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Empirical evidence for Italy

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**Employability of graduates and development of competencies:
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Riccardo Leoni*

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Abstract

European policy makers are focusing on the gap between the competencies required of graduates by the modern production context and the knowledge that university systems traditionally transfer to students. Their objective is to significantly transform the higher education system so that it adheres more closely to the new needs generated by the vigorous technological and organizational innovations in production and work. For the time being, the so-called Bologna Process and the Dublin Descriptors are an attempt to change the university's mission and unit of measure, seeking to move from the transfer of knowledge from the teacher to that of learning by the student, and from disciplinary knowledge to competencies. At the same time, the European project "Tuning Educational Structures in Europe" indicates the opportunity to operationalize a distinction between generic (or transversal) competencies and specific competencies (in the personal area of discipline), also suggesting methodological indications to design degree courses and to adopt a 'constructivist' pedagogy.

Economic analysis has long shown that the considerable gaps between competencies required and those held on entering the labour market have costly consequences both in the short and long term. In this paper, it is argued that these gaps are not only responsible for the medium-low positioning of the competency profile that develops during working life with respect to a counterfactual constituted by a graduate with a good match between the competencies required and those held. They also tend to affect the growth path of the competencies themselves: the bigger the gap, the smaller the steps in competency growth.

Through an econometric analysis controlling for a number of factors, the paper also documents that the level of 'expressed' competencies significantly influences graduate remuneration whereas the cultural background of the family of origin tends to assume greater importance than the formal educational level acquired, suggesting that, thus far, this is mainly responsible for the formation of the transversal component of competencies. The results are confirmed by controlling for endogeneity of schooling as well as of competencies, indicating that degrees per se are an increasingly weak signal for recruiters and the competencies they are looking for. The Bologna Process could overturn the situation, provided it is integrated with a constructivist pedagogical approach, a tool that is lacking today but is vital in providing education processes with the key role of competency formation.

The paper concludes with a series of policy indications.

Key work: education, competencies, employability

JEI classification: I21, I24, J24.

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1. Introduction

The gap between competencies required of graduates in the modern production context and knowledge traditionally transferred by universities to students has been central in guiding various European policy makers towards a profound transformation and convergence of the higher education system in order to bring it closer to the new needs generated by vigorous technological and organizational innovations in production and work since the '90s. The outcome, for the time being, is constituted by the so-called *Bologna Process*, which set the objective of pursuing a progressive convergence of the university systems and qualifications of signatory states to the 'Declaration', as well as by the *Dublin descriptors*, which define the educational objectives translated in terms of the *intended learning outcomes* of all graduates of a course of study.

The Process is being developed in stages in different countries, defined and 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 both the descriptor system adopted in the European Union and the career opportunities related to the International Standard Classification of Occupations (ISCO), and finally, 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 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 design of curricula 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 more or less acquire in the various study courses, which necessarily leads to disciplinary type problems, but rather to identify 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 (traditionally described on the basis of the contents of what is taught), 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 “*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, p. 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.*, p. 18)¹, 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, p. 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, p. 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, p. 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* (2006) project interceded recently, which - following a field survey² - indicated to European universities and higher education institutions that a distinction had to be made between generic competencies³ (or transversal) and specific competencies (their discipline area), suggesting that the designers of various degree courses (the Faculty as a last resort) use - in an holistic approach - the conceptual tool of matrices. This 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, with very different situations, with problematic interpretation and operational difficulties but also with much resistance⁴ and clear signs of difficulty of the thousands and thousands of academic colleagues, likely to

¹ A classic study on the issue of objectives is still that of Mager (1975), according to whom the drafting of the didactic objective must foresee the observable behaviour, the conditions for the execution of the objective and the criterion for its assessment.

² The survey involved 101 European universities, with 5183 questionnaires from graduates, 944 from companies/employers and 998 from academics.

³ These in turn were divided into three types: instrumental competencies (cognitive abilities, methodological, technological and language knowledge or competencies), interpersonal and systemic competencies.

⁴ 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

be more researchers/scientists in their mindsets than teachers,⁵ who in facing the proposal of progressive education (or social-constructivist), feel (or are) 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 Leuvain-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, Deane and Pauwels, 2009, p. 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 - to the contrary - not just unease and disorientation among students but also among company recruiters.

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

In terms of world production, since the mid-90s, new organizational and technological models have been developed (lean production, internally flexible firm, modular firm, ICT), which have imposed fundamental shifts in working competencies with respect to the traditional Taylorist firm organization: the turning point may be glimpsed in leveraging the participatory circuits of knowledge development, through which tacit knowledge becomes explicit and codified, and thereafter incorporated into new products, new services and new ways of working (Nonaka and Takeuchi, 1995; Nooteboom, 2000; Leoni, 2011). 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

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). But 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 diminution 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.

⁵ See section six for further considerations on this point.

qualitatively better synthesis between manual work and mental work, compared to the traditional model. Intelligence that is all the more necessary precisely because it is required at both individual and organizational levels in a context of continuous changes, high volatility and substantial uncertainty: namely, *cognitive and communicative* activity (Cainarca and Zollo, 2001), or rather, a distinctive competence in the sphere of analysis and interpretations of economic production facts (flow of new products, improvement of old ones, and more efficient ways to produce them). Lester and Piore (2004) argue in this regard that *analytical processes* are at work when the alternative outcomes are well understood and can be clearly defined and distinguished from each other, while *interpretative processes* are activated 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 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 possible through the classical mechanism of hierarchy or the price mechanism.

All this has decisive consequences on individual competencies, revealed to some extent by the overeducational mismatch⁶ data at international level (Sloane, 2003; Leuven and Oosterbeek, 2011, p. 16; CEDEFOP, 2010), according to which many graduates are progressively assigned to jobs that require a lower educational level, since their competencies do not fit (or are misaligned) with respect to those requested by the new ways of working.

This phenomenon, furthermore, 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, p. 16).⁷ Although, in partial defence of these countries, it must be remembered that technological and organizational innovation is much stronger than in European countries; in these latter countries, the phenomenon of the scarcity of adequately trained and competent human resources is (partially) offset to a greater extent, when compared to the US, by internal organizational learning mechanisms, giving rise to an undereducation⁸ 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 competencies, despite this being extensively subsidized, especially in Europe, and consequently (university education) should have been more easily adjustable by a policy oriented towards the employability goal. Evidently,

⁶ Education mismatch is not the only new concept introduced in overskilling literature. In fact, there is a whole range of closely related terms that researchers working on mismatch issues use. In a report on skill mismatch in Europe, CEDEFOP (2010) even introduces a glossary of – mostly self-explanatory – terms, covering over/under qualification, skill shortage/surplus, economic/physical skills obsolescence, horizontal/vertical mismatch, etc.

⁷ Estimates of the phenomenon of over/under-education vary depending on the method of measurement used. Those above 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).

