imprenditori e amministratori di aziende private in altri settori di attività economica	6,48	6,22	6,34	6	EXP
1.2.2.1.0	Direttori di aziende private nell'agricoltura, nelle foreste, nella caccia e nella pesca	5,6	5,69	5,6	6	STR
1.2.2.2.0	Direttori di aziende privati nell'industria in senso stretto	6,4	6,21	6,03	6	EXP
1.2.2.3.0	Direttori di aziende private nelle costruzioni	6,48	6,26	6,21	6	EXP
1.2.2.4.0	Direttori di aziende private nel commercio	5,68	5,51	5,48	6	EXP
1.2.2.5.0	Direttori di aziende private negli alberghi e pubblici esercizi	5,92	6,08	5,92	6	STR
1.2.2.6.0	Direttori di aziende private nei trasporti e comunicazioni	6,16	5,73	5,54	6	EXP
1.2.2.7.0	Direttori di aziende private nei servizi per le imprese, bancari e assimilati	6,32	6,48	6,61	6	COM
1.2.2.8.0	Direttori di aziende private nei servizi alle persone, di pulizia e assimilati	6	5,94	5,84	6	EXP
1.2.2.9.0	Direttori di aziende private in altri settori di attività economica	6	6,18	6,27	6	COM
1.2.3.1.0	Direttori del dipartimento finanza ed amministrazione	6,45	6,48	6,4	6	STR
1.2.3.2.0	Direttori del dipartimento organizzazione, gestione delle risorse umane e delle relazioni industriali	6,56	6,42	6,32	6	EXP
1.2.3.3.0	Direttori del dipartimento vendite e commercializzazione	6,4	6,49	6,57	6	COM
1.2.3.4.0	Direttori del dipartimento comunicazione, pubblicità e pubbliche relazioni	6,04	6	6,33	6	COM
1.2.3.5.0	Direttori del dipartimento approvvigionamento e distribuzione	5,52	5,72	5,89	6	COM

1.2.3.6.0	Direttori del dipartimento servizi informatici	6,03	5,98	5,9	6	EXP
1.2.3.7.0	Direttori del dipartimento ricerca e sviluppo	6,29	6,33	6,35	6	COM
1.3.1.1.0	Imprenditori, gestori e responsabili di piccole imprese nell'agricoltura, nelle foreste, nella caccia e nella pesca	4,93	4,78	4,72	5	NON-G
1.3.1.2.0	Imprenditori, gestori e responsabili di piccole imprese nell'industria in senso stretto	5,68	5,85	5,68	6	STR
1.3.1.3.0	Imprenditori, gestori e responsabili di piccole imprese nelle costruzioni	5,36	5,48	5,2	5	NON-G
1.3.1.4.0	Imprenditori, gestori e responsabili di piccole imprese nel commercio	-	5,25	5,24	5	NON-G
1.3.1.5.0	Imprenditori, gestori e responsabili di piccole imprese negli alberghi e pubblici esercizi	5,12	5,3	5,32	5	NON-G
1.3.1.6.0	Imprenditori, gestori e responsabili di piccole imprese nei trasporti e nelle comunicazioni	5,44	5,54	5,55	6	COM
1.3.1.7.0	Imprenditori, gestori e responsabili di piccole imprese nei servizi per le imprese, bancari e assimilati	5,8	5,96	5,81	6	STR
1.3.1.8.0	Imprenditori, gestori e responsabili di piccole imprese nei servizi alle persone, di pulizia e servizi assimilati	5,16	4,98	4,96	5	NON-G
1.3.1.9.0	Imprenditori, gestori e responsabili di piccole imprese in altri settori di attività economica	6,08	5,84	5,76	6	EXP
2.1.1.1.1	Fisici	7,3	6,92	7	7	EXP
2.1.1.1.2	Astronomi ed astrofisici	7,26	7,08	7,12	7	EXP
2.1.1.2.1	Chimici ricercatori	6,26	5,88	6,1	6	EXP
2.1.1.2.2	Chimici informatori e divulgatori	6,08	5,56	5,95	6	EXP
2.1.1.3.1	Matematici	7,16	7,1	6,96	7	EXP
2.1.1.3.2	Statistici	6,34	6	6,21	6	EXP
2.1.1.4.1	Specialisti nella ricerca informatica di base	6,84	7,2	7,09	7	STR
2.1.1.4.2	Analisti e progettisti di software applicativi e di sistema	6,23	5,96	5,6	6	EXP
2.1.1.4.3	Analisti di sistema	6,59	6,24	6	6	EXP
2.1.1.4.4	Specialisti in sicurezza informatica	6,14	5,89	5,82	6	EXP
2.1.1.4.5	Specialisti in reti e comunicazioni informatiche	6,08	5,65	5,88	6	EXP
2.1.1.5.1	Geologi	5,68	5,24	5,54	5	EXP
2.1.1.5.2	Paleontologi	6,41	6,22	6,49	6	COM
2.1.1.5.3	Geofisici	7,05	-	7,28	7	COM
2.1.1.5.4	Meteorologi	6,64	6,24	6,14	6	EXP
2.1.1.5.5	Idrologi	6,52	6,48	6,32	6	EXP

2.2.1.1.1	Ingegneri meccanici	6,73	6,16	6,4	6	EXP
2.2.1.1.2	Ingegneri navali	7,12	6,64	6,72	7	EXP
2.2.1.1.3	Ingegneri aeronautici e spaziali	6,16	6,12	6,16	6	EXP
2.2.1.1.4	Ingegneri nucleari	7,72	-	7,68	7	EXP
2.2.1.2.1	Ingegneri metallurgici	6,64	6,16		6	EXP
2.2.1.2.2	Ingegneri minerari	6,76	6,54	6,98	7	COM
2.2.1.3.0	Ingegneri elettrotecnici e dell'automazione industriale	6,3	6,27	6,2	6	EXP
2.2.1.4.1	Ingegneri elettronici	6,32	6,28	6,04	6	EXP
2.2.1.4.2	Ingegneri progettisti di calcolatori e loro periferiche	6,9	6,8	6,8	7	EXP
2.2.1.4.3	Ingegneri in telecomunicazioni	6,47	-	6,4	6	EXP
2.2.1.5.1	Ingegneri chimici	6,55	6,45	6,4	6	EXP
2.2.1.5.2	Ingegneri petroliferi	6,78	6,74	6,72	7	EXP
2.2.1.6.1	Ingegneri edili	6,34	5,86	5,84	6	EXP
2.2.1.6.2	Ingegneri idraulici	6,1	5,84	5,6	6	EXP
2.2.1.9.1	Cartografi e fotogrammetristi	6,14	5,56	5,5	6	EXP
2.2.1.9.2	Ingegneri industriali e gestionali	6,2	6,4	6,16	6	STR
2.2.1.9.3	Ingegneri dei materiali	6,66	6,58	6,56	7	EXP
2.2.1.9.4	Ingegneri biomedici e bioingegneri	6,28	6,04	6,24	6	EXP
2.2.2.0.1	Architetti	6,56	6,13	6,19	6	EXP
2.2.2.0.2	Urbanisti e specialisti del recupero e della conservazione del territorio	6,02	5,56	5,78	6	EXP
2.3.1.1.1	Biologi	6,22	6,12	5,98	6	EXP
2.3.1.1.2	Biochimici	6,04	5,63	5,81	6	EXP
2.3.1.1.3	Biofisici	7	6,96	7,06	7	COM
2.3.1.1.4	Biotecnologi alimentari	6,64	6,24	6,56	6	EXP
2.3.1.1.5	Botanici	6,29	6,32	6,3	6	STR
2.3.1.1.6	Zoologi	6,7	6,45	6,58	7	EXP
2.3.1.1.7	Ecologi	6,62	6,14	6,43	6	EXP
2.3.1.2.1	Farmacologi	7,02	6,92	6,8	7	EXP
2.3.1.2.2	Microbiologi	6,32	5,67	5,94	6	EXP
2.3.1.3.0	Agronomi ed assimilati	5,26	5,16	5,44	5	COM
2.3.1.4.0	Veterinari ed assimilati	5,58	5,43	5,54	6	EXP

2.3.1.5.0	Farmacisti e professioni assimilate	5,87	5,6	5,64	6	EXP
2.4.1.1.0	Medici generici	6,75	6,26	6,58	7	EXP
2.4.1.2.0	Specialisti in terapie mediche	6,51	5,89	6,45	6	EXP
2.4.1.3.0	Specialisti in terapie chirurgiche	7,24	6,44	6,63	7	EXP
2.4.1.4.0	Laboratoristi e patologi clinici	6,69	5,92	6,56	6	EXP
2.4.1.5.0	Dentisti e odontostomatologi	6,21	5,66	5,97	6	EXP
2.4.1.6.0	Specialisti in diagnostica per immagini e radioterapia	6,92	5,76	6,22	6	EXP
2.4.1.7.1	Dietologi e igienisti	6,3	6,03	6,19	6	EXP
2.4.1.7.2	Specialisti in medicina sociale e del lavoro	6,21	6,08	6,12	6	EXP
2.4.1.7.3	Epidemiologi	6,5	6,21	6,29	6	EXP
2.4.1.8.0	Anestesisti e rianimatori	7,01	6,48	6,88	7	EXP
2.5.1.1.1	Specialisti della gestione nella Pubblica Amministrazione	6,04	6,03	6,21	6	COM
2.5.1.1.2	Specialisti del controllo nella Pubblica Amministrazione	5,84	5,84	5,99	6	COM
2.5.1.1.3	Specialisti in pubblica sicurezza	6,08	6,18	6,03	6	STR
2.5.1.2.0	Specialisti della gestione e del controllo nelle imprese private	6,4	6,38	6,36	6	EXP
2.5.1.3.1	Specialisti in risorse umane	6,44	6,48	6,05	6	STR
2.5.1.3.2	Specialisti dell'organizzazione del lavoro	6,64	6,1	6,18	6	EXP
2.5.1.4.1	Specialisti in contabilità	5,96	5,68	5,78	6	EXP
2.5.1.4.2	Fiscalisti e tributaristi	5,95	5,57	6,03	6	COM
2.5.1.4.3	Specialisti in attività finanziarie	6,06	6,03	6,13	6	COM
2.5.1.5.1	Specialisti nell'acquisizione di beni e servizi	5,84	6,27	5,95	6	STR
2.5.1.5.2	Specialisti nella commercializzazione di beni e servizi	6,24	6,07	6,25	6	COM
2.5.1.5.3	Analisti di mercato	6,64	6,4	6,4	6	EXP
2.5.1.6.0	Specialisti nelle pubbliche relazioni, dell'immagine e simili	6,32	5,95	6,49	6	COM
2.5.2.1.0	Avvocati	7,2	6,22	6,73	7	EXP
2.5.2.2.1	Esperti legali in imprese	6,72	6,62	6,55	7	EXP
2.5.2.2.2	Esperti legali in enti pubblici	6,85	6,21	6,26	6	EXP
2.5.2.3.0	Notai	6,91	6,18	6,86	7	EXP
2.5.2.4.0	Magistrati	6,69	5,88	6,86	6	COM
2.5.3.1.1	Specialisti dei sistemi economici	6,77	6,72	6,84	7	COM
2.5.3.1.2	Specialisti dell'economia aziendale	6,88	6,56	6,56	7	EXP

2.5.3.2.1	Sociologi	6,35	6,19	6,51	6	COM
2.5.3.2.2	Antropologi	6,96	6,72	6,76	7	EXP
2.5.3.2.3	Geografi	6,72	6,51	6,54	7	EXP
2.5.3.2.4	Archeologi	6,64	6,06	6,16	6	EXP
2.5.3.3.1	Psicologi clinici e psicoterapeuti	7,1	6,88	6,93	7	EXP
2.5.3.3.2	Psicologi clinici e psicoterapeuti	7,12	6,8	6,92	7	EXP
2.5.3.3.3	Psicologi del lavoro e delle organizzazioni	7,17	7,33	6,7	7	STR
2.5.3.4.1	Psicologi del lavoro e delle organizzazioni	6,32	5,92	6,17	6	EXP
2.5.3.4.2	Esperti d'arte	6,04	6,21	6,5	6	COM
2.5.3.4.3	Specialisti in scienza politica	6,88	7,07	7,04	7	STR
2.5.3.4.4	Filosofi	6,7	6,4	6,59	7	EXP
2.5.4.1.1	Scrittori e poeti	5,42	5,12	5,8	5	COM
2.5.4.1.2	Dialoghisti, soggettisti e parolieri	5,94	4,88	5,71	6	EXP
2.5.4.1.3	Redattori di testi per la pubblicità	6,22	5,88	6,17	6	EXP
2.5.4.1.4	Redattori di testi tecnici	4,71	4,67	5,16	5	NON-G
2.5.4.2.0	Giornalisti	6,21	5,75	6,16	6	EXP
2.5.4.3.0	Interpreti e traduttori di livello elevato	6,69	5,47	5,82	6	EXP
2.5.4.4.1	Linguisti e filologi	6,94	6,13	6,51	7	EXP
2.5.4.4.2	Revisori di testi	6,22	5,36	6,19	6	EXP
2.5.4.5.1	Archivisti	6,2	5,64	6,03	6	EXP
2.5.4.5.2	Bibliotecari	5,52	5,44	5,72	6	COM
2.5.4.5.3	Curatori e conservatori di musei	5,6	5,56	5,87	6	COM
2.5.5.1.1	Pittori, scultori e disegnatori	5,77	5,46	5,1	5	EXP
2.5.5.1.2	Bozzettisti e cartonisti	5,58	4,9	4,91	5	EXP
2.5.5.1.3	Restauratori di opere d'arte	5,6	5,6	6,08	6	COM
2.5.5.2.1	Registi	6,7	6,12	6,37	6	EXP
2.5.5.2.2	Attori	5,6	5,46	6,08	6	COM
2.5.5.2.3	Direttori artistici	5,3	5,35	5,49	5	NON-G
2.5.5.2.4	Sceneggiatori	5,75	4,97	5,86	6	COM
2.5.5.2.5	Scenografi	6,12	5,25	5,35	6	EXP
2.5.5.3.1	Coreografi	6,26	5,93	5,98	6	EXP

2.5.5.3.2	Ballerini	5,46	4,84	5,11	5	NON-G
2.5.5.4.1	Compositori	5,69	5,18	5,9	6	COM
2.5.5.4.2	Direttori d'orchestra e coro	5,98	6,18	6,16	6	STR
2.5.5.4.3	Strumentisti	6,48	5,36	5,76	6	EXP
2.5.5.5.0	Cantanti	4,65	4,57	5,49	5	NON-G
2.5.6.0.0	Specialisti in discipline religiose e teologiche	5,79	5,57	5,62	6	EXP
2.6.1.1.0	Docenti universitari in scienze statistiche, matematiche, fisiche, chimiche e della terra	6,93	6,96	7,07	7	COM
2.6.1.2.1	Docenti universitari in scienze della vita	6,73	6,51	7	7	COM
2.6.1.2.2	Docenti universitari in scienze della salute	6,86	6,6	6,95	7	COM
2.6.1.3.1	Docenti universitari in scienze ingegneristiche	7,18	6,96	7,21	7	COM
2.6.1.3.2	Docenti universitari in scienze dell'informazione	7,2	7,24	7,32	7	COM
2.6.1.4.0	Docenti universitari in scienze dell'antichità, filologico-letterarie e storico-artistiche	6,83	6,64	6,98	7	COM
2.6.1.5.0	Docenti universitari in scienze storiche, filosofiche, pedagogiche e psicologiche	6,83	6,84	7	7	COM
2.6.1.6.0	Docenti universitari in scienze giuridiche e sociali	6,8	7,16	7,25	7	COM
2.6.2.0.0	Ricercatori e tecnici laureati nelle scienze matematiche e dell'informazione	6,82	6,76	6,82	7	EXP
2.6.2.0.1	Ricercatori e tecnici laureati nelle scienze fisiche	6,51	6,48	6,56	7	COM
2.6.2.0.2	Ricercatori e tecnici laureati nelle scienze chimiche e farmaceutiche	6,2	6,29	6,17	6	STR
2.6.2.0.3	Ricercatori e tecnici laureati nelle scienze della terra	6,67	6,52	6,67	7	EXP
2.6.2.0.4	Ricercatori e tecnici laureati nelle scienze biologiche	6,8	6,8	6,7	7	EXP
2.6.2.0.5	Ricercatori e tecnici laureati nelle scienze mediche e veterinarie	7,07	6,93	7,06	7	EXP
2.6.2.0.6	Ricercatori e tecnici laureati nelle scienze agrarie e della produzione animale	6,51	6,4	6,68	7	COM
2.6.2.0.7	Ricercatori e tecnici laureati nelle scienze ingegneristiche e dell'architettura	6,67	6,68	6,86	7	COM
2.6.2.0.8	Ricercatori e tecnici laureati nelle scienze dell'antichità, filologico-letterarie, storiche, filosofiche, pedagogiche, psicologiche e giuridiche	6,71	6,86	6,99	7	COM
2.6.2.0.9	Ricercatori e tecnici laureati nelle scienze economiche, politiche, sociali e statistiche	6,53	6,51	6,79	7	COM
2.6.3.1.1	Professori di discipline artistiche nelle accademie di belle arti e nelle istituzioni scolastiche assimilate	6,37	6	6,34	6	EXP

2.6.3.1.2	Professori di discipline musicali nei conservatori e nelle istituzioni scolastiche assimilate	6,55	5,81	6,87	6	COM
2.6.3.1.3	Professori di arte drammatica e danza nelle accademie e nelle istituzioni scolastiche assimilate	6,28	5,94	6,57	6	COM
2.6.3.2.1	Professori di scienze matematiche, fisiche e chimiche	6,12	5,81	6,21	6	COM
2.6.3.2.2	Professori di scienze della vita e della salute	5,6	5,32	5,59	6	EXP
2.6.3.2.3	Professori di discipline tecnico-ingegneristiche	6,08	-	6,34	6	COM
2.6.3.2.4	Professori di scienze dell'informazione	6,49	6,4	6,61	7	COM
2.6.3.2.5	Professori di scienze letterarie, artistiche, storiche, filosofiche, pedagogiche e psicologiche	6,73	6,43	6,49	7	EXP
2.6.3.2.6	Professori di scienze giuridiche e sociali	5,47	5,38	5,59	5	COM
2.6.3.3.1	Professori di discipline umanistiche	6,34	6,08	6,32	6	EXP
2.6.3.3.2	Professori di discipline tecniche e scientifiche	5,55	5,04	5,42	5	EXP
2.6.4.1.0	Professori di scuola primaria	5,96	5,76	6	6	COM
2.6.4.2.0	Professori di scuola pre-primaria	5,04	5,16	5,06	5	NON-G
2.6.5.1.0	Specialisti nell'educazione e nella formazione di soggetti diversamente abili	5,94	5,6	5,73	6	EXP
2.6.5.2.0	Dirigenti scolastici e assimilati	6,11	6,32	6,16	6	STR
2.6.5.3.0	Dirigenti tecnici della pubblica istruzione ed assimilati	6,83	6,48	6,56	7	EXP
2.6.5.4.1	Docenti della formazione professionale	6,48	6,13	6,43	6	EXP
2.6.5.4.2	Esperti della progettazione formativa e curricolare	6,72	5,9	6,09	6	EXP
2.6.5.5.0	Consiglieri dell'orientamento	6,24	6,2	6,05	6	EXP
3.1.1.1.1	Tecnici geologici	5,2	5,23	5,25	5	NON-G
3.1.1.1.2	Tecnici nucleari	6	5,82	5,6	6	EXP
3.1.1.1.3	Tecnici del risparmio energetico e delle energie rinnovabili	4,72	4,71	4,56	5	NON-G
3.1.1.2.0	Tecnici chimici	5,41	5,06	5,07	5	NON-G
3.1.1.3.1	Tecnici programmatori	6,09	5,55	5,49	6	EXP
3.1.1.3.2	Tecnici hardware	6,1	5,26	5,17	6	EXP
3.1.1.3.3	Tecnici amministratori di reti e di sistemi telematici	5,7	5,31	5,2	5	EXP
3.1.1.3.4	Tecnici amministratori di basi di dati	5,71	5,36	5,07	5	EXP
3.1.1.3.5	Tecnici esperti in applicazioni	6,36	5,96	5,88	6	EXP
3.1.1.4.0	Tecnici statistici	5,3	5,28	5,26	5	NON-G
3.1.2.1.0	Tecnici meccanici	4,93	4,88	4,91	5	NON-G

3.1.2.2.1	Tecnici della produzione ceramica	5,64	5,34	5,12	5	EXP
3.1.2.2.2	Tecnici minerari	5,07	4,76	5,22	5	NON-G
3.1.2.2.3	Tecnici metallurgici	5,57	5,56	5,52	6	EXP
3.1.2.3.0	Elettrotecnici	5,39	5,13	5,12	5	NON-G
3.1.2.4.0	Tecnici elettronici	6,05	5,65	5,68	6	EXP
3.1.2.5.1	Tecnici delle costruzioni civili	5,25	4,85	4,96	5	NON-G
3.1.2.5.2	Rilevatori e disegnatori di mappe e planimetrie per le costruzioni civili	5,59	5,61	5,63	6	COM
3.1.2.6.1	Disegnatori tecnici	4,99	5,06	5,09	5	NON-G
3.1.2.6.2	Disegnatori tessili	5,2	5,02	4,76	5	NON-G
3.1.2.9.0	Tecnici della gestione del processo produttivo	5,84	5,66	5,6	6	EXP
3.1.3.1.1	Comandanti navali	5,72	5,15	5,2	5	EXP
3.1.3.1.2	Ufficiali e assistenti di bordo	5	4,75	4,83	5	NON-G
3.1.3.1.3	Piloti navali	4,99	5,1	4,84	5	NON-G
3.1.3.2.1	Piloti e ufficiali di aeromobili	6,58	6,24	6,4	6	EXP
3.1.3.2.2	Tecnici avionici	5,88	5,81	5,68	6	EXP
3.1.3.2.3	Tecnici aerospaziali	6,82	-	6,84	7	COM
3.1.3.3.1	Controllori di volo	5,79	5,66	6,11	6	COM
3.1.3.3.2	Tecnici del traffico aeroportuale	6,4	6,29	6,45	6	COM
3.1.4.1.0	Fotografi e assimilati	5,79	5,28	5,12	5	EXP
3.1.4.2.1	Operatori radio	3,6	3,63	4,15	4	NON-G
3.1.4.2.2	Tecnici delle trasmissioni radio-televisive	4,88	4,88	4,79	5	NON-G
3.1.4.3.1	Tecnici degli apparati audio-video e della ripresa video-cinematografica	5,42	5,36	4,88	5	NON-G
3.1.4.3.2	Tecnici del suono	5,82	5,37	5,28	5	EXP
3.1.4.3.3	Tecnici del montaggio audio-video-cinematografico	5,29	5,09	5,12	5	NON-G
3.1.4.4.0	Tecnici di apparati medicali e per la diagnostica medica	4,56	4,51	4,45	5	NON-G
3.1.4.9.0	Altri operatori di apparati ottici ed elettronici	5,3	4,94	5,04	5	NON-G
3.1.5.1.2	Tecnici della sicurezza sul lavoro	5,79	5,62	5,71	6	EXP
3.1.5.2.0	Tecnici del controllo della qualità industriale	5,76	5,41	5,21	5	EXP
3.1.5.3.0	Tecnici del controllo ambientale	5,32	5,18	5,38	5	NON-G
3.1.5.4.1	Tecnici della raccolta e dello smaltimento dei rifiuti	5,08	4,97	4,96	5	NON-G
3.1.5.4.2	Tecnici del trattamento e della gestione delle acque reflue e	4,68	4,63	4,62	5	NON-G

	potabili					
3.2.1.1.1	Infermieri	5,95	5,73	5,79	6	EXP
3.2.1.1.2	Tecnici di diagnostica	5,56	4,82	5,31	5	EXP
3.2.1.2.1	Ortottisti e assistenti di oftalmologia	5,18	5,19	5,41	5	NON-G
3.2.1.2.2	Ottici e optometristi	5,44	4,77	5,04	5	NON-G
3.2.1.3.1	Igienisti dentali	5,74	5,52	5,55	6	EXP
3.2.1.3.2	Odontotecnici	5,52	5,2	-	5	EXP
3.2.1.4.1	Fisioterapisti e tecnici della riabilitazione	4,96	5,18	5,05	5	NON-G
3.2.1.4.2	Tecnici protesici	5,39	5,26	5,34	5	NON-G
3.2.1.5.0	Levatrici e ostetriche	5,9	5,86	5,78	6	EXP
3.2.1.6.1	Dietisti	5,63	5,63	5,59	6	EXP
3.2.1.6.2	Tecnici della nutrizione	5,12	5,31	5,36	5	NON-G
3.2.1.7.1	Tecnici della prevenzione sanitaria	5,6	5,56	5,53	6	EXP
3.2.1.7.2	Tecnici dell'assistenza sanitaria	5,92	5,64	5,79	6	EXP
3.2.1.9.0	Tecnici della medicina popolare ed altri tecnici paramedici	5,12	4,96	5,28	5	NON-G
3.2.2.1.1	Tecnici agronomi	5,42	4,96	5,2	5	NON-G
3.2.2.1.2	Tecnici forestali	5,6	5,63	5,6	6	STR
3.2.2.2.0	Zootecnici	5,63	5,32	5,44	5	EXP
3.2.2.3.1	Tecnici di laboratorio di analisi cliniche	4,72	4,5	4,4	5	NON-G
3.2.2.3.2	Tecnici di laboratorio biochimico	6,41	5,84	6,4	6	EXP
3.2.2.3.3	Tecnici dei prodotti alimentari	5,63	5,52	5,28	5	EXP
3.2.2.3.4	Tecnici di laboratorio veterinario	5,28	4,9	5,42	5	NON-G
3.3.1.1.1	Segretari amministrativi e tecnici degli affari generali	5,38	5,2	5,37	5	NON-G
3.3.1.1.2	Assistenti di archivio e di biblioteca	5,15	4,88	5,52	5	COM
3.3.1.2.1	Contabili	5,82	5,45	5,6	6	EXP
3.3.1.2.2	Economi e tesorieri	5,84	5,98	5,48	6	STR
3.3.1.2.3	Amministratore di stabili e condomini	5,57	5,15	5,33	5	EXP
3.3.1.3.0	Tecnici addetti all'organizzazione e al controllo gestionale della produzione.	5,68	5,26	5,2	5	EXP
3.3.1.4.1	Tecnici dell'acquisizione delle informazioni	5,28	5,1	5,41	5	NON-G
3.3.1.4.2	Intervistatori e rilevatori professionali	4,06	4,35	4,72	4	NON-G
3.3.1.5.0	Corrispondenti in lingue estere e assimilati	5,76	5,23	5,63	6	EXP

