

# Graduate employability and the development of competencies.

## *The incomplete reform of the 'Bologna Process'*

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**Purpose:** We aim to analyse the coherence between competency mismatches and the objective of European policy makers to transform the higher education system through the Bologna Process and the Dublin Descriptors, moving from the transfer of knowledge from the teacher to learning by the student and from disciplinary knowledge to competencies.

**Design/methodology/approach:** The paper is based first on the theoretical arguments that confront the European reform of the tertiary education system and the nature of competency mismatches, and secondly on graduate earnings function estimates using two Italian databases. We demonstrate the waning signalling power associated with university degrees and the disruptive assertion of the competency concept.

**Findings:** The theoretical arguments developed suggest that competency mismatches are not only responsible for the medium-low positioning of the competency profile with respect to a counterfactual constituted by a graduate with a good match but also tend to affect the growth path of the competencies themselves: the bigger the initial gap, the smaller the steps in their growth. The econometric estimates carried out document that the level of expressed competencies drives graduate remuneration.

**Originality/value:** By disentangling educational outcomes (i.e., disciplinary knowledge) from requested competencies the study demonstrates that firms remunerate competencies and to a far lesser extent disciplinary knowledge per se, and that cultural family background tends to assume greater importance than formal education in forging transversal competencies. The Bologna Process could overturn this situation, provided it is integrated with a constructivist pedagogical approach, a tool that is lacking today but is vital in providing education processes that enable students to acquire and develop the competencies required by modern production techniques.

**Keywords:** education, competencies, employability, wages (JEL codes: I21, J24, M51, J31)

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## 1. Introduction

The gap between competencies required of graduates in modern productive organisations and knowledge traditionally transferred to students by universities has been central in guiding various European policy makers towards more efficient and effective education systems. This gap has its origin in the technological and organizational shocks that have affected production systems, shocks that have caught the bureaucratic apparatuses in charge of producing human resources equipped with the requested competencies unprepared. One of the European policies implemented for this purpose is the so-called *Bologna Process*. The aim of this paper is to analyse the coherence between competency mismatches and the objective of European policy makers to transform the higher education system, and to verify whether modern firms pay for education or for competencies. In developing our arguments, we first look at the nature of the changes that are affecting the technological front as much as the organizational front of productive organizations, and their impact on the development of required competencies (section 2). This is pursued by considering the learning curves of competencies that develop in the course of working life and the fact that the initial gap may adversely affect the slope of the profile curve. We then evaluate the response of the *Bologna Process* (section 3). In section 4, the gap that is being generated between the competencies required and those held is evaluated in a sample of Italian graduates, while in section 5 we undertake earnings function estimates to control whether firms remunerate their employees for their education or for their expressed competencies in order to extract information of use to policy makers. In section 6, we draw our conclusions.

## 2. Technological and organizational changes and the growing mismatch between competencies requested and those acquired, owned and expressed

Since the mid-90s, new organizational and technological models have been developed (lean production, internally flexible firm, modular firm, ICT) that have imposed fundamental shifts in working competencies with respect to the traditional Taylorist firm organization. The turning point can be glimpsed in leveraging the participatory circuits of knowledge development, through which tacit knowledge becomes explicit and codified, and thereafter more easily incorporable into new products, new services and new ways of working (Nonaka and Takeuchi, 1995). Yet, these developments cannot happen in any undifferentiated work environment: Kenney and Florida (1993) highlight that lean production has precisely the characteristic of mobilizing the intelligence of a larger number of workers involved in the enterprise and create a new and qualitatively better synthesis between manual work and mental work compared to the traditional model. Lester and Piore (2004) point out that *analytical processes* prevail when the work environment is stable, when alternative outcomes are well understood and can be clearly defined and distinguished from each other, while *interpretative processes* predominate when the possible outcomes are unknown, i.e., when the task is precisely to create the results and determine their properties. The two processes are somehow opposed to each other, but the distinctive competence is in the integration of the two processes, namely, thinking of them independently but managing them simultaneously.

The organizational structure that best stimulates and assists in this integration of the two processes is a flexible form of lean production, which leads to the learning organization, inasmuch as individuals, but also single production units within the organization, relate to each other in a more complex but also more fruitful way than is configurable through the classic mechanism of hierarchy or the price mechanism.

All this has decisive consequences on individual competencies requested by firms, compared to those acquired by students at school. The gap that emerges from these divergent processes is mirrored in overeducational mismatch data (Sloane, 2003; Leuven and Oosterbeek, 2011: 16; CEDEFOP, 2010)<sup>1</sup>, according to which many graduates are progressively assigned to jobs that require a lower level of formal educational, since their acquired competencies do not fit (or are misaligned) with respect to those requested by the new ways of working. This phenomenon has greatly increased in the last twenty years, rising from an average of 24% in the penultimate decade to 39% in the last decade, reaching a pathological level of around 30% in Europe and 40% in the U.S. and Canada (Leuven and Oosterbeek, 2011: 16).<sup>2</sup> In partial defence of these countries, we must recall that technological and organizational innovation is much stronger than in European countries where the phenomenon of the scarcity of adequately trained and competent human resources is (partially and to a greater extent) offset by internal organizational learning mechanisms, giving rise to an undereducation phenomenon equal to 30% versus 16% in North America. University education, in particular, is still too set on the transmission of knowledge and too little on learning and on relational and management competencies, despite this being extensively subsidized, especially in Europe; consequently, university education should have been easier to adjust with a policy oriented towards the employability goal. Evidently, European academic institutions are more rigid and more self-referenced. It should be recalled that overeducation gives rise to significant costs for the individual, for the enterprise and the economy in general, with higher wages and higher transaction costs on the one hand, and less job satisfaction, lower productivity and inferior quality on the other. This decrease in efficiency is expected to be prolonged to the extent that academic institutions will not be able to reduce the problem of overeducation at the physiological level. The alternative is likely to be as previously described by the scenarios in Finegold and Soskice (1988), whereby competency shortages can lead to low-competency equilibrium within the economy. Once in this trap, there are no obvious policy levers to correct the situation (Tether *et al.*, 2005).

Rendering the problem even more serious, from a life-cycle perspective, is the issue of the evolutive profile of the individual's competencies if, at the time of entry into the labour market, a balance were to exist between the competencies requested by recruiters and those held by the individual. Figure 1 helps to stylize and deconstruct the issue.

< Figure 1 about here >

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<sup>1</sup> Education mismatch is not the only new concept introduced in mismatch literature. In a European report, CEDEFOP (2010) introduces a glossary of – mostly self-explanatory – terms, covering over/under qualification, skill shortage/surplus, economic/physical skills obsolescence, and horizontal/vertical mismatch.

<sup>2</sup> Estimates of the phenomenon of over/under-education vary depending on the method of measurement used. The above-reported data are an average of estimates from various sources, using one of three standard methods (job-analyst method, subjective method and the method based on realised matches).