⁸ A situation in which individuals hold a position above the level of education they possess, due to on- and off-the-job formal and informal learning.

European academic institutions are more rigid and more self-referenced, precisely the assumptions driving the Bologna Process. It should be remembered 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 one hand, and less job satisfaction, lower productivity and worse quality on the other; and 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 that already described by the scenarios of Finegold and Soskice (1988) and Haskel and Holt (1999), whereby skills shortage can lead to low-skill equilibrium within the economy. And 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 world of work, 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 >

The profile of individual competencies during the course of a working life, indicated by the solid line (a), is designed on the assumption that the level of competencies - apart from the level of education attained - evolve as a function of experience, formal and informal training, on- and off-the-job training, etc.: we therefore assume that the requested competencies (RC) are equal to those acquired, owned and expressed (EC).

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 higher than acquired competencies, we would expect this to have a permanent negative effect, shifting the age-competence profile downward (dashed line (b)), unless through job mobility the worker can over time overcome the initial disequilibrium. But recent researches show (Bosma *et al.*, 2003a, 2003b) that workers who are 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-competencies 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, thus diminishing for the company, for the individual and also for the economy in general, the possibility of being able to count on higher competencies. To the contrary, a challenging job not only contributes to the cognitive resilience of workers but also to developing the competencies (Leoni, 2011) not only of those with good matching, but also of workers in undereducated positions.

3. Requested competencies by productive organizations and competencies held by Italian graduates: *mind the gap!*

In the following pages, we provide empirical evidence of the concepts discussed here, with references to the Italian situation.

Following the excellent theoretical-conceptual work developed by a group of researchers at the beginning of the decade (Montedoro, 2001, 2002, 2003),⁹ ISFOL (Tomassini, 2006) started carrying out innovative type surveys to learn first hand the competencies requested by the world of work and implemented by various professional graduates (and non). Competencies are defined as behaviours intended to effectively respond to specific needs, behaviours that involve cognitive and noncognitive dimensions of human action because they mobilize knowledge, cognitive competencies and/or practices, social interactions, but also attitudes, emotions, values and motivations. The first survey, conducted in 2004, with the use of a stratified sample, representing the population of over 9 million workers employed in industry and services, indicates the overeducation impact - within the sphere of graduate and post-graduate educational qualifications - representing respectively 37.6% and 65.8%, compared to undereducation with 7.3% and 0.0 % (Cainarca and Sgobbi, 2006, p.194). This data cannot but solicit questioning the nature of acquired competencies and consequently their distinctive value.

But as often happens, the real problem lies in the details. The survey does not capture the issue of the transition between university education and the world of work of more recent cohorts (who are faced with momentous changes in the competencies required), instead reflecting the accumulation of situations of alignment, misalignment and adjustments made between competencies required and competencies expressed in all cohorts present among employee workers. Furthermore, it does not tend to measure - *at the time of entry of graduates (and other educational levels) into the world of work* - the possible gap between competencies required and competencies acquired, and between these and those that the individual would expect with the attainment of a degree. 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 37 industrial and service enterprises located in the Lombardy region (employing 33,000 workers), with an articulated and complex questionnaire (around thirty pages),¹⁰ developed by a working group composed of academics and human resource managers. Although the sample does not have generalizable statistical significance, we believe that the results deserve serious consideration.

Competencies were divided into two classes: technical-specialist and transversal. The first class was in turn divided into three dimensions: (i) disciplinary knowledge (approximated by degree class and final

⁹ This work was carried out in line with the DeSeCo project (which stands for: Definition and Selection of Competencies) of the OCED launched in 1997: see, in this sense, Salganik *et al.* (1999).

¹⁰ The questionnaire can be obtained from the author on request.

grades), (ii) technical competencies that are, or can be, simulated in recruitment tests (assessment centres), and cognitive competencies (analytical, conceptual and systemic thinking). The second class was in turn broken down into two dimensions: (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. As argued previously, only socio-constructivist pedagogy would be able to contribute positive learning for such competencies.

< 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.

The recruitment of graduates (called on, at some time, to assume roles of responsibility and management and/or coordination) is the subject of an intense scrutiny (exploring the hidden part of the iceberg), and is driven by the empirically established idea that the competencies on the surface (knowledge and skills) can be easily transferred from the organization to the newly employed through professional training, and are more easily acquired by them. The basic idea of recruitment is that the greater the match between the requirements of the role to be filled and the person's competencies, the greater will be both their performance and job satisfaction. The potential deviations that recruiters find are also evaluated in light of the learning curves that each person reveals in the selection process or in so-called assessment centres.

The research we report set the goal of measuring the potential difference between the average competencies requested by recruiters from new graduates and the competencies held by them, irrespective of strictly academic/disciplinary knowledge. The results of this survey are shown in Figure 4: the gaps in the four competencies investigated are very significant.¹¹ This data cannot but draw the attention of policy makers, on the one hand, to the unease of recent graduates and on the other, to the costs that businesses face in improving competency levels (whether private or public, profit or non-profit organizations) in the new graduate entry phase.

It could be that the data here recalled are not sufficiently representative of an average Italian reality that is more complex and more structured than that from which these data derive. However, it does not seem far-fetched to consider that in the face of (i) the varying needs that major organizational and technological changes have created in the world of work for over a decade, (ii) the delays that the education system is manifesting with respect to the changed requirements in the world of work, and (iii) the difficulties of discernment in recruitment candidates of good performance predictors, especially by

¹¹ Please refer to Leoni and Mazzoni (2006) for a detailed analysis of the gaps relating to the various items that compose each competence.

SMEs, insufficiently equipped with the tools required for a competency approach to recruitment and the development and management of work performance, we repeat, 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, as well as his/her learning curves,¹² in light of the weakness of the 'signal' that education in the last ten/fifteen years has emitted.

4. Learning curve, competencies development and performance management: *mind the step!*

Having passed the entry threshold into some productive organization, the work-life cycle of a graduate (as well as any other worker) proceeds with the adjustment of competencies to be expressed with respect to both competencies required by the role and the future positions to be acquired with potential promotion. The search for the matching of required competencies and expressed competencies is not only the task of the internal training function, but also of the individual's learning efforts. At this stage of our analysis, a small digression may be helpful on the concept of competence, since - again - the devil is in the details.

Assuming that each given behaviour (each given action) has the (intrinsic) characteristic to appear with greater or less intensity or completeness among the various actors, in literature it is argued that *behaviours have scalar properties*, i.e., they can be measured in relation to a progression from lower levels to higher levels. Not only that, but *behaviours also have polyhedric properties*, namely, they have different dimensions: one example is the extension of the effect of a behaviour, which can precisely vary according to the amount of resources involved (people, funding, technologies used, etc.); other examples of dimensions of a given behaviour could be the effort to complete it, motivation and complexity. Finally, each behaviour is an autonomous unit of analysis if it is characterized by *a noticeable difference* compared to other behaviours.