3.3.2.1.1	Tecnici della gestione finanziaria aziendale	5,76	5,68	5,57	6	EXP
3.3.2.1.2	Consulenti finanziari	6,12	5,88	6,19	6	COM
3.3.2.2.0	Tecnici del lavoro bancario	5,36	5,39	5,49	5	NON-G
3.3.2.3.0	Agenti assicurativi	-	5,63	5,87	6	COM
3.3.2.4.1	Periti stimatori di danno	4,94	5,04	5,36	5	NON-G
3.3.2.4.2	Valutatori di rischio	6,08	5,79	5,8	6	EXP
3.3.2.4.3	Liquidatori	5,6	5,52	5,72	6	COM
3.3.2.5.0	Agenti di borsa e cambio, tecnici dell'intermediazione titoli ed assimilati	5,36	5,34	5,52	5	COM
3.3.2.9.2	Tecnici della locazione finanziaria	5,92	5,87	5,87	6	EXP
3.3.3.1.0	Approvvigionatori e responsabili acquisti	4,84	5,12	5,25	5	NON-G
3.3.3.2.0	Responsabili di magazzino e della distribuzione interna	4,08	4,14	4,13	4	NON-G
3.3.3.3.1	Commissari e aggiudicatori d'asta	5,12	5,24	5,23	5	NON-G
3.3.3.3.2	Periti commerciali	4,88	5,22	5,11	5	NON-G
3.3.3.4.0	Tecnici della vendita e della distribuzione	4,88	5,12	5,12	5	NON-G
3.3.3.5.0	Tecnici del marketing	6	6,22	6,23	6	COM
3.3.3.6.1	Tecnici della pubblicità	5,7	5,57	5,79	6	COM
3.3.3.6.2	Tecnici delle pubbliche relazioni	6,42	6,34	6,6	6	COM
3.3.4.1.1	Agenti e spedizionieri	5,92	5,43	5,46	6	EXP
3.3.4.1.2	Tecnici dell'organizzazione commerciale	5,52	6	5,86	6	STR
3.3.4.2.0	Agenti di commercio	-	5,03	5,37	5	NON-G
3.3.4.3.0	Agenti concessionari	5,2	5,28	5,59	5	COM
3.3.4.4.0	Agenti di pubblicità	5,47	5,52	5,82	6	COM
3.3.4.5.1	Agenti immobiliari	-	5,32	5,49	5	NON-G
3.3.4.5.2	Periti immobiliari	5,68	6	6,07	6	COM
3.3.4.6.0	Rappresentanti di commercio	4,88	4,95	5,24	5	NON-G
3.3.4.9.0	Agenti e rappresentanti di artisti ed atleti	5,28	5,68	6,05	6	COM
3.4.1.1.0	Tecnici delle attività ricettive ed assimilati	-	5,28	5,56	5	COM
3.4.1.2.1	Organizzatori di fiere ed esposizioni	5,92	5,87	6,03	6	COM
3.4.1.2.2	Organizzatori di convegni e ricevimenti	5,84	6,19	6,32	6	COM
3.4.1.3.0	Animatori turistici ed assimilati	4,82	5,15	5,12	5	NON-G
3.4.1.4.0	Agenti di viaggio	6	5,4	5,47	6	EXP

3.4.1.5.1	Guide ed accompagnatori sportivi	5,47	5,14	5,35	5	NON-G
3.4.1.5.2	Guide ed accompagnatori turistici	5,34	5,08	5,31	5	NON-G
3.4.2.1.0	Insegnanti elementari	5,56	5,39	5,51	5	EXP
3.4.2.2.0	Insegnanti per soggetti diversamente abili, di sostegno e altri insegnanti di scuole speciali	5,39	5,5	5,43	5	STR
3.4.2.3.1	Insegnanti di asili nido	4,61	4,73	5,03	5	NON-G
3.4.2.3.2	Insegnanti di scuole materne	4,79	5,09	4,97	5	NON-G
3.4.2.4.1	Tutor, istitutori e insegnanti nella formazione professionale	5,36	5,15	5,31	5	NON-G
3.4.2.4.2	Insegnanti tecnico-pratici negli istituti di istruzione secondaria	5,77	5,36	5,77	6	COM
3.4.3.1.1	Istruttori di volo	5,84	5,89	6,05	6	COM
3.4.3.1.2	Istruttori di guida automobilistica	5,08	4,89	5,2	5	NON-G
3.4.3.1.3	Istruttori di nautica	5,31	5,02	5,54	5	COM
3.4.3.2.1	Istruttori di arti figurative	5,78	5,16	5,96	6	COM
3.4.3.2.2	Istruttori di danza	5,9	5,36	5,97	6	COM
3.4.3.2.3	Istruttori di canto	5,41	5,38	5,68	5	COM
3.4.3.2.4	Istruttori di strumenti musicali	6,06	5,44	5,87	6	EXP
3.4.3.2.5	Istruttori in campo linguistico	6,3	6,04	6,15	6	EXP
3.4.3.3.0	Istruttori di discipline sportive non agonistiche	5,12	4,94	5,15	5	NON-G
3.4.3.4.1	Organizzatori di eventi e di strutture sportive	5,12	5,11	5,23	5	NON-G
3.4.3.4.2	Osservatori sportivi	6,24	5,58	5,78	6	EXP
3.4.3.5.1	Allenatori e tecnici sportivi	4,92	5,05	5,32	5	NON-G
3.4.3.5.2	Arbitri e giudici di gara	4,61	5,02	4,82	5	NON-G
3.4.3.6.0	Atleti	4,44	4,45	4,69	5	NON-G
3.4.4.1.1	Annunciatori della radio e della televisione	5,3	4,94	5,51	5	COM
3.4.4.1.2	Presentatori di performance artistiche e ricreative	5,23	4,9	5,98	5	COM
3.4.4.2.1	Grafici pubblicitari	6,18	5,84	5,9	6	EXP
3.4.4.2.2	Disegnatori di moda	5,12	4,63	4,61	5	NON-G
3.4.4.2.3	Disegnatori e allestitori di scena	5,63	5,3	5,18	5	EXP
3.4.4.2.4	Disegnatori commerciali ed industriali	5,46	5,12	4,86	5	NON-G
3.4.4.2.5	Disegnatori artistici e illustratori	5,45	4,86	5,07	5	NON-G
3.4.4.3.1	Tecnici dei musei	5,15	5,04	5,26	5	NON-G
3.4.4.3.2	Tecnici delle biblioteche	5,06	4,82	5,06	5	NON-G

3.4.4.4.1	Stimatori di opere d'arte	6,21	6,1	6,04	6	EXP
3.4.4.4.2	Periti filatelici e numismatici	5,14	5,63	5,12	6	STR
3.4.4.4.3	Periti grafologi ed esperti in analisi e comparazione della scrittura	5,71	6,07	6	6	STR
3.4.4.5.0	Tecnici dell'organizzazione della produzione radiotelevisiva, cinematografica e teatrale	5,26	5,06	5,49	5	NON-G
3.4.4.6.1	Artisti di strada	4,87	4,74	5,25	5	NON-G
3.4.4.6.2	Artisti di varietà	4,88	4,99	5,43	5	NON-G
3.4.4.6.3	Acrobati e artisti circensi	5,52	4,93	5,68	5	COM
3.4.5.1.1	Assistenti sociali	5,84	6,02	6,06	6	COM
3.4.5.1.2	Operatori socio-assistenziali e animatori per l'infanzia e la prima adolescenza	5,2	5,55	5,73	5	COM
3.4.5.2.0	Tecnici del reinserimento e dell'integrazione sociale degli adulti	6,12	6,3	6,25	6	STR
3.4.5.3.0	Tecnici dei servizi di informazione e di orientamento scolastico e professionale	5,2	5,3	5,4	5	NON-G
3.4.5.4.0	Tecnici dei servizi di collocamento	5,68	6	5,9	6	STR
3.4.5.5.0	Tecnici dei servizi di sicurezza privati e assimilati	4,96	5,2	5,12	5	NON-G
3.4.5.6.0	Tecnici della cura estetica	4,48	4,65	4,7	5	NON-G
3.4.6.1.0	Tecnici dei servizi giudiziari	5,14	4,55	5,09	5	NON-G
3.4.6.2.0	Ufficiali della Polizia di Stato	6	5,95	6,02	6	COM
3.4.6.3.1	Comandanti e ufficiali dei vigili urbani	5,84	5,84	5,84	6	STR
3.4.6.3.2	Comandanti e ufficiali dei vigili del fuoco	7,28	6,8	6,64	7	EXP
3.4.6.3.3	Comandanti e ufficiali del corpo forestale	5,97	5,89	5,96	6	EXP
3.4.6.4.0	Ufficiali di finanza	5,89	6,01	5,89	6	STR
3.4.6.5.0	Controllori fiscali	5,62	5,44	5,43	5	EXP
3.4.6.6.1	Tecnici dei servizi pubblici di concessioni licenze	4,92	5,03	5,25	5	NON-G
3.4.6.6.2	Tecnici dei servizi pubblici per il rilascio di certificazioni e documentazioni personali	4,74	4,44	4,68	5	NON-G
4.1.1.1.0	Dattilografi, stenodattilografi	4,49	4,2	4,31	4	NON-G
4.1.1.2.0	Operatori su macchine di calcolo e di elaborazione dati	5,28	4,64	5,13	5	NON-G
4.1.1.3.0	Operatori su macchine per la riproduzione di documenti e assimilati	4,4	4,64	4,48	5	NON-G
4.1.1.4.0	Personale di segreteria	4,76	4,6	4,94	5	NON-G
4.1.1.5.0	Personale addetto allo smistamento di materiali e documenti	4,1	4,08	4,47	4	NON-G

4.1.1.6.0	Addetti agli affari generali	4,72	4,21	4,55	4	NON-G
4.1.1.7.0	Addetti alla ricezione di materiali e documenti	4,94	4,48	4,26	5	NON-G
4.1.2.1.0	Aiuto contabili e assimilati	4,51	4,22	4,23	4	NON-G
4.1.2.2.0	Addetti alle rilevazioni di dati amministrativi	4,51	4,23	4,34	4	NON-G
4.1.2.3.0	Addetti a compiti di controllo e verifica	4,72	4,61	4,9	5	NON-G
4.1.2.4.0	Personale ausiliario nel campo della pianificazione e della progettazione	4,88	4,97	5,03	5	NON-G
4.1.2.5.0	Addetti alla gestione del personale	4,8	4,56	4,93	5	NON-G
4.1.2.6.0	Addetti ai servizi finanziari	6,04	6	6,32	6	COM
4.1.3.1.0	Addetti alla gestione amministrativa dei magazzini	3,76	3,83	4,18	4	NON-G
4.1.3.2.0	Addetti alla gestione amministrativa degli approvvigionamenti	-	5,28	5,25	5	NON-G
4.1.3.3.0	Addetti alla gestione amministrativa dei trasporti	4,77	4,77	4,72	5	NON-G
4.1.3.4.0	Addetti al controllo della documentazione di viaggio	3,8	4,18	4,3	4	NON-G
4.1.4.1.0	Addetti ad archivi e schedari	4,32	-	4,28	4	NON-G
4.1.4.2.0	Addetti a biblioteche ed assimilati	5,09	4,66	5,05	5	NON-G
4.1.4.3.0	Addetti a servizi statistici e di documentazione	5,34	5,28	5,28	5	NON-G
4.1.4.4.0	Addetti a servizi Studi e Ricerche	5,95	5,81	5,95	6	EXP
4.1.4.6.0	Addetti alla pubblicizzazione dei testi e della documentazione	5,26	5,17	5,6	5	COM
4.1.4.7.0	Addetti all'inoltro e allo smistamento di posta e documentazione	2,96	3,16	3,85	3	NON-G
4.1.4.8.0	Addetti a telescriventi e ad altri mezzi di diffusione telematica della documentazione	5,48	5,33	5,52	5	COM
4.2.1.1.1	Cassieri	5,56	5,87	6,21	6	COM
4.2.1.1.2	Bigliettai	3,3	3,89	3,64	4	NON-G
4.2.1.2.0	Addetti allo sportello bancario	4,68	4,86	4,84	5	NON-G
4.2.1.3.0	Addetti a sportelli assicurativi e assimilati	5,16	5,44	5,27	5	NON-G
4.2.1.4.0	Addetti allo sportello di altri intermediari finanziari	4,42	4,56	4,92	5	NON-G
4.2.1.5.0	Esattori di fatture e di crediti	5,34	5,06	5,27	5	NON-G
4.2.1.6.0	Addetti ad agenzie di pegno e assimilati	5,57	5,61	5,41	6	STR
4.2.1.7.1	Allibratori	4,4	4,73	4,52	5	NON-G
4.2.1.7.2	Croupiers	4,72	5,28	4,9	5	NON-G
4.2.1.7.3	Ricevitori	3,92	4,04	4,16	4	NON-G
4.2.2.1.0	Addetti all'accoglienza ed assimilati	4,08	4,46	4,42	4	NON-G

4.2.2.2.0	Addetti ad uffici stampa ed assimilati	5,57	4,8	5,4	5	EXP
4.2.2.3.1	Centralinisti	3,34	3,96	3,99	4	NON-G
4.2.2.3.2	Telefonisti e addetti ai Call Center	3,84	3,92	4,2	4	NON-G
4.2.2.4.1	Assistenti di volo	5,44	5,84	5,44	6	STR
4.2.2.4.2	Assistenti di viaggio e crociera	5,32	5,54	5,5	5	STR
4.2.2.4.3	Assistenti congressuali e fieristici	4,12	4,38	4,48	4	NON-G
5.1.1.1.0	Esercenti e gestori delle vendite all'ingrosso	4,48	4,77	4,92	5	NON-G
5.1.1.2.0	Addetti ad attività organizzative delle vendite all'ingrosso	3,83	4,4	4,34	4	NON-G
5.1.1.3.0	Addetti alle vendite all'ingrosso	-	5,11	5,34	5	NON-G
5.1.2.1.0	Commessi e assimilati	3,52	4,18	4,22	4	NON-G
5.1.2.2.0	Esercenti delle vendite al minuto	4,4	4,71	4,89	5	NON-G
5.1.2.3.0	Esercenti di distributori di carburanti ed assimilati	-	4,31	4,19	4	NON-G
5.1.2.4.0	Addetti ai distributori di carburanti ed assimilati	3,12	3,2	3,3	3	NON-G
5.1.2.5.1	Venditori a domicilio	4,8	4,97	5,13	5	NON-G
5.1.2.5.2	Venditori a distanza	4,72	4,77	5,01	5	NON-G
5.1.2.6.0	Cassieri di esercizi commerciali	3,31	3,41	3,79	4	NON-G
5.1.3.1.0	Indossatori, modelli e assimilati	4,24	4,49	5,25	5	NON-G
5.1.3.2.0	Dimostratori ed assimilati	3,92	4,45	5,06	4	NON-G
5.1.3.3.0	Vetrinisti ed assimilati	4,67	4,8	4,78	5	NON-G
5.1.3.4.0	Addetti all'informazione e all'assistenza dei clienti	-	5,22	5,03	5	NON-G
5.2.1.1.0	Esercenti e gestori di servizi alberghieri ed assimilati	5,04	5,1	5,04	5	NON-G
5.2.1.2.0	Esercenti e gestori di servizi extralberghieri ed assimilati	-	4,82	4,98	5	NON-G
5.2.1.3.0	Addetti all'accoglimento, portieri di albergo ed assimilati	4,44	4,46	4,77	5	NON-G
5.2.2.1.0	Cuochi in alberghi e ristoranti	3,84	3,84	3,79	4	NON-G
5.2.2.2.1	Cuochi di imprese per la ristorazione collettiva	4,38	4,35	4,34	4	NON-G
5.2.2.2.2	Cuochi di fast food	4,24	4,48	4,48	4	NON-G
5.2.2.2.3	Addetti e confezionatori nella ristorazione collettiva	3,01	2,75	3,15	3	NON-G
5.2.2.3.1	Camerieri di albergo	3,08	3,63	3,26	3	NON-G
5.2.2.3.2	Camerieri di ristorante	3,73	3,93	4	4	NON-G
5.2.2.3.3	Camerieri di mensa e fast food	3,44	3,89	3,85	4	NON-G
5.2.2.4.0	Baristi e assimilati	3,68	4,06	4,16	4	NON-G

5.2.2.5.0	Esercenti di servizi di ristorazione ed assimilati	-	4,89	5,02	5	NON-G
5.3.1.1.0	Maestri d'arte nel campo dell'artigianato	5,17	4,96	5,46	5	NON-G
5.3.1.2.0	Maestri di attività per il tempo libero, la cura della persona e assimilati	5,02	4,5	4,99	5	NON-G
5.3.1.3.1	Addestratori di animali	4,6	4,98	5,09	5	NON-G
5.3.1.3.2	Custodi e allevatori di animali domestici e da esposizione	3,36	3,69	3,69	4	NON-G
5.4.1.0.0	Professioni qualificate nei servizi sanitari	3,79	4,28	4,56	4	NON-G
5.5.1.1.1	Esercenti e gestori di cinema e teatri	4,96	5,14	5,44	5	NON-G
5.5.1.1.2	Esercenti e gestori di locali notturni	-	5,17	5,48	5	NON-G
5.5.1.1.3	Esercenti e gestori di attività ricreative	5,01	4,86	5,02	5	NON-G
5.5.1.1.4	Esercenti e gestori di attività sportive	-	5,07	5,1	5	NON-G
5.5.1.2.0	Guide ed accompagnatori urbani	4,8	4,37	4,67	5	NON-G
5.5.2.1.0	Tintori, lavandai e assimilati	3,8	3,82	3,71	4	NON-G
5.5.2.2.0	Esercenti di tintorie, lavanderie e assimilati	4,24	4,58	4,43	4	NON-G
5.5.3.1.1	Parrucchieri e barbieri	4,44	4,21	4,33	4	NON-G
5.5.3.1.2	Estetisti	5,2	4,79	4,87	5	NON-G
5.5.3.2.0	Personale di compagnia e personale qualificato di servizio alle famiglie	4,16	5,05	5,17	5	NON-G
5.5.3.3.0	Addetti alla sorveglianza di bambini ed assimilati	3,66	4,03	4,2	4	NON-G
5.5.3.4.0	Addetti all'assistenza personale in istituzioni	4,16	4,75	5,09	5	NON-G
5.5.3.5.0	Addetti all'assistenza personale a domicilio	4,44	4,79	4,88	5	NON-G
5.5.3.6.0	Gestori di agenzie per il disbrigo di pratiche ed assimilati	5,12	4,9	4,85	5	NON-G
5.5.3.7.0	Addetti di agenzie per il disbrigo di pratiche ed assimilati	5,1	4,84	5,06	5	NON-G
5.5.3.8.0	Gestori di agenzie di pompe funebri	-	4,53	4,45	4	NON-G
5.5.3.9.0	Addetti alle agenzie di pompe funebri	3,76	4,1	4,2	4	NON-G
5.5.4.1.0	Personale addetto alla custodia di edifici, impianti ed attrezzature	3,32	3,55	3,43	3	NON-G
5.5.4.2.1	Vigili urbani	4,91	4,72	4,85	5	NON-G
5.5.4.2.2	Personale di guardiania territoriale	4,77	4,99	5,02	5	NON-G
5.5.4.3.1	Agenti della Polizia di Stato	5,48	5,42	5,27	5	NON-G
5.5.4.3.2	Agenti della Guardia di Finanza	5,2	5,12	5,22	5	NON-G
5.5.4.3.3	Agenti del corpo forestale	4,97	4,7	4,99	5	NON-G
5.5.4.4.1	Vigili del fuoco	6,24	6,08	5,93	6	EXP

5.5.4.4.2	Personale delle squadre antincendio	5,24	4,91	4,88	5	NON-G
5.5.4.5.0	Agenti di istituti di pena e rieducazione	4,46	4,67	4,72	5	NON-G
5.5.4.6.0	Guardie private di sicurezza	4,08	4,54	4,19	4	NON-G
5.5.4.7.0	Bagnini e assimilati	3,6	3,99	4,25	4	NON-G
5.5.4.8.0	Gestori di garage ed autorimesse	3,6	3,57	3,92	4	NON-G
6.1.1.1.0	Minatori	3,23	3,76	4	4	NON-G
6.1.1.2.0	Brillatori e artificieri in cave e miniere	4,29	3,92	3,92	4	NON-G
6.1.1.3.0	Tagliatori e levigatori di pietre, scalpellini e marmisti	3,53	3,51	3,63	4	NON-G
6.1.1.4.1	Coltivatori di cave	3,76	3,93	4,06	4	NON-G
6.1.1.4.2	Coltivatori di saline	4,84	4,56	4,56	5	NON-G
6.1.1.5.0	Assistenti e agenti di miniere e cave	5,31	5,04	4,93	5	NON-G
6.1.1.6.0	Armatori e binaristi di miniere e cave	4,77	4,84	4,8	5	NON-G
6.1.2.1.0	Muratori in pietra e mattoni	4,72	3,87	4	4	NON-G
6.1.2.2.1	Armatori e ferraioli	3,01	3,44	3,47	3	NON-G
6.1.2.2.2	Casseronisti/Cassonisti	4,32	3,92	3,92	4	NON-G
6.1.2.2.3	Muratori e formatori in calcestruzzo	4,8	4,03	4,43	4	NON-G
6.1.2.3.0	Carpentieri e falegnami edili	4,32	3,8	3,84	4	NON-G
6.1.2.4.0	Pontatori e ponteggiatori	5,26	5,08	5,25	5	NON-G
6.1.2.5.2	Armatori di ferrovie	3,78	3,88	3,95	4	NON-G
6.1.2.6.1	Asfaltisti	3,31	3,06	3,06	3	NON-G
6.1.2.6.2	Lastricatori e pavimentatori stradali	4,26	4,28	4,16	4	NON-G
6.1.2.9.0	Montatori di prefabbricati e di preformati	4,19	3,7	3,71	4	NON-G
6.1.3.1.0	Copritetti e impermeabilizzatori di solai	5,12	4,73	4,88	5	NON-G
6.1.3.2.1	Posatori di pavimenti	3,88	3,76	3,88	4	NON-G
6.1.3.2.2	Rifinitori di pavimenti	4,36	4,37	4,25	4	NON-G
6.1.3.2.3	Piastrellisti e rivestimentisti in pietra e materiali simili	3,74	3,75	3,9	4	NON-G
6.1.3.3.0	Intonacatori	3,84	3,5	3,63	4	NON-G
6.1.3.4.0	Installatori di impianti di isolamento e insonorizzazione	4,32	4,56	4,4	4	NON-G
6.1.3.5.0	Vetrai	3,86	3,81	3,84	4	NON-G
6.1.3.6.1	Idraulici nelle costruzioni civili	4,88	4,7	4,48	5	NON-G
6.1.3.6.2	Installatori di impianti termici nelle costruzioni civili	4,72	4,16	4,16	4	NON-G
6.1.3.7.0	Elettricisti ed installatori di impianti elettrici nelle costruzioni	4,96	4,4	4,36	5	NON-G

	civili					
6.1.3.8.0	Installatori di infissi e serramenti	3,84	4,05	4,42	4	NON-G
6.1.4.1.1	Pittori edili	3,76	4,01	3,93	4	NON-G
6.1.4.1.2	Decoratori edili e ornatisti	4,56	4,77	4,77	5	NON-G
6.1.4.1.3	Stuccatori	4,16	3,89	4,22	4	NON-G
6.1.4.2.0	Parchettisti e posatori di pavimenti e rivestimenti sintetici e in legno	4,88	4,62	4,63	5	NON-G
6.1.4.3.0	Pulitori di facciate	4,36	4,11	4,21	4	NON-G
6.1.5.1.0	Operai addetti ai servizi di igiene e pulizia	4,2	3,84	3,61	4	NON-G
6.1.5.2.0	Operai addetti alla manutenzione degli impianti fognari	4	4,01	4,02	4	NON-G
6.2.1.1.1	Fonditori	4,26	3,82	4,08	4	NON-G
6.2.1.1.2	Formatori e animisti	3,79	3,66	3,62	4	NON-G
6.2.1.2.0	Saldatori e tagliatori a fiamma	2,99	3,33	3,57	3	NON-G
6.2.1.3.1	Lattonieri e calderai	3,68	4,03	4,21	4	NON-G
6.2.1.3.2	Tracciatori	4,88	4,48	4,49	5	NON-G
6.2.1.4.0	Carpentieri e montatori di carpenteria metallica	3,8	3,81	3,63	4	NON-G
6.2.1.5.0	Attrezzatori e montatori di cavi metallici per uso industriale e di trasporto	4,78	4,37	4,72	5	NON-G
6.2.1.6.0	Sommozzatori e lavoratori subacquei	4,16	4,78	4,59	5	NON-G
6.2.1.7.0	Saldatori elettrici e a norme ASME	3,82	3,67	3,75	4	NON-G
6.2.1.8.1	Carrozzieri	4,64	4,38	4,35	4	NON-G
6.2.1.8.2	Stampatori e piegatori di lamiere	4,26	3,98	4,1	4	NON-G
6.2.2.1.1	Fabbri	4,08	4,2	4,12	4	NON-G
6.2.2.1.2	Fucinatori e forgiatori	4,17	3,97	4,32	4	NON-G
6.2.2.2.0	Costruttori di utensili, modellatori e tracciatori meccanici	4,37	4,58	4,68	5	NON-G
6.2.2.3.1	Attrezzisti di macchine utensili	5,1	4,54	4,64	5	NON-G
6.2.2.3.2	Aggiustatori meccanici	4,88	4,35	4,56	5	NON-G
6.2.2.4.1	Rettificatori	3,87	4,05	3,78	4	NON-G
6.2.2.4.2	Levigatori e affilatori di metalli	4,08	3,83	3,76	4	NON-G
6.2.3.1.1	Meccanici motoristi e riparatori di veicoli a motore	5,44	4,17	4,21	5	NON-G
6.2.3.1.2	Carburatoristi e pompisti	4,35	4	3,97	4	NON-G
6.2.3.1.3	Radiatoristi	4,64	4,15	4,04	4	NON-G

6.2.3.1.4	Gommisti	4,56	4,51	4,56	5	NON-G
6.2.3.1.5	Meccanici di biciclette e veicoli simili	4,8	4,09	4,38	5	NON-G
6.2.3.2.0	Meccanici, riparatori e manutentori di aerei	5,22	4,8	5,18	5	NON-G
6.2.3.3.1	Riparatori e manutentori di macchinari e impianti industriali	5,1	4,33	4,11	5	NON-G
6.2.3.3.2	Installatori e montatori di macchinari e impianti industriali	5,12	4,7	4,88	5	NON-G
6.2.3.4.0	Frigoristi	5	4,26	4,16	5	NON-G
6.2.3.5.1	Riparatori e manutentori di apparecchi e impianti termoidraulici	4,05	4,36	4,13	4	NON-G
6.2.3.5.2	Installatori e montatori di apparecchi e impianti termoidraulici	4,45	4,43	4,32	4	NON-G
6.2.3.6.0	Meccanici collaudatori	5,32	4,65	5,2	5	NON-G
6.2.3.7.0	Verniciatori artigianali ed industriali	3,6	3,67	3,72	4	NON-G
6.2.4.1.1	Installatori e riparatori di impianti elettrici	5	4,9	4,84	5	NON-G
6.2.4.1.2	Riparatori di apparecchi elettrici e di elettrodomestici	4,12	3,73	3,78	4	NON-G
6.2.4.1.3	Elettromeccanici	4,16	3,8	3,84	4	NON-G
6.2.4.1.4	Installatori e riparatori di apparati di produzione e conservazione dell'energia elettrica	5,04	4,5	4,66	5	NON-G
6.2.4.1.5	Elettrauto	4,72	4,19	4,2	4	NON-G
6.2.4.2.0	Manutentori e riparatori di apparati elettronici industriali	5,36	4,77	4,83	5	NON-G
6.2.4.3.0	Riparatori di apparecchi radio televisivi	4,84	4,43	4,56	5	NON-G
6.2.4.4.0	Installatori e riparatori di apparati telegrafici e telefonici	4,76	4,29	4,24	4	NON-G
6.2.4.5.0	Installatori, manutentori e riparatori di linee elettriche, cavisti	4,08	4,07	4,13	4	NON-G
6.2.5.1.1	Attrezzisti navali	3,84	3,87	3,76	4	NON-G
6.2.5.1.2	Meccanici e motoristi navali	5,08	3,82	3,84	4	NON-G
6.2.5.2.0	Carpentieri navali	3,52	3,63	3,79	4	NON-G
6.2.5.3.0	Frigoristi navali	3,82	3,89	3,74	4	NON-G
6.2.5.4.0	Elettomeccanici navali	4,64	4,19	4,44	4	NON-G
6.3.1.1.1	Attrezzisti e meccanici di precisione	4,83	4,62	4,6	5	NON-G
6.3.1.1.2	Strumentisti di precisione	5,04	4,94	4,92	5	NON-G
6.3.1.2.0	Meccanici e riparatori di protesi, di ortesi e di tutori ortopedici e simili	5,12	5,27	5,2	5	NON-G
6.3.1.3.1	Accordatori di strumenti musicali	4,77	4,7	4,53	5	NON-G
6.3.1.3.2	Addetti alla costruzione e riparazione di strumenti musicali	4,67	4,72	4,4	5	NON-G
6.3.1.4.0	Addetti alla costruzione e riparazione di orologi	4,26	4,29	4,16	4	NON-G