The profile of individual competencies during the course of a working life, indicated by the solid line (a), has been designed on the assumption that the level of competencies – apart from the level of education attained – evolves as a function of experience, formal and informal training, on- and off-the-job training, etc. We therefore assume that the requested competencies (RC) of a representative firms are equal to those acquired, owned and expressed (OEC) by a representative worker. On the assumption that, in the first job, the worker is in a position of overeducation (very likely in difficult economic times, with qualified workers more prone to taking lower-level jobs), with requested competencies that are higher and/or dissimilar than acquired competencies, we would expect this to have a permanent negative effect, shifting the age-competence profile downwards (dashed line (b)), unless through training, learning by doing and job mobility the worker over time overcomes the initial disequilibrium. However, recent researches show (Bosma *et al.*, 2003a, 2003b) that workers employed in jobs with a low mental workload have a higher risk of age-related cognitive decline. This phenomena should be greater for more educated workers, which implies an increasing lowering of the curvature of their age-competency profile (dotted line (c)), consistent with de Grip *et al.*'s (2010) empirical results, according to which job-worker mismatch induces cognitive decline with respect to immediate and delayed recall abilities, cognitive flexibility and verbal fluency.

The negative effect of the initial gap thus induces long-term effects, which extend over the working life, hence diminishing for the company, for the individual and also for the economy in general, the possibility of being able to count on higher competencies. However, it has been shown (Leoni, 2012) that a job impregnated with high performance characteristics not only contributes to the cognitive resilience of workers but also to developing competencies both for those with good matching and for workers in undereducated positions.

### **3. The *Bologna Process*: from teaching to learning, and from disciplinary knowledge to competencies**

The response of European policy makers to the technological and organizational shocks is the so-called *Bologna Process*. This established the objective of pursuing the progressive convergence of the university systems and qualifications of signatory states to the 'Declaration', together with the *Dublin descriptors*, towards the educational objectives defined as the *intended learning outcomes* of all graduates of a course of study.

The Process is being developed in stages in different countries, monitored biannually by the Ministries of the signatory countries through national action plans in relation to the prefixed objectives and the accumulated delays. One of the first stages included both setting training objectives in terms of expected learning outcomes, intended as observable and measurable behaviours, referring to i) the descriptor system adopted in the European Union, ii) the career opportunities related to the International Standard Classification of Occupations (ISCO), and finally, iii) the conditions of the employability of graduates. In a subsequent step, colleges and universities were asked to define the *competencies* (in terms of quality and depth) among the requirements that students *must acquire* during their studies, competencies that need to be *identified, formed and evaluated*, competencies that must be agreed upon with the social and professional context of reference, competencies that must be coherent with the expectations of the territories and their various stakeholders.

In the Dublin descriptors, first cycle (Bachelor), second cycle (Master) and the third cycle (PhD) competencies are delineated according to the following elements: (i) knowledge and understanding, (ii) applying knowledge and understanding, (iii) making judgements, (iv) communication skills and (v) learning skills, leaving the individual faculties and schools to delineate the content, identify the teaching method strategy for their formation, and the determination of their evaluation metric. However, in the transition from first to third level, each of these elements must find increasing depth (or intensity) in order to be aptly used in the curricula project in terms of credits (ECTS), designed as a unit of measurement of the *presumed* time and workload required by students to achieve pre-defined learning outcomes, and no longer for teaching.

The Dublin descriptors do not focus on the aspect of the level of knowledge that students should acquire in the various study courses, which necessarily leads to disciplinary type problems, but rather to identifying the learning outcomes on a *metalevel*, since these will reflect the nature of the qualification as a whole that the study course tends towards, which is certainly composed of knowledge, but also and above all, of competencies, understood as observable and measurable behaviours.

These policy decisions were intended to overturn the university's mission and unit of measure: wanting to move from the transfer of knowledge from the teacher to learning by the student, and from disciplinary knowledge to competencies. The first step involves abandoning, or at least radically rethinking, the traditional pedagogical approach based on 'what the teacher does' and the contents of the discipline in favour of more 'constructivist', more cognitivist and meta-cognitivist, more experiential didactic strategies, since (drawing from the literature) "*learning takes place through the active behaviour of the student; it is what he does that he learns, not what the teacher does*" (Tyler, 1949: 63). The second step registers the compelling rise of the concept of competence in the world of educational and training processes, acquired through various research projects where the results indicate that "*education is the process, and the student's competence is the outcome*" (*ibidem*: 18), and that competence is no longer a set of knowledge but is given by the "*ways in which [students] are to act, think or feel, as a result of their participation in some unit of instruction*" (Bloom, 1956: 12).

An intermediate step between the two is the reformulation of the concept of 'objectives', to be understood as the "*description of a performance you want learners to be able to exhibit before you consider them competent. An objective describes an intended result of instruction, rather than the process of instruction itself*" (Mager, 1975: 5). This expected performance at the same time defines "*the criteria by which materials are selected, content is outlined, instructional procedures are developed and tests and examinations are prepared*" (Tyler, 1949: 3).

It should also be recognized that all this is constituted by the leading scientific discoveries of the twentieth century, which demonstrated the impossibility of knowing reality without the active intervention of the individual: if, therefore, knowledge is not objective, then the learner and his/her ability to learn has an essential role. On this concept, not always easy to define operationally, the *Tuning Educational Structures in Europe* (2008) project interceded recently, which - following a field survey<sup>3</sup> - indicated to European universities and

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<sup>3</sup> The survey involved 101 European universities, with 5183 questionnaires from graduates, 944 from companies/employers and 998 from academics.

higher education institutions that a distinction had to be made between generic (or transversal) competencies<sup>4</sup> and specific competencies (discipline fields), suggesting to the designers of various degree courses to follow a holistic approach and to use the conceptual tool of matrices. The latter allows highlighting in rows the various teachings and in columns the various competences as educational objectives, and to specify, for each, the distinctive competencies that the student must acquire. In this way, it is easy to obtain a complete picture of the competencies (disciplinary and transversal) that the graduate will acquire.

These steps are today still being metabolized by the entire European academic structure, which is engaged in very different situations, with problematic interpretation and operational difficulties but also with much resistance<sup>5</sup>. These are all signs of the difficulty of the thousands and thousands of academicians, likely to be more researchers/scientists in their mindsets than teachers, who in facing the proposal of a progressive (or social-constructivist) education approach, feel unprepared, hesitant and/or reluctant. Bergen's 2005 'Stocktaking Exercise', which saw the application of a balanced scorecard to measure the progress of various aspects of the *Bologna Process*, compiled an ascending list (1 to 5) of the 43 signatory countries and revealed the following state of affairs: notwithstanding that 6 years had elapsed since the beginning of the process, only 10% of participating countries obtained the highest score, while 44% obtained a score of 4, and 33% (including Italy) an even lower score. The situation that Leuven-la-Nueve's 2009 stocktaking exercise depicted showed little improvement. Indeed, although in part due to the use of more demanding indicators than in the previous two years, "*the overall picture for the whole EHEA [European Higher Education Area] is not as 'green' in 2009 as it was in the two previous stocktaking reports in 2005 and 2007, although there are a number of countries that have improved their scores in this stocktaking exercise*" (Rauhvargers *et al.*, 2009: 6)

It is highly likely that these results have not made a significant contribution to the containment and reduction of the gap between the competencies demanded by the world of work and knowledge passed on to new generations, creating - contrary to expectations - unease and disorientation not just among students but also among company recruiters.