Different behaviours could have a matrix representation, equivalent to a double-entry table, where the measurement scales are declinated (in ascending or descending order) along the rows and the various dimensions along the columns. Most behaviours tend to be ascribed, however, to a single dimension and thus the double-entry table can be usefully turned upside down, putting along the rows the different behaviours and along the columns the intensity scale (or complexity, effect dimension, degree of effort, etc.). In these cases, the scale tends to be declinated according to a Likert scale.

The most common technique, statistically, to detect and measure competencies foresees the use of questionnaires administered to employees where a series of working behaviours are listed that they are

¹² According to an ISFOL survey (2005) on a sample of 3807 firms in the industrial, construction and private services sectors, atypical employment is 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.

required to tick if, and to what extent, these are implemented. The most-investigated dimensions are the frequency and degree of the effectiveness of the action, in a dual capacity: as required by the role and as expressed (or implemented) by the individual.

The list of behaviours should aim to cover the whole range of work actions in a given context, paying attention however to refer to the smallest units of observations that on one side are directly comparable and on the other sufficiently distinguishable. At the same time, the term 'behaviour' should refer not so much to the activity requested and completed (example: keeping of accounts), but to the underlying competencies, knowledge, skills, efforts and motivations requested (or enacted) by a distinctive performance action. In other words, we must not stop at the surface level (a description of actions) but as evidenced on the *metalevel*. And this action can be read on the demand side (competencies *required* by the organization), the supply side (competencies acquired and then *owned* by the individual), and finally on the side of the actions practiced (*expressed* or enacted competencies).

Various single organizational behaviours can help to define a competence; the aggregation process of these behaviours, aimed at identifying competencies (required, owned or enacted/expressed), is usually left to be generated by the data – on an empirical analysis level - through factorial analysis.

The three most significant researches in this regard, completed in recent years in Italy, present significant differences. Leoni's survey (2006a, chap. 2-5) refers to three cohorts of graduates of the University of Bergamo, representing a population of 1600 students, 1, 3 and 5 years after graduation; they were asked to declare, if employed, the competencies *required* by the position occupied (as an employee or self-employed) and those subjectively *expressed* in the performance of work activities. The monitored work behaviours, declinated to a *metalevel*, focused on the dimensions of importance and frequency (relative to the competencies required), and the effectiveness of the activated behaviour (relative to the expressed competencies). The ISFOL (Tomassini, 2006) and ISTAT (2008) national surveys, were limited to identifying only the *expressed* competencies of employees in the former, and total workers (employees and self-employed) in the latter.

Below we report some of the results of the second case because it has the advantage not only of a stratified sample of national importance (in the same way as the third), but also has a much more structured questionnaire, similar to the first research. The radar chart in Figure 5 shows the respective competencies expressed by the ISFOL stratified sample (extrapolated to the population) on three age groups (25-29, 30-45, 46-64) and when holding a degree.

< Figure 5 about here >

The polyhedric nature of expressed competencies of the average employee is expressed in all its plasticity. The image also allows capturing the various levels (or importance) of individual expressed competencies. Naturally, this image can be reproduced for the different strata investigated (regions, sectors, firm size, gender, etc.). What emerges at some point is the evolution of individual competencies

during the lifecycle.¹³ With increasing age, the polyhedron extends, but at very different rates: in some cases, the rate is even positive while in others (from the second profile to the third) the rate becomes negative. The most relevant data, however, is constituted by the conspicuous growth that is registered in the transition from the first polyhedron (referring to the 25-29 age group) to the second (30-45 age group), particularly in some competencies, which are - as it happens - precisely those that are lowest at the beginning of working life (and also those that higher education most likely does not nurture). The growth rate is over 190 percent for competence relating to 'employee relations', over 90 percent for 'customer relations' (internal and external to the organization), over 50 and 40 percent respectively for 'teamwork' and 'planning and organization of own/others' work' competencies. The first two competencies are moreover those that continue to develop significantly (with an additional 30 to 20 percent) also in the third segment of working life (46-64 age group).

It is beyond the scope of this work to analytically investigate the factors affecting the shapes of learning curves and competence development of individual workers.¹⁴ As we have already briefly mentioned in section 2, several studies have amply demonstrated that, regardless of the level of education, the most reliable variables are constituted by business training, job satisfaction and the incentive structure, to which are added – based on the most recent studies (Leoni, 2011) - 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, and on the other, full use of competencies owned (de Grip *et al.*, 2008), acting as an antidote to the decline of the cognitive dimension of the competencies themselves. Additional support in this direction is found in the work of Heckman (*ibidem.*, 2000) - according to whom learning is a dynamic process, and skill begets skill, which underlies a path-dependence form of the process of building competencies - and to Barron *et al.* (1989), Black and Lynch (1995) and Brunello (2003) - according to whom adjustment or improvement of competencies also depends on previously acquired education, accrediting a complementary relationship between education and professional training, although possibly manifesting itself in the market not in full correspondence with the (mis) matching of education and the (mis) matching of competencies (Allen and Van der Velden, 2001).

5. Level of competencies and remuneration

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 Becker's (1964) theory of human capital.

¹³ It should be remembered that the three age classes represented in the figure form an 'artificial' profile of the professional life cycle, in that it does not express the evolution of the profile of a given group of individuals, but to a variety of individuals that belong to different groups.

¹⁴ In Leoni, Gaj and Cristini (2006, pp. 172-5) and Leoni (2011) a number of workplace characteristics that contribute to developing competencies throughout the working lifecycle were studied.

Heckman, Lochner and Todd (2003), reviewing the international literature on Mincer's earning function (an empirical version of Becker's theory) critically document that it contains quite a number of weaknesses, ambiguities and paradoxes. Heckman (2000, p. 5) himself notes that, although much learning takes place in informal settings and ways, namely, outside of educational institutions, this is widely neglected by the technocrats of education (within which he also includes *many academics: ibidem*, p. 4) and politicians, who continue undeterred to equate the formation of competencies and skills to classroom learning only. He also believes that «*once we recognize the importance of informal sources of learning for skill formation, we think about policies to foster skill in a different way*» (*ibidem*, p. 5). These, and other elements of abstraction of Becker's theoretical framework, led him to conclude that if taking into account that the resolution of uncertainty related to educational choices and the estimated value of options come about sequentially, «*the internal rate of return - a cornerstone of classical human capital theory - is not a useful guide to policy analysis*» (*ibidem*, p. 5).

Rather than grapple with the theoretical disputes, here we prefer to adopt a pragmatic and informative approach, based on a 'hedonic function' of remuneration, that is to say, 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 person. The coefficients of this function in many cases tend to be assumed as shadow prices (long-run equilibrium) of the attributes investigated (Lucas, 1977). However, a cross-sectional analysis such as that which we develop seems 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 based¹⁵, 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.¹⁶ The second reason is linked to the fact that an analysis such as that which we intend to carry out is based on cross-sectional data, and these certainly 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 that will be used (cross-sectional data) does not easily permit to separately identify 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.