6.3.1.5.1	Addetti alla produzione di lenti e occhiali	4,3	4,11	4,3	4	NON-G
6.3.1.5.2	Addetti alla produzione di apparecchi ottici	4,58	3,95	4,21	4	NON-G
6.3.1.6.1	Orafi e gioiellieri	4,62	4,18	4,03	4	NON-G
6.3.1.6.2	Addetti alla lavorazione di metalli preziosi	4,46	4,22	4,32	4	NON-G
6.3.1.6.3	Addetti alla lavorazione di pietre preziose e dure	4,81	5,03	4,6	5	NON-G
6.3.1.6.4	Addetti alla lavorazione di bigiotteria	4,56	4,31	4,62	4	NON-G
6.3.2.1.1	Vasai e terracottai	4,11	4,08	4,22	4	NON-G
6.3.2.1.2	Ceramisti	4,68	4,28	4,44	4	NON-G
6.3.2.2.1	Soffiatori e modellatori del vetro	3,92	3,64	3,49	4	NON-G
6.3.2.2.2	Tagliatori, molatori e levigatori del vetro	4,11	4,04	3,97	4	NON-G
6.3.2.3.0	Incisori ed acquafortisti su vetro	3,54	3,71	3,79	4	NON-G
6.3.2.4.0	Pittori e decoratori su vetro e ceramica	4,38	4,45	3,92	4	NON-G
6.3.3.1.1	Cartapestai	5,04	4,3	4,35	5	NON-G
6.3.3.1.2	Incisori e intarsiatori su legno	4,19	4,07	4,14	4	NON-G
6.3.3.2.1	Artigiani di prodotti tessili lavorati a mano	4,34	4,34	4,83	5	NON-G
6.3.3.2.2	Artigiani di prodotti in pelle e cuoio lavorati a mano	4,13	3,67	3,92	4	NON-G
6.3.4.1.0	Compositori tipografici	4,33	4,34	4,53	5	NON-G
6.3.4.2.0	Tipografi impressori	4,48	4,1	4,1	4	NON-G
6.3.4.3.0	Stampatori offset e alla rotativa	3,84	3,67	3,81	4	NON-G
6.3.4.4.0	Zincografi, stereotipisti ed elettrotipisti	3,68	3,66	3,72	4	NON-G
6.3.4.5.1	Acquafortisti e serigrafisti	4,76	4,4	4,38	5	NON-G
6.3.4.5.2	Litografi e incisori tipografici	4,37	4,27	4,28	4	NON-G
6.3.4.6.0	Rilegatori e rifinitori post stampa	3,73	3,61	3,65	4	NON-G
6.3.4.7.1	Fototecnici di tipografia	4,36	4,27	4,3	4	NON-G
6.3.4.7.2	Fototipografi e fotocompositori	4,31	4,11	4,01	4	NON-G
6.4.1.1.0	Agricoltori e operai agricoli specializzati di colture in pieno campo	4,76	3,91	3,52	4	NON-G
6.4.1.2.0	Agricoltori e operai agricoli specializzati di coltivazioni legnose agrarie	4,48	3,91	3,72	4	NON-G
6.4.1.3.1	Agricoltori e operai agricoli specializzati di vivai, di coltivazioni di fiori e piante ornamentali	3,87	3,91	3,95	4	NON-G
6.4.1.3.2	Agricoltori e operai agricoli specializzati di coltivazioni ortive in serra, di ortive protette o di orti stabili	4,05	3,92	3,76	4	NON-G

6.4.1.4.0	Agricoltori e operai agricoli specializzati di colture miste	3,79	3,63	3,64	4	NON-G
6.4.2.1.0	Allevatori e operai specializzati degli allevamenti di bovini ed equini	4,16	4,03		4	NON-G
6.4.2.2.0	Allevatori e operai specializzati degli allevamenti di ovini e caprini	3,68	3,44	3,52	4	NON-G
6.4.2.3.0	Allevatori e operai specializzati degli allevamenti di suini	4,34	4,12	4,16	4	NON-G
6.4.2.4.0	Allevatori e operai specializzati degli allevamenti avicoli	3,48	3,45	3,64	4	NON-G
6.4.2.5.0	Allevatore di bestiame misto	4	3,95	4,21	4	NON-G
6.4.2.9.1	Allevatori e operai specializzati degli allevamenti di insetti e di molluschi	4,54	4,31	3,97	4	NON-G
6.4.2.9.2	Allevatori e operai specializzati degli allevamenti di altri animali da carne e di animali da pelliccia	5	4,82	4,64	5	NON-G
6.4.3.0.0	Allevatori e agricoltori	4,72	4,01	3,6	4	NON-G
6.4.4.0.1	Tagliaboschi, abbattitori di alberi e disboscatori	3,68	3,83	3,74	4	NON-G
6.4.4.0.2	Sugherai e raccoglitori di resine	4,56	4,78	4,56	5	NON-G
6.4.4.0.3	Rimboschitori	4,16	4,13	4,26	4	NON-G
6.4.5.1.0	Acquacoltori	4,51	4,65	4,62	5	NON-G
6.4.5.2.0	Pescatori della pesca costiera e in acque interne	3,28	3,42	3,26	3	NON-G
6.4.5.3.0	Pescatori d'alto mare	4,22	3,92	3,96	4	NON-G
6.4.5.4.0	Cacciatori	3,87	3,77	3,73	4	NON-G
6.5.1.1.1	Macellai e abbattitori di animali	4,16	3,5	3,39	4	NON-G
6.5.1.1.2	Norcini	4,64	4,03	4,16	4	NON-G
6.5.1.1.3	Pesciaioli	4,44	4,19	4,22	4	NON-G
6.5.1.1.4	Addetti alla conservazione di carni e pesci	4,48	3,98	3,82	4	NON-G
6.5.1.2.1	Panettieri	3,96	3,85	3,71	4	NON-G
6.5.1.2.2	Pastai	4,35	4,12	4,35	4	NON-G
6.5.1.3.1	Pasticcieri e cioccolatai	4,72	4,58	4,56	5	NON-G
6.5.1.3.2	Gelatai	4,74	4,45	4,16	4	NON-G
6.5.1.3.3	Conservieri	5,09	4,63	4,92	5	NON-G
6.5.1.4.0	Degustatori e classificatori di prodotti alimentari e bevande	5,17	5,12	4,68	5	NON-G
6.5.1.5.0	Artigiani ed operai specializzati delle lavorazioni artigianali casearie	4,37	4,19	4,19	4	NON-G
6.5.1.6.0	Operai specializzati della preparazione e della lavorazione delle foglie di tabacco	3,94	3,89	3,84	4	NON-G
6.5.2.1.1	Stagionatori, ed operai specializzati del primo trattamento del	3,81	3,52	3,52	4	NON-G

	legno					
6.5.2.1.2	Curvatori, sagomatori ed operai specializzati della prima lavorazione del legno	3,47	2,72	2,8	3	NON-G
6.5.2.2.1	Attrezzisti di falegnameria	3,48	3,56	3,28	3	NON-G
6.5.2.2.2	Falegnami	4,11	3,99	4,16	4	NON-G
6.5.2.2.3	Ebanisti	3,89	3,92	3,81	4	NON-G
6.5.2.3.1	Impagliatori e lavoranti in vimini e setole	3,25	3,31	3,42	3	NON-G
6.5.2.3.2	Cordai e intrecciatori di fibre	4,72	4,38	4,24	4	NON-G
6.5.2.3.3	Lavoranti in giunco e canna	4,43	3,85	3,92	4	NON-G
6.5.2.3.4	Lavoranti in sughero e spugna	3,8	3,42	3,5	4	NON-G
6.5.3.1.0	Preparatori di fibre	3,84	3,44	3,2	3	NON-G
6.5.3.2.1	Tessitori	4,4	4	3,87	4	NON-G
6.5.3.2.2	Maglieristi	3,5	3,65	3,73	4	NON-G
6.5.3.2.3	Tintori e addetti al trattamento chimico dei tessuti	4,98	4,47	4,45	5	NON-G
6.5.3.3.1	Modellisti di capi di abbigliamento	4,64	4,33	4,27	4	NON-G
6.5.3.3.2	Tagliatori e confezionatori di capi di abbigliamento	3,96	4	3,97	4	NON-G
6.5.3.3.3	Sarti	4,24	3,9	4,02	4	NON-G
6.5.3.3.4	Cappellai confezionatori di complementi di abbigliamento	3,98	3,88	4,08	4	NON-G
6.5.3.4.1	Modellisti di pellicceria e di capi in pelle	4,62	4,34	4,35	4	NON-G
6.5.3.4.2	Tagliatori e confezionatori di pellicceria e di capi in pelle	4,48	4,26	4,36	4	NON-G
6.5.3.4.3	Pellicciai e sarti in pelle	4,26	3,97	4	4	NON-G
6.5.3.5.1	Confezionatori e rifinitori di biancheria intima	4,02	4,23	4,36	4	NON-G
6.5.3.5.2	Confezionatori e rifinitori di biancheria per la casa	3,98	4	4,19	4	NON-G
6.5.3.5.3	Merlettai e ricamatrici a mano	4,27	3,79	4,07	4	NON-G
6.5.3.5.4	Bottonai	4,91	4,6	4,84	5	NON-G
6.5.3.6.1	Confezionatori di tende e drappeggi	3,76	3,55	3,79	4	NON-G
6.5.3.6.2	Modellisti di poltrone e divani	4,29	4,23	4,2	4	NON-G
6.5.3.6.3	Tagliatori di imbottiture e rivestimenti e confezionatori di poltrone e divani	3,66	3,71	3,57	4	NON-G
6.5.3.6.4	Tappezzieri di poltrone, divani e simili	4,03	4,04	4,1	4	NON-G
6.5.3.6.5	Materassai	4,2	4,13	3,84	4	NON-G
6.5.4.1.0	Conciatori di pelli e di pellicce	3,72	3,48	3,76	4	NON-G

6.5.4.2.1	Modellisti di calzature	4,61	4,1	4,04	4	NON-G
6.5.4.2.2	Tagliatori e confezionatori di calzature	3,81	3,53	3,97	4	NON-G
6.5.4.2.3	Calzolai	3,52	3,51	3,5	4	NON-G
6.5.4.2.4	Sellai e cuoiai	3,92	3,85	3,98	4	NON-G
6.5.4.3.1	Modellisti di pelletteria	4,5	4,11	4	4	NON-G
6.5.4.3.2	Tagliatori e confezionatori di pelletteria	3,68	3,69	3,57	4	NON-G
6.5.4.3.3	Pellettieri	4,02	3,87	3,8	4	NON-G
6.6.1.0.0	Macchinisti ed attrezzisti di scena	3,4	3,72	3,93	4	NON-G
7.1.1.1.0	Conduttori di impianti di miniere e di cave	3,34	3,33	3,58	3	NON-G
7.1.1.2.0	Conduttori di impianti per il trattamento di minerali e di pietre	3,68	3,89	3,79	4	NON-G
7.1.1.3.1	Trivellatori di pozzi	4,84	4,7	4,7	5	NON-G
7.1.1.3.2	Conduttori di sonde e perforatrici da prospezione	4,13	4,07	4,18	4	NON-G
7.1.2.1.1	Conduttori di altoforno	4,56	4,42	4,7	5	NON-G
7.1.2.1.2	Conduttori di colata	4,2	4,47	4,32	4	NON-G
7.1.2.2.1	Conduttori di forni di seconda fusione	3,92	3,64	3,73	4	NON-G
7.1.2.2.2	Conduttori di laminatoi	4,34	4,33	4,41	4	NON-G
7.1.2.3.0	Conduttori di impianti per il trattamento termico dei metalli	3,63	3,7	3,76	4	NON-G
7.1.2.4.1	Conduttori di macchine per la trafila di metalli	3,71	3,49	3,86	4	NON-G
7.1.2.4.2	Conduttori di macchine per l'estrusione e la profilatura di metalli	4,42	4,39	4,54	4	NON-G
7.1.2.5.1	Conduttori di impianti termici per la produzione di metalli non ferrosi	4,03	3,7	3,76	4	NON-G
7.1.3.1.1	Conduttori di forni per la produzione del vetro	4,16	4,37	4,16	4	NON-G
7.1.3.1.2	Conduttori di impianti per la lavorazione del vetro	4,16	4,18	4,1	4	NON-G
7.1.3.2.1	Conduttori di impianti per la formatura di articoli in ceramica e terracotta	3,84	3,71	3,76	4	NON-G
7.1.3.2.2	Conduttori di forni per la produzione di articoli in ceramica e terracotta	4,27	3,85	3,95	4	NON-G
7.1.3.3.1	Conduttori di impianti per la formatura di laterizi	3,95	3,68	3,76	4	NON-G
7.1.3.3.2	Conduttori di forni per la produzione di laterizi	3,86	3,65	3,58	4	NON-G
7.1.3.9.0	Conduttori di impianti per dosare, miscelare ed impastare materiali per la produzione del vetro, della ceramica e dei laterizi	4,36	3,9	3,8	4	NON-G
7.1.4.1.0	Conduttori di impianti per la fabbricazione in serie di pannelli in legno	3,5	3,44	3,48	4	NON-G

7.1.4.2.0	Conduttori di impianti per la preparazione della pasta di legno e di altri materiali per cartiera	4,9	4,64	4,96	5	NON-G
7.1.4.3.0	Conduttori di impianti per la fabbricazione della carta	4,53	4,43	4,4	4	NON-G
7.1.5.1.0	Conduttori di frantumatrici, mulini e impastatrici	4,19	3,91	3,97	4	NON-G
7.1.5.2.0	Conduttori di forni e di impianti per il trattamento termico dei minerali	4,8	4,43	4,44	5	NON-G
7.1.5.3.0	Conduttori di apparecchi di filtraggio e di separazione	4,84	4,98	4,99	5	NON-G
7.1.5.4.0	Conduttori di distillatori e di reattori chimici	5,16	5,09	5,33	5	NON-G
7.1.5.5.1	Conduttori di impianti per la raffinazione dei prodotti petroliferi	4,8	4,91	5,11	5	NON-G
7.1.5.5.2	Conduttori di impianti per la stazzatura di prodotti petroliferi	4,24	4,13	4,19	4	NON-G
7.1.5.6.0	Strumentisti e quadristi di impianti chimici	4,02	3,78	3,92	4	NON-G
7.1.5.9.0	Conduttori di impianti per la produzione di prodotti chimici	4,64	3,84	4,01	4	NON-G
7.1.6.1.1	Quadristi di impianti per la produzione di energia elettrica	4,35	4,68	4,26	4	NON-G
7.1.6.1.2	Conduttori di impianti per la produzione di energia elettrica	4,48	4,42	4,48	4	NON-G
7.1.6.2.0	Conduttori di caldaie a vapore e di motori termici in impianti industriali	3,84	3,89	3,92	4	NON-G
7.1.6.4.1	Conduttori di impianti per la depurazione, la potabilizzazione e la distribuzione delle acque	4,16	3,63	3,6	4	NON-G
7.1.6.4.2	Conduttori di impianti di incenerimento dei rifiuti	3,8	4,11	3,86	4	NON-G
7.1.6.4.3	Conduttori di impianti di recupero e riciclaggio dei rifiuti	5,3	5,38	-	5	NON-G
7.1.7.1.0	Conduttori di catene di montaggio automatizzate	3,92	3,84	3,88	4	NON-G
7.1.7.2.0	Conduttori di robot industriali ed assimilati	3,74	3,95	4,05	4	NON-G
7.2.1.1.0	Conduttori di macchine utensili automatiche e semiautomatiche industriali	3,71	3,49	3,6	4	NON-G
7.2.1.2.0	Conduttori di macchinari per la produzione di manufatti in cemento ed affini	3,88	3,2	3,54	4	NON-G
7.2.1.3.0	Conduttori di macchinari per la produzione di abrasivi e manufatti abrasivi minerali	4,11	3,87	3,77	4	NON-G
7.2.2.1.1	Conduttori di macchinari per la produzione di farmaci	4,22	3,82	3,77	4	NON-G
7.2.2.1.2	Conduttori di macchinari per la produzione di cosmetici	4,02	3,48	3,5	4	NON-G
7.2.2.1.3	Conduttori di macchinari per la produzione di detergenti	4,91	4,56	4,7	5	NON-G
7.2.2.2.0	Conduttori di macchinari per la fabbricazione di esplosivi e munizioni	5,04	4,64	4,65	5	NON-G
7.2.2.3.0	Finitori di metalli e conduttori di impianti per finire, rivestire, placcare metalli e oggetti in metallo	4,44	4,01	4	4	NON-G

7.2.2.9.0	Conduttori di macchinari per la fabbricazione di altri prodotti derivati dalla chimica	3,96	3,43	3,55	4	NON-G
7.2.3.1.0	Conduttori di macchinari per la confezione e vulcanizzazione dei pneumatici	4,48	3,75	3,94	4	NON-G
7.2.3.2.0	Conduttori di macchinari per la fabbricazione di altri articoli in gomma	4	3,75	4,1	4	NON-G
7.2.3.3.0	Conduttori di macchinari per la fabbricazione di articoli in plastica e affini	4,2	3,84	3,8	4	NON-G
7.2.4.0.0	Addetti a macchinari per la produzione in serie di mobili e di articoli in legno	4,28	4,02	4,08	4	NON-G
7.2.5.1.0	Conduttori di macchinari per tipografia e stampa su carta e cartone	4,67	4,28	4,24	4	NON-G
7.2.5.2.0	Conduttori di macchinari per la fabbricazione di prodotti in carta e cartone	3,79	3,48	3,81	4	NON-G
7.2.5.3.0	Conduttori di macchinari per rilegatura di libri ed affini	4,14	3,97	3,96	4	NON-G
7.2.6.1.0	Addetti a macchinari per la filatura e la bobinatura	2,98	2,69	2,72	3	NON-G
7.2.6.2.0	Addetti a telai meccanici e a macchinari per la tessitura e la maglieria	3,66	3,24	3,6	4	NON-G
7.2.6.3.0	Operai addetti a macchinari industriali per confezioni di abbigliamento in stoffa e affini	3,6	3,37	3,42	4	NON-G
7.2.6.4.0	Addetti a macchinari per il trattamento e la tintura di filati e tessuti	3,64	3,24	3,63	4	NON-G
7.2.6.5.0	Addetti a macchinari per la stampa dei tessuti	3,96	3,7	3,52	4	NON-G
7.2.6.9.1	Addetti a macchinari per la confezione in serie di passamanerie, feltrerie e prodotti simili	3,76	3,47	3,65	4	NON-G
7.2.6.9.2	Addetti a macchinari industriali per la preparazione di pelli e pellicce	4,61	4,42	4,35	4	NON-G
7.2.6.9.3	Addetti a macchinari per la produzione in serie di calzature	4,42	4,3	4,06	4	NON-G
7.2.6.9.4	Addetti a macchinari per la produzione in serie di articoli in pelle	3,68	3,27	3,74	4	NON-G
7.2.7.1.0	Assemblatori in serie di parti di macchine	3,5	3,2	3,21	3	NON-G
7.2.7.2.0	Assemblatori e cablatori di apparecchiature elettriche	3,36	3,28	3,67	3	NON-G
7.2.7.3.0	Assemblatori e cablatori di apparecchiature elettroniche e di telecomunicazioni	3,66	3,37	2,88	3	NON-G
7.2.7.4.0	Assemblatori in serie di articoli in metallo, in gomma e in materie plastiche	3,38	3,73	3,49	4	NON-G
7.2.7.5.0	Assemblatori in serie di articoli in legno e in materiali affini	4,08	3,29	3,57	4	NON-G
7.2.7.6.0	Assemblatori in serie di articoli in cartone, in tessuto e materie similari	3,76	3,98	4,11	4	NON-G

7.2.7.9.0	Assemblatori in serie di articoli industriali compositi	4,05	3,88	4,09	4	NON-G
7.2.8.0.0	Addetti a macchine confezionatrici e al confezionamento di prodotti industriali	3,33	3,04	3,3	3	NON-G
7.3.1.1.1	Addetti agli impianti fissi in agricoltura	4,93	5,12	4,7	5	NON-G
7.3.1.1.2	Addetti agli impianti fissi nell'allevamento	3,4	3,54	3,56	4	NON-G
7.3.1.2.0	Addetti agli impianti per la trasformazione delle olive	4,32	4,1	4,04	4	NON-G
7.3.1.3.0	Addetti alla refrigerazione, trattamento igienico e prima trasformazione del latte	4,28	4,1	4,4	4	NON-G
7.3.2.1.0	Conduttori di macchinari per la conservazione e la lavorazione della carne e del pesce	4,36	3,86	4,22	4	NON-G
7.3.2.2.0	Conduttori di apparecchi per la lavorazione industriale di prodotti lattiero-caseari	3,6	3,31	3,7	4	NON-G
7.3.2.3.1	Conduttori di macchinari industriali per la lavorazione dei cereali	4,4	3,93	3,86	4	NON-G
7.3.2.3.2	Conduttori di macchinari industriali per la lavorazione delle spezie	4,16	3,58	3,38	4	NON-G
7.3.2.3.3	Conduttori di macchinari industriali per la lavorazione di prodotti a base di cereali	4,35	4,14	4,08	4	NON-G
7.3.2.4.1	Conduttori di macchinari per cernita e la calibratura di prodotti ortofrutticoli	3,84	3,77	3,74	4	NON-G
7.3.2.4.2	Conduttori di macchinari per la conservazione di frutta e verdura	3,6	3,59	3,58	4	NON-G
7.3.2.4.3	Conduttori di macchinari per la conservazione di legumi e riso	3,8	3,45	3,73	4	NON-G
7.3.2.4.4	Conduttori di macchinari per la produzione di oli di semi	4,24	4,18	4,32	4	NON-G
7.3.2.5.0	Conduttori di macchinari per la produzione e la raffinazione dello zucchero	6,52	5,57	5,28	6	NON-G
7.3.2.6.1	Conduttori di macchinari per la preparazione e la produzione del the, del caffè e del cacao	4,77	4,34	4,43	5	NON-G
7.3.2.6.2	Conduttori di macchinari per la preparazione e la produzione della cioccolata	4,66	4,67	4,7	5	NON-G
7.3.2.7.0	Conduttori di macchinari per la lavorazione dei prodotti del tabacco	4,38	4,39	4,29	4	NON-G
7.3.2.8.1	Addetti a macchinari industriali per la vinificazione	4	4,04	3,98	4	NON-G
7.3.2.8.2	Addetti a macchinari industriali per la produzione di birra	4,4	4,06	4,12	4	NON-G
7.3.2.8.3	Addetti a macchinari industriali per la produzione di liquori, di distillati e di bevande alcoliche	3,95	4,08	4,02	4	NON-G
7.3.2.8.4	Addetti a macchinari industriali per la produzione di bevande analcoliche e gassate	4,36	3,97	3,97	4	NON-G
7.3.2.9.0	Conduttori di macchinari per la produzione di pasticceria e	4,44	3,98	3,84	4	NON-G

	prodotti da forno					
7.4.1.1.0	Conduttori di locomotive	4,64	4,02	3,97	4	NON-G
7.4.1.2.0	Frenatori, segnalatori ed agenti di manovra	3,7	3,6	4,35	4	NON-G
7.4.1.3.0	Manovratori di impianti di funivia	4,02	4,17	4,33	4	NON-G
7.4.2.2.0	Autisti di taxi, conduttori di automobili e di furgoni	3,56	3,56	3,89	4	NON-G
7.4.2.3.0	Conduttori di autobus, di tram e di filobus	3,72	3,4	3,74	4	NON-G
7.4.2.4.0	Conduttori di mezzi pesanti e camion	3,47	3,2	3,32	3	NON-G
7.4.2.5.0	Conduttori di veicoli a trazione animale	3,36	3,59	4,02	4	NON-G
7.4.3.1.0	Conduttori di trattori agricoli	4,37	3,69	3,92	4	NON-G
7.4.3.2.0	Conduttori di macchine raccoglitrici, trinciatrici e pressatrici agricole	4,48	4,15	4,06	4	NON-G
7.4.3.3.0	Conduttori di mietitrebbiatrici	4,8	3,93	3,84	5	NON-G
7.4.3.4.0	Conduttori di macchine per la raccolta di prodotti agricoli (barbabietole, patate, frutta, uva e ortive)	4,26	4,2	4,13	4	NON-G
7.4.3.5.0	Conduttori di macchine forestali	3,63	3,52	3,68	4	NON-G
7.4.4.1.0	Conduttori di macchinari per il movimento terra	4,08	4,04	4,13	4	NON-G
7.4.4.2.0	Conduttori di macchinari mobili per la perforazione in edilizia	3,92	3,8	3,86	4	NON-G
7.4.4.3.0	Conduttori di gru e di apparecchi di sollevamento	2,69	2,96	3,04	3	NON-G
7.4.4.4.0	Conduttori di carrelli elevatori	3,44	3,14	3,69	3	NON-G
7.4.5.1.0	Marinai di coperta	4,03	4,05	3,97	4	NON-G
7.4.5.2.0	Conduttori di caldaie ed altre attrezzature navali	4,65	4,56	4,56	5	NON-G
7.4.5.3.0	Conduttori di barche e battelli	4,52	4,03	4,02	4	NON-G
8.1.1.1.0	Uscieri, commessi ed assimilati	2,88	2,92	3,32	3	NON-G
8.1.1.2.0	Lettori di contatori, collettori di monete ed assimilati	4,14	4,34	5	4	NON-G
8.1.2.1.0	Facchini, addetti allo spostamento merci ed assimilati	2,92	3,01	3,17	3	NON-G
8.1.2.2.0	Personale ausiliario addetto all'imballaggio, al magazzino ed alla consegna merci	2,88	3,04	3,21	3	NON-G
8.1.2.3.0	Portalettere e fattorini postali	3,32	3,93	3,6	4	NON-G
8.2.1.1.0	Venditori ambulanti di ortofrutticoli	3,32	3,29	3,79	3	NON-G
8.2.1.2.0	Venditori ambulanti di prodotti alimentari non ortofrutticoli	3,8	4,21	4,51	4	NON-G
8.2.1.3.0	Venditori ambulanti di manufatti o di servizi	3,6	3,99	4,13	4	NON-G
8.2.2.1.0	Personale addetto alla pulizia in esercizi alberghieri, extralberghieri e sulle navi	2,88	3,16	3,2	3	NON-G