#### **4. Mind the gap but also mind the step! Empirical evidences**

Mismatches are traditionally measured across workers of different ages, occupations and industry of belonging. Surveys do not capture the transition between university education and the world of work of more recent cohorts; on the contrary, they reflect the accumulation of situations of alignment and misalignment between competencies

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<sup>4</sup> These in turn were divided into three types: instrumental competencies (cognitive abilities, methodological, technological and language knowledge or competencies), interpersonal and systemic competencies.

<sup>5</sup> In the Italian case, this resistance has resulted in imaginative, to say the least, if not frantic, action. The design autonomy granted to Italian universities has in fact given rise to two paradoxical situations: the first relates to teaching courses, which in 2002-2003 numbered 120,000 and today have reached around 180,000, with an explosion of Contract Professors, and many courses taught by young researchers, who instead of 'researching' teach, without anyone ever having tested their pedagogical/didactic competencies; the second situation is given by the great number of first and second level degrees, which in 8 years have gone from around 2,500 to over 5,500 courses that are often further divided into several curricula (source: Italian Minister for University and Research). However, the credit system is also rather discredited: it was used with a 'heterogenesis of ends' to measure even the minimum requirements of courses, distorting its original function as a measure of the student's workload. But not only: in many cases it has not been implemented properly because teachers have not always accepted the idea of quantifying the workload of their disciplines or worse still, to reduce it (this operation is seen as a lessening of their role with respect to their colleagues) to allow for the completion of studies on time, with the result that many courses now have an equal number of credits.

required and competencies expressed in all cohorts present among employee workers in a given time. To be more precise, no survey (to our knowledge) tends to measure - at the time of entry of graduates into the world of work - the possible gap between competencies required and competencies acquired. This information could provide academic teaching staff with an 'objective/statistical' measure to evaluate the effectiveness of their work, but also indicate the private and social costs that are additionally sustained to enable a graduate to fully cover her/his first business/professional role. The only information in this direction is provided by an *ad hoc* survey carried out by Leoni and Mazzoni (2006) with a sample of enterprises (employing 33,000 workers) located in the Lombardy region (Italy) using an articulated and complex questionnaire (around thirty pages).<sup>6</sup> Although the sample does not have generalizable statistical significance, we believe that the results deserve serious consideration. Following the theoretical-conceptual work developed by the DeSeCo/OECD project,<sup>7</sup> competencies were defined as behaviours intended to respond effectively to specific needs, behaviours that involve cognitive and non-cognitive dimensions of human action because they mobilize knowledge, cognitive and/or practice competencies, social interactions but also attitudes, emotions, values and motivations. Behaviours have *scalar properties*, namely, they can be measured in relation to a progression from lower levels to higher levels, and *polyhedric properties*, that is to say, different dimensions (for example, the extension of the effect of a behaviour, which can vary according to the amount of resources involved: people, funding, technologies used, etc.). Operationally, competencies were divided into two classes: technical-specialist and transversal. The first class was in turn decomposed into two dimensions: (i) disciplinary knowledge (approximated by degree class and final grades), and (ii) technical competencies that are, or can be, simulated in recruitment tests (or assessment centres). The second class was in turn broken down into three dimensions: (iii) cognitive competencies (analytical, conceptual and systemic thinking), (iv) management competencies and (v) relational competencies. The weight and order of importance given by the average of recruiters to the five competencies are shown in figures 2 and 3, where an inverted image emerges with respect to common academic belief: transversal competencies weigh roughly 10 percentage points more, and are more significant by around 30 percent compared to technical and specialized competencies, thus constituting the principal object of selection.

< Figures 2, 3 and 4 about here, on a single page >

The reasons for the preferences of recruiters are well explained by Spencer and Spencer (1993), according to whom transversal competencies (which constitute the hidden part of the iceberg of the intrinsic characteristics of the individual) are the most difficult and most expensive to form within firms. As argued previously, only socio-constructivist pedagogy would be able to anticipate future competency needs, contributing to positive learning for such competencies.

The gap between the competencies requested by recruiters from new graduates and the competencies held by them, irrespective of strictly academic/disciplinary knowledge, is shown in figure 4: the differences in the four competencies investigated are very significant. To our understanding, these data cannot but draw the attention of policy makers to the unease of recent graduates and to the costs that businesses face in improving competency

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<sup>6</sup> The questionnaire can be obtained from the author on request.

<sup>7</sup> DeSeCo stands for Definition and Selection of Competencies: see Salganik *et al.* (1999).

levels in the new graduate entry phase. It does not seem far-fetched to consider that the explosion of the world of atypical work *also* constitutes a solution and a test bench that companies use to verify the competencies actually expressed by an individual in the workplace,<sup>8</sup> in light of the weakness of the signal that education in the last ten/fifteen years has emitted.

The concern is not only confined to the initial gap and related adjustment processes, but extends to the learning curves of workers. Empirical studies (Ashton *et al.*, 1999, for UK; Tomassini, 2006, for Italy), based on work behaviours declinated to a *metalevel*, were able to identify and measure the *expressed* or activated competencies of employees, showing the evolution of individual competencies during the lifecycle. The most relevant phenomenon is the conspicuous growth that has registered in the transition from the first age group (25-29) to the second (30-45 age group), particularly in competencies that were lowest at the beginning of working life (and which are, incidentally, those that higher education most likely does not nurture).

It is beyond the scope of this work to analytically investigate the factors affecting the shapes of learning curves and competence development of workers. The most recent literature has pointed out that the most reliable variables are constituted, in addition to business training, job satisfaction and the incentive structure, by, on one hand, the role of organizational design and work practices ‘practiced’ in flexible lean production, providing incentives for self-reflexivity and self-development of competencies (Leoni, 2012), and, on the other, the full use of competencies owned, acting as an antidote to the decline of the cognitive dimension of the competencies themselves (de Grip *et al.*, 2008). However, these mechanisms do not guarantee full correspondence with the matching of education and the matching of competencies (Allen and Van der Velden, 2001).