¹⁵ The theory of *equalizing differences* of Smithian origin: see Rosen (1986).

¹⁶ 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.

The idea for the study of a hedonic function of remuneration with ‘informative’ valence is offered by the fact that the AlmaLaurea¹⁷ survey relating to students who graduated in 2004, interviewed 5 years later, contains 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 October 2009). The statistic descriptions relating to the data used here are available on the Consortium’s website¹⁸ and refer to 2004 graduates with a degree prior to the Bologna Process reform. 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 universe of graduates contacted (27,248) refers to all universities that were part of the consortium at the graduation date. 20,795 graduates were contacted with a response rate 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).

A glance at Figure 6 provides a first overview of the evolution of wages of different groups of pre-reform graduates. Two distinct phenomena emerge: the first concerns entry wages. The real wages¹⁹ received by graduates surveyed in 2003, a year after their graduation, is made equivalent to 100, while the wages of successive cohorts resulted in a progressive loss up to reaching the value of 98.3 for graduates surveyed in 2008 (a year after their graduation). The net loss amounted to 1.7 percentage points.

< Figure 6 about here >

The second phenomenon concerns the rate of wage increase to the increasing age of the individual cohorts: the loss in this case is even more significant. If comparing the cohorts at 3 years after graduation, the (real) net monthly income of the more recent cohorts is 1.7 percentage points lower than that perceived by their contemporaries 5 years earlier, a loss that rises to 3.4 points compared to their contemporaries of 3 years earlier. Moving the comparison to 5 years after graduation, the three cohorts reported in the graph indicate a fall of 6.3 percentage points.

In summary, the entry wage penalty of the last generations of graduates does not appear to be a transient phenomenon, such as an economic cycle, recoverable during the course of working life, but rather a permanent loss of income,²⁰ to which a further reduction is added throughout working life, evidenced by the lower slopes of the profile curvature of earnings by age. The loss of the education return does not seem to be attributable to increases in the supply or demand of qualified youth work, but rather to a widening gap between the competencies requested by firms and the supply of competencies offered by academia. This gap has been channelled into various types of atypical work contracts that

¹⁷ AlmaLaurea is an Inter-University Consortium, which, with the support of the Ministry of Education, University and Research, operates in Italy with the intention of connecting companies and graduates.

¹⁸ <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.

¹⁹ The monthly net monetary wages were deflated using the ISTAT consumer price index.

²⁰ In this sense, see Rosolia and Torrini (2007) of the ‘Centro Studi di Banca d’Italia’.

erupted in the second half of the '90s. With reference to the precarious condition of these new types of contracts, the paradox is that while the theory of ‘equalizing differences’ would foresee a premium for the condition of job insecurity, the reality conversely indicates a reduction of the remuneration of atypical employment; the most plausible interpretation of this situation, to our understanding, is the negative gap between the competencies required from new graduates and those accumulated through years of university study.

Our econometric analysis focuses on the salary received in 2009 by the cohort that graduated in 2004, 5 years later. In terms of competencies used, the AlmaLaurea source informs us (see Table 1) that the initial gap is gradually reduced through work experience: in the course of 5 years, the ‘high’ degree of use of competencies acquired through university education grows by 8 percentage points, from 44 to 52 percent. The ISFOL source (see Leoni, 2006b, Table 3.1) also reveals that the stock of expressed competencies themselves - *ceteris paribus* - increases as the subject moves along the course of working life.

< Table 1 about here >

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:

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

(1)

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

5.1 The main results

Table 2 reports the estimates carried out on data available in a selective manner in order to focus on the variables that are most relevant for our purposes.

Model [1] is the simplistic reference to the variables suggested by the theory of human capital: 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 means that each additional year of schooling would increase the net monthly wage by 15.7%. This value may appear excessive with respect to literature on the theme (Checchi, 2006). However, it is worth remembering that the sample discussed here consists of pre-reform graduates and therefore the total years of formal education range from 17 to 19 years, depending on the degree obtained: it follows that the coefficient measures the impact of additional education at the margin in this range. In addition, the segment of working life is considered to be

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 2 about here >

Model [2] considers the presence of three sets of categories of variables announced in (1). 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 having possibly 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 in pursuing 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; Addison *et al.*, 2009), 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. In terms of our Figure 1, this means that the slope of the profile represented by the dashed line, which expresses wage development in the presence of an initial gap, suffers a downward crush and thus determines an even more pronounced gap over the years compared to the counterfactual,

namely, for those who may have had an initial balance between competencies required and competencies held, or with an imbalance, albeit of a transitory nature.

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 of 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.

5.2 *The issue of endogeneity*

Issues concerning the endogeneity of some regressors can be raised against model [2]. The focus in literature has been on the variables relating to education, labour market experience and competencies.

With regard to the first variable (the cornerstone of human capital theory), the theory of ‘credentialism’, both in the *screening hypothesis* version (Stiglitz, 1975) and that of *job-market signalling* (Spence, 1973), considers that a higher level of education does not make individuals more productive, but signals some hidden features of the individuals (e.g., greater reliability in dealing successfully with different situations) that could be appreciated by recruiters in the selection phase to form an order and a queue of applicants, without any influence on wage levels. The coefficient relating to education is therefore affected by distortions (even inconsistencies), with a sign that is not easily identifiable in advance. A review of these distortions can be found in Leoni (2011), to whom we refer for simplicity.

The most-used solution in recent years to try to resolve the potential endogeneity problem of education (raised by the alternative theories to human capital) has been the application of the instrumental variable method. This technique consists in finding variables that are correlated with education, but not with income. The idea is to find an instrument that is able to influence the education of people, but not directly their income. The solution to the problem of distortion of the estimates, therefore, is via the correct choice of instruments, i.e., variables that behave as described above. The most accredited measures in literature are constituted by 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.²¹ The years of experience in the labour market are instrumented, in general, by the age of the subject. These instrumental variables are available in our database, and are therefore used in our subsequent estimates. Instead, we have no plausible instruments

²¹ Several studies on graduates on the Italian labour market show that the 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 (Cecchi, 2006).

for the competencies used by individuals. An alternative attempt in this direction will be made later in the text.

Model [3] presents the results of the *IV* estimates, which show that the three endogenous regressors are no longer statistically significant,²² 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 that suggested by Antonelli and Campiglio (2009), consisting in directly using 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 lower education are associated with progressively lower income of their graduate children. The result could be explained by the idea that a strong family background affects not only the different cognitive abilities of children (which is also expressed through the choice of secondary school attended and the grades achieved there, without this however directly conditioning the wage level achieved later), but also the construction of socio-relational networks, which are then used throughout life on diverse occasions, including the son/daughter's search for a job with a certain prestige and relatively well remunerated.