8.2.2.2.0	Personale non qualificato addetto alla ristorazione	2,36	2,32	2,76	2	NON-G
8.3.1.0.0	Bidelli ed assimilati	3,16	3,49	3,8	3	NON-G
8.3.2.0.0	Portantini ed assimilati	3,76	4,08	4,17	4	NON-G
8.4.1.0.0	Personale non qualificato nei servizi ricreativi e culturali	-	4,59	4,62	5	NON-G
8.4.2.1.0	Collaboratori domestici ed assimilati	2,96	2,63	2,47	3	NON-G
8.4.2.2.0	Addetti non qualificati a servizi di pulizia in imprese ed enti pubblici ed assimilati	2,64	2,84	3,16	3	NON-G
8.4.2.3.0	Spazzini e altri raccoglitori di rifiuti ed assimilati	2,96	2,52	2,64	3	NON-G
8.4.3.1.0	Garzoni di barbiere, di parrucchiere, manicure ed assimilati	3,68	3,76	3,93	4	NON-G
8.4.3.2.0	Lustrascarpe ed altri mestieri di strada	-	3,51	3,81	4	NON-G
8.4.4.0.0	Personale non qualificato addetto alla custodia di edifici, di impianti e di attrezzature	3,12	3,48	3,03	3	NON-G
8.5.1.0.0	Braccianti agricoli	4,8	2,66	3,15	5	NON-G
8.5.2.1.0	Personale forestale non qualificato	2,72	2,67	2,82	3	NON-G
8.5.2.2.0	Personale non qualificato addetto alla cura degli animali	2,96	3,35	2,86	3	NON-G
8.5.2.3.0	Personale non qualificato addetto alla pesca ed alla caccia	3,36	3,03	3,14	3	NON-G
8.6.1.0.0	Manovali ed altro personale non qualificato delle miniere e delle cave	3,76	3,7	3,56	4	NON-G
8.6.2.1.0	Manovali e personale non qualificato dell'edilizia civile ed assimilati	3,6	3,15	3,57	3	NON-G
8.6.2.2.0	Manovali e personale non qualificato della costruzione e manutenzione di strade, dighe e altre opere pubbliche	3,07	2,67	3,16	3	NON-G
8.6.3.0.0	Personale non qualificato delle attività industriali ed assimilati	2,66	2,59	3	3	NON-G

APPENDIX 4

Estimates shown in subparagraph §2.3 are obtained as OLS estimates of the linear regression model specificated as follows:

$$lnW_i = \delta_E SOC\_EXP_i + \delta_S SOC\_STR_i + \delta_C SOC\_COM_i + \delta_D CONTROLS_i + \varepsilon_i$$

Where $\boldsymbol{CONTROLS_i}$ is a vector of controls, all of which are described in Table A.4

Table A.4 Variables description

Variable name	Description
lnW	Natural logarithm of gross monthly earnings (Dependent Variable)
SOC_EXP	Dummy variable for being employed in Experts occupational group; D=1 if employed, D=0 otherwise
SOC_STR	Dummy variable for being employed in Orchestrators occupational group; D=1 if employed, D=0 otherwise
SOC_COM	Dummy variable for being employed in Communicators occupational group; D=1 if employed, D=0 otherwise
AGE	Age at the time of the interview
TENURE	Job tenure defined as time spent in the current job, measured in years
PART_TIME	Dummy variable for being part-time workersg: D=1 if employed in part-time jobs, D=0 otherwise
GENDER	Dummy variable for gender: D=1 if male, D=0 otherwise
DISTRETTO_NW	Working area: D=1 if North-West district, D=0 otherwise
DISTRETTO_NE	Working area: D=1 if North-East district, D=0 otherwise
DISTRETTO_C	Working area: D=1 if Central district, D=0 otherwise
DISTRETTO_S	Working area: D=1 if South district, D=0 otherwise

DISTRETTO_I	Working area: D=1 if Isles district, D=0 otherwise
AGRICOLTURA	Industry: D=1 if Agriculture, D=0 otherwise
ENERGIA	Industry: D=1 if Energy and Mining, D=0 otherwise
MANIFATTURA	Industry: D=1 if Manufacturing, D=0 otherwise
COSTRUZIONI	Industry: D=1 if Construction, D=0 otherwise
COMMERCIO	Industry: D=1 if Retail and Wholesale, D=0 otherwise
TURISMO	Industry: D=1 if Tourism, D=0 otherwise
TRASPORTI	Industry: D=1 if Transports, Warehousing and Logistics, D=0 otherwise
FINANZA	Industry: D=1 if Finance and Insurance Services, D=0 otherwise
SERVIZI	Industry: D=1 if Other Firms and Business Services, D=0 otherwise
PUBBLICO	Industry: D=1 if Public Administration, D=0 otherwise
WELFARE	Industry: D=1 if Public Health and Care, D=0 otherwise
OTHER_SERVICES	Industry: D=1 if Other Services, D=0 otherwise

Table A.5 Linear regression model with OLS estimates of the impacts on earnings of SOC(HE)-Italy groups

	(1) lnW	(2) lnW
SOC_EXP	0.2884*** (0.0056)	0.2082*** (0.0044)
SOC_STR	0.3475*** (0.0218)	0.2858*** (0.0167)
SOC_COM	0.4010*** (0.0072)	0.2535*** (0.0058)
AGE		0.0032*** (0.0002)
TENURE		0.0065*** (0.0002)
PART_TIME		-0.4949*** (0.0047)
GENDER		0.1446*** (0.0037)
DISTRETTO_NW		0.0509*** (0.0048)
DISTRETTO_NE		0.0648*** (0.0050)
DISTRETTO_S		-0.0705*** (0.0052)
DISTRETTO_I		-0.0784*** (0.0063)
AGRICOLTURA		-0.0789*** (0.0111)
ENERGIA		0.2688*** (0.0166)
MANIFATTURA		0.1579*** (0.0071)
COSTRUZIONI		0.1319*** (0.0087)
COMMERCIO		0.1554*** (0.0077)
TURISMO		0.0779*** (0.0093)
TRASPORTI		0.2281*** (0.0090)

FINANZA		0.3520***
		(0.0106)
SERVIZI		0.1258***
		(0.0083)
PUBBLICO		0.2616***
		(0.0082)
WELFARE		0.2442***
		(0.0072)
_cons	6.9510***	6.5876***
	(0.0024)	(0.0099)
N	42720	42720
R^2	0.108	0.479
adj. R^2	0.1082	0.4786

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Assessing the incidence and wage effects of overeducation among Italian graduates using a new measure for educational requirements

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Abstract. This essay investigates three dimensions of overeducation: incidence, impact on earnings and possible determinants. The analysis focuses on Italian graduates and refers to the cohort that graduated in 2007 using data from the AlmaLaurea survey on graduates' career paths. A new measure of overeducation is introduced and it is jointly examined along with other pre-existing measures based on workers' self-assessment. The analysis is carried out by comparing the different results obtained adopting the two different measures of overeducation. Results show that the newly introduced measure can deal with the biases affecting workers' self- assessment measures.

JEL classification: I2, J31

Key words: overeducation, graduate labour market, wage differentials

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Introduction

Overeducated workers are basically individuals endowed with educational attainments, were they knowledge, competences or skills, in excess of what is actually needed or required to perform tasks associated with their current job. The economic literature on overeducation starts with Freeman (1976) as an aggregate study on decreasing returns to education investments, proxied by the average college premium paid to graduate workers in American labour markets. In this view, public and private overinvestments in education result in lower levels of returns due to the fact that the supply of highly qualified labour is outpacing its relative demand and causing a depreciation of college premiums. At a micro level, overeducation is interpreted as a source of inequality among peers, such as workers with the same educational levels but earning different wages once employed in differently demanding jobs (Frank, 1978; Berg, 1970). Duncan and Hoffman (1981) implement an extended version of the Mincerian equation in order to estimate separately the effects on wages of required, surplus or deficit years of schooling and kick-start the overeducation literature, a popular and much debated economic subfield lying in between labour economics and the economics of education. At the operational level, measuring overeducation consists in the assessment of the gap between the required and the attained years of schooling for each individual in a given sample. However, while it is quite easy to assess employees' education with a simple question, measuring what employers are effectively demanding has proved to be slightly more complicated, dividing most of the contributions to the debate between supporters of workers' self-assessment (WA) or job analysis (JA) measures.

In this essay we contribute to this debate by introducing a new JA measure based on the Italian Standard Occupational Classification SOC(HE) built by Cattani et al. (2014) and applying it to Italian graduates interviewed five years after the degree. Our purpose is to assess the incidence, the possible determinants and the impact on earnings of overeducation by using this new JA measure and iterate the same analysis utilizing an alternative WA measure in order to compare the two different outcomes.

In this respect, the Italian context represents an interesting case study. In early 2000s Italy has experienced a sudden increase in the number of graduates due to the participation expansion in tertiary education and to the implementation of the so-called "3+2" system[12].

[12] The reform was termed "3+2" and represented the implementation of the so-called "Bologna process" being it based onto a two-cycle degree structure: a first-level three-year undergraduate

This expansion combined with the dramatic recession that hit the country in the 2008-2012 period, has raised growing concerns for a proper employability of the Italian graduates and for the wage penalty associated with overeducation.

The structure of the essay is as follows. Paragraph 1 introduces some theoretical issues together with the most relevant measurement issues, paragraph 2 presents the new measurement of overeducation adopted in the essay, paragraphs 3 and 4 describe the estimation methodology along with the dataset, paragraphs 5 and 6 present and discuss estimates concerning determinants of overeducation and its impact on wages. Paragraph 7 concludes.

1 Theoretical framework(s) – Labour market theories

There are no generally accepted theories of overeducation, its determinants and its effects on wages although a good number of applied studies has tried to relate it to the main labour market theories. The most adopted model in such studies was first proposed by Duncan and Hoffman in 1981 as an extension of the Mincerian equation, relating wage differentials to attained years of schooling now decomposed in required, excess and deficit ones. Although this peculiar model was developed starting from a typical human capital framework, it can be placed in a theoretical middle ground between human capital theory and institutional theories as it allows to test their different hypothesis. Before discussing measurement issues, it could be salutary to remember such hypothesis.

a. Human capital theory

Becker (1964) suggests that wages are only determined by and equal to workers' marginal productivity in turn influenced by their human capital level, however accumulated. In fact, there is no distinction between formal education and on-the-job training and firms will adequately adapt production processes in order to fully utilize the supply of qualified labour. This assumption has a perfect formalization in Mincer's (1974) equation where the logarithm of wages (lnw_i) equals attained years of schooling plus working experience.

course plus a second-level two-years master's degree. Few programs maintained their five/six-year single-cycle structure.

$$lnw_i = \delta_r S_i^a + x'_i\beta + \varepsilon_i$$

Where S_i^a is the number of attained years of school and x' is a vector of controls including years of working experience and experience squared. By disaggregating attained schooling into required (S_i^r), surplus (S_i^o) and deficit (S_i^u) years it is assumed that not all of them will result in the same wage differentials, which is in contradiction with the postulated identity between human capital, marginal productivity and wages.

$$lnw_i = \delta_r S_i^r + \delta_o S_i^o + \delta_u S_i^u + x'_i\beta + \varepsilon_i$$

Broadly speaking, if there is no correspondence between workers' marginal productivity and wages, productivity levels will be attached to job characteristics rather than to individual ones, making overeducation inconsistent with the human capital perspective. Imposing in the Duncan and Hoffman specification equal returns to all schooling years it can be tested whether human capital theory fits data or not:

$$\delta_r = \delta_o = \delta_u$$

However, there is a number of objections to the postulated inconsistence of overeducation with the human capital view that it is worth reporting. First, if overeducation is only a transitory phenomenon, it can be still consistent with HC theory: in the short run firms can face some problems in adapting their production processes to take full advantage of their human capital. Frictions and constraints can lead to transitory disequilibria affecting the supply side as well: as we discuss more in depth in subparagraph 1.1, the *search theory* and the *career mobility theory* support the idea that skilled workers may accept unskilled jobs if these last let them free to engage in job search (Gautier, 2002; Hornstein et al., 2006; Dolado et al., 2009) or promise them higher promotion probabilities (Sicherman and Galor, 1990). Unfortunately, all of these theories are at odds with the observed persistency of overeducation for many individuals (Sicherman, 1991). Secondly, workers could lack of working experience and thus being properly matched once they acquire it. This is consistent with Becker's assertion on the substitutability between formal and informal human capital:

workers with less experience have less (informal) human capital as they haven't had the chance to accumulate it with on-the-job training. Thus, they are not actually overeducated and are paid exactly their marginal productivity (Sicherman, 1991; Kiker et al, 1997). However, little evidence supports the idea that formal education and informal training are treated as substitutes by employers (Duncan and Hoffman, 1981; Groot, 1993) and, moreover, overeducated workers still suffer significant wage penalties after having controlled for training and experience (Ramirez, 1993; Dolton and Vignoles, 2000; McGuinness, 2003; McGuinness, 2006). Finally, human capital measures can fail to capture all individual abilities, namely workers' skills heterogeneity. Thus, overeducation can be interpreted, according to *heterogeneous skills theory*, as a lack of controls in Mincerian equation resulting in, at best, omitted variable biases where the omitted variable is unobservable ability (Chevalier, 2003).

b. Job competition model

Institutional theories suggest that wage levels are only related to job characteristics, while hiring processes are carried out in a lack of information that forces firms to require formal qualifications to minimize expected training costs (Thurow, 1975; 1979). In the human capital perspective investments in education affect wages through marginal productivity while labour oversupply always leads to lower wages because unemployed individuals compete among themselves lowering their requests. In the job competition model workers compete in the hiring process to obtain a particular job. Labour oversupply leads workers to queue up on the basis of their expected trainability and not to lower their wages. In this model, labour demand and labour supply are not independent one each other and the supply of skilled labour depends on its relative demand. In fact, workers cannot affect their wages and will invest in education to minimize training costs for the possible employers: this is possibly the best framework to explain overinvestments in education and thus overeducation. Frictions on both sides of the labour market can lead to mismatches while individuals are engaged in increasing educational attainments in their attempt to avoid unemployment. Similar assumptions are shared by the signalling theory (Spence, 1973), where education still plays a major role in shaping jobs allocation among workers. Given that only required education affects wage levels, it is relatively straightforward to test in the Duncan and Hoffman extended equation whether excess and deficit years of schooling are not significantly different from zero:

$$(\delta_o = \delta_u = 0)$$

c. Assignment theory

Placed in a theoretical middle ground between human capital and job competition models, the assignment theory proposed by Sattinger (1993) states that both demand and supply factors affect wage levels. On the one hand, qualifications and education levels drive allocating processes like in the job competition model. On the other hand, workers will not be randomly assigned to jobs as investments in education are driven by income maximization. In fact, wages are determined by job characteristics and those workers who are willing to obtain better (and better paid) jobs will increasingly accumulate skills, knowledge and qualifications to win the competition. Individual characteristics will also play a role in job allocation and thus in earnings distribution. Hence, wages are not entirely determined by job requirements and a straightforward way to test assignment theory is to impose the restriction proposed by McGuinnes (2006): $\delta_r \neq \delta_o \neq \delta_u$.

Several works on the topic adopt a different model specification, first proposed by Verdugo and Verdugo (1989), which employs dummy variables to capture the effects on earnings of over and under education. This is the specification we use in this essay and there are three notes we should unavoidably mention before continuing to other theoretical issues. First, as we will argue more in depth in paragraph 3, coefficients associated with these dummy variables do not estimate the impact on earnings of an additional year of education but the fact itself that a worker is over or under educated. Second, dummy variables are especially useful when analysing samples or populations composed by graduates only, where individuals can be only matched or overeducated. This is exactly how our sample is defined and our study should therefore be benchmarked against similar graduates' labour markets analyses, particularly popular in Europe and UK (Dolton and Vignoles, 2000; Allen and Van der Velden, 2001; Green, McIntosh and Vignoles, 2002; Green and McIntosh, 2007; Dolton and Silles, 2008; Green and Zhu, 2010 and many others). Third, if regressors cannot be interpreted as returns to schooling years but just as differences among different employment realizations, it is impossible to test which labour market theory fits best our data. With respect to this last issue, there is to be said that tests presented in this section are taken by McGuinness (2006) and Hartog (2000) and are not necessarily to be taken for granted. In fact, once assessed that the three coefficients are different it is impossible to reject in a neat way the human capital theory because of the three mentioned objections to

the inconsistence of overeducation with this theory. Furthermore, Thurow's job competition model is not necessarily unfit to explain results with returns to excess and deficit years different from zero as in this model wages are not deterministically determined solely by demand side factors and their relationship with educational attainments, which are supply side factors by definition, is indirect. Notably, these restrictions intended to test the human capital theory and the job competition model have always been rejected by data (Hartog, 2000; Leuven and Oosterbeek, 2011). Finally, the proposed test for the assignment theory could be questioned and labelled as residual with respect to the former two.

1.1 Theoretical framework – Determinants

Estimating returns to education with separate information on required, exceeding and deficit years of schooling is only useful when Freeman's view is adopted: overeducation is due to an oversupply of qualified labour at an aggregate level that calls in turn for policies intended to stimulate its demand or limit its formation. However, no sufficient empirical evidences have been brought in support to Freeman's interpretation: were wages only determined by market forces, we should then expect a relative depreciation of skilled professions against non-skilled ones. However, recent analyses report substantial relative gains for graduate workers (Machin, 1999; Dearden et al., 2002). It is not clear, moreover, to what extent overeducation is related to macro dimensions, such as business cycles (Rubb, 2003), and surveys of the UK business community on job vacancies and skills deficiencies report, even at times of cyclical upswing, recruitment difficulties (see Campbell et al., 2001). It is hard to assess these relationship without discussing and testing potential determinants of overeducation. Furthermore, assuming that overeducation is a matter of private investments that affects only a given proportion of workers because of their individual characteristics, brings us to the same conclusions. In fact, no information concerning returns to required, surplus or deficit years will be capable to affect individual investments in education and training without a clear and reliable tool to predict who will be matched, overeducated and undereducated. Strategies to achieve this goal include measuring the incidence of overeducation for different categories of workers, estimating distribution function models to assess different probabilities to be overschooled as driven by individual characteristics and assessing differential wage-effects for such characteristics.

a. Differential overeducation

Women tend to show a higher probability to be overeducated in almost all studies on the topic. Frank (1978) measures its incidence controlling by gender and theorizes that married women can be heavily constrained in their quest for an appropriate job by the location of their families in case this is based on their men's career needs. Sloane et al. (1999) explain similar findings otherwise, suggesting that part-time workers are more likely to be overeducated and women with young children are more likely to accept part-time jobs. All in all, gender is considered to be heavily affected by supply side rigidities such as time and mobility constraints in skilled labour markets, including a lower propensity to commuting for married women and families with children (McGoldrick and Robst, 1996; Green et al., 2002; Buchel and Van Ham, 2003; Buchel and Battu, 2003). Ethnicity can play a similar role in increasing such rigidities as immigrants can be limited in commuting or less proficient in the host country language and thus experience difficulties in finding jobs that are appropriate to their educational titles, once these have been recognized or achieved in place (Green et al., 2007; Battu et al., 2004). Additional sources of differential overeducation can be identified in workers' social background and the contractual basis. In fact, education can have a consumption value for richer families whose children may be driven to attend more years of schooling than those suggested by their potential role of human capital investments (Leuven and Oosterbeek, 2011). On the contrary, richer families and graduates with graduated parents can benefit of a larger number of opportunities and acquaintances when looking for a proper job. The contractual basis can affect individuals' capability to learn on the job and gain field experience and, for subjective measures (WA) heavily affect workers' perception when asked to state whether they are matched or overeducated.

b. Age and work experience

Skilled labour mismatches can be just a temporary phenomenon and tend to disappear as young graduates' careers evolve gaining field experience. At least two theories are based on this assumption, the search theory and the career mobility theory. According to the former, highly qualified workers can accept jobs for which they are overeducated but highly productive or rewarded and allowed to engage in on-the-job search to obtain a better job, resulting in progressively better matches (Gautier, 2002; Hornstein et al., 2006; Dolado et al., 2009). According to the latter one, developed by Sicherman and Galor (1990), graduates

may accept jobs with lower educational requirements associated with lower wages but with higher probabilities to be promoted. Many works support the idea that overeducation is only transitory and due to a lack of experience (Dolton and Vignoles, 1997; Sloane et al., 1999; Kiker et al., 2000) but applied studies show difficulties in testing such hypothesis. Moreover, a huge amount of structural overeducated workers that never switch their statuses, reported by the same authors that supported this view clearly tackles its explanatory potential (Sicherman, 1991; Dolton and Vignoles, 1997; Sloane et al., 1999; Dolton and Vignoles, 2000; Rubb, 2003). In conclusion, negative relationships between age and the probability to be overeducated has been assessed for all countries and periods and this fact is one of the few constants in this economic subfield. Nonetheless, we lack of a clear explanation for this, while evidence supports the idea that skills and abilities, more than age, can explain these differentials (Battu et al., 1999; Bauer, 2002). Some graduate workers who are overeducated and don't shift to better jobs can, in the end, be less skilled or, alternatively, those who are able to get better jobs could have developed further skills on the job thus explaining a new and secondary role played by age.

c. Skills

Chevalier (2003) builds up a measure to capture the structural overeducated share of workers and tries to explain it. He distinguishes between apparent and genuine overeducated applying the idea that workers with the same education level not necessarily share the same level of skills. He thus defines overeducation as *apparent* where graduates employed in non-graduate jobs don't state to be dissatisfied with their jobs, proving to share a lower skill level and being adequately matched for such jobs. *Genuine* overeducation, on the contrary, occurs where overeducated workers perceive it, reporting a certain degree of dissatisfaction thus signalling they have higher skill levels compared to those required by their particular job post. Basically, in Chevalier's view, the distinction between genuine and apparent overeducation is marked by job satisfaction. A similar approach is used by Allen and Van der Velden (2001) who conceptualize *overskilling* as the excess skill levels workers are endowed with, not necessarily correlated to overeducation. They aren't interested in the overall job satisfaction and ask workers only about skills utilizations. They have the same purpose as Chevalier: explaining structural overeducation with an heterogeneity in human capital dimensions not referred to formal education such as innate ability. The *heterogeneous skills theory* states that individuals with equal education titles don't match

equally demanding jobs if they're actually offering different skill levels: less skilled graduates, for instance, are matched in non-graduate jobs and their overeducation is just apparent (Chevalier, 2003) or formal (Green and Zhu, 2010) if, respectively, it doesn't imply effects on job satisfaction or wage penalties. Skills and abilities are considered by the majority of contributions in this field as determinants of overeducation and possibly of wage penalties, although assessing this last causal relationship has proved to be problematic as we discuss in paragraph 3. All the attempts to measure or capture skills and ability levels we have presented so far are proxies based on workers self-assessment (WA). Di Pietro and Urwin (2009) applies this strategy to the Italian case, but there are pros and cons one should take into account before relying on such information. On the one hand, in small surveys on workers or graduates it is rather simple to ask them directly whether skills acquired via higher education are being utilized on the job or not. On the other hand, when elaborating already available data on the entire labour force this question may not be included in the questionnaire. Moreover, regardless data availability WA is subjective and can bring significant biases in the measurement if workers tend to over/under state systematically their job requirements. In fact, there is a number of studies based on objective measures for skills and ability. Green et al. (2002) test relationships between the possibility to be overeducated and, respectively, math marks achieved during the high school and data from the International Adult Literacy Survey (IALS). Similar evidence is also found with data from the UK Skills Survey (Green and McIntosh, 2007). Hartog et al. (1996) report a negative relation between quantitative literacy and underschooling and a weak but positive relation between this last one and IQs (Hartog and Jonker, 1996). Ability has been also proxied by high school final marks (Buchel and Pollmann-Schult, 2001) while a certain degree of diversity in the probability to be overeducated can be explained by the type of skills imparted via education, such as the disciplinary field (Dolton and Vignoles, 2000).

1.2 The different approaches to the measurement of overeducation

Individual characteristics, anyhow measured, represent the supply side of the human capital matching in the labour markets. Measuring workers' titles and skills is thus just half of the work one should accomplish in order to assess overeducation incidence and wage effects. Education and skill levels demanded by employers are, in fact, the benchmark to which we have to refer individual endowments of human capital in order to understand who is matched, who has deficit and who has excess schooling. We discuss in this paragraph the three main methods adopted in the economic literature to proxy for job requirements.

a. Worker self-assessment (WA)

The first and most utilized strategy to measure job requirements is to directly ask workers what is required or needed to obtain or carry out the job. Duncan and Hoffman (1981) along with others (Hartog and Tsang, 1987; Sicherman, 1991) refer to the formal education required to *obtain* the job, while Ramirez (1993) refers to the informal education needed to *perform* the job. These are quite different things to analyse, being the former referred to hiring standards and the latter to the cognitive content encompassed in the assigned tasks. Nonetheless, WA is not available for most labour force surveys and it is subjective, given that it only reflects the worker's point of view. This fact can bring to biases as workers tend to overstate their job requirements to inflate their job position during the interview or, in newly hired workers, reflect qualification inflation in firms' hiring strategies (Hartog, 2000). In our view, a subjective measure of job requirements can be affected also by workers' job satisfaction including economic rewards for their educational titles. Individuals can perceive their job as inadequate to their educational level, in fact, basing their evaluation on poor college wage premiums even if the cognitive content of the assigned tasks is in line with their studies.

b. Job-analysis (JA)

This measurement is obtained by looking at information provided in the occupational classifications and thus building a correspondence table that assigns an educational level to each job title. Many works adopt this strategy (Eckaus, 1964; Thurow and Lucas, 1972; Hartog, 1980; Rumberger, 1987; Kiker and Santos, 1991; Oosterbeek and Webbink, 1996) referring to the General Educational Development (GED) taxonomy or the Dictionary of Occupation Titles (DOT). Unfortunately, this measurement hasn't gain much popularity as classifications are rarely updated because updates are costly (Mason, 1996; Hartog, 2000) and there is no consensus when converting occupational scales into schooling years (Halaby, 1994).

c. Realized matches.

One may also look at market realizations such as the mean educational attainment in a given occupation or as hiring standards used by firms' personnel departments (Verdugo and Verdugo, 1989; Groot and Maassen van der Brink, 1997; Groenveld and Hartog, 2004).

Unfortunately, these matches are the result of demand and supply forces and don't reflect only job requirements (Leuven and Oosterbeek, 2011).