## **5. Do firms remunerate education or competencies?**

The last question that we wish to confront in this paper is whether there is any specific relationship between competencies and remuneration, or if education could be a good proxy for the level of professional competencies of the individual, as accredited by human capital theory. We adopt a pragmatic and informative approach, based on a cross-section function of remuneration, precisely a reduced form of the relationship between wages and a vector of attributes that reflect on the one hand the position held and on the other the competency levels expressed by each worker. The coefficients of such a function are claimed to be assumed as shadow prices (long-run equilibrium) of the attributes investigated (Lucas, 1977). However, Schultz (1975: 829) cautioned us not to err by not distinguishing between the analytical property of a theory (Walrasian theory, in Lucas’ case) and the fact that human beings are not always in equilibrium and that they do not regain equilibrium instantaneously. We believe that a cross-sectional analysis such as that which we develop appears to be some way off from capturing conditions according to which the estimated coefficients would express the marginal rates of substitution. This for three fundamental reasons: the first concerns the lack of plausibility of the hypothesis of perfect information and perfect mobility of workers on which the theory of reference is based (the *equalizing differences* of Smithian

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<sup>8</sup> According to a survey carried out by an Italian governmental Institute (ISFOL, 2005) on a sample of 3807 private sector firms (agriculture excluded), atypical employment was constituted by the employment share of 13.6% of the universe of employees considered (equal to 11.636 million); the most important reasons stated by companies for making use of atypical workers is due to periods of pre-employment trial (42.9%), followed by 23.4% due to the unexpected discharge of orders or projects, and 15.4% due to seasonal schedules.



origin: Rosen, 1986), namely that on the supply side, the worker is fully informed about processes and workplaces as harbingers of training/learning, and is willing to move, sustaining the costs of mobility as an investment; on the demand side, that the firm is informed about the actual competencies of the worker to be selected.<sup>9</sup> The second reason is that cross-sectional data do not constitute the information needed to study long-term solutions: at any given time, and even more in a dynamic environment, prices can move slowly, thus positioned above or below the offering price. If considering the time required to accumulate a good level of competencies, as well as the real uncertainties that surround the choices of individuals, it is likely that scarcity (or abundance) creates a premium and thus generates quasi-rent (positive or negative) for the holders of these attributes. The third reason is that the data used (cross-sectional data) does not easily permit separately identifying the processes on the demand and supply side that underlie the valuation of different attributes, even if we will attempt to address the issue of endogeneity with respect to some key variables such as education, experience and competencies accumulated. From all this, it follows that wages – at any given moment – can be more appropriately interpreted along a Schumpeterian tradition (Bowles *et al.*, 2001) as capturing some ‘disequilibrium rents’: for example, some attitudes differing in kind, not referable to mere rational economic behaviours, or even a portion of the economic return of schooling that Schultz (1975: 843) himself attributes to the individual ability to deal with disequilibria, to the extent that ability – such as, for example, different degrees of risk aversion, the degree of self-directedness, or self-confidence – is enhanced through education.

The opportunity to study a function of remuneration with informative valence is offered by the AlmaLaurea database,<sup>10</sup> relating to Italian students who graduated in 2004 with a degree prior to the *Bologna Process* reform and interviewed 5 years later, containing a series of questions aimed at detecting certain characteristics (or attributes) of the position held, and the level of competencies used in work activities at the time of the interview (as reported on 1<sup>st</sup> October 2009).<sup>11</sup> Considering that the average duration of university study of this population was 7.5 years, their matriculation can be traced back roughly to the years 1995-1997.

The model used relates the logarithm of net monthly wages ( $y$ ) received by the pre-reform graduates, interviewed in 2009, 5 years after graduation, to a series of variables:

$$y_i = \alpha + \mathbf{B}' \text{position}_j + \Phi' \text{context}_s + \Omega' \text{attributes}_i + \varepsilon_i$$

where position indicates a vector of the characteristics of the position ( $j$ ) of the individual, context indicates a vector of information that defines the collocation of the organization in the production system ( $s$ ) and attributes

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<sup>9</sup> This hypothesis gave rise to Spence’s (1973) unlikely signalling theory, according to which the matching between the characteristics and attributes of the individual would instead come about through an intermediary, namely a person already employed in the enterprise in possession of the same signals as the candidate.

<sup>10</sup> AlmaLaurea is an Italian Inter-University Consortium, which, with the support of the Ministry of Education, University and Research, operates with the intention of connecting firms and graduates.

<sup>11</sup> The statistic descriptions relating to the data used here are available on the Consortium’s website, and refer to graduates of the year 2004 (<http://www2.almalaurea.it/cgi-php/universita/statistiche/tendine.php?config=occupazione>) under the condition: year of survey 2009, pre-reform course, 5 years after graduation. The universe of graduates contacted (27,248) refers to all universities that were part of the consortium at the graduation date. The response rate was equal to 76.3 percent; the interviews usable for our purposes were reduced to 14,000 due to lack of information on family background (variously and incompletely collected by universities at the time of matriculation).

indicates a vector of variables delineating the characteristics of the subject (i). The last term is the stochastic error [ $\varepsilon_i \sim \mathcal{N}(0, I)$ ].

### 5.1 First results

Table 1 reports the estimates carried out selectively on available data to focus on the variables that are most relevant for our purpose. Model [1] is the simplistic reference to the variables suggested by human capital theory: years of schooling and experience in the labour market. The coefficient of years of education is positive and statistically significant with a value of 0.157, which may appear excessive at first glance with respect to literature (Checchi, 2006), but this may be due to the fact that the segment of working life considered is composed of up to 5 years, hence, the phenomenon of obsolescence of knowledge, usually treated with a variable that expresses the years of study as a quadratic function, is not acceptable here.

The years of experience in the labour market (measured from the potentially usable 5 years following graduation) are statistically significant, even if the signs are reversed compared to common expectations. In any case, the explanatory power of this model is very modest:  $R^2$  is equal to 0.038.

< Table 1 about here >

Model [2] considers the presence of three sets of categories of variables. In this model, the constant captures the remunerative condition of a graduate associated with the default variable: (i) employed in the North-West, (ii) in the private service sector, (iii) with a job started after graduation. Overall, the model has much higher explanatory power than the previous:  $R^2$  rises to 0.359.

*Investment in education.* Compared to model [1], the return of the years of education decreases to 13.6 percent, although integrated by possibly having attended other post-graduate schools (generally completed simultaneously with employment activity). The years of delayed graduation carry a wage penalty because they reduce the potential 5 years of experience in the labour market, and because it probably represents a negative stigma that firms attribute to the determination to pursue a degree in the official time scale and/or to learning difficulties. The coefficient relating to curricular training carried out within the degree program is positive and statistically significant, confirming the view that this experience constitutes a successful element linking academia and the world of work, which allows the student to acquire competencies and professionalism that are appreciated by the labour market, especially during job placement.

*Characteristics of the position held.* As one might reasonably expect, a part-time position reduces wages by around 50 percent compared to a full-time position. However, contrary to the expectations suggested by the theory of equalizing differences, job insecurity is a wage disadvantage: the measure is equal to 12.3 percent. The results are consistent with the theory of the gap between competencies required and competencies held by graduates, under which firms are induced to verify (through temporary contracts) the competencies expressed by the individual in the workplace. Although for some workers the initial job insecurity can function as a stepping-stone to permanent employment (Booth *et al.*, 2002), for most workers it ends up being a trap that is difficult to escape from, assuming this is even possible. The reasons are twofold: on one hand, the demand for labour could discriminate between two individuals with different periods of job instability, penalizing the person with the

longest period on the basis that this person is less equipped in terms of competencies, motivation and willingness compared to the person with the shorter period of instability. On the other hand, labour supply could be discouraged from making further efforts to reposition the competencies offered due to the repeated negative experiences accumulated.

*Continuity and discontinuity of work during the course of study.* Continuing the work previously performed in the course of studies allows counting on seniority, which is a premium. The competencies acquired in the job are less rewarded if after graduation the person changes jobs.