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 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 to 45 year age group: the number is equal to 238 individuals, representing a population of 374,000 individuals. By virtue of the underlying sampling technique, we will use estimates that employ weighting.

Many variables that are used are similar to those already commented on earlier: these are illustrated in Table 3 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, (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.

²² The results do not change if instead of the 2SLS estimator the GMM is used (with the *wmatrix robust* option).

< Table 3 about here >

The results are shown in model [1] of Table 3. Beyond the confirmation of the expected sign and significance of different variables, similar to those commented on above, the explanatory power appears to be strong (confirmed by the standardized beta coefficient) of the ‘expressed competencies’ variable. It should be borne in mind that in this model, compared to the previous ones, not only seniority and company size are controlled for, but also professional groups.

The treatable endogenous variables are constituted by 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 sample²³ and the deviation of the average level of individual competencies of the professional group to which they belong (of the sample).²⁴

From econometric literature 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 of the squared deviation of the average years of seniority, and able to simultaneously include both organizational characteristics instruments, we try to estimate an overidentified model. The regressions [2] and [3] of Table 3 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 the competencies in function of earnings, while no significance is attributed to schooling (see model [2] of Table 2, and model [3] in Table 3) or at the limit of statistical acceptability (see model [2] in Table 3). 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.²⁵ However, it should be borne in mind that there is a gap 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 wait for more information-rich databases.

²³ This ‘instrument’ is a powerful tool because it is not correlated - by construction - with the component of individual fixed effects: for references on this point please refer to Leoni (2011).

²⁴ Leoni (2011) demonstrates that competencies are very dependent on the chance that a worker has of being employed or not in a company that adopts organizational designs in line with the HPWO paradigm (*High Performance Work Organization*).

²⁵ For Italian literature on Mincer’s earnings function estimates, see Checchi (2003).

6. Concluding remarks: new wine in old wineskins? An incomplete Reform: an unavoidable new failure?

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 21st Century Skills (www.21stcenturyskills.org), the Cisco/Intel/Microsoft assessment and teaching of 21st century skills project (www.atc21s.org), the PIACC frameworks (www.oecd.org/document/35/0,3746,en_2649_201185_40277475_1_1_1_1,00.html), designed to assess *metalevel* competencies (numeracy, literacy, reading and problem-solving in technology-rich environments) that are increasingly required in the labour market also point to the importance currently attached to this area not only by researches, practitioners and policy makers but also by the private sector.

European policy makers, aware of the gap between the competencies required of graduates by the modern production context and the knowledge that university systems traditionally transfer to students, in 1999 established the so-called Bologna Process and the Dublin Descriptors with the aim of changing the university's mission and unit of measure, namely to move from the transfer of knowledge from the teacher to that of learning by the student, and from disciplinary knowledge to competencies. At the same time, the "Tuning Educational Structures in Europe" project indicated to European universities to make a distinction between generic (or transversal) competencies and specific competencies (in the personal area of discipline), suggesting the adoption of a 'constructivist' pedagogy.

On the scientific knowledge academic frontier, employment literature has explained the difference between the concepts of job and role, with the former associated to the Taylor-Ford work approach based on a narrow definition of tasks and the occupational profile defined as the worker's professional qualification (as well as the set of knowledge and capabilities needed to occupy a position), and the latter associated to the modern production complex, requiring competencies understood as observable and measurable with efficient and effective behaviours (application of knowledge to solve problems, to manage and work socially, to activate relational capabilities). Education literature has instead pointed out the difference between transferring knowledge (equivalent to information transfer) and building knowledge and competencies, suggesting that knowledge is acquired not by the internalization of some given outside datum but is constructed from within. Moreover, statistical surveys have demonstrated the incidence of overeducation and undereducation, as well as the gap between competencies required and those held on entering the labour market, while economic analysis has long shown the considerable and serious consequences of the gap in the economy both in the short and long term. Among other things, it has been argued that the aforementioned gaps are not only responsible for the medium-low positioning of the competency profile that develops during the working life of a graduate with respect to a counterfactual constituted by a graduate with a good match between the competencies required and those held. They also affect the growth path of the competencies themselves: the bigger the gap, the smaller

the steps in competency growth. In addition, the competencies that are developed most during the course of a working life tend to be those that at the time of entry into the labour market had the largest gaps. As has been discussed, education is not the only mechanism that promotes and develops workers' professional competencies: literature has shown that the development of a worker's 'key' competencies also depends on the organizational design of the workplace and the work practices that are 'practised'.

Through an econometric analysis that controls for a number of factors, the paper documents that the level of 'expressed' competencies significantly influences graduate remuneration, while the cultural background of the family of origin tends to assume greater importance than the formal educational level acquired. The results are confirmed by controlling for endogeneity of schooling as well as of competencies.

Despite all precautions, it seems difficult to deny the irruption of the individual's 'situated competencies' among the regressors of the hedonic wage function and the fact that the market explicitly recognizes them. This novelty should lead us to question the significance of this category, of this new 'unit of measure'. In our opinion it constitutes the result, but also a reflection of a new way not only to delineate job descriptions towards selection by firms, but also to evaluate the performance of workers, which a responsible university education should internalize in order to live up to the task and mission that society and the economy generally grants it: training graduates by equipping them with good performance predictors.

If we accept the thesis of the existence of significant gaps between the competencies required at the time of selection and the competencies held by graduates when they enter the labour market, especially in the cohorts of the last ten years, then it goes without saying that no one today is able to know (a) how much would employed graduates 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. What many experts suggest, on a reasonable basis, is that academic qualifications have become increasingly poor signals compared to the new competencies required by the market. The interpretation we have advanced in the paper is that this problem is not so much a reflection of the irrelevance of university education as such but of the outdated pedagogical and didactic instrumentation used by university teaching, with a few exceptions, which there surely must be. In other words, we do not believe that you can put new wine (constructivist pedagogy) into old wineskins (teaching consisting of a pedagogical paradigm based on the simple transfer of information/knowledge).

A rethinking of university teaching, however, cannot simply be left to the autonomy of academia. In light of the results of our analysis, this issue is crucial because it involves the quality of graduates (the ruling class of tomorrow), their future ability to develop superior competencies and the performance of productive organizations. We believe that university teaching in general, in the way it is formed and selected, is 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. Is this an assessment that only refers to the Italian situation, or can it be extended to other European countries? Since comparative

literature on recruitment and selection systems at university level (apart from episodic personal knowledge) is entirely absent, this question is difficult to answer. Nevertheless, it is quite enlightening to reflect on the competencies that are assessed in public exams to become an academic, at least in Italy, where they are considered civil servants. Researchers are recruited through a written exam on domain-specific knowledge and an oral general exam where the focus is on her/his publications, associated professors on scientific publications on specific subjects and on a pre-determined lecture given before a board of examiners (elected at national level), while full professors are assessed only on scientific publications: hence, almost no pedagogical and didactic competencies are proved or tested. This is in line with the prevailing or dominant view that what people need to know in order to become an academic teacher is principally subject or content knowledge related. The study of pedagogy is viewed as relatively unimportant.