2 The new measurement of overeducation adopted in the essay

In this study we try to address the job requirements measurement error problem highlighted in the above mentioned literature (Hartog, 2000; Leuven and Oosterbeek, 2011) by adopting a mixed method of measurement. In fact, we infer employers' job requirements from Italian occupational classification (CP 2006) after having attached to each job title its European Qualification Framework (EQF)[13] corresponding level as identified by Cattani et al. (2014). In his application to Italian labour force of the Warwick IER's SOC(HE) classification, the allocation of job titles to major groups (Experts, Orchestrators, Communicators and Non-graduate-jobs) is based on data from the Istat survey on Italian professions (2009) in which 16,000 workers are asked to assign a score (1-100) to 109 variables referred to the O*Net[14] taxonomy for knowledge, skills and competences. These variables are grouped into the three categories of SOC(HE): experts, orchestrators and communicators. Following Istat-Isfol methodology, Cattani et al. (2014) assigns a difficulty score to each group of variables for each job title[15]. This score is then translated into an equivalent 1-8 scale EQF score. The

[13] The European Qualification Framework (EQF) is a common transnational translation device for all European qualifications. Qualifications are here defined as educational titles issued at the completion of an educational or training process. The aim of the EQF (issued by the European Commission in 2008) is to make different national qualifications more readable across the continent and "promoting workers' and learners' mobility between countries and facilitating their lifelong learning" (Recommendation 111/2008). It relates all European national qualifications to 8 major levels, referring to knowledge, skills and competences acquired in their relative education/training process. In our study, this is of crucial importance given the univocal translation from Italian qualifications into EQF levels letting room for a univocal translation of EQF levels into schooling years.

[14] O*Net (Occupational Information Network) is an American data collection and spreading system focused on employment, jobs, skills shortages, professional profiles and individual characteristics. It is based on the SOC classification and it has been structured to describe tasks and professional profiles demanded and supplied enacting work processes. O*Net embodies the advantages of SOC classification and its implementation took large account of the indications emerged from the SCAN works, such as the distinction within the three types (basic, thinking and personal) of *soft skills*. It is divided into six dimensions: *Experience Requirements*, *Occupation Requirements*, *Occupation Specific Information*, *Occupation Characteristics*, *Worker Characteristics* and *Worker Requirements*. This particular structure allows the in-depth description of different job profiles and it is fit, thanks to transcode tools, to networking by exploiting linkages with other classification systems.

[15] The difficulty index varies in each group of variables between 1 and 100 and is calculated as the average score of variables selected case by case for each job title. The selection of variables in each group however is not subjective and it is based on the standard deviation rule: for each job title Cattani et al. (2014) selected those variables exceeding the mean of all variables in the grouping (experts, strategists or communicators) incremented by the value of the standard deviation. Knowledge, skills and competences selected in this way are the ones needed to carry out the most characterizing tasks of the profession.

highest score of the three groups is then adopted as the job title's EQF level. This is particularly useful as the translation from occupational classifications into schooling years still lacks an adequate level of consensus among economists and EQF provides us with a correspondence table which is, at least, accepted by all European governments and their statistical offices.

< Insert Table 1 here>

Following this methodology, economists are, for instance, assigned to Experts major group while their EQF level is 7, equivalent to the Italian master degree (18 schooling years).

< Insert Table 2 here>

This job requirement measure shares with JA measures the advantage of avoiding biases driven by WA. In fact, the employers' point of view is represented by educational requirements stated by workers without including the job satisfaction dimension and their subjective job position assessment. Interviews in the Istat survey are carried out referring explicitly only to skills, knowledge and competences utilization on the job place without mentioning job positions. Moreover, workers are sampled and selected on the basis of the position they hold in the firm and there is no room for them to overstate it. Finally, workers interviewed in Istat survey are not the same ones we observe in our model. Our study on overeducation is based on AlmaLaurea data on Italian graduates as described in paragraph 3 and their individual point of view is completely neglected when considering job requirements.

The described methodology allows Istat-Isfol[16] to attach to each job title an objective degree of skills utilizations on which we build our measure that captures what is actually needed to carry out a specific profession in terms of cognitive contents embodied in its constituent tasks. SOC(HE)-Italy measure for overeducation comes to be a sort of JA measure expressed in schooling years which are in turn determined by EQF framework and therefore granted of a certain degree of consensus. However, JA measures are, as noted above, affected also by imprecision as they are costly to revise and thus rarely updated. Our measure can be, in other words, objective and precise to some extent but limited in time as professions evolve changing their typical tasks and their relative cognitive contents. Basing

[16] The Italian Institute for the Development of Vocational Training (Isfol) implemented the methodology with which Istat assigned to each job title a corresponding EQF level, working on data from the above mentioned survey. This is why in this work we refer to this methodology as Istat, Isfol or Istat/Isfol methodology.

our measure on data from the Istat survey on Italian professions partially addresses this problem as this survey is periodically held by Istat and thus data availability should not represent a major problem with respect to Italy. We do recognize however that such data can be unavailable for many European and western countries and in that case our SOC(HE)[17] measure for overeducation could be limited when trying to extend its application to other national contexts.

3 The estimation methodology

The basic specification of our model consists in a Duncan and Hoffmann extended wage equation as modified by Verdugo and Verdugo (1989), while alternative specifications will be obtained by adding controls for observable abilities and family or social background.

$$lnw_i = \delta_o D_i + x'_i\beta + \varepsilon_i$$

Where D_i is the dummy variable for overeducation and x'_i is the vector of controls including experience, experience squared, gender, working area, field of study and industry and others, fully described in paragraph 3.3. The three specifications differ in additional controls that are included step by step. In the first specification we include experience, gender, working area, tenure, field of study. In the second specification we add (see Tables 11 and 12) abilities related variables. In the third and last specification, social and family background proxies are included. The model is run onto AlmaLaurea data, referring to a sample of Italian graduates so that individuals can only be overeducated or matched. Overeducation here is a dummy variable defined by SOC(HE)-Italy, where D=1 if the individual is overeducated (employed in job titles with EQF Level below or equal to 6), D=0 otherwise.

It is important to stress that when adopting this specification we compare overeducated workers and individuals with the same level of education but employed in adequate jobs. Thus, the sign of regressor δ_o is often negative, suggesting that overeducated workers earn less than their adequately matched ex schoolmates. This is not exactly what Verdugo and

[17] For a complete description of the original SOC(HE) classification see Elias and Purcell (2004; 2011) and Purcell et al. (2012).

Verdugo (1989) suggest. They erroneously interpret this negative sign as a negative return to overschooling in opposition to higher and positive returns to required schooling and in contradiction with previous empirical evidences of positive although lower returns to excess schooling. This is actually a misinterpretation as the utilization of dummy variables relates the selected individuals in comparison with their direct counterparts: in this case, matched people. Returns to overschooling may well be positive even in case their regressor has a negative sign: this just means, as noted above, that these returns are lower compared to those earned by matched workers (Cohn and Kahn, 1995; Leuven and Oosterbeek, 2011).

Although highly criticized[18], this specification has gained some popularity due to its capacity to describe differences among graduates' entering the labour market. Allen and Van der Velden (2001) find for the Netherlands that overeducated graduates earn some 5-10% less than their matched former schoolmates while, in the UK, a large literature based on this estimation strategy highlights wage penalties as large as 16% associated with overeducation statuses (Dolton and Silles, 2008) with significant differences between males and females who suffer respectively penalties equal to 10% and 27% (Green, McIntosh and Vignoles, 2002). Similar evidence is found by a number of studies for the UK and Northen Ireland (Sloane et al. 1999; Sloane, 2003; McGuinness, 2006; Green and McIntosh, 2007; Green and Zhu, 2010 among the others). Although estimating returns to schooling seems not to be affected by the utilized overeducation measurement, overeducation incidence varies a lot: objective measures (JA) are significantly lower than subjective (WA) ones (Groot and Maassen van der Brink, 2000; McGuinness, 2006; Cedefop, 2010). The total share of the labour force that is affected by overeducation increased in the last two decades with little differences between genders, from 21.7% to 33.2% for men and from 23.8% to 32.1% for women (Green and Zhu, 2010). Significant differences can also be found when comparing different European countries, reaching a minimum of 14-15% in the Netherlands (Allen and van del Velden, 2001; Groot and Maassen van der Brink, 2000) and a maximum of 30-40% in the UK (Green and Zhu, 2010; Dolton and Vignoles, 2000).

However, evidence for Italy is contradictory: Ferrante et al. (2010) find that wages are affected by overskilling only and there is no relationship with overeducation. Di Pietro and Urwin (2006) estimate a 5.5% wage penalty for those 25.5% of Italian graduates that state to be overeducated.

[18] Hartog asserted in the year 2000 its deletion would have benefited to researches in this field.

3.1 The analysis of the determinants of overeducation

As outlined in the previous paragraphs, the new measure of overeducation is dichotomous and, therefore, its determinants can be estimated through a straightforward Probit model. Applying standard treatment of the Probit model, we have that Overeducation =1 (YES) when a latent variable Y is strictly positive, Y>0, and that Overeducation =0 (NO) when Y is nil, Y=0.

The latent variable is linked through a linear function to a set of statistical variables so that:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots . \beta_n X_n + \varepsilon_i = X'_i \beta + \varepsilon_i$$

Where ε_i is a normally and independently distributed error term (NID)

Consequently, we have:

$$\text{P(Overeducation=1=YES)= P(Y>0)=} P(X'_i \beta + \varepsilon_i > 0) = P(-\varepsilon_i \leq X'_i \beta) = F(X'_i \beta)$$

where F is the distribution function for ε_i, which in the case of the Probit model is a standard normal distribution function.

3.2 The analysis of the effects of overeducation on wages

In order to investigate the effects of both measures of overeducation on the level of wages, one cannot simply run a standard OLS to estimate a multivariate regression model in which the level of wage depends on a dummy variable indicating overeducation and a set of covariate as control variables. As the level of wage cannot be observed for, voluntarily or involuntarily, unemployed graduates, a straightforward OLS estimate would contain a sample selection bias, which would bias the estimation of the parameters. To overcome this problem, one has to model, in a first step, the decision to work. Therefore, following Heckman (1979), one has to estimate a system of two equations:

$$W_i = X'_{1i}\beta_1 + \varepsilon_{1i}$$

Of course, *W* can be observed only if the individual works. The decision to work is moulded by a Probit model, which is the second equation of the system:

$$h_i = X'_{2i} + \varepsilon_{2i}$$

The wage can be observed if and only if $h_i > 0$ and cannot be observed if $h_i \leq 0$. The model is completed, assuming that the error terms $(\varepsilon_{2i}, \varepsilon_{2i})$ are normally distributed with variance σ_1^2 and σ_2^2, respectively, and covariance σ_{12}.

3.3 Dataset and variables.

The empirical analysis presented in this essay is based on data from the AlmaLaurea dataset on Italian graduates. AlmaLaurea is a consortium of Italian Universities aimed at fostering highly qualified labour demand and supply matching for graduates, universities and the business world. AlmaLaurea collects every year extensive data on the graduates of each cohort and on their early working career path. This complex information is gathered in two stages. At the time of graduation students fill in a questionnaire providing their personal data and information concerning their social and family background, educational path and performances, intrinsic motivation and other subjective features. Then, graduates are interviewed after one, three and five years after graduation on their career paths and/or their post-graduate studies.

In our analysis we refer to the last cohort of graduates whose information is fully available for both steps of the survey. This cohort includes individuals graduated in either a two-year Master's degree or a five/six-year university degree (such as Medicine and Law faculties) during 2007, who completed their two-step survey in 2012. The relevant population is composed by 184.669 graduates in 46 Italian universities, representing 61.5% of the Italian

graduates in that year[19]. The subsample of graduates who answered the questionnaire after five years from graduation is composed by 31,162 individuals. Since we are only interested employed graduates, we exclude all those reporting to be either unemployed or inactive. Accordingly, we end up with a final sample of 25,523 graduates reporting to be employed at the time of the interview. Due to missing data our descriptive statistics on JA overeducation are limited to 18,269 individuals.

Our main variables of interest are represented by the wage levels and by two dummies that capture overeducation in both WA and JA terms. Wages are measured in terms of net monthly earning. Our measures of overeducation are based onto two items of the AlmaLaurea questionnaire. The JA measure is built on the occupational code, provided at a 5 digit level. Individuals are considered matched if their job is included in one of the three 'graduate-jobs' categories of the newly introduced SOC(HE)-Italy classification, overeducated otherwise. The WA measure is based on a specific question for job requirements as reported by respondents. However, 5-digit occupational codes are only available in the 5-year after graduation interview. Consequently, our empirical analysis is cross-sectional and referred to the 5-year after graduation survey, held in 2012.

Additional variables in the analysis include standard covariates of the human capital model: personal characteristics, educational path and achievements (field of study, graduation mark, and delay in completing the degree) and employment history (experience, tenure). Individual heterogeneity is also captured by data on skills concerning software usage, foreign languages and the attainment of a scholarship, which are used as proxies of intrinsic abilities. In addition, we include variables related to current job's characteristics, such as the industrial sector, the working region, and the type of contract.

4 Descriptive statistics.

Table 3 shows descriptive statistics for the two measures of overeducation used in our empirical analysis. 20.9% of graduates are currently employed in jobs that require an undergraduate educational attainment (JA measure), while 26.1% of graduates report to be overeducated in their current job (WA measure). However, the two definitions of overeducation do not perfectly overlap. On the one side, 71.5% of JA overeducated individuals also perceive themselves in such a status. On the other side, only 42.1% of

[19] Source: our elaborations on ISTAT data.

individuals reporting to be overeducated are classified as overeducated in JA terms. All in all, both percentages confirm that Italy has one of the highest incidence in Europe of overeducated workers five years after graduation (Ferrante et al., 2010; Verhaest and Van der Velden, 2010)[20].

< Insert Table 3 here >

The interaction of wage levels and overeducation with the other variables included in our models reveals some interesting findings with respect to both types of overeducated graduates.

Concerning individual characteristics (Table 4), we find that the gender variable acts in a different way according to the measure of overeducation. Women show higher proportions of JA overeducation (24.2%) than men (21.4%). Conversely, the share of men that perceive themselves as overeducated (28.2%) is higher than the correspondent share of women (24.9%), although the gender gap in terms of wage is substantial (504 €). Moreover, women with children show higher proportions of WA overeducated (32.7%). Similarly, the share of working students reporting to be WA overeducated 5 years after graduation (33.9%) is higher than that of full time students, because the former tend not to change job once graduated. Finally, a higher social and/or family background is associated with a lower share of overeducated, as expected.

< Insert Table 4 here >

When reference is made to the field of study (Table 5), the best results in terms of JA matching are achieved by sciences, medicine and pedagogy, all of them showing a rate of overeducated lower than 10%. On the contrary, economics, statistics, sport sciences, geo-biological disciplines, agriculture and architecture show the highest share of JA overeducated (more than 30%). These results partly differ from those reported by the WA measure, which is higher for engineering and political and social sciences, while it is lower for agriculture and architecture.

< Insert Table 5 here >

The difference between the two measures of overeducation is clearly highlighted by descriptive statistics referred to job characteristics (Table 6). In this respect, we analyse the type of contract and the working area. In terms of geographical distribution, all Italian

[20] Notably, the greatest part of the European countries has shares of overeducated workers ranging from 10% to 15% (Verhaest and Van der Velden, 2010).

macro-regions show similar percentages of overeducated (slightly more than 20%). Foreign countries are the only working area reporting a substantially lower share of overeducated (17,6%). Italian regions differ with respect to workers' distribution and wages: the majority of respondents works in northern Italy, where wages are also substantially higher than in other regions. The highest wages, however, are reported by graduates working abroad, who earn on average 2229€. Looking at the contractual basis, summary statistics primarily show the heterogeneity of the employment relationships and the relatively low diffusion of open-ended contracts (covering only half of the sample), which is connected with the short working experience reported by our sample (on average 2.8 years out of a five-year period). Then, in terms of both JA and WA measures, descriptive statistics show that self-employed workers are less overeducated than employees. Additionally, workers on fixed-term and non-standard contracts are less overeducated than those with open-ended contracts. The highest shares of overeducated graduates (more than 50%) are associated with apprentices and temporary contracts.

< Insert Table 6 here >

5 The determinants of overeducation

a. The determinants of JA overeducation

In order to analyse thoroughly the determinants of JA, five different specifications of the same model have been taken into account.

In the first specification (column 1 in Table 8) the relationship between the likelihood to be overeducated and the characteristics of the job post have been investigated. Available information on job posts includes the industry, the contractual basis and whether the work activity is full time or part time. Each sector is identified by a dummy variable; IND_OTH_SERV is omitted in the model and therefore selected as benchmark for all other industries. An identical procedure has been applied to identify each contractual basis; in this case the open-ended employment contract has been chosen as benchmark. The estimates show that, with few exceptions, most of the sectors show a positive and statistically significant coefficient. Consultancy (IND_OTHCONS) and the education sector (IND_EDU_RES) are the only exceptions as they show negative and statistically significant coefficients. This result can be interpreted as remarkable evidence that JA is spread in most of the sectors of the economic system, at least for graduate workers, and is not a

phenomenon observable in few well defined sectors. As far as the contractual basis is concerned, the evidence is more controversial. Self-employed and fixed term employment contracts (SELF_EMPL and FIX_CON, respectively) affect negatively the probability to be overeducated, whereas the opposite impact on overeducation is estimated for non-standard and training contracts (PERM_CON and TRAIN_CON, respectively). In addition to sectorial and contractual dummies, the model also includes a gender dummy, whose coefficient is negative and statistically significant: males are more likely to be overeducated than females. This counterintuitive evidence is in line with previous analyses (Franzini and Raitano, 2009) that pointed out how Italy actually represents an exception to differential overeducation theories. Finally, it should be observed that full time employment relationship has a negative impact on the probability to be overeducated.

In the second specification (column 2 in Table 8) five dummy variables, each one identifying a single macro geographical area, are added. All parameters related to the Italian macro geographical areas present a positive sign but these are all statistically not significant. Interestingly, only the parameter identifying the foreign macro geographical area (AREA_ABR) arises with a statistically significant parameter. In this case the sign is negative, which indicates that the likelihood to be over educated is lower for graduates working abroad. Moreover, it is worth noting that in this second specification the estimated parameters associated with sectors and contractual basis do not change significantly with respect to the first specification.

In the third specification (column 3 in Table 8) two sets of variables related to the graduates' characteristics are added. Unfortunately, due to missing data concerning these variables, the number of observations in this model is reduced by over 60%, making any comparison between this model and the previous ones problematic. The first set of variables includes information concerning graduates' work experience, postgraduate studies and age. As far as this set of variables is concerned, postgraduate studies is the only significant dimension showing a negative sign. This result suggests that the probability to be overeducated is higher for graduates entering the labour market and decreases with working experience. The second set of dummy variables includes the field of study and a dummy variable associated with the attainment of a PhD. The parameters for most of the humanities and for law studies and medicine show a positive and statistically significant sign, whereas techno-scientific degrees such as engineering and chemical-pharmaceutical degrees have negative and statistically significant coefficients. Not surprisingly, the parameter for the attainment of a PhD. is positive and statistically significant.

In the fourth specification (column 4 in Table 8) we add few further individual variables such as the graduation mark (DEG_MARK), the average mark in university studies (AV_MARK) and marks in high school leaving certificates. All these variables can be considered as proxies of individual ability. As expected, the estimates for these parameters turn out to be positive and statistically significant for the variables concerning the university studies, whereas the parameter for the achievement at the secondary school is negative, but statistically non-significant.

Finally, the fifth specification (column 5 in Table 8) includes dummy variables for graduates' social background. The coefficient of parents' education is negative and statistically significant, whereas father's social position is not statistically different from nil.

< Insert Table 8 here >

b. The determinants of WA overeducation

The analysis on WA overeducation reiterates that with the JA measure, allowing staightforward comparisons between the two.

The results of the first specification (column 1 in Table 9) almost coincide with those obtained for JA. First, sectorial dummies show similar results with exception for the parameter associated with the health sector, which in this estimate shows a negative and statistically significant sign. As far as the contractual basis is concerned, only parasubordinated contracts change their effect on the probability to be overeducated, showing a negative and statistically significant parameter.

However, results change significantly in the second specification (column 2 in Table 9), where a set of dummy variables identifying macro geographical areas have been included. All areas, with the exception of AREA_ISL, show a statistically significant parameter. As observed for JA, the parameter for the AREA_ABR is negative, whereas for all the other macro geographical area the sign is strictly positive. Overeducation seems to be a widespread phenomenon not confined to few specific areas.

Graduates' individual characteristics are added in the third specification (column 3 in Table 9). In this case, comparisons with the estimate run for JA highlight striking differences. Postgraduate studies are the ones having a negative impact on the probability to be

overeducated, while both years of work experience (EXP) and tenure in the current job (TENURE) show positive signs. Results are quite different compared to the JA measure estimates even when controlling for the field of study. In this case, graduates from STEM faculties are not the ones showing a lower propensity to be overeducated as law and medicine show negative sign too. Finally, we find differences between WA and JA measures when considering the effect of having completed a PhD course.

Ability proxies are included in the fourth specification (column 4 in Table 9). The variable measuring the average mark in university exams is positive and statistically significant as in the case for JA; the variable reporting the degree final evaluation is also positive but the statistical significance is limited to 10%.

Finally, the fifth specification (column 5 in Table 9) shows the irrelevance of variables catching the individual social background as all the variables are statistically non-significant.

< Insert Table 9 here >

c. The bivariate Probit model

Following Greene (2013), one can say that a bivariate Probit consists of two Probit equations with correlated disturbances (error). Following the notation used for the Probit model, the general specification for this two equations model is given by:

$$\text{P(Objective Overeducation=1=YES)} = P(Y_1) > 0, where Y_1 = X'_1\beta_1 + \varepsilon_1 > 0$$

$$\text{P(Subjective Overeducation=1=YES)} = P(Y_2) > 0, where Y_2 = X'_2\beta_2 + \varepsilon_2 > 0$$

and the error specification is given by:

$$E[\varepsilon_1 I X_1 X_2] = E[\varepsilon_2 I X_1 X_2]$$

$$var[\varepsilon_1 I X_1 X_2] = var[\varepsilon_2 I X_1 X_2] = 1$$

$$cov[\varepsilon_1 \varepsilon_2 I X_1 X_2] = \rho$$

Interestingly, even though the assumptions of the bivariate Probit (see Table 10) differ substantially from those of a standard Probit model, the results of the estimate do not change. Starting from the analysis of the determinants of JA, the bivariate Probit confirms the pivotal role played by the variables identifying the job post (sector and contracts) as drivers affecting significantly overeducation, contrary to individual characteristics, which play a marginal role. Moreover, the bivariate Probit also confirms the results concerning the WA overeducation. This result confirms the relevance of variables related to the graduates' experience in the labour market and raises doubts about the role of ability proxies. In fact, ability proxies are weakly correlated to both measures of overeducation even when including three additional ability dimensions (SCOLARSHIP, ENG_S and ENG_W) along with the natural logarithm of the net monthly wage (see Table 13). It is important to stress that due to a fall in the number of observations in this last specification, making comparisons between the two models is not so straightforward. However, in this model wages are not correlated with the JA measure of overeducation as the parameter is not

statistically significant from zero, whereas a strong negative correlation (-0.411) shows up with respect to the WA measure. The more gradute workers earn, the less they perceive to be overeducated. This evidence reinforces the idea that subjective measurements of overeducation account for factors other than the required and attained education, involving the individual labour market experience. Moreover, the new overeducation measure based onto the SOC(HE)-Italy classification is independent from wage differentials whereas the subjective measure based on the workers' point of view is not. This is an important point to stress before proceeding to estimating the wage effects of overeducation as wage equations including the WA measure for overeducation will face severe endogeneity problem while wage equations including the SOC(HE) measure will not. This is a further consistent endorsement of the new SOC(HE) measure.

< Insert Table 10 here >

6 The wage penalty

Table 11 and 12 report estimates of the two Heckit models, used to assess possible wage penalties associated with overeducation as measured with WA and JA, respectively. Three different specifications have been estimated for both measurements, following basically the same steps adopted for the Probit estimates. The expected sign for the parameters of overeducation is negative. Ceteris paribus, an overeducated worker is expected to earn a lower wage compared with that of a matched peer as a consequence of market wage differentials between graduate and non-graduate jobs. First, it is worth noting that the sign and the level of significance remains unaltered for most of the variables when comparing the corresponding columns between the two tables. Second, whatever the measure adopted, overeducation has a negative and statistically significant impact on wages in all of the three models. Overeducated graduate workers earn, *ceteris paribus*, lower wages than their matched counterparts. This evidence is consistent with evidence highlighted in pre-existing literature. In particular, our coefficients are close to those of Allen and Van der Velden (2001) and Di Pietro and Urwin (2006), ranging between 5% and 10% for both JA and WA measures. However, the penalty is lower than the one measured by Dolton and Vignoles (2000), Dolton and Silles (2008) and Chevalier and Lindley (2007) for overeducated graduates in the UK, and by Rubb (2003) for the US. This result is also in line with international comparisons showing that Italian overeducated graduates suffer one of the

lowest pay-penalty in Europe (Ferrante et al., 2010; Barcena et al., 2011)[21]. Actually, other empirical studies referring to Italian data come out with even lower penalties. Cutillo and Di Pietro (2006) report a 4.4% wage penalty for WA overeducation using the same estimation method adopted in this study (while the penalty raise to 5.7% using instrumental variables). Franzini and Reitano (2009) find that the wage penalty is not significant once controlled for individual ability. This result can be explained by the poor tendency of wages in the Italian graduate labour market in the last decade as suggested by Ferrante et al. (2010). This is consistent with our evidence on wage premia earned by Italian graduates working abroad (+45%). Other studies report slightly higher wage penalties for overeducated Italian graduates, ranging between 10% and 15% (Carmen and Pastore, 2013).

< Insert Table 11 here >

However, it is important to emphasize that in all the three specifications the WA measure for overeducation is associated with higher penalties compared to those reported for the JA measure. This evidence can be interpreted referring to the results obtained in the analysis of the determinants. As expected, individual characteristics play a more relevant role in the analysis of WA overeducation than in that of JA overeducation. The way in which graduates perceive their job position or their relative position in the labour market can affect their perception to be overeducated. WA overeducation can be thus considered to be more than a simple indicator of educational mismatch as it accounts also for graduates' perception of their relations to either the job or the labour market. As a result, WA overeducation is a biased indicator of overeducation. Accordingly, it is not surprising that the wage penalty associated with WA overeducation is significantly higher than that of JA overeducation.

< Insert Table 12 here >

Conclusion

This essay introduces a new measurement of overeducation in order to address the measurement error problem highlighted by the relevant economic literature. As the

[21] Ferrante et al. (2010) report the absence of a wage penalty for Italian (and Estonian) overeducated graduate workers, whereas in the other surveyed countries such penalty ranges between 21% and 54%. Barcena-Martin et al. (2011) estimate that Italy is the only European country where the wage penalty fails to be statistically significant.

measurement error is typically associated with biases generated by workers' self-assessment (WA) we develop a job analysis measure (JA) based on the SOC(HE)-Italy occupational classification dealing with possible further sources of measurement error. We thus carry out analyses with both measures on the possible determinants and the impact on wages of overeducation. We try to assess the extent to which certain factors affect the probability to be overeducated by estimating five different specifications of a single Probit model.

We can derive at least three conclusions from our analysis.