*The competencies used.* This is the *clou* and innovative variable of the model tested. The coefficient (positive and statistically significant) expresses the wage premium in a simple step, from a low/no-level use of competencies acquired through university education to a high level of utilization. Unfortunately, we must recall that we do not have a continuous variable or a variable that expresses the stock of competencies used; we only have a dichotomous variable. Further on, we will demonstrate a second econometric exercise where this variable is more appropriately measured.

With respect to Models [1] and [2], the endogeneity of some regressors (such as education, labour market experience and competencies) can be biased and render the estimates inconsistent. The most-used solution in recent years to try to resolve the potential endogeneity problem of education (raised by alternative theories to human capital) has been the application of the instrumental variable method. The most accredited measures in literature are family background (i.e., parents' schooling) for the education of the individual, based on the idea that the educational level of parents influences the development of children's learning competencies,<sup>12</sup> and the age of the worker for the years of experience in the labour market. These instrumental variables are available in our database and are therefore used in our subsequent estimates. Instead, we have no plausible instruments for the competencies used by individuals. An alternative attempt in this direction will be made in the next section.

Model [3] presents the results of the *IV* estimates, which show that the three endogenous regressors are no longer statistically significant,<sup>13</sup> furthermore (see the second part of the table) the instruments used pass both the Durbin-Wu-Hausman (DWH) exogeneity test, and those of the robustness of the instruments themselves (consisting of partial  $R^2$ , Stock and Yogo robust F, and Shea's partial  $R^2$ : Cameron and Trivedi, 2009, Ch.6). Based on these results, the education of parents therefore itself constitutes the driver of the cognitive abilities of children.

An alternative solution to the instrumental variables is to use the OLS estimator, replacing the variable of education of graduates investigated with that of the parents. The results are presented in model [4], significantly confirming the previous result: parents with a lower education are associated with the progressively lower income of their graduate children.

## 5.2 *Second results*

As stated earlier, the AlmaLaurea database does not contain useful information to test the endogeneity of the other *clou* variable of our estimates, the competencies used or expressed. In this regard we use an alternative

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<sup>12</sup> Several studies on graduates in the Italian labour market show that parents' ability positively influences the academic success of children, but that an academic career as such has little or no impact on the subsequent career (Checchi, 2006).

<sup>13</sup> The results do not change if instead of the 2SLS estimator the GMM is used (with the *wmatrix robust* option).

database constructed following the 2004 ISFOL survey (see Tomassini, 2006) with a stratified sample of over 3600 employees with respect to a universe of over 9 million employed in the private sector of the economy (excluding agriculture and construction). For our exercise, we limit ourselves to completing the test on the stratified sample that identifies the population holding a degree and belonging to the 25-45 age group: the number is equal to 238 individuals, representing a population of 374,000 individuals. By virtue of the underlying sampling technique, we use estimates that employ weighting.

Many variables used are similar to those already commented on earlier: these are illustrated in Table 2 with fairly self-explanatory delineations. There are three significant differences between the AlmaLaurea database (first used) and ISFOL (which we use now): (i) the first contains information on family background, the second does not; (ii) the first has no information on length of service, the second does; and (iii) the first contains the degree of use of competencies in dichotomous form, with no possibility of finding the suitable instruments needed, while the second contains information on the ‘overall level of competencies expressed’, elaborated by Leoni (2006b) with the factor analysis technique, through which we arrive at a continuous variable that expresses the stock of competencies used, individual by individual.

*< Table 2 about here >*

The results are shown in model [1] of Table 2. Beyond the confirmation of the expected sign and significance of different variables, similar to those commented on above, the explanatory power of the ‘expressed competencies’ variable appears to be strong (confirmed by the standardized beta coefficient). It should be borne in mind that in this model, compared to the previous, not only seniority and company size are controlled for, but also professional groups.

The treatable endogenous variables are experience in the labour market, length of service and expressed competencies. The instruments used are age, the deviation of years of service of an individual compared to the industry average of the sample (not correlated - by construction - with the component of individual fixed effects) and the deviation of the average level of individual competencies of the professional group to which they belong (of the sample).<sup>14</sup> It is known that as the instruments increase with respect to the endogenous variables, the efficiency of the estimators also increases; with the availability of an additional instrument, consisting in the squared deviation of the average years of seniority, and able to simultaneously include both organizational characteristics instruments, we attempt to estimate an over-identified model. The regressions [2] and [3] of Table 2 differ in the estimators used: 2SLS in the former, GMM in the latter. The Wald test confirms the goodness of the two regressions. The values of the tests, respectively Sergeant and Hansen’s, in the hypothesis that all instruments are valid against the hypothesis that at least one of the instruments is not, do not allow rejecting the null hypothesis: therefore, all the instruments used are considered valid. The Shea partial  $R^2$  values provide a positive indication on the robustness of the instruments used.

Overall, the econometric results tend to accredit a strong and significant explanatory role of competencies in function of earnings, while no significance is attributed to schooling (see model [2] of Table 2, and model [3] in

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<sup>14</sup> Leoni (2012) demonstrates that competencies are very dependent on the opportunity that a worker has or not of being employed in a firm that adopts organizational designs in line with the ‘High Performance Work Organization’ paradigm.

Table 1) or at the limit of statistical acceptability (see model [2] in Table 2). It is worth pointing out that these results stem from models that contain a series of controls that are far greater than the traditional Mincer *earnings function* estimates.<sup>15</sup> However, it should be borne in mind that there is a weakness in the exercises completed due to deficiencies in the databases used. The AlmaLaurea database allows treating the endogeneity of the individual's schooling, but not the utilization of competencies; ISFOL's has opposing characteristics. The correct specification of a function would require that both endogeneities be treated simultaneously. To complete this exercise, we must therefore await more information-rich databases.

## 6. Concluding remarks. The *Bologna Process*: an incomplete reform

The arguments developed, and the empirical estimates carried out in this paper, have highlighted how the recent organizational and technological progresses have dramatically rendered the traditional role of education obsolete, and demonstrate the 'irresistible rise' of the concept of competence, both in the workplace and in the educational sphere, as a link between actors, organizations and institutions. Arguing that academic qualifications have become increasingly poor signals does not imply sustaining the irrelevance of university education as such, but rather the outdated pedagogical and didactic instrumentation used by university teachers.

Awareness is progressively growing of the fact that the current century will continue to critically demand a very different set of competencies in order for people to function effectively. Initiatives such as the Partnership for 21<sup>st</sup> Century Skills ([www.21stcenturyskills.org](http://www.21stcenturyskills.org)), the Cisco/Intel/Microsoft assessment and teaching of 21<sup>st</sup> century skills project ([www.atc21s.org](http://www.atc21s.org)), the PIACC frameworks ([www.oecd.org/document/35/0,3746,en\\_2649\\_201185\\_40277475\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/35/0,3746,en_2649_201185_40277475_1_1_1_1,00.html)), designed to assess the competencies (numeracy, literacy, reading and problem-solving in technology-rich environments) that are increasingly required in the labour market, stress the importance currently attached to this area not only by researchers, practitioners and policy makers but also by private and public organization recruiters. Unfortunately, no one today is able to know (a) how much employed graduates would have been paid if they had started out in a state of equilibrium, (b) what the relationship between expressed competencies and competencies held by employed graduates could be, and (c) what the level of economic productivity and efficiency could be.