The 'European' scope of the *Bologna Process* and the transversality of the overeducation phenomenon in various European countries (Galasi, 2008) definitely favour the hypothesis according to which, underlying the common phenomenon of a mismatch, a common 'flawed' mechanism is at work: the inadequacy of academics as teachers. But the solution envisaged consists only in a redefinition of the output concept of the education process (the so-called learning outcome), without *also* paying attention to the input conditions and pre-requisites. What is really missing in the Bologna Process is an analysis of the competencies required of *academic trainers*, i.e., university teachers, whether they are insiders, outsiders or new entrants, and some suitable action towards intensifying the motivations to change and upgrade the competencies expressible by those in charge. A training project is required for aspiring future academics that will force them to tackle not only the instruments of research but also those of modern epistemology (constructivism, cognitivism, metacognition, active learning, etc.), using the specific didactics of socio-psycho-pedagogical disciplines, laboratory and training paths where trainees can become active in first person, practicing in the fundamental distinction between the discipline 'itself' and when on one hand it is taught and on the other learned.

After all, are good teachers not those who, next to mastery of knowledge, nurture the intentional and inexhaustible endeavour of rethinking the mechanisms that govern the cognitive and metacognitive learning of the recipients?

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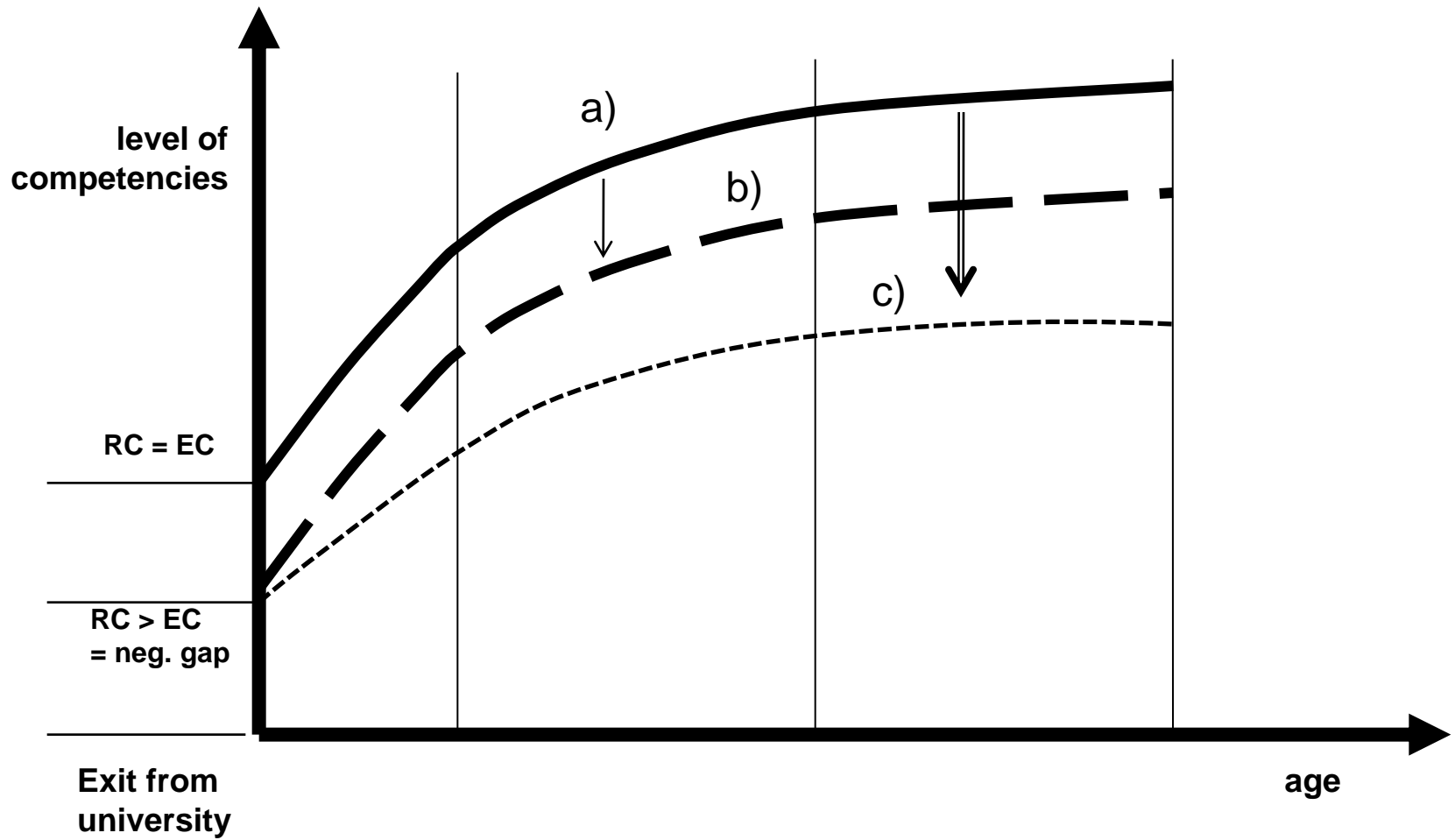
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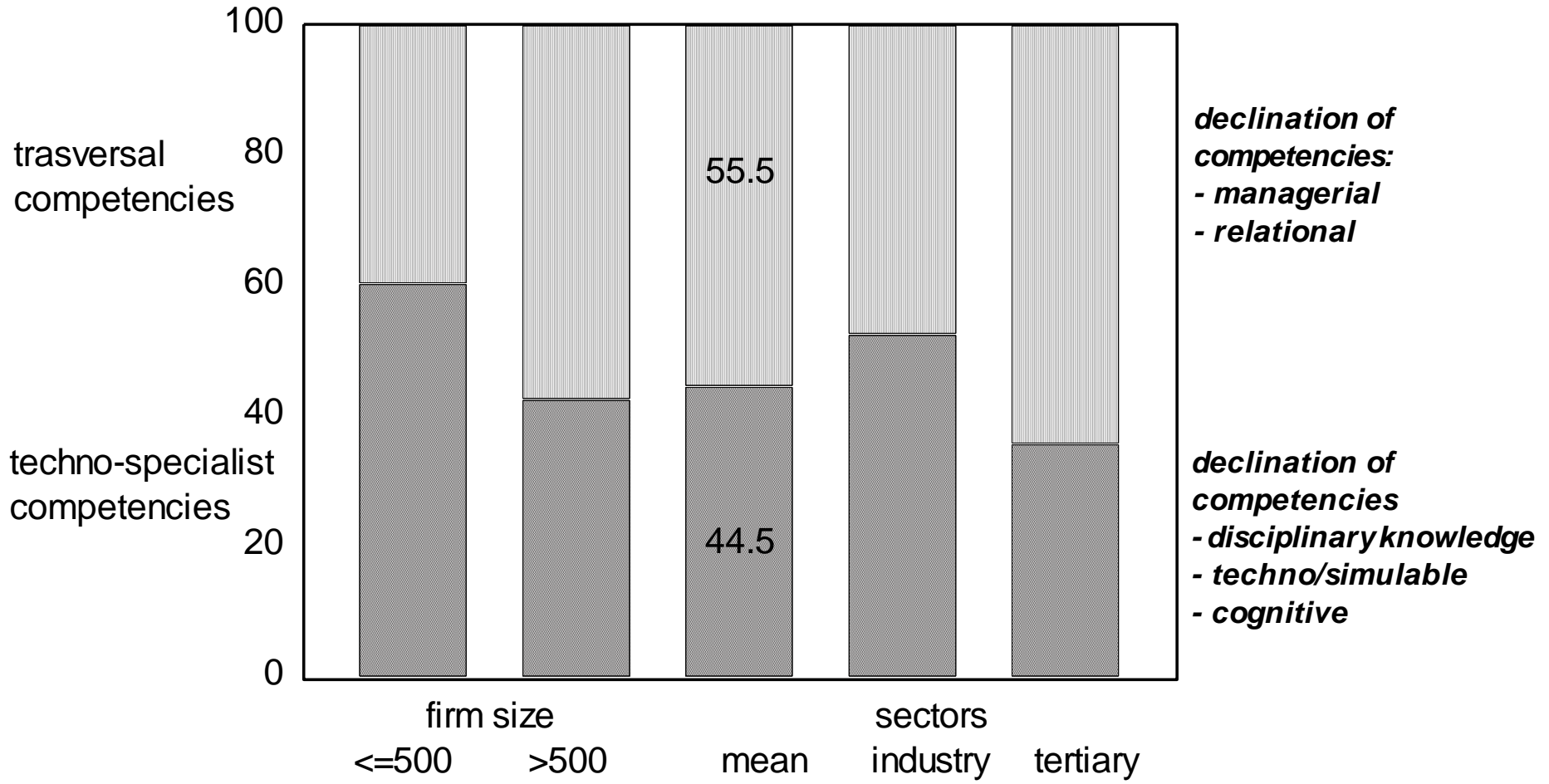
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Figure 1 – Development of competencies in the life-cycle depending on the possible gap between requested competencies (RC) and owned and expressed competencies (EC)