First, it is important to emphasize that job characteristics are significant determinants for both JA and WA. Data availability allows us to take into account two different factors which identify a job post: its techno-organisational content and its socio-institutional context, both regulating the employment relation and the performance of its constituent tasks. The former is proxied by two sets of dummy variables identifying the industry and the relevant field of study. Actually, this set of variables describes the cognitive content of the constituent tasks of a particular job. In this view, the relevant field of study represents job requirements of labour demand rather than a distinctive trait of labour supply. The latter is represented by the contractual basis. Graduates on either a self-employment or a fixed term contract are less likely to be overeducated than graduates with open-ended contracts. This evidence could be explained by two not mutually exclusive explanations. On the one hand, it may indicate that workers prefer a job on an open-ended contract, even though it does not fully match their skills and, possibly, their expectations. They accept job proposal on an open-ended employment contract, because they value the expected tenure and security above the match between their skills and the job contents. On the other hand, this lower probability can derive from employers' hiring strategies. Firms could use the open-ended employment relationship as an incentive for employees' long term attachment. If internal labour markets operate and favour upward internal mobility, ports of entry can be opened at a low level with the prospect to match individual skills and job contents after a lapse of internal career or of on-the-job training.

Second, individual characteristics have a different impact on the two different measures of overeducation. The impact of gender supports the view that women are less JA overeducated than men, while the difference is not significant for WA. Thus, we do not find only that graduated women are less likely to be overeducated than men, but also that women may perceive to be overeducated although the cognitive content of their assigned job does match with their educational attainment. This insight is supported by our evidence that women win larger wage premia (17.6%) than men if they find a matched job[22]. Graduates'

[22] Rubb (2003) obtains similar results.

social and family background is a determinant of overeducation only when the JA measure is adopted. Consequently, our JA measure captures the better career opportunities entailed by a higher social background. On the contrary, effects on overeducation measured by WA are ambiguous as this subjective measure is upwardly biased by higher expectations in terms of wages and careers.

Finally, the characteristics of the graduates' experience in both the external and the internal labour market, such as working experience and tenure, measured in years, are relevant only as determinants of WA while they are not statistically significant for JA. This is not surprising as WA does not embody only job characteristics but accounts also for the overall individual experience in the labour market. Moreover, when running bivariate probit models to assess the different impact of several determinants on the two different overeducation measures we find that the WA measure is correlated with wage differentials whereas the SOC(HE)-based measure is not. This means that wage equations that estimate the impact of overeducation face severe endogeneity problem when including WA measures for required level of schooling. On the contrary, the SOC(HE)-based measure is strictly exogenous. Finally, since we have only one observation at five years after the degree without any information on the number of jobs graduates had in that period we cannot derive any suggestion with regard to the hypothesis that overeducation is just a temporary phenomenon.

We have thus run Heckit estimates to assess the impact of overeducation on wages. We find that, anyhow defined, overeducated workers suffer a wage penalty when compared to their peers employed in a matched job. Nevertheless, differences between alternative definitions of overeducation arise when referring to the magnitude of such penalty. The JA measure reports a lower wage penalty (8.0%) than the WA measure does (9.9%). This evidence is consistent with previous findings by Sloane et al. (1999) for the UK, by Cohn and Kahn for the US and by Groot and van den Brink (2000) for the Netherlands. From this result we draw two different conclusions. First, job satisfaction and individual expectations may affect the perception to be overeducated. If so, the WA measure of overeducation accounts also for factors other than educational mismatches. Individual motivation, job satisfaction and wellbeing at work can be positively correlated with WA overeducation while omitting variables related to such dimensions can result in upward biases (Pollmann-Schult and Buchel, 2004; Vaisey, 2006; Green and Zhu, 2008). Accordingly, wage penalties associated with WA overeducation incorporate the lower intrinsic motivation of graduated reporting to be overeducated. For this reason the introduction of these variables in the specification can represent a further step in the empirical research on this topic applied to the Italian context.

Second, skill heterogeneity can play a different role according to the chosen measure. Unobserved individual characteristics can affect overeducation perception and thus WA measures while this is not the case when using JA measures. All in all, we can claim that WA measures of overeducation are spurious indicators of different, interrelated phenomena, which makes the use of this measure highly problematic.

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Table 1 EQF Framework (source: http://ec.europa.eu/education/lifelong-learning-policy/eqf_en.htm)

Level	Knowledge	Skills	Competence	Example
Level 1	Basic general knowledge	basic skills required to carry out simple tasks	work or study under direct supervision in a structured context	
Level 2	Basic factual knowledge of a field of work or study	basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools	work or study under supervision with some autonomy	lower secondary school
Level 3	Knowledge of facts, principles, processes and general concepts, in a field of work or study	a range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information	take responsibility for completion of tasks in work or study; adapt own behaviour to circumstances in solving problems	
Level 4	Factual and theoretical knowledge in broad contexts within a field of work or study	a range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change; supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities	Lower middle school
Level 5	Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge	a comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems	exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others	Higher middle school
Level 6 (HE)	Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles	advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study	manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts; take responsibility for managing professional development of individuals and groups	Honours bachelor degree, vocational university German State-certified Engineer, Business Manager and Designer (Fachhcochschule) Bachelor, City and Guilds, Graduateship(GCGI)
Level 7 (HE)	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research; Critical awareness of knowledge issues in a field and at the interface between different fields	specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields	manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches; take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams	Masters, vocational university (Fachhcochschule) Masters, City and Guilds (MCGI)
Level 8 (HE)	Knowledge at the most advanced frontier of a field of work or study and at the interface between fields	the most advanced and specialised skills and techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice	demonstrate substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work or study contexts including research	Doctorate Awards - Fellowship

Table 2 EQF levels for economists (2.5.3.1.1) according to SOC(HE)-Italy

CP Code	Job Title	Experts EQF	Orchestrators EQF	Communicators EQF	Highest EQF Score	Major Group
2.5.3.1.1	Specialists in economic systems	6.84	6.77	6.72	Experts (6.84)	EXP

Legend

Variable	Description
JA_OVERED	JA Overeducated
WA_OVERED	WA Overeducated
EXP	Years of experience after graduation
AGE	Age at the time of the interview
SEX	Male
EDU_PAR_PRIM	Parental education: primary school
EDU_PAR_SEC	Parental education: secondary school
EDU_PAR_HIGH	Parental education: high school
EDU_PAR_DEG	Parental education: degree (at least one)
OCC_FATH_ENT	Father's occupation: self-employed, entrepreneur, manager
OCC_FATH_OTH	Father's occupation: employee, unemployed, inactive
FATH_UPP	Father's social status: upper
MOTH	Mother
TEN	Tenured
POST_GRAD	Years of post-graduate education
PHD	Post graduate studies: Doctorate
lnW	Natural logarithm of the net monthly wage
SCHOLARSHIP	Having had scholarship during the studies
ENG_S	English Language Proficiency: Speaking
ENG_W	English Language Proficiency: Writing
FIELD_AGRIC	Field of study: Agriculture
FIELD_ARCH	Field of study: Architecture
FIELD_PHA	Field of study: Pharmaceutical
FIELD_ECO	Field of study: Economics and statistics
FIELD_SPO	Field of study: Sport science
FIELD_GEO	Field of study: Geo-biological
FIELD_LAW	Field of study: Law
FIELD_ENG	Field of study: Engineering
FIELD_EDU	Field of study: Education
FIELD_HUM	Field of study: Humanities
FIELD_LAN	Field of study: Foreign languages
FIELD_MED	Field of study: Medicine and dentistry
FIELD_POL	Field of study: Political and social sciences
FIELD_PSYCH	Field of study: Psychology
FIELD_SCIE	Field of study: Sciences
AV_MARK	Exams average mark
DEG_MARK	Degree mark
HSCH_MARK	High School mark
DEL_IND	Delay index
AREA_NW	Working area: North-west
AREA_NE	Working area: North-east
AREA_CEN	Working area: Centre
AREA_SOU	Working area: South
AREA_ISL	Working area: Islands
AREA_ABR	Working area: abroad
LIV_NW	Living area: North-west
LIV_NE	Living area: North-east
LIV_CEN	Living area: Centre
LIV_SOU	Living area: South
LIV_ISL	Living area: Islands
PERM_CON	Open-ended contract
FIX_CON	Fixed-term contract
SELF_EMPL	Self-employed
TRAIN_ CON	Training contract
TEMP_CON	Temporary contract

NONSTD_CON	Non-standard employment contract
NONSTD_SELF	Non-standard self-employed
OTH_NONSTD	Other non-standard contracts
NO_CON	Without contract
FULL_TIME	Full-time
IND_AGRIC	Industry: Agriculture, forestry and fishing
IND_PRINT	Industry: Printing and reproduction of recorded media
IND_ENERGY	Industry: Energy/mining
IND_CHEM	Industry: Manufacture of chemical products
IND_MET	Industry: Manufacture of metal products and machineries
IND_ELECT	Industry: Manufacture of electronic and electric products
IND_OTHMAN	Industry: Other manufacturing
IND_CONSTR	Industry: Construction
IND_TRADE	Industry: Wholesale and retail trade
IND_TRANSP	Industry: Transporting and storage
IND_COMM	Industry: Information and communication
IND_FIN	Industry: Financial and insurance activities
IND_OTHCONS	Industry: Other consulting and professional activities
IND_INFOR	Industry: Information service activities
IND_BUS_SERV	Industry: Other business support service activities
IND_PUB	Industry: Public administration and defence
IND_EDU_RES	Industry: Education/ R&D
IND_HEAL	Industry: Human health and social work activities
IND_CULT	Industry: Arts, entertainment and recreation
IND_OTH_SERV	Industry: Other services activities
REG_STUD	Regularity in studies
STUD_WORK	Working experience during studies
COMP_SKIL	Computer skills (ability in using excel spreadsheets)
CONS_JOB	Coherent job during studies
TRAINEESHIP	Training, apprenticeship

Table 3 – Descriptive statistics on overeducation

Overeducated workers	**%**
JA overeducated	20.9%
WA overeducated	26.1%
WA overeducated conditioned on being JA overeducated	72.4%
JA overeducated conditioned on being WA overeducated	42.1%

Table 4 - Overeducation by individual characteristics and social and family background

	%	**Monthly net earning**	**JA overeducated (%)**	**WA overeducated (%)**
Female	60.9%	1233	24.2%	24.9%
Male	39.1%	1737	21.4%	28.2%
Parental education: primary school	5.4%	1396	24.0%	30.5%
Parental education: secondary school	18.3%	1360	26.4%	31.4%
Parental education: high school	37.4%	1382	24.6%	28.2%
Parental education: degree (at least one)	26.3%	1451	19.3%	22.4%
Father's occupation: self-employed, entrepreneur, manager	55.2%	1482	21.6%	25.5%
Father's occupation: employee, unemployed, inactive	44.8%	1359	25.1%	28.9%
Mother	12.3%	1264	22.2%	32.7%
Tenured	44.7%	1501	24.9%	33.9%

Table 5 - Overeducation by educational attainment and field of study

	%	**Monthly net earning**	**JA overeducated (%)**	**WA overeducated (%)**
Agriculture	2.7%	1202	31.4%	18.5%
Architecture	5.0%	1222	30.7%	18.7%
Pharmaceutical	4.6%	1405	10.9%	6.1%
Economics and statistics	12.3%	1572	34.4%	40.4%
Sport science	1.0%	1101	43.4%	36.9%
Geo-biological	5.2%	1260	36.8%	19.0%
Law	7.0%	1240	12.5%	12.3%
Engineering	13.0%	1722	18.4%	33.1%
Education	7.9%	1175	4.3%	12.5%
Humanities	5.8%	1134	15.1%	20.8%
Foreign languages	2.7%	1184	14.4%	19.6%
Medicine and dentistry	13.2%	1459	7.8%	11.5%
Political and social sciences	10.5%	1273	24.4%	32.2%
Psychology	6.0%	1087	10.3%	19.6%
Sciences	3.1%	1259	8.4%	17.3%

Table 6 – Overeducation by job characteristics

	%	Monthly net earning	JA overeducated (%)	WA overeducated (%)
Working area: North-west	22.9%	1464	21.4%	40.4%
Working area: North-east	30.2%	1380	25.6%	44.7%
Working area: Centre	24.9%	1324	23.6%	40.5%
Working area: South	11.1%	1207	21.6%	40.7%
Working area: Islands	5.6%	1264	23.5%	40.5%
Working area: abroad	5.2%	2229	17.6%	38.1%
Open-ended contract	50.2%	1547	29.1%	51.9%
Fixed-term contract	15.3%	1345	19.3%	31.3%
Self-employed	19.4%	1298	8.2%	20.0%
Training contract	2.7%	1236	51.4%	66.4%
Temporary contract	0.8%	1126	52.4%	66.5%
Non-standard employment contract	8.1%	1334	26.5%	42.3%
Non-standard self-employed	1.7%	1094	12.0%	30.1%
Other non-standard contracts	0.2%	1102	21.0%	33.1%
Without contract	1.3%	706	21.4%	48.8%
Full-time	84.4%	1505	23.5%	41.9%
Part-time	15.6%	832	21.2%	40.4%

Table 7 - Overeducation by industry (NACE code)

	%	Monthly net earning	JA overeducated (%)	WA overeducated (%)
Agriculture, forestry and fishing	0.9%	1232	66.9%	53.4%
Printing and reproduction of recorded media	0.8%	1088	22.6%	74.6%
Energy/mining	2.7%	1759	35.0%	43.4%
Manufacture of chemical products	2.4%	1623	34.8%	44.3%
Manufacture of metal products and machineries	5.1%	1709	31.6%	56.9%
Manufacture of electronic and electric products	1.2%	1761	16.9%	41.6%
Other manufacturing	2.9%	1555	45.5%	63.9%
Construction	3.6%	1402	25.1%	33.0%
Wholesale and retail trade	7.5%	1315	38.1%	53.2%
Transporting and storage	1.3%	1425	45.5%	71.4%
Information and communication	2.5%	1335	21.0%	71.0%
Financial and insurance activities	6.2%	1571	57.8%	67.6%
Other consulting and professional activities	7.4%	1277	5.4%	13.8%
Information service activities	3.6%	1589	14.0%	65.4%
Other business support service activities	2.5%	1284	44.0%	66.2%
Public administration and	5.7%	1592	28.0%	54.4%

defence				
Education/ R&D	16.4%	1199	9.5%	19.1%
Human health and social work activities	12.7%	1579	12.4%	27.8%
Arts, entertainment and recreation	2.2%	1023	34.1%	71.7%
Other services activities	4.6%	1039	18.8%	54.0%
No answer	1.0%	-	-	-

Table 8- Probit model with JA measure for overeducation as dependent variable. Marginal effects

	(1) SOC_Overed	(2) SOC_Overed	(3) SOC_Overed	(4) SOC_Overed	(5) SOC_Overed
IND_AGRIC	1.825***	1.807***	1.535***	1.495***	1.496***
	(0.1151)	(0.1154)	(0.1985)	(0.2014)	(0.2019)
IND_PRINT	0.221*	0.224*	-0.00977	0.00150	0.00419
	(0.1245)	(0.1251)	(0.2325)	(0.2331)	(0.2332)
IND_ENERGY	0.751***	0.757***	0.916***	0.911***	0.921***
	(0.0831)	(0.0834)	(0.1647)	(0.1666)	(0.1668)
IND_CHEM	0.653***	0.644***	0.866***	0.871***	0.871***
	(0.0859)	(0.0862)	(0.1725)	(0.1752)	(0.1753)
IND_MET	0.624***	0.623***	0.992***	1.012***	1.014***
	(0.0730)	(0.0735)	(0.1427)	(0.1451)	(0.1454)
IND_ELECT	0.261**	0.275**	0.638***	0.646***	0.667***
	(0.1110)	(0.1114)	(0.2419)	(0.2431)	(0.2435)
IND_OTHMAN	0.916***	0.912***	0.878***	0.854***	0.858***
	(0.0790)	(0.0794)	(0.1468)	(0.1489)	(0.1493)
IND_CONSTR	0.489***	0.472***	0.923***	0.976***	0.971***
	(0.0873)	(0.0875)	(0.1698)	(0.1722)	(0.1725)
IND_TRADE	0.762***	0.743***	1.169***	1.167***	1.168***
	(0.0652)	(0.0654)	(0.1230)	(0.1248)	(0.1250)
IND_TRANSP	0.950***	0.947***	0.976***	1.003***	0.999***
	(0.1066)	(0.1071)	(0.1885)	(0.1906)	(0.1910)
IND_COMM	0.265***	0.276***	0.170	0.157	0.165
	(0.0866)	(0.0870)	(0.1552)	(0.1573)	(0.1574)
IND_FIN	1.325***	1.317***	1.261***	1.260***	1.267***
	(0.0714)	(0.0717)	(0.1341)	(0.1357)	(0.1360)
IND_OTHCONS	-0.210***	-0.233***	-0.126	-0.0943	-0.0949
	(0.0779)	(0.0781)	(0.1465)	(0.1482)	(0.1483)

IND_INFOR	0.0819	0.0836	0.360**	0.329*	0.331**
	(0.0823)	(0.0826)	(0.1646)	(0.1685)	(0.1687)
IND_BUS_SERV	0.884***	0.868***	0.905***	0.881***	0.885***
	(0.0822)	(0.0825)	(0.1458)	(0.1486)	(0.1489)
IND_PUB	0.556***	0.523***	0.198	0.247*	0.247*
	(0.0722)	(0.0726)	(0.1285)	(0.1312)	(0.1314)
IND_EDU_RES	-0.487***	-0.521***	-0.384***	-0.374***	-0.378***
	(0.0716)	(0.0719)	(0.1337)	(0.1357)	(0.1359)
IND_HEAL	0.0221	-0.00703	0.184	0.199	0.207
	(0.0657)	(0.0660)	(0.1334)	(0.1350)	(0.1352)
IND_CULT	0.671***	0.665***	0.526***	0.542***	0.534***
	(0.0942)	(0.0945)	(0.1555)	(0.1570)	(0.1572)
IND_OTH_SERV	0.233***	0.222***	0.213	0.235	0.226
	(0.0854)	(0.0857)	(0.1456)	(0.1476)	(0.1479)
SELF_EMPL	-0.586***	-0.604***	-0.649***	-0.633***	-0.618***
	(0.0404)	(0.0406)	(0.0719)	(0.0729)	(0.0732)
NONSTD_CON	0.447***	0.447***	0.483*	0.472*	0.466*
	(0.1102)	(0.1105)	(0.2567)	(0.2566)	(0.2563)
OTH_NONSTD	-0.482***	-0.484***	-0.355***	-0.347**	-0.326**
	(0.0803)	(0.0804)	(0.1377)	(0.1393)	(0.1399)
FIX_CON	-0.515***	-0.508***	-0.548**	-0.535**	-0.526**
	(0.1141)	(0.1144)	(0.2626)	(0.2628)	(0.2625)
FULL_TIME	-0.0951***	-0.0763**	-0.202***	-0.213***	-0.212***
	(0.0352)	(0.0355)	(0.0622)	(0.0635)	(0.0636)
SEX	-0.220***	-0.212***	-0.162***	-0.155***	-0.152***
	(0.0251)	(0.0253)	(0.0453)	(0.0466)	(0.0468)
AREA_NW		-0.109***	-0.0634	-0.0535	-0.0437
		(0.0347)	(0.0600)	(0.0612)	(0.0615)

AREA_SOU	0.0432	0.0463	0.0340	0.0265
	(0.0403)	(0.0682)	(0.0694)	(0.0695)
AREA_ABR	-0.368***	-0.532***	-0.516***	-0.498***
	(0.0616)	(0.1262)	(0.1330)	(0.1335)
POST_GRAD		-0.172***	-0.174***	-0.172***
		(0.0316)	(0.0322)	(0.0321)
AGE		-0.0260	-0.0184	-0.0258
		(0.0288)	(0.0308)	(0.0309)
AGE SQUARED		0.000381	0.000282	0.000352
		(0.0003)	(0.0004)	(0.0004)
EXP		0.356*	0.327	0.324
		(0.2030)	(0.2066)	(0.2068)
EXP SQUARED		-0.0432	-0.0385	-0.0383
		(0.0272)	(0.0276)	(0.0277)
TEN		-0.0362	-0.0423	-0.0470
		(0.0501)	(0.0509)	(0.0510)
FIELD_AGRIC		0.607***	0.242*	0.241*
		(0.1729)	(0.1292)	(0.1295)
FIELD_ARCH		0.216	-0.234	-0.235
		(0.1873)	(0.1526)	(0.1526)
FIELD_PHA		-0.956***	-1.272***	-1.263***
		(0.1783)	(0.1405)	(0.1406)
FIELD_ECO		0.202	-0.214***	-0.214***
		(0.1355)	(0.0733)	(0.0734)
FIELD_LAW		0.434***	-0.00923	-0.0110
		(0.1647)	(0.1184)	(0.1185)
FIELD_ENG		-0.367***	-0.759***	-0.762***
		(0.1424)	(0.0959)	(0.0961)

FIELD_HUM			0.523***	0.0659	0.0743
			(0.1503)	(0.0813)	(0.0813)
FIELD_MED			0.440***	0.0179	0.0129
			(0.1659)	(0.0982)	(0.0983)
FIELD_PSYCH			0.117	-0.328***	-0.332***
			(0.1540)	(0.0814)	(0.0815)
PHD			0.539***	0.550***	0.535***
			(0.1547)	(0.1575)	(0.1578)
AV_MARK				0.113**	0.108**
				(0.0493)	(0.0493)
DEG_MARK				0.0148***	0.0145***
				(0.0044)	(0.0044)
OCC_FATH_ENT					-0.0696
					(0.0437)
EDU_PAR_DEG					-0.125**
					(0.0556)
_cons	-0.952***	-0.933***	-1.205*	-2.413**	-2.149**
	(0.0669)	(0.0707)	(0.7030)	(0.9539)	(0.9580)
Pseudo R^2	0.1654	0.1691	0.2083	0.2108	0.2123
N	18045	18034	6219	6065	6065

Standard error in parenthesis
* Significant at 10%
**Significant at 5%
*** Significant at 1%

Table 9 - Probit model with WA measure for overeducation as dependent variable. Marginal effects

	(1) SOC_Overed	(2) SOC_Overed	(3) SOC_Overed	(4) SOC_Overed	(5) SOC_Overed
IND_AGRIC	0.671***	0.656***	0.988***	1.027***	1.022***
	(0.0922)	(0.0925)	(0.1746)	(0.1789)	(0.1790)
IND_PRINT	1.113***	1.121***	0.850***	0.842***	0.847***
	(0.1006)	(0.1007)	(0.1848)	(0.1853)	(0.1854)
IND_ENERGY	0.158***	0.167***	0.470***	0.455***	0.454***
	(0.0604)	(0.0606)	(0.1234)	(0.1244)	(0.1245)
IND_CHEM	0.191***	0.191***	0.765***	0.769***	0.769***
	(0.0628)	(0.0629)	(0.1380)	(0.1401)	(0.1401)
IND_MET	0.486***	0.481***	0.840***	0.850***	0.849***
	(0.0504)	(0.0507)	(0.1017)	(0.1033)	(0.1033)
IND_ELECT	0.130	0.133*	0.364**	0.322*	0.322*
	(0.0800)	(0.0803)	(0.1836)	(0.1856)	(0.1857)
IND_OTHMAN	0.676***	0.663***	0.934***	0.910***	0.906***
	(0.0592)	(0.0593)	(0.1125)	(0.1143)	(0.1143)
IND_CONSTR	0.105*	0.0997*	0.353***	0.355***	0.351***
	(0.0553)	(0.0555)	(0.1091)	(0.1108)	(0.1109)
IND_TRADE	0.458***	0.439***	1.118***	1.114***	1.109***
	(0.0451)	(0.0452)	(0.0927)	(0.0940)	(0.0941)
IND_TRANSP	0.909***	0.904***	1.026***	1.044***	1.046***
	(0.0805)	(0.0808)	(0.1459)	(0.1485)	(0.1486)
IND_COMM	0.967***	0.988***	0.933***	0.928***	0.928***
	(0.0630)	(0.0631)	(0.1169)	(0.1181)	(0.1181)
IND_FIN	0.758***	0.746***	0.832***	0.812***	0.812***
	(0.0486)	(0.0487)	(0.0942)	(0.0952)	(0.0952)
IND_OTHCONS	-0.390***	-0.414***	-0.161	-0.176*	-0.180*
	(0.0509)	(0.0510)	(0.0995)	(0.1010)	(0.1010)
IND_INFOR	0.757***	0.760***	1.185***	1.196***	1.196***
	(0.0557)	(0.0558)	(0.1183)	(0.1219)	(0.1219)

IND_BUS_SERV	0.776***	0.763***	0.955***	0.929***	0.927***
	(0.0625)	(0.0626)	(0.1129)	(0.1151)	(0.1151)
IND_PUB	0.450***	0.421***	0.257***	0.245***	0.246***
	(0.0488)	(0.0492)	(0.0853)	(0.0870)	(0.0870)
IND_EDU_RES	-0.469***	-0.493***	-0.238***	-0.242***	-0.241***
	(0.0432)	(0.0433)	(0.0836)	(0.0850)	(0.0850)
IND_HEAL	-0.0991**	-0.126***	0.161*	0.160*	0.160*
	(0.0416)	(0.0418)	(0.0885)	(0.0898)	(0.0898)
IND_CULT	1.046***	1.041***	0.772***	0.782***	0.782***
	(0.0667)	(0.0668)	(0.1107)	(0.1123)	(0.1123)
IND_OTH_SERV	0.480***	0.463***	0.355***	0.350***	0.349***
	(0.0517)	(0.0518)	(0.0908)	(0.0921)	(0.0921)
SELF_EMPL	-0.676***	-0.690***	-0.546***	-0.548***	-0.549***
	(0.0280)	(0.0282)	(0.0515)	(0.0524)	(0.0525)
NONSTD_CON	0.294***	0.297***	0.0266	0.0145	0.0110
	(0.0937)	(0.0939)	(0.2142)	(0.2147)	(0.2148)
OTH_NONSTD	-0.450***	-0.448***	-0.238**	-0.241**	-0.241**
	(0.0519)	(0.0520)	(0.0971)	(0.0985)	(0.0986)
FIX_CON	-0.545***	-0.540***	-0.0849	-0.0682	-0.0668
	(0.0959)	(0.0961)	(0.2176)	(0.2181)	(0.2182)
FULL_TIME	-0.140***	-0.124***	-0.217***	-0.232***	-0.233***
	(0.0257)	(0.0259)	(0.0468)	(0.0477)	(0.0478)
SEX	-0.0148	-0.00741	0.0483	0.0562	0.0588*
	(0.0186)	(0.0187)	(0.0343)	(0.0353)	(0.0354)
AREA_NW		-0.0751***	-0.0943**	-0.0818*	-0.0856*
		(0.0255)	(0.0440)	(0.0449)	(0.0451)
AREA_SOU		0.131***	0.212***	0.217***	0.217***
		(0.0296)	(0.0498)	(0.0506)	(0.0506)