We believe that university teachers in general, due to the way they are trained and selected, are unable to meet the educational challenges of the modern employment condition. Its status is too focused on research and little, or not at all, on the role of the trainer. We believe that the Italian academic situation is not unique among European countries, and European policy makers should activate a reflection on the competencies that are assessed in public examinations to become an academic, especially where they are considered civil servants and where almost no pedagogical and didactic competencies are proven or tested. What is really missing in the *Bologna Process* is an analysis of the competencies required of *academic trainers*, whether they be insiders, outsiders or new entrants, and the indication of some suitable action towards intensifying the motivations and the reflections on the instruments of modern epistemology (constructivism, cognitivism, metacognition, active learning, etc.), in order to master the fundamental distinction between the discipline 'itself' and the mechanisms

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<sup>15</sup> For Italian literature on Mincer's earnings function estimates, see Checchi (2003).

that govern its learning. To our understanding, this is crucial since Western democracies nobly placed great emphasis on education to make the transition from compensation welfare to that of opportunities (or employability in European Union language), in order to liberate each individual through a transfer of capabilities instead of the simple transfer of resources (Paci, 1997), to ensure lasting social inclusion in the labour market to the individual.

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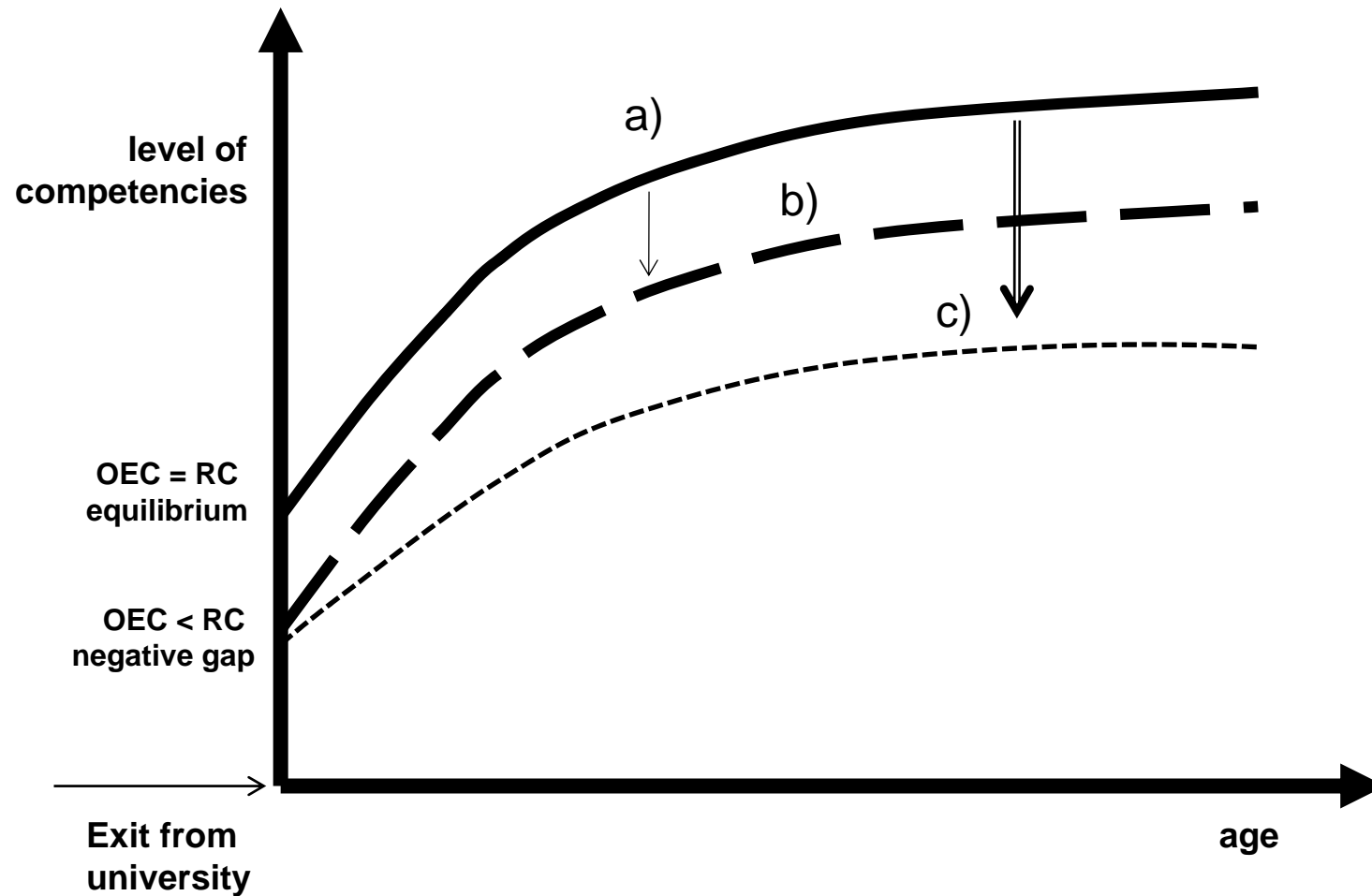
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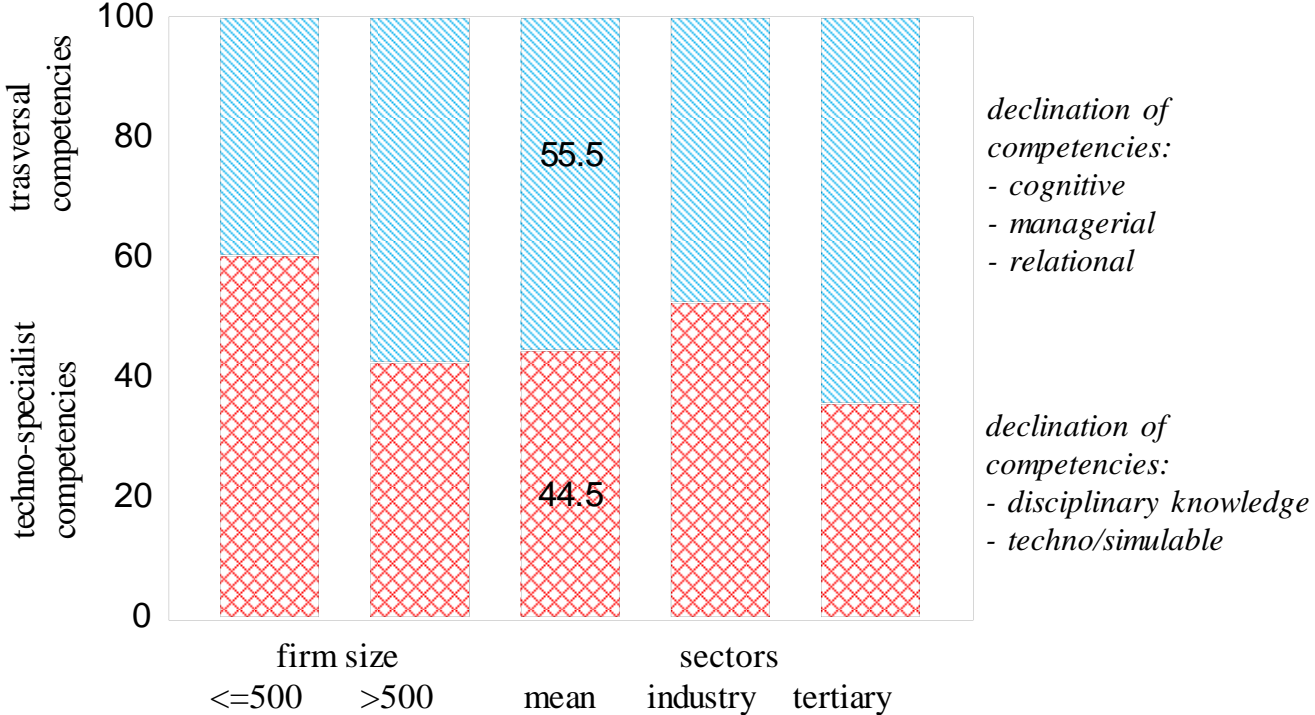