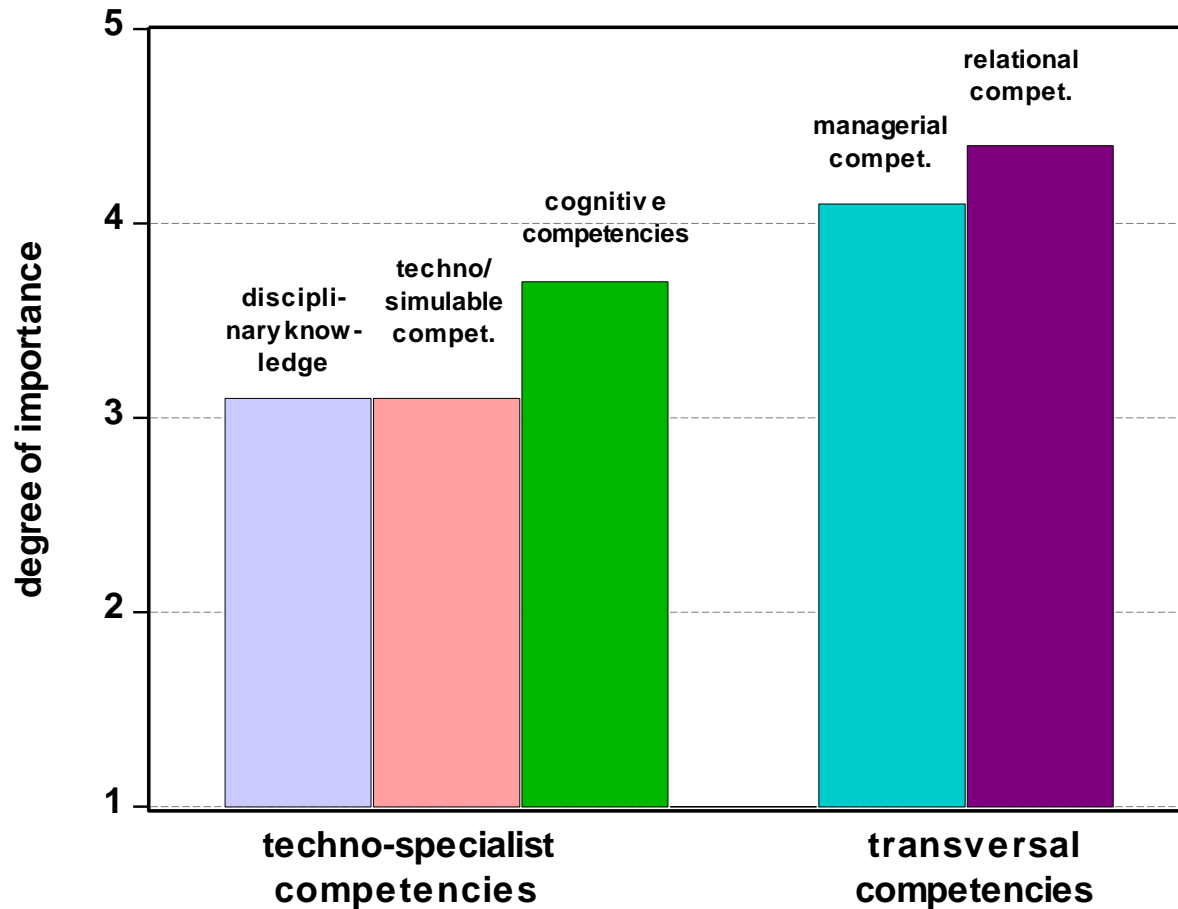


**Figure 2 - Competencies requested of new-graduates by firms at selection interviews
(weighted data)**



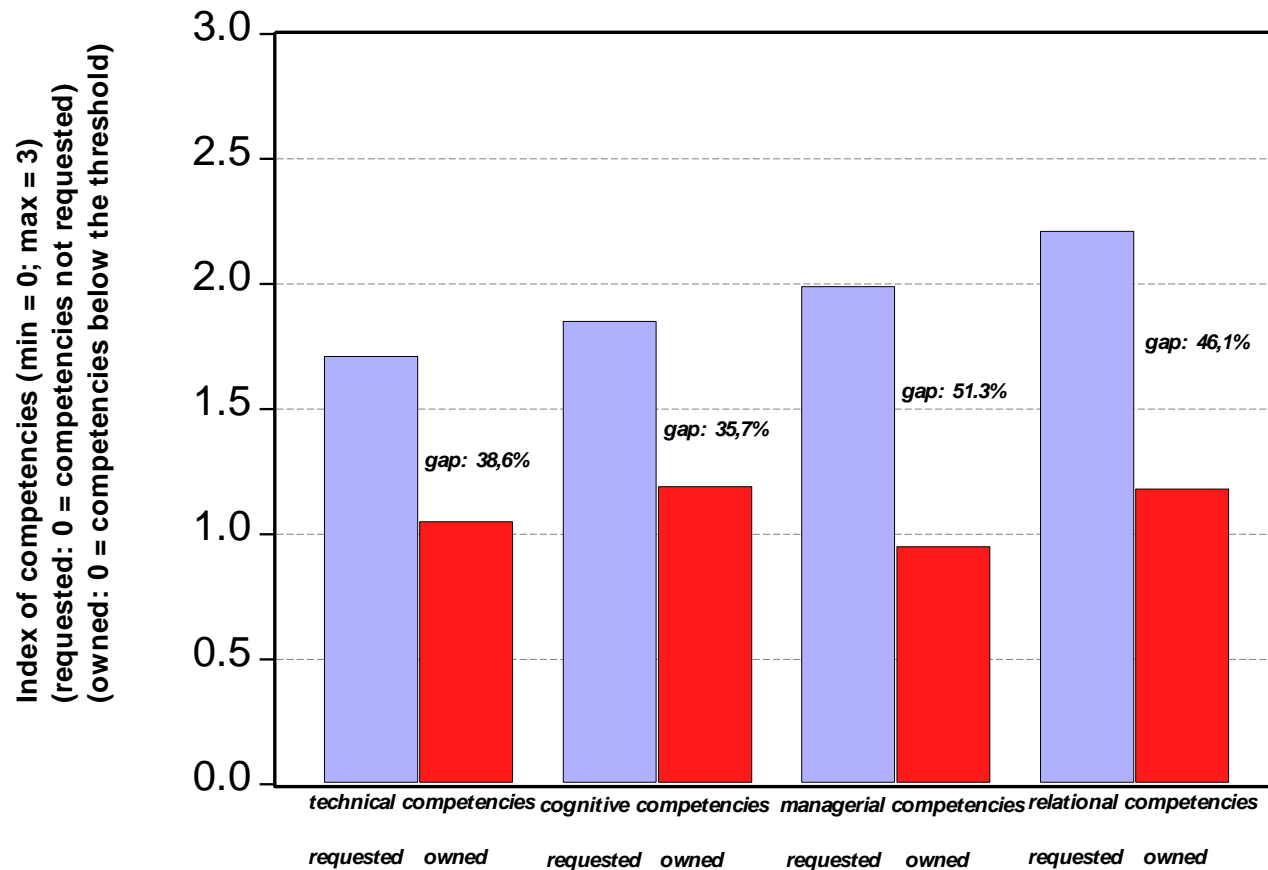
Source: Leoni and Mazzoni, 2006