AREA_ABR	-0.183***	-0.214**	-0.195**	-0.197**
	(0.0421)	(0.0848)	(0.0893)	(0.0894)
POST_GRAD		-0.144***	-0.146***	-0.146***
		(0.0207)	(0.0210)	(0.0210)
AGE		0.0781***	0.0880***	0.0870***
		(0.0202)	(0.0214)	(0.0215)
AGE SQUARED		-0.000956***	-0.00108***	-0.00107***
		(0.0002)	(0.0002)	(0.0002)
EXP		0.697***	0.746***	0.748***
		(0.1489)	(0.1516)	(0.1517)
EXP SQUARED		-0.0773***	-0.0837***	-0.0841***
		(0.0201)	(0.0205)	(0.0205)
TEN		0.454***	0.461***	0.460***
		(0.0361)	(0.0367)	(0.0367)
FIELD_AGRIC		-0.487***	-0.678***	-0.681***
		(0.1435)	(0.1138)	(0.1138)
FIELD_ARCH		-0.320**	-0.491***	-0.492***
		(0.1257)	(0.0896)	(0.0897)
FIELD_PHA		-1.930***	-2.088***	-2.085***
		(0.1497)	(0.1241)	(0.1241)
FIELD_ECO		-0.155	-0.338***	-0.340***
		(0.1065)	(0.0586)	(0.0587)
FIELD_LAW		-0.290**	-0.491***	-0.492***
		(0.1303)	(0.0949)	(0.0949)
FIELD_ENG		-0.578***	-0.753***	-0.756***
		(0.1088)	(0.0705)	(0.0706)
FIELD_HUM		0.260**	0.0524	0.0548
		(0.1181)	(0.0639)	(0.0639)

FIELD_MED			-0.140	-0.313***	-0.313***
			(0.1225)	(0.0681)	(0.0681)
FIELD_PSYCH			-0.0571	-0.259***	-0.264***
			(0.1153)	(0.0582)	(0.0583)
PHD			0.251**	0.281***	0.286***
			(0.1044)	(0.1069)	(0.1069)
AV_MARK				0.101***	0.101***
				(0.0367)	(0.0367)
DEG_MARK				0.00571*	0.00560*
				(0.0032)	(0.0032)
OCC_FATH_ENT					0.0340
					(0.0324)
EDU_PAR_DEG					-0.0529
					(0.0413)
_cons	-0.152***	-0.177***	-3.026***	-3.791***	-3.762***
	(0.0443)	(0.0472)	(0.5022)	(0.6753)	(0.6776)
Pseudo R^2	0.1433	0.1467	0.2187	0.2215	0.22217
N	25155	25131	9139	8912	8912

Standard error in parenthesis
* Significant at 10%
**Significant at 5%
*** Significant at 1%

Table 10 - Bivariate probit model with WA measure for overeducation as dependent variable

	OVERED	SOC_Overed
POST_GRAD	-0.143***	-0.172***
	(0.0251)	(0.0322)
AGE	0.0981***	-0.0264
	(0.0266)	(0.0307)
AGE_SQUARED	-0.00108***	0.000382
	(0.0003)	(0.0004)
EXP	0.737***	0.370*
	(0.1862)	(0.2066)
EXP SQUARED	-0.0847***	-0.0431
	(0.0251)	(0.0276)
TEN	0.501***	-0.0469
	(0.0459)	(0.0511)
FIELD_AGRIC	-0.573***	0.669***
	(0.1682)	(0.1761)
FIELD_ARCH	-0.169	0.197
	(0.1790)	(0.1927)
FIELD_PHA	-2.103***	-0.856***
	(0.1799)	(0.1857)
FIELD_ECO	-0.269**	0.222
	(0.1299)	(0.1378)
FIELD_LAW	-0.409***	0.435***
	(0.1554)	(0.1671)
FIELD_ENG	-0.652***	-0.317**
	(0.1335)	(0.1454)
FIELD_HUM	0.135	0.493***
	(0.1436)	(0.1531)
FIELD_MED	-0.189	0.415**
	(0.1558)	(0.1697)
FIELD_PSYCH	-0.294**	0.0814
	(0.1432)	(0.1562)
SEX	0.0448	-0.151***
	(0.0434)	(0.0467)
PHD	0.443***	0.543***
	(0.1353)	(0.1584)
IND_AGRIC	1.112***	1.482***
	(0.2040)	(0.2028)
IND_PRINT	0.784***	0.0427
	(0.1961)	(0.2264)
IND_ENERGY	0.433***	0.893***
	(0.1451)	(0.1656)
IND_CHEM	0.801***	0.865***
	(0.1603)	(0.1733)
IND_MET	0.837***	0.993***
	(0.1244)	(0.1437)
IND_ELECT	0.252	0.603**
	(0.2141)	(0.2461)
IND_OTHMAN	0.848***	0.837***
	(0.1341)	(0.1479)
IND_CONSTR	0.399***	0.925***
	(0.1517)	(0.1726)
IND_TRADE	1.105***	1.150***
	(0.1112)	(0.1240)
IND_TRANSP	0.939***	0.975***
	(0.1876)	(0.1891)
IND_COMM	0.886***	0.173

	(0.1352)	(0.1548)
IND_FIN	0.678***	1.244***
	(0.1166)	(0.1343)
IND_OTHCONS	-0.225*	-0.136
	(0.1152)	(0.1478)
IND_INFOR	1.222***	0.327**
	(0.1409)	(0.1663)
IND_BUS_SERV	0.895***	0.871***
	(0.1362)	(0.1475)
IND_PUB	0.0439	0.212
	(0.1074)	(0.1305)
IND_EDU_RES	-0.293***	-0.410***
	(0.1060)	(0.1343)
IND_HEAL	0.0483	0.182
	(0.1115)	(0.1352)
IND_CULT	0.627***	0.525***
	(0.1435)	(0.1553)
IND_OTH_SERV	0.292**	0.202
	(0.1229)	(0.1476)
SELF_EMPL	-0.566***	-0.633***
	(0.0634)	(0.0733)
NONSTD_CON	-0.0469	0.443*
	(0.2529)	(0.2528)
OTH_NONSTD	-0.438***	-0.331**
	(0.1258)	(0.1413)
FIX_CON	-0.0161	-0.496*
	(0.2574)	(0.2590)
FULL_TIME	-0.210***	-0.212***
	(0.0599)	(0.0639)
AV_MARK	0.146***	0.107**
	(0.0450)	(0.0492)
DEG_MARK	0.00892**	0.0151***
	(0.0038)	(0.0044)
OCC_FATH_ENT	0.0498	-0.0782*
	(0.0395)	(0.0437)
EDU_PAR_DEG	-0.0603	-0.119**
	(0.0498)	(0.0554)
_cons	-4.643***	-2.736***
	(0.8418)	(0.9595)
athrho		0.371***
		(0.0278)
N	6065	6065
Wald χ^2		2420.69
Log-likelihood		-5710.56

Standard error in parenthesis
* Significant at 10%
**Significant at 5%
*** Significant at 1%

Table 11 - Heckman selection model with natural logarithm of net monthly wage as dependent variable; overeducation measured as JA

	(1) lnW	(2) lnW	(3) lnW
SOC_Overed	-0.0827***	-0.0819***	-0.0801***
	(0.0130)	(0.0131)	(0.0131)
EXP	0.00177	-0.0174	-0.0167
	(0.0685)	(0.0692)	(0.0690)
EXP SQUARED	0.00481	0.00746	0.00739
	(0.0091)	(0.0092)	(0.0092)
TEN	0.0617***	0.0597***	0.0596***
	(0.0132)	(0.0133)	(0.0133)
SEX	0.169***	0.164***	0.164***
	(0.0138)	(0.0139)	(0.0140)
AREA_NW	0.0536***	0.0521***	0.0503***
	(0.0159)	(0.0160)	(0.0160)
AREA_SOU	-0.121***	-0.121***	-0.120***
	(0.0239)	(0.0242)	(0.0242)
AREA_ABR	0.440***	0.428***	0.424***
	(0.0339)	(0.0341)	(0.0341)
SELF_EMPL	0.778***	0.779***	0.775***
	(0.1064)	(0.1066)	(0.1061)
PERM_CONTR	0.889***	0.888***	0.889***
	(0.1042)	(0.1042)	(0.1037)
TRAIN_CONTR	0.775***	0.776***	0.775***
	(0.1071)	(0.1071)	(0.1066)
NONSTD_CONT	0.632***	0.633***	0.636***
	(0.1318)	(0.1314)	(0.1312)
NONSTD_SELF	0.644***	0.644***	0.644***
	(0.1083)	(0.1086)	(0.1081)
OTH_NONSTD	0.525***	0.537***	0.532***
	(0.1215)	(0.1211)	(0.1206)
FIX_CON	0.194**	0.192**	0.189**
	(0.0827)	(0.0820)	(0.0823)
IND_PRINT	0.0979	0.0979	0.0974
	(0.0646)	(0.0658)	(0.0658)
IND_ENERGY	-0.205***	-0.203**	-0.202**
	(0.0793)	(0.0794)	(0.0790)
IND_CHEM	0.142***	0.169***	0.165***
	(0.0382)	(0.0322)	(0.0325)
IND_MET	0.176***	0.174***	0.172***
	(0.0275)	(0.0279)	(0.0280)
IND_ELECT	0.128***	0.124***	0.124***
	(0.0248)	(0.0252)	(0.0251)
IND_OTHMAN	0.0977**	0.0956*	0.0905*
	(0.0497)	(0.0496)	(0.0492)
IND_FIN	0.122***	0.121***	0.119***
	(0.0256)	(0.0255)	(0.0255)
IND_INFOR	0.0839*	0.0846*	0.0834*
	(0.0452)	(0.0452)	(0.0453)
FIELD_AGRIC	-0.0951*	-0.0930*	-0.0954*
	(0.0528)	(0.0534)	(0.0533)
FILD_ECO	-0.0273	-0.0352	-0.0355
	(0.0577)	(0.0597)	(0.0593)
FIELD_SPO	0.116***	0.121***	0.120***
	(0.0387)	(0.0398)	(0.0397)
FIELD_ENG	0.146***	0.145***	0.141***
	(0.0328)	(0.0331)	(0.0331)
FIELD_HUM	-0.158**	-0.159**	-0.158**
	(0.0658)	(0.0663)	(0.0661)
FIELD_MED	0.00364	0.00469	0.00730
	(0.0482)	(0.0487)	(0.0485)

FIELD _POL	0.00691	0.0144	0.0132
	(0.0471)	(0.0483)	(0.0483)
FIELD _PSYCH	0.129***	0.126***	0.123***
	(0.0330)	(0.0332)	(0.0332)
HSCH_MARK	-0.000474	-0.000646	-0.000631
	(0.0005)	(0.0005)	(0.0005)
REG_STUD	-0.00321	-0.00279	-0.00227
	(0.0067)	(0.0070)	(0.0069)
STUD_WORK	0.0316**	0.0320**	0.0324**
	(0.0144)	(0.0144)	(0.0146)
COMP_SKIL		0.0106*	0.0106*
		(0.0062)	(0.0062)
OCC_FATH_ENT			0.0228*
			(0.0121)
_cons	6.062***	6.072***	6.063***
	(0.1706)	(0.1735)	(0.1733)
Occ_Heckit			
EDU_PAR_DEG	-0.180***	-0.176***	-0.181***
	(0.0397)	(0.0399)	(0.0400)
POST_GRAD	0.0587***	0.0593***	0.0597***
	(0.0226)	(0.0226)	(0.0226)
LIV_NW	0.260***	0.263***	0.264***
	(0.0537)	(0.0539)	(0.0539)
LIV_NE	0.222***	0.222***	0.222***
	(0.0491)	(0.0494)	(0.0493)
LIV_SOU	-0.245***	-0.262***	-0.262***
	(0.0551)	(0.0556)	(0.0555)
LIV_ISL	-0.107	-0.127*	-0.127*
	(0.0689)	(0.0696)	(0.0696)
LIV_ABR	-0.764***	-0.746***	-0.742***
	(0.2398)	(0.2398)	(0.2398)
DEL_IND	-0.167**	-0.162**	-0.162**
	(0.0676)	(0.0683)	(0.0683)
CONS_JOB	-0.113***	-0.107***	-0.107***
	(0.0233)	(0.0235)	(0.0235)
MOTH	-0.228***	-0.237***	-0.237***
	(0.0513)	(0.0518)	(0.0517)
STUD_WORK	0.424***	0.422***	0.421***
	(0.0458)	(0.0463)	(0.0463)
TRAINEESHIP	-0.253***	-0.247***	-0.246***
	(0.0484)	(0.0487)	(0.0488)
PHD	-1.390***	-1.382***	-1.382***
	(0.0943)	(0.0945)	(0.0945)
_cons	1.460***	1.377***	1.376***
	(0.3832)	(0.3881)	(0.3879)
Field of study	Yes	Yes	Yes
athrho			
_cons	-0.196***	-0.195***	-0.204***
	(0.0558)	(0.0548)	(0.0562)
lnsigma			
_cons	-0.994***	-0.997***	-0.997***
	(0.0188)	(0.0188)	(0.0190)
N	7408	7285	7285
Wald χ^2	1474.99	1644.56	2291.39

Robust standard error in parenthesis
* Significant at 10%
**Significant at 5%
*** Significant at 1%

Table 12 - Heckman selection model with natural logarithm of net monthly wage as dependent variable; overeducation measured as WA

	(1)	(2)	(3)
	lnW	lnW	lnW
OVERED	-0.101***	-0.0989***	-0.0993***
	(0.0097)	(0.0098)	(0.0098)
EXP	-0.00962	-0.0272	-0.0258
	(0.0544)	(0.0551)	(0.0551)
EXP SQUARED	0.00608	0.00844	0.00829
	(0.0073)	(0.0074)	(0.0074)
TEN	0.0553***	0.0537***	0.0546***
	(0.0104)	(0.0105)	(0.0105)
SEX	0.160***	0.158***	0.159***
	(0.0108)	(0.0109)	(0.0109)
AREA_NW	0.0462***	0.0448***	0.0435***
	(0.0102)	(0.0103)	(0.0103)
AREA_SOU	-0.0933***	-0.0942***	-0.0916***
	(0.0178)	(0.0182)	(0.0182)
AREA_ABR	0.452***	0.443***	0.439***
	(0.0263)	(0.0264)	(0.0264)
SELF_EMPL	0.698***	0.716***	0.711***
	(0.0870)	(0.0884)	(0.0881)
PERM_CONTR	0.848***	0.866***	0.867***
	(0.0853)	(0.0866)	(0.0863)
TRAIN_CONTR	0.722***	0.738***	0.738***
	(0.0871)	(0.0885)	(0.0881)
NONSTD_CONT	0.578***	0.595***	0.599***
	(0.1033)	(0.1042)	(0.1039)
NONSTD_SELF	0.576***	0.594***	0.594***
	(0.0881)	(0.0895)	(0.0892)
OTH_NONSTD	0.426***	0.451***	0.448***
	(0.0970)	(0.0980)	(0.0976)

FIX_CON	0.196***	0.197***	0.193***
	(0.0597)	(0.0594)	(0.0593)
IND_PRINT	-0.142*	-0.140*	-0.139*
	(0.0734)	(0.0734)	(0.0732)
IND_ENERGY	0.115***	0.138***	0.136***
	(0.0306)	(0.0264)	(0.0265)
IND_CHEM	0.171***	0.171***	0.171***
	(0.0224)	(0.0227)	(0.0226)
IND_MET	0.0908***	0.0882***	0.0881***
	(0.0194)	(0.0197)	(0.0196)
IND_ELECT	0.0760*	0.0766*	0.0710*
	(0.0423)	(0.0423)	(0.0420)
IND_OTHMAN	0.117***	0.116***	0.114***
	(0.0204)	(0.0204)	(0.0202)
IND_FIN	0.0823***	0.0807***	0.0810***
	(0.0144)	(0.0145)	(0.0145)
IND_INFOR	0.0963***	0.0867***	0.0869***
	(0.0270)	(0.0266)	(0.0265)
FIELD_AGRIC	-0.105***	-0.102***	-0.101***
	(0.0373)	(0.0372)	(0.0370)
FILD_ECO	0.131***	0.131***	0.130***
	(0.0140)	(0.0141)	(0.0141)
FIELD_SPO	-0.136***	-0.143***	-0.141***
	(0.0398)	(0.0402)	(0.0401)
FIELD_ENG	0.130***	0.129***	0.128***
	(0.0172)	(0.0174)	(0.0174)
FIELD_HUM	-0.112***	-0.110***	-0.110***
	(0.0190)	(0.0193)	(0.0193)
FIELD_MED	0.228***	0.231***	0.232***
	(0.0175)	(0.0181)	(0.0181)
FIELD _POL	0.0697***	0.0731***	0.0733***
	(0.0130)	(0.0129)	(0.0129)

FIELD _PSYCH	-0.233***	-0.238***	-0.237***
	(0.0192)	(0.0194)	(0.0194)
HSCH_MARK	-0.000774*	-0.000924**	-0.000881**
	(0.0004)	(0.0004)	(0.0004)
REG_STUD	-0.00974*	-0.0110**	-0.0107**
	(0.0051)	(0.0053)	(0.0053)
STUD_WORK	0.0359***	0.0388***	0.0399***
	(0.0112)	(0.0112)	(0.0112)
COMP_SKIL		0.00828*	0.00836*
		(0.0049)	(0.0049)
OCC_FATH_ENT			0.0195**
			(0.0097)
_cons	6.293***	6.283***	6.262***
	(0.1334)	(0.1355)	(0.1353)
Occ_Heckit			
EDU_PAR_DEG	-0.178***	-0.176***	-0.178***
	(0.0364)	(0.0366)	(0.0366)
POST_GRAD	0.0365*	0.0366*	0.0367*
	(0.0212)	(0.0214)	(0.0214)
LIV_NW	0.245***	0.247***	0.247***
	(0.0493)	(0.0496)	(0.0496)
LIV_NE	0.201***	0.205***	0.204***
	(0.0449)	(0.0452)	(0.0451)
LIV_SOU	-0.262***	-0.279***	-0.280***
	(0.0503)	(0.0508)	(0.0508)
LIV_ISL	-0.201***	-0.213***	-0.213***
	(0.0626)	(0.0633)	(0.0633)
LIV_ABR	-0.905***	-0.886***	-0.885***
	(0.2375)	(0.2374)	(0.2372)
DEL_IND	-0.128***	-0.125***	-0.124***
	(0.0468)	(0.0474)	(0.0474)
CONS_JOB	-0.133***	-0.126***	-0.126***

	(0.0211)	(0.0212)	(0.0212)
MOTH	-0.229***	-0.238***	-0.238***
	(0.0483)	(0.0487)	(0.0486)
STUD_WORK	0.423***	0.423***	0.422***
	(0.0419)	(0.0423)	(0.0423)
TRAINEESHIP	-0.338***	-0.335***	-0.334***
	(0.0433)	(0.0437)	(0.0437)
PHD	-1.180***	-1.168***	-1.168***
	(0.0845)	(0.0848)	(0.0848)
_cons	1.680***	1.602***	1.605***
	(0.3529)	(0.3573)	(0.3571)
Field of study	Yes	Yes	Yes
athrho			
_cons	-0.186***	-0.179***	-0.183***
	(0.0459)	(0.0444)	(0.0444)
lnsigma			
_cons	-1.015***	-1.017***	-1.018***
	(0.0154)	(0.0153)	(0.0154)
N	9594	9395	9395
Wald χ^2	2158.02	2420.68	3423.37

Robust standard error in parenthesis
* Significant at 10%
**Significant at 5%
*** Significant at 1%

Table 13 - Bivariate probit model with WA measure for overeducation (OVERED) as dependent variable and Wage (lnW) as an explanatory variable

	(1) OVERED	(2) SOC_Overed
lnW	-0.411***	-0.141
	(0.1126)	(0.1279)
AV_MARK	0.224**	0.0132
	(0.0954)	(0.1022)
SCHOLARSHIP	-0.207**	0.0221
	(0.0912)	(0.0992)
ENG_S	0.156**	-0.0224
	(0.0756)	(0.0835)
ENG_W	-0.195**	-0.0770
	(0.0790)	(0.0856)
POST_GRAD	-0.248***	-0.291***
	(0.0614)	(0.0837)
FIELD_AGRIC	-0.649**	0.801**
	(0.2816)	(0.3119)
FIELD_ARCH	-0.675**	-0.0757
	(0.3286)	(0.3806)
FIELD_PHA	-2.030***	-0.771**
	(0.3079)	(0.3300)
FIELD_LAW	-0.930***	0.352
	(0.2993)	(0.3327)
FIELD_ENG	-0.756***	-0.177
	(0.2252)	(0.2579)
FIELD_EDU	0.467	-2.300*
	(1.0077)	(1.1775)
FIELD_HUM	0.134	0.575*
	(0.2752)	(0.3074)
FIELD_LAN	0.100	0.709**
	(0.2885)	(0.3228)
FIELD_MED	-0.923**	-0.00103
	(0.4147)	(0.5249)
FIELD_POL	0.201	0.557**
	(0.2406)	(0.2655)
FIELD_PSYCH	-0.507**	0.284
	(0.2520)	(0.2885)
SEX	0.181*	-0.0485
	(0.0971)	(0.1058)
PHD	0.909***	1.174***
	(0.2850)	(0.3498)
SELF_EMPL	-0.564***	-0.789***
	(0.1241)	(0.1490)

TRAIN_ CON	0.295 (0.2150)	0.675*** (0.2042)
IND_AGRIC	1.170*** (0.4032)	1.193*** (0.4272)
IND_ENERGY	0.582** (0.2260)	0.807*** (0.2823)
IND_CHEM	0.586** (0.2589)	0.826*** (0.3000)
IND_MET	0.819*** (0.2028)	1.178*** (0.2501)
IND_ELECT	-0.0944 (0.3635)	0.851** (0.4065)
IND_OTHMAN	0.893*** (0.2264)	1.023*** (0.2619)
IND_CONSTR	0.580** (0.2571)	1.174*** (0.3113)
IND_TRADE	1.126*** (0.1933)	1.289*** (0.2268)
IND_TRANSP	0.275 (0.3001)	0.684* (0.3528)
IND_COMM	0.676*** (0.2252)	0.377 (0.2734)
IND_FIN	0.616*** (0.2024)	1.457*** (0.2472)
IND_OTHCONS	-0.0313 (0.2199)	0.274 (0.2733)
IND_INFOR	1.293*** (0.2336)	0.759*** (0.2859)
IND_BUS_SERV	1.025*** (0.2260)	1.095*** (0.2574)
IND_PUB	0.283 (0.2389)	1.041*** (0.2794)
IND_EDU_RES	-0.582*** (0.2176)	-0.349 (0.2878)
IND_CULT	0.860*** (0.2819)	1.153*** (0.2991)
IND_OTH_SERV	0.569** (0.2276)	0.396 (0.2831)
athrho		0.332*** (0.0555)
N	1549	1549

Overeducation in the Italian labour market: clarifying the concepts and addressing the measurement error problem

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Abstract. The present essay introduces a new measurement of overeducation based onto the SOC(HE)-Italy classification in an attempt to address the measurement error problem recently highlighted by the relevant economic literature. Applying the new measure, which has been presented and validated in the first essay of the present thesis, I run an analysis of possible determinants of overeducation in which Italy is confirmed to represent an exception to the generally accepted theory of differential qualification. Thus, I attempt the first application ever of the ORU model the whole Italian labour force using Istat RCFL data. Furthermore, basic concepts such as overqualification and overskilling are discussed and the relevant economic literature on overeducation is reviewed to clarify the conceptual basis of such definitions.

JEL classification: I2, J31

Key words: overeducation, overqualification, wage differentials

Acknowledgments. This essay has been written relying on elaborations on data from the Istat survey on Italian professions and from the Istat survey on the Italian labour force (RCFL): elaborations on these data have been run under my responsibility. Usual disclaimers apply.

Introduction

Educational mismatch constituted a major source of concern for both policy makers and analysts since the education expansion of the 1960s. On the one hand, first evidences on falling returns to education (Berg, 1970; Freeman, 1976) were interpreted as both an oversupply of skilled labour or an overinvestment in education. On the other hand, Skill-Biased Technical Change (SBTC) and skill obsolescence threatened to increase wage inequalities (as in fact they did) as the accelerating rate of technological progress tended to favour skilled workers over the unskilled (Acemoglou, 1992). As graduates continued to enter the labour markets in ever higher numbers during the 1980s, the idea that the increasing supply of highly qualified labour was overtaking the increase of its relative demand gained popularity and attracted much attention thanks to a simple equation model introduced by the seminal work by Duncan and Hoffman (1981). Since then, the analysis of the returns to education focused on this particular type of educational mismatch generating a wide set of definitions, taxonomies, measures and estimation methods. While the definition of this particular phenomenon experienced a beneficial stabilization thanks to continuous and active reviews of the relevant literature on the topic (Hartog, 2000; Green et al., 2002; McGuinness, 2006; Cedefop, 2010; Leuven and Oosterbeek, 2012), a number of theoretical and operational issues concerning the measurement of overeducation and the estimation of its wage effects are still to be addressed. This essay explores the most relevant measurement issues trying to address them by applying the SOC(HE)-Italy classification to whole Italian labour force. This last circumstance represents novelty on its own. In fact, little research has focused on overeducation in Italy so far and when it has done so it has often focused solely on graduates. First studies on overeducation in Italy were carried out as late as the mid-2000s and the majority of them aimed at comparing the earnings of graduates employed in appropriate jobs and those of graduates hired in less demanding ones. Based on data collected by Istat and AlmaLaurea for the relative surveys on graduates' career paths, these studies adopt a much criticized estimation method that focuses on wage penalties associated with having excess education and thus neglecting to assess the returns to required and deficit schooling. The present essay tries to address the measurement error problem, leaving estimation issues to further research in such field. Nonetheless and as far as measurement is concerned, estimates on wage effects of overeducation as defined with the SOC(HE)-Italy are here presented to provide a baseline for further improvements in estimation methods and identification issues. Paragraph §1 introduces and discusses different definitions and measurements of overeducation, paragraph §2 examines some theoretical issues and their relations to labour market theories. Different estimation methodologies are presented in

paragraph §3, along with references to the Italian case. The new measurement of overeducation based onto the SOC(HE)-Italy classification is also introduced in pragarph §3 and estimates on wage effects and possible determinants based on this measurement are reported in paragraphs §4 and §5.

1. Measurement issues

When trying to define overeducation, the first issue one has to cope with consists in choosing the relevant dimension of educational mismatch we want to analyse. In fact, overeducation is usually assessed by interviewing employees directly and this assessment rarely refers to objective qualitative analysis of the constituent tasks and duties associated with a particular job. As argued later on in this paragraph, workers' self-assessment measures (WA) is capable to introduce biases in the estimation due to the fact that workers may tend to systematically overstate or understate their job positions or their bundle of human capital according to the different formulations of the questions. However, there could be a potential and additional source of measurement error in case the question has been ambiguously formulated: confusing vertical mismatch with its horizontal counterpart. Questions such as 'Is your educational title required for a job like yours?' may refer to both employers' hiring standards (requirements *to get* the job) or the knowledge and skills needed to carry out the assigned duties (requirements *to do* the job). Additionally, workers could tend to refer to their specific field of studies and state to be overeducated, thus neglecting the linking between the tasks and duties associated with their job and the broader level of general knowledge and skills acquired in the education system. Leuven and Oosterbeek (2012) brilliantly reviewed the most frequent questions onto which scholars and analysts have built their overeducation measures, pointing out how different studies on the overeducation have sometimes measured different concepts: recruitment standards based on formal educational titles, recruitment standard based on informal or vocational training, minimum competences requirements and best competences requirements. As differences in operational definitions could prove to be far less than trivial and lead to biases, it could be salutary to remind the theoretical concepts from which they stemmed in order ensure a minimum level of reliability and validity of such measures.