**Figure 1 – Development of competencies in the life-cycle depending on the possible gap between requested competencies (RC) and owned and expressed competencies (OEC)**



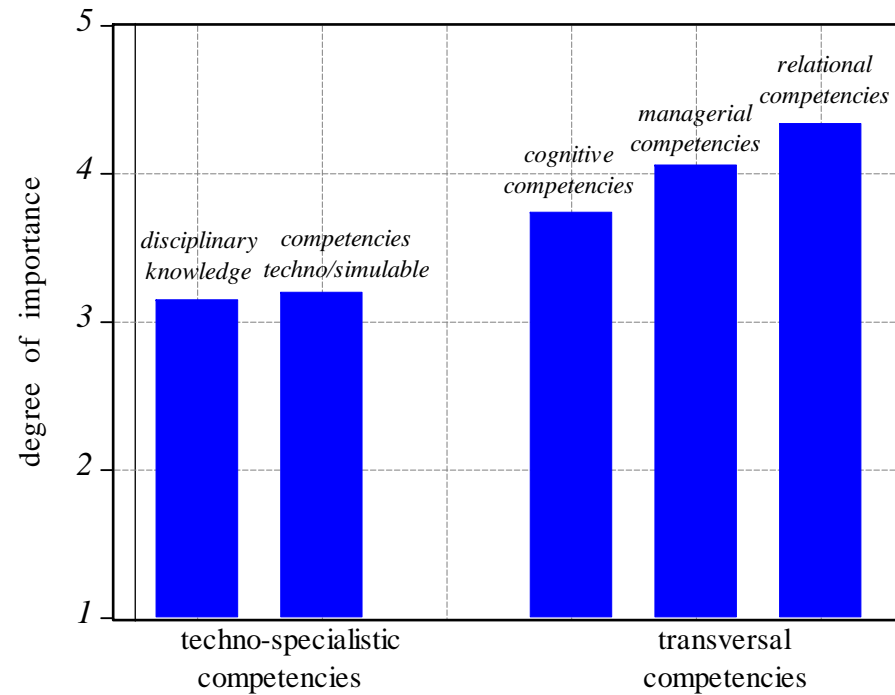
**Figure 2 - Competencies requested of new-graduates by firms at selection interviews**

**(weighted data)**



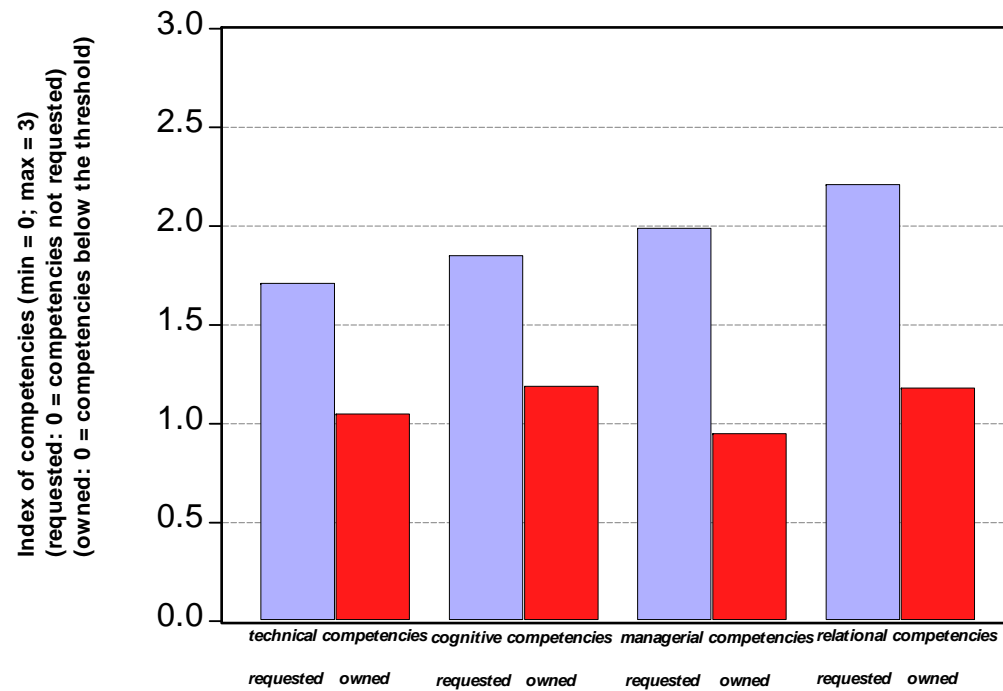
Source: Leoni and Mazzoni (2006)

**Figure 3 – Ranking of competencies ‘requested’ of new graduates by firms at selection interviews.  
Overall firm sample (weighted mean data)**



Source: Leoni and Mazzoni (2006)

**Figure 4 – Comparison between the mean requested competencies and the mean owned competencies**



Source: Leoni and Mazzoni (2006)