**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

**Figure 5 - Levels and polyhedricity of competencies of graduates
(mean values by age-groups). ISFOL national survey: year 2004**

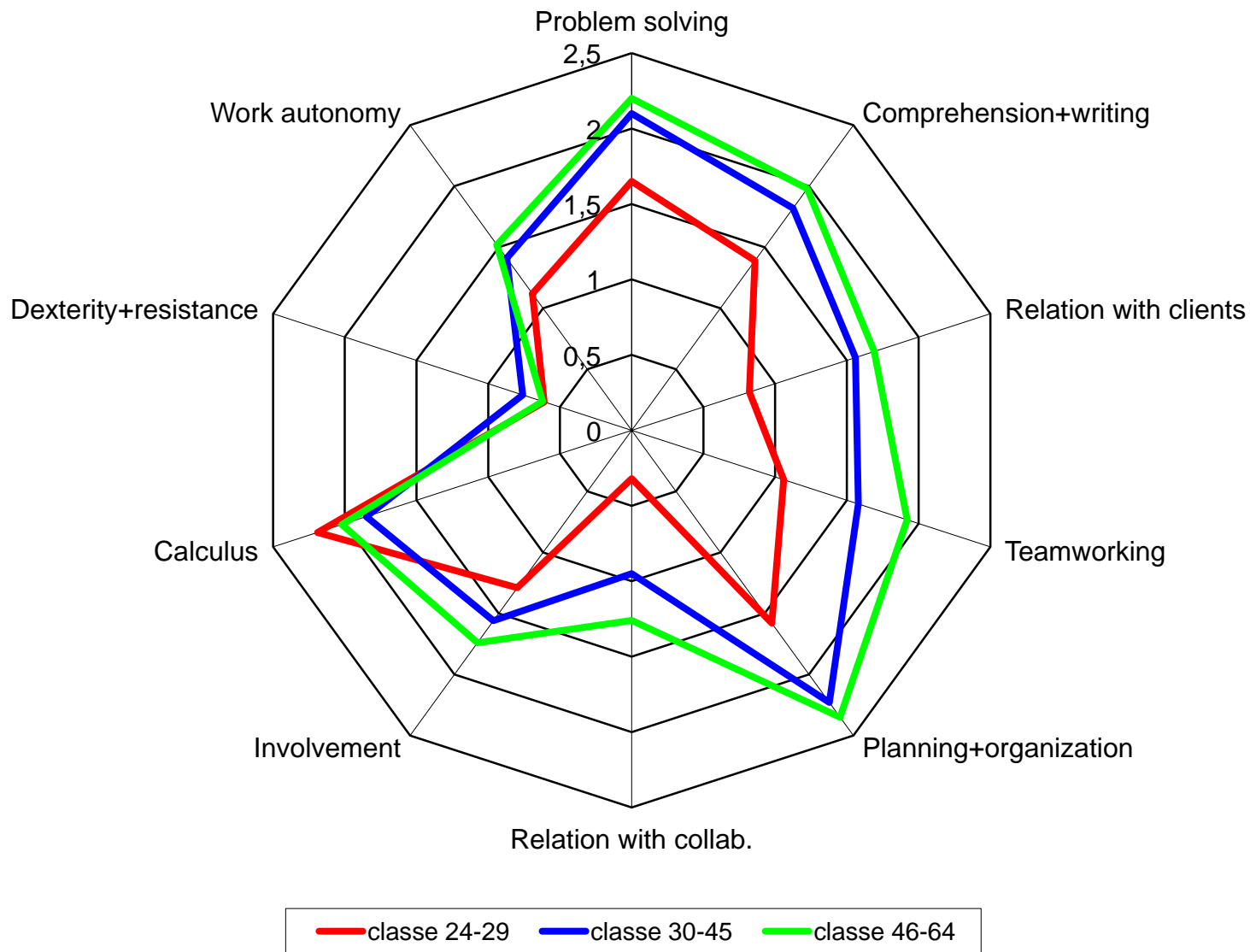