1.1 Definitions

Horizontal mismatch refers to employment realizations in which the educational title held by the employee matches the level of knowledge and skills required to competently perform his/her particular job but do not match the relevant field of knowledge. Vertical mismatch, on the other hand, is when the educational title matches the relevant field of knowledge but it is inappropriate with respect to the level of such knowledge. As far as overeducation is concerned, vertical mismatch is the only relevant dimension to take into account and a measure intended to capture both its incidence and its wage effect should be consistent with this choice in order to be valid and reliable. As argued later on in this essay, WA measure are not always consistent with this need.

When comparing the different levels of educational attainments and job requirements, overeducation and undereducation are usually measured in years of schooling. Thus, the estimates of their wage effects are to be interpreted as returns to a single year of excess or deficit schooling respectively. Verdugo and Verdugo (1989) proposed a different estimation method I will discuss in paragraph §3 in which overeducation and undereducation were defined and measured in terms of qualifications with dummy variables accounting for being matched, overequalified or underqualified. Many studies (examples are Sloane et al., 1999; Allen and van der Velden, 2001; Sloane, 2003; Di Pietro and Urwin, 2006; Green and McIntosh, 2007; Brynin and Longhi, 2009; Green and Zhu, 2010) were based, especially in the European context, on such measures alternatively and confusingly labelled as either overeducation and overqualification. Furthermore, these studies were often focused on graduates only, thus neglecting educational mismatches occurring at any other level in the labour force. In most cases this different focus was intentional and explicit. However, it is important to stress how assessing returns to additional years of schooling in the whole labour force and assessing wage penalties for graduates employed in non-graduate jobs are two extremely different things. An additional source of ambiguity is represented by the concept of overskilling. In its first two formulations (Allen and van der Velden, 2001; Chevalier, 2003), this concept was referred to personal and often unobservable characteristics, such as ability. Overeducated workers may differ from matched workers in that they are less skilled and, consequently, not all overeducated workers are necessarily overskilled as well. As pointed out by Leuven and Oosterbeek (2012), this concept was suitable to account for unobservable heterogeneity among workers thus addressing a major identification problem affecting Duncan and Hoffman's model. Unfortunately, in recent studies the term 'overskilling' has come to cover a much less striking fact: that overeducated

graduates do not use all the skills they acquired during their Higher Education (HE) courses. Studies like that of Di Pietro and Urwin (2003) present 'overeducation' and 'overskilling' as separate concepts while actually they aren't. Education and skills mismatch measures were in fact obtain respectively from questions like "With respect to your current job, do you feel that having a university degree is excessive, adequate or insufficient?" and "Please indicate the extent to which you make use of the knowledge and skills acquired at university in your current job". Not surprisingly, their measure for overskilling is not significantly different from nil when controlling for overeducation. In fact, these operationalizations account, at best, for having too much education *to get* and *to do* a particular job. In my view, stressing in this way a theoretical difference between concepts like 'overeducation', 'overskilling' or 'overqualification' is neither possible nor useful. The concept of overeducation is a much broader one and, in fact, it encompasses all of the possible dimensions: knowledge, qualification and skills acquired via formal education and training. The term 'overqualification' could be only useful whether conventionally adopted to label a sub-field of the overeducation literature aiming at assessing wage penalties for overeducated graduates. 'Overskilling', on the contrary, should be purified by eradicating any possible reference to skills acquired via HE (also present in Green and McIntosh, 2007) and only devoted to correct for unobserved heterogeneity between individuals.

1.2 Measurements

Measures of overeducation can be only obtained by comparing the educational attainments of a job post holder and the educational requirements of that particular job. In the ideal measure for overeducation these educational attainments account for both knowledge and skills acquirable via either formal education and vocational training. Additionally, they must not relate to working experience, unobserved ability or recruitment standards as these are different dimensions to be separately estimated and interpreted. In fact, recruitment standard and the *to get* overeducation may account for credentialism/qualification inflation/grade drift.

a. Realized matches

In the article with which Verdugo and Verdugo (1989) introduced their much criticized alternative estimation method for returns to schooling, the required education level was

inferred from the existing market realizations: the mean educational attainment of workers employed in a particular profession. Even without in-depth discussions on the construction of this measurement, it is reasonable to consider it as inadequate as realized matches account for both demand and supply factors by definition.

b. Workers' self-assessment (WA)

As noted above, asking directly to workers to assess job requirements associated with their job posts could lead to crucial misunderstandings and biases. First, the way in which the question is formulated in the interview could lead to measure much different things: recruitment standards based on formal educational titles, recruitment standard based on informal or vocational training, minimum competences requirements and best competences requirements. Second, workers could misunderstand the question and report they are overeducated because the field of study of their educational path is different from the relevant field of knowledge of their job activities, thus neglecting the relevant dimension of skill levels. Third, as noted by a number of consistent literature reviews (Hartog, 2000; Green et al., 2002; McGuinnes, 2006; Leuven and Oosterbeek, 2012) workers' self-assessment often leads to measurement error if respondents tend to overstate their job positions. Moreover, WA is not available for most labour force surveys.

c. Job analysis (JA)

The direct linking between knowledge and skills imparted via education and knowledge and skills encapsulated in tasks and skills of a particular job can be objectively assessed by experts or referring to official occupational classification and job dictionaries. These last classifications, in fact, embody the conceptual basis of Isco88 and rank jobs according to their particular level of skills. According to Hartog (2000) this is virtually the best measure for job requirements but its utilisation is limited by the fact that up-to-date dictionaries and classifications are available only for specific years while letting a team of expert ranks job requirements would be much more expansive than relying on already available dataset built with WA. Furthermore, in the specific case one would rely on official occupational classification, there is an additional issue to be taken into account: classifications based onto Isco88 do rank jobs according to their skill level but this skill level do not accounts for education and training only. This is in fact determined by three dimensions: the nature of the

work, the required formal education and the needed informal training or working experience. Formal education and training are neither the only possible measures for the level of skill of a particular job nor the most important two:

> "The concept of skill level is applied […] living more emphasis to the first of these operational measures, the nature of the work perfomed, than to the formal and informal education and training requirements." (ILO, 2012)

This is why further assessment made by experts is needed and this is why overeducation is measured in this essay utilising the SOC(HE)-Italy classification for occupations. This classification, in fact, was constructed to directly link knowledge and skills requirements to a specific educational qualification. Before introducing such classification and proceed to estimate the wage effects, a brief overview on the relevant findings and their theoretical interpretations is required.

2. Theoretical issues

Overeducation has been interpreted in several ways, not all of which consistent with the others. Before the introduction of Duncan and Hoffman's model, the gradient of interpretation and theoretical underpinnings was even larger. On the one hand, concerns on the falling returns to education suggested the presence of an overinvestment in such sector. According to this view, governments had to cut subsidies or at least limit the access to the tertiary education, which sounded a little bit too draconian. On the other hand, credentialism was pointed out as the principal factor to blame along with the necessity to sustain the increase in number of more demanding jobs. However, the introduction of the mentioned model didn't put out the debate. A shift occurred in the level of analysis, from the aggregate measures to the micro ones. Freeman's study on the mean college premum was overcome by Duncan and Hoffman's model, termed ORU as it provided estimates for the effects on wages of Over, Required and Under education at the individual level. This model can be better understood if derived from Mincer's wage equation where wages are determined by the total amount of schooling years a workers has completed.

$$lnw_i = \delta_r S_i^a + x'_i\beta + \varepsilon_i$$

Where S_i^a is the number of schooling years and x' represents other explanatory variables such as work experience. The ORU model basically decomposes attained schooling into required (S_i^r), surplus (S_i^o) and deficit (S_i^u) years.

$$lnw_i = \delta_r S_i^r + \delta_o S_i^o + \delta_u S_i^u + x'_i\beta + \varepsilon_i$$

Although no theory on such effects has gained general agreement, still there is a number of facts with potential theoretical implications reckoned by a vast majority of studies. These facts were highlighted by a huge review by Hartog (2000) and some of them held the meta-analysis carried out by Leuven and Oostebeek (2012)[23].

a. When running estimates with the ORU model and estimates with Mincer's equation on the same data, regressors associated with required schooling in the first one are higher than those associated with attained schooling in the second one;
b. Returns to excess years of education are positive and statistically significant from nil;
c. Returns to excess years of education are lower than those to required ones. The gradient of the proportions varies between one half and one third but the meta-analysis run by Leuven and Oosterbeek, consisting in averaging the existing estimates, shows that returns to overeducation are half of their counterparts;
d. Returns to undereducation are significantly different from zero and have negative sign. As far as the absolute value is concerned, (negative) returns to undereducation are lower than returns to required education. When comparing (negative) returns to undereducation and returns to overeducation, the former ones are smaller than (Hartog, 2000) or equal to (Leuven and Oostebeek, 2012) the latter ones;
e. Regardless differences in the measurement methods exposed in subparagraph §1.2, estimates of returns to required, excess and deficit years are broadly similar. This circumstance alternatively raised doubts on the reliability of such measurements (Hartog, 2000) and on the unbiasedness of such estimates (Battu et al., 2000; McGuinness, 2006). The only work in my knowledge that has contradicted this evidence has been written by Groot and Van den Brink (2000);

[23] This last study do not claims results from estimates obtained in such model as representing causal effects because of the above mentioned identification problems.

f. By imposing restrictions on the ORU model it is possible to test basic assumptions of the human capital theory ($\delta_R = \delta_O = \delta_U$) and of the job competition model ($\delta_O = \delta_U = 0$). None of these has ever held such tests.

Although these last evidence, no consensus has been reached on the potential contradiction between the existence of overeducation and the assumptions of the human capital theory. In fact, overeducation could be a temporary phenomenon as young graduates accept non-gradutes jobs that allow them to engage in on-the-job search (Gautier, 2002; Hornstein et al., 2006; Dolado et al., 2009) or because they know they have higher probability to be promoted (Sicherman and Galor, 1990). However, for many individuals overeducation is persistent (Sicherman, 1990; Rubb, 2003). Another point of disagreement is represented by the relation between working experience and overeducation. In Becker's view formal and informal human capital are substitutes: workers with less experience have less (informal) human capital as they haven't had the chance to accumulate it with on-the-job training. Therefore, they are not overeducated as they lack human capital and they are paid less because of their lower marginal productivity (Sicherman, 1991; Kiker et al, 1997). Nonetheless, overeducation persistency contradicts this argument as well and evidences has been brought against the idea that education and experience are treated as substitutes by employers: returns to education and returns to experience are different (Duncan and Hoffman, 1981; Groot, 1993). In addition, wage penalties associated with overeducation are significant even when controlling for work experience (Ramirez, 1993; Dolton and Vignoles, 2000; McGuinness, 2003; McGuinness, 2006). Finally, estimates of returns to excess schooling years have been interpreted as a statistical artefact consisting in biases determined by a lack of controls for unobserved heterogeneity between individuals. McGuinness (2006) observes how

> "[i]t is obvious from the results that the more poorly specified the model the more upwardly biased the overeducation penalty will be. The results demonstrates the importance of including job characteristics and some form of ability heterogeneity control"

Unfortunately, unobservable ability is hard to measure by definition. Attempts to rely on proxy measures for this dimension are about to be introduced in the next subparagraph but what is important to stress here is that omitting such an important variable results in biases which are potentially able to overtake the impact on wages of overeducation. This is basically what I noted above when discussing overskilling and what prevented Leuven and Oosterbeek (2012) to claim that estimates on returns to overeducation represent causal

relation. Strategies to overcome the omitted variable bias problem included the adoption of instrumental variables (Dolton and Vignoles, 2000; Korpi and Tahlin, 2009) and fixed effect estimates (Bauer, 2002; Korpi and Tahlin, 2009). Disappointingly, the identification of good instruments proved to be virtually impossible while the postulated time-invariance of unobserved characteristics in fixed effect models is unlikely to hold. This essay does not introduce any of the mentioned strategies to overcome the omitted variable bias and it is intended to address only the measurement error problem. However, estimates presented in paragraph §4 benefit of a good degree of novelty as the ORU model has never been applied to the wholw Italian labour force: all the existing studies have applied the Verdugo specification (Di Pietro and Urwin, 2006; Cutillo and Di Pietro, 2006; Franzini and Raitano, 2009; Caroleo and Pastore, 2010; Ferrante et al., 2010; Aina and Pastore, 2012). These studies relied onto WA measures for overeducation, which are not included in Istat survey on the Italian labour force (RCFL) and the most of them focused their analysis on graduates with data from either the specific AlmaLaurea or Istat surveys, where individuals can only be overeducated. Two of these works (Franzini and Raitano, 2009; Aina and Pastore) utilized Isfol-Plus data were non graduated workers are also included. In this dataset however there are no measures for undereducation while overeducation is measured with a dummy variable as in Verdugo.

2.1 Determinants

Estimations on returns to overeducation are only useful when it is possible to predict who is more likely to be overeducated. As far as individual and social choices in investments in education are concerned, it is crucial to understand what factor are capable to increase the probability to be overeducated. At the individual level, the choice to engage in an additional year of education could be heavily affected by the probability that this additional year will pay less in terms of wage premium. At the social level, governments must know which type of individuals are more likely to be overeducated and whether this higher probability does not have only economic determinants. Suppose women with children are more likely to be overeducated because the lack of nurseries and kindergarten forces them to accept only part-time jobs, which are typically associated with overeducation: policy implication would include more investments in children care. Unfortunately, there are no generally accepted theories on overeducation determinants. However, there is a number of factors and individual characteristics that are usually regarded as potential source of an higher probability to be overeducated.

a. Differential overeducation

Women actually show higher propensity to be overeducated and the linking between having children, being part-time worker and being overeducated was explicitly tested by Sloane et al. (1999). Many works associated gender with other source of supply side rigidities such as the lower propensity to commuting (McGoldrick and Robst, 1996; Green et al., 2002; Buchel and Van Ham, 2003; Buchel and Battu, 2003). Another category of workers heavily affected by overeducation is represented by immigrants, which may share with women a lower propensity to commuting and could experience difficulties in speaking the host country language (Green et al., 2007; Battu et al., 2004);

b. Age and work experience

As argued above, age and working experience are one of the dimensions on which the theoretical debate has focused most intensively. The career mobility theory and the search theory have proved to be in contradiction with evidences on the persistence of overeducation for many individuals. Nonetheless, that the age and the work experience decrease the probability to be overeducated has been assessed for all countries;

c. Ability

The idea that unobserved abilities can affect the probability to be overeducated is widely acknowledged and reinforces the identification problems of the ORU model. This does not mean that ability measures have always succeeded in explaining overeducation. Hartog and Jonker (1996) found a positive but poorly significant relationship between IQ and educational mismatches and relations were found between overeducation and quantitative literacy (Green and McIntosh, 2007) and between this last one and undereducation (Hartog et al., 1996). Finally, some evidences were found in support of a relation between performances during school and overeducation (Green et al., 1999; Buchel and Pollmann-Schult, 2001).

3. Estimation methodologies and dataset

Estimates in the present essay are obtained running the ORU model:

$$lnw_i = \delta_r S_i^r + \delta_o S_i^o + \delta_u S_i^u + x'_i\beta + \varepsilon_i$$

Where the dependent variable is the logarithm of the gross monthly pay. Required, excess and deficit of schooling are measured in years and the vector of controls include age, work experience, work experience squared and job tenure, all measured in years. Additional controls are included as dummy variables and referred to the working area and the NACE sector of economic activity.

No measures for unobserved skills are introduced in the model. This is both intentionally and data driven, as Istat RCFL data on the Italian labour force do not provide information onto which constructing them. As this is, in my knowledge, the first pertinent application to the whole Italian labour force of the ORU model, estimates will benefit of a good degree of novelty even without challenging in ambitious struggles to identify a good instrument. Estimates presented in paragraph §4 may well be biased because a relevant variable is omitted. Anyhow, they will constitute a benchmark for future improvements in estimation strategies.

However, as gross monthly earnings cannot be observed for unemployed individuals, a OLS estimate would lead to biases determined by a sample selection bias. The problem is overcome by adding an additional equation that explains the decision to work and thus solving a system of equation as in Heckman (1979).

$$W_i = X'_{1i}\beta_1 + \varepsilon_{1i}$$

$$h_i = X_{2i}{}' + \varepsilon_{2i}$$

The wage is be observed only if $h_i > 0$ and is not observed if $h_i \leq 0$[24].

[24] The model is completed, assuming that the error terms (ε_{1i}i and ε_{2i}) are normally distributed with variance σ_1^2 and σ_2^2, respectively, and covariance σ_{12}.

The dataset

Istat surveys continuously over 250,000 families (more than 600,000 individuals) settled in 1,100 Italian municipalities. The survey is termed RCFL (Rilevazione Continua sulle Forze di Lavoro) and aims at collecting and organizing relevant wage and occupational information. Given that the overeducation measure adopted in the essay refers to the Italian official occupational classification, it is worth noting that all the workers in the sample have been allocated to a 3-digit level. The choice to analyze data referred to the year 2010 is explained by adoption of a new classification in the following year. Restricting observations to employed individuals with a valid occupational code resulted in selecting 58,190 individuals only: 34,156 males and 24,034 females.

3.1 The new measurement based onto the SOC(HE)-Italy classification

The adopted overeducation measure is based onto the SOC(HE)-Italy classification which basically allocates each of the 800 Italian job titles to 'graduate' and 'non graduate' job categories. In order to do so, it assigns a complexity score on a 1-100 point scale to 109 variables representing knowledges, skills and competences. The computation of this score is based on data from the survey on Italian professions held by Istat and Isfol (the Italian institute for vocational training) in 2006 on more than 16,000 workers. With this study, Isfol assigned to each Italian profession an equivalent EQF level[25].

In order to select for each profession only those variables capable to represent tasks and duties typically associated with that particular job, the average complexity score is computed for each job title. Then, for a given job title I have selected only those variable exceeding the mean of a standard deviation.

I constructed this classification under the supervision of Kate Purcell and Peter Elias (2013) who developed the first version of SOC(HE) starting from the British national classification. In this classification, jobs were referred to three clusters of competence identified in a previous work (Purcell et al., 2004): knowledge expertise, knowledge orchestration and knowledge communication. I have aggregated the selected variables referring to these three clusters: the mean of the relevant variables for each cluster is adopted as the complexity score of that cluster for that particular job. Then, borrowing from the Istat/Isfol methodology that postulates a linear progression between EQF levl 2 and EQF level 7 I

[25] The European Qualification Framework (EQF) is a transantional translation device for qualifications. It is articulated in 8 levels to which all the European qualifications are referred.

translate such scores in equivalent EQF levels by running a simple proportion between the two scales. The highest EQF score of the three clusters of competence comes to represent the equivalent EQF level of the concerned job title.

As EQF ranks both graduate and non-graduate titles, the overeducation measure based on SOC(HE)-Italy accounts for educational mismatches occurring at any level and does not focus on graduates only. Moreover, both skills and knowledge are taken into account. Finally, qualifications can be translated into schooling years to be compared to the attained schooling years stated by workers. This is an important point as the conversion of job titles into schooling years systematically lacked of an acceptable degree of consensus. Basing our measure on EQF provides, at least, a translation device into schooling which is share, if not by scholars, by all the European governments.

As this measure contains direct workers' self-assessment of neither their job position nor job requirements, it should contain no measurement error.

The validity and reliability of the utilization of the SOC(HE)-Italy classification have been tested onto RCFL data in the first essay of this thesis.

4. The wage effect of overeducation on the Italian labour force

As most of the works devoted to analyze overeducation in Italy have focused onto graduates only, there is little choice when trying to benchmark a measurement of overeducation in the whole labour force. The only comparable measures, in that they have been computed on the entire labour force, are basically two and not much dispersed: Franzini and Raitano (2009) and Aina and Pastore (2012). Unfortunately, these estimates were obtained with a different specification of the model, first proposed by Verdugo and Verdugo (1989). In this specification, overeducation is operationalized as a dummy variable the effect on wages of which is to be interpreted as the percentage differential between overeducated and matched workers. By doing so, estimates have negative sign, implying that overeducated are suffering a wage penalty compared to their counterparts. Consequently, these estimates cannot be compared with the present ones. Still, there is always room for comparison with overeducation facts listed in paragraph §2. Table 1 shows estimates of the ORU model.

< Insert Table 1 here >

First, all ORU estimates are significant. Returns to excess years of schooling are significant, positive and lower than those to required one. Interestingly, returns to OS are lower than expected: about one fourth of returns to RS instead of half of them.

Second, returns to undereducation are significant and have negative sign. Their value is in line with pre-existing literature, about one half of returns to required schooling.

Controls for experience and experience squared are both significant but they show opposite signs. This is also in line with the literature, postulating a positive but decreasing relation between experience and productivity. Notably, returns to experience and returns to overschooling are jointly significant thus confirming that they cannot be considered as substitutes (Ramirez, 1993; Dolton and Vignoles, 2000; McGuinness, 2003; McGuinness, 2006) as Sicherman and Galor (1990) theorized.

Controls for gender, age and job tenure are significant and show the expected signs, implying that males are paid more than females and that job tenure is rewarded. Notably, age and working experience are jointly significant.

5. Determinants

In order to run the probit model, overeducation must be operationalized as a dummy variable. Estimates of the effects on the probability to be overeducated are thus comparable to those obtained in the works by Franzini and Raitano (2009) and Aina and Pastore (2012).

The effects of age, tenure and working experience are significant and show the expected signs.

< Insert Table 2 >

The only relevant issue is the somewhat counterintuitive effect on the probability to be overeducated of gender. In fact, males in the RCFL sample are more likely to be overeducated. This evidence contradicts the vast majority of the studies that have worldwide attempted to test the differential overeducation theory (Frank, 1978; Sloane et al., 1999; McGoldrick and Robst, 1996; Green et al., 2002; Buchel and Van Ham, 2003; Buchel and Battu, 2003). Interestingly, Franzini and Raitano (2009) found similar evidences while Aina and Pastore (2012) found no relations between gender and overeducation. Italy could come to represent an exception to this much consolidated evidence.

6. Conclusion

The overeducation literature has crossed three decades and yet has not come to a reasonable degree of agreement concerning definitions, measurements and estimations methods. I have discussed in this essay the major sources of disagreement regarding definitions and measurements. Terms like overqualification and overskilling has been used alternatively and sometimes confusingly enriching or overlapping the concept of overeducation. As far as the valid and reliable measurement of this phenomen is concerned, these two terms should be re-shaped to avoid dangerous misunderstandings. Overqualification, often associated with studies that focus on graduates labour market, could be devoted to label such subfield of the overeducation literature implying the use of dummy variables. Overskilling should be more clearly defined avoiding confusing relations to skills imparted via formal education or training. In its first formulation by Chevalier (2003), this concept concerned unobservable abilities only and virtually shed lights onto the way out from one of the biggest unsolved issues of the overeducation literature: the omitted variable bias. However, in most cases the later adoptions have somehow distorted its original conceptual basis by referring to skills and competences acquirable via formal education.

Additional sources of disagreement stemmed from several attempts to establish a standard in operational measures of job requirements. I argued in this essay as measures based on worker's self-assessment (WA) contain biases and therefore cannot be considered as neither valid nor reliable. I presented a new measure of overeducation, based onto the SOC(HE)-Italy classification I presented and validated in the first essay of the present thesis. This measure contains no biases, is easy to construct as it based on already available data periodically collected by Istat in its survey on Italian professions. This circumstance also limit the extent to which doubts usually raised against job analysis (JA) measures are to be considered as founded, being it easy to update. Adopting this new measurement, the analysis of the determinats of overeducation confirmed a counterintuitive pre-existing evidence on the role played by gender: Italian women are less likely to be overeducated than Italian males.

Finally, estimates of returns to required, excess and deficit schooling have been run with the ORU model. Although I reckon that these estimates could be affected by omitted variable bias (as all estimates in the relevant literature are), they always represent estimates obtained applying a measurement of overeducation which is not affected by measurement error. Moreover, as these is, to my knowledge, the first application to the whole Italian labour

force of the ORU model, these estimates benefit of a certain degree of novelty and provide a benchmarking precedent for further possible developments in the identification and estimation field capable to remove the omitted variable bias.

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Table 1 ORU model estimated with Heckman selection methodology

	(1) lnW
RS	0.0430*** (0.0008)
OS	0.0098*** (0.0009)
US	-0.0239*** (0.0014)
AGE	0.0107*** (0.0004)
EXP	0.0131*** (0.0008)
EXP2	-0.0003*** (0.0000)
TENURE	0.0056*** (0.0003)
GENDER	0.0634*** (0.0054)
PART_TIME	-0.4359*** (0.0068)
DISTRETTO_NW	0.0297*** (0.0069)
DISTRETTO_NE	0.0163** (0.0072)
DISTRETTO_S	0.1319*** (0.0090)
DISTRETTO_I	0.1244*** (0.0107)
AGRICOLTURA	-0.0491*** (0.0156)
ENERGIA	0.1689*** (0.0194)
MANIFATTURA	0.1144*** (0.0087)
COSTRUZIONI	0.1036*** (0.0104)
COMMERCIO	0.0957*** (0.0095)

TURISMO	0.0723***
	(0.0122)
TRASPORTI	0.1465***
	(0.0110)
FINANZA	0.2273***
	(0.0133)
SERVIZI	0.0638***
	(0.0108)
PUBBLICO	0.1292***
	(0.0112)
WELFARE	0.1240***
	(0.0094)
_cons	6.3342***
	(0.0181)
EMPLOYED	
GENDER	0.3657***
	(0.0089)
AGE	-0.0224***
	(0.0002)
DISTRETTO_NW	0.0853***
	(0.0133)
DISTRETTO_NE	0.1462***
	(0.0139)
DISTRETTO_S	-0.5476***
	(0.0149)
DISTRETTO_I	-0.5008***
	(0.0181)
_cons	0.2791***
	(0.0156)
athrho	
_cons	-1.4047***
	(0.0215)
lnsigma	
_cons	-0.7624***
	(0.0120)
N	112373
R^2	
adj. R^2	

Table 2 Determinants of overeducation (Source: elaborations on RCFL data)

	(1) OVER
GENDER	0.0508*** (0.0195)
AGE	0.0330*** (0.0016)
lnW	0.0070 (0.0218)
TENURE	-0.0106*** (0.0012)
EXP	-0.0614*** (0.0034)
EXP2	0.0002*** (0.0001)
DISTRETTO_NW	-0.1015*** (0.0243)
DISTRETTO_NE	-0.0643*** (0.0249)
DISTRETTO_S	-0.1317*** (0.0293)
DISTRETTO_I	-0.1831*** (0.0359)
AGRICOLTURA	-0.6127*** (0.0613)
ENERGIA	-0.4930*** (0.0890)
MANIFATTURA	-0.5642*** (0.0359)
COSTRUZIONI	-0.5992*** (0.0449)
COMMERCIO	-0.5243*** (0.0392)
TURISMO	-0.2476*** (0.0472)
TRASPORTI	-0.4361*** (0.0460)
FINANZA	-0.6645*** (0.0562)

SERVIZI	-0.4864***
	(0.0416)
PUBBLICO	-0.8002***
	(0.0454)
WELFARE	-0.0897**
	(0.0368)
_cons	0.0972
	(0.1485)
N	25661
R^2	
adj. R^2	