**Table 1 – Hedonic functions of earnings by graduates**  
(dependent variable: log of net average monthly earnings)

<b>Independent variables:</b>	<b>[1] OLS</b>	<b>[2] OLS</b>	<b>[3] 2SLS<sup>+, ++</sup></b>	<b>[4] OLS</b>
Official years of schooling	0.157 ***	0.136 ***	0.988	
Traineeship during study (1=yes; 0=no)		0.031 ***	- 0.036	0.044 ***
Post-degree traineeship (1=yes; 0=no)		- 0.074 ***	- 0.247	- 0.044 ***
Post-graduate school (1=yes; 0=no)		0.022 **	0.028	0.018 *
Additional years of study to get a degree (+*)		- 0.008 ***	0.008	- 0.009 ***
Potential experience in the labour market : years	- 0.022 ***	0.018 ***	- 0.690	0.025 ***
Potential experience in the labour market : years <sup>2</sup>	0.001 ***	0.000	0.024	- 0.001 *
<b>High level of utilization of competencies acquired during academic formation (1=high level; 0=reduced level/not at all)</b>		<b>0.019 ***</b>	<b>0.025 **</b>	<b>0.019 ***</b>
Educational qualification of parents (at the most, a parent with a degree) ( <i>default</i> )				-----
Educational qualification of parents (at the most, a parent with a high school diploma)				- 0.022 ***
Educational qualification of parents (at the most, a parent with a secondary school diploma)				- 0.028 ***
Part-time job (1=part time; 0= full time)		- 0.518 ***	- 0.599 ***	- 0.508 ***
Atypical work (1=yes; 0=no)		- 0.123 ***	- 0.135 ****	- 0.122 ***
Work started after the degree ( <i>default</i> )		-----	-----	-----
The respondent works but does not continue the work she/he did before the degree		0.040 ***	0.027	0.044 ***
The respondent works		0.115 ***	0.165 ***	0.118 ***

and is continuing the work she/he did before the degree (1=yes; 0=no)				
Controls	no	yes	yes	yes
Constant	4.458 ***	4.691 ***	- 6.769	6.996 ***
<i>Number of observations</i>	<i>16311</i>	<i>14288</i>	<i>14043</i>	<i>14013</i>
<i>R</i> <sup>2</sup>	<i>0.038</i>	<i>0.359</i>		<i>0.353</i>
<i>F</i>	<i>212.161 ***</i>	<i>362.523 ***</i>		<i>331.548***</i>
<i>Wald Chi</i> <sup>2</sup> (22)			2931.98	
<i>Prob &gt; Chi</i> <sup>2</sup>			0.0000	
<i>Testing for regressor endogeneity: parents' years of schooling =0; age = 0; age</i> <sup>2</sup> <i>=0</i>				
<i>1</i> <sup>o</sup> <i>stage: years of schooling</i> <i>F (3. 14020) (Prob&gt;F)</i>			77.1 (0.0000)	
<i>1</i> <sup>o</sup> <i>stage: labour market experience</i> <i>F (3. 14020) (Prob&gt;F)</i>			9717.8(0.0000)	
<i>1</i> <sup>o</sup> <i>stage: labour market experience</i> <sup>2</sup> <i>F (3. 14020) (Prob&gt;F)</i>			472.7 (0.0000)	
<i>Formal tests for weak instruments</i>				
- <i>Official years of schooling</i>				
<i>Partial R</i> <sup>2</sup>			0.126	
<i>Robust F (3.14020)</i>			77.097	
<i>Prob &gt;F</i>			0.0000	
<i>Shea's partial R</i> <sup>2</sup>			0.0004	
- <i>Experience in LM</i>				
<i>Partial R</i> <sup>2</sup>			0.945	
<i>Robust F (3.14020)</i>			9717.85	
<i>Prob &gt;F</i>			0.0000	
<i>Shea's partial R</i> <sup>2</sup>			0.0008	
- <i>Experience</i> <sup>2</sup> <i>in LM</i>				
<i>Partial R</i> <sup>2</sup>			0.892	
<i>Robust F (3.14020)</i>			472.70	
<i>Prob &gt;F</i>			0.0000	
<i>Shea's partial R</i> <sup>2</sup>			0.0009	

Legend: p\_value \*\*\* ≤ 1%, \*\* ≤ 5%, \* ≤ 10%.

<sup>+</sup> : instrumented variables: official years of schooling, experience and experience-squared.

instruments: parents' years of schooling, age and age-squared (at the time of interview).

<sup>++</sup> function has been re-estimated by GMM estimator without obtaining different statistical results (these can be obtained on request from the author).

(+\*) Additional years of study, the student having failed to get a degree within the prescribed time

Controls variables: dummies relative to i) gender, ii) work area (North-West, North-East, Centre, South-Islands, Abroad), sectors (agriculture, industry, private services, public services), iv) Ph.D. and v) scientific degrees.

Database source: AlmaLaurea. Cohorts of graduates 2004, interviewed at 1<sup>o</sup> October 2009.

**Tab. 2 - Hedonic functions of earnings by employee graduates**  
**Age group: 25-45 years old. Year: 2004**  
**(dependent variable: log of net average monthly earnings)**

Independent variables	Weighted OLS, with robust S.E. [1]	<i>Standardized Beta-coefficients</i>	Weighted 2SLS, with robust S.E. [2]	Weighted GMM, with robust S.E. [3]
Gender (1=F, 0=M)	-0.183***	-0.225***	<b>-0.181***</b>	-0.162***
Establishment size	0.028***	0.131***	<b>0.027***</b>	0.028***
Temporary contract (1=yes, 0=no)	-0.00009	-0.00009	<b>0.009</b>	-0.001
Part time (1=yes, 0=no)	-0.491***	-0.383***	<b>-0.501***</b>	-0.498***
Years of schooling	4.083	6.246	<b>3.943*</b>	3.415
Years of schooling <sup>2</sup>	-0.102	-6.240	<b>-0.098*</b>	-0.085
Years of experience in LM	0.018***	0.219***	<b>0.023**</b>	0.027**
Seniority	0.008	0.079	<b>0.003</b>	0.001
<b>Level of overall expressed competencies</b>	<b>0.202***</b>	<b>0.261***</b>	<b>0.205***</b>	<b>0.184***</b>
Constant	-34.217	0.261	<b>-32.843</b>	-27.676
<i>Number of observations (population weight)</i>	238 (374.000)		238 (374.000)	238 (374.000)
<i>F (24,213)</i>	26.13			
<i>Wald chi<sup>2</sup> (24)</i>			685.656	703.672
<i>p_value</i>	0.0000		0.0000	0.0000
<i>R<sup>2</sup></i>	0.743			
<i>Sergeant test</i>			2.419 (p_v=0.120)	
<i>Hansen J test</i>				1.397 (p_v=0.237)
<i>Shea's partial R<sup>2</sup></i>				
<i>Experience</i>			0.414	0.414
<i>Seniority</i>			0.552	0.522
<i>Competencies</i>			0.941	0.941
<i>Endogenous variables:</i> <i>experience in LM, seniority and overall competencies</i>				
<i>Instruments:</i> <i>age, dev_seniority from the sectoral mean, dev_seniority, dev_competencies from the mean of professional occupations.</i>				

Legend: p-value \*\*\* ≤1%, \*\* ≤5%, \* ≤10%

Control variables: dummies relative to i) sectors (traditional manufacturing, scale-intensive manufacturing, science-based manufacturing, commerce/hotels, transports/warehousing, communication/ICT, monetary and financial intermediaries, real estate/renting), ii) occupations (manager, professionals,

associated professional & technicians, clerical & secretarial occupations, craft & related occupations, personal & protective services, sale occupations, plants & machine operatives, other occupations), iii) work area (North-West, North-East, Centre, South-Islands).

Source: ISFOL database ( Tomassini, 2006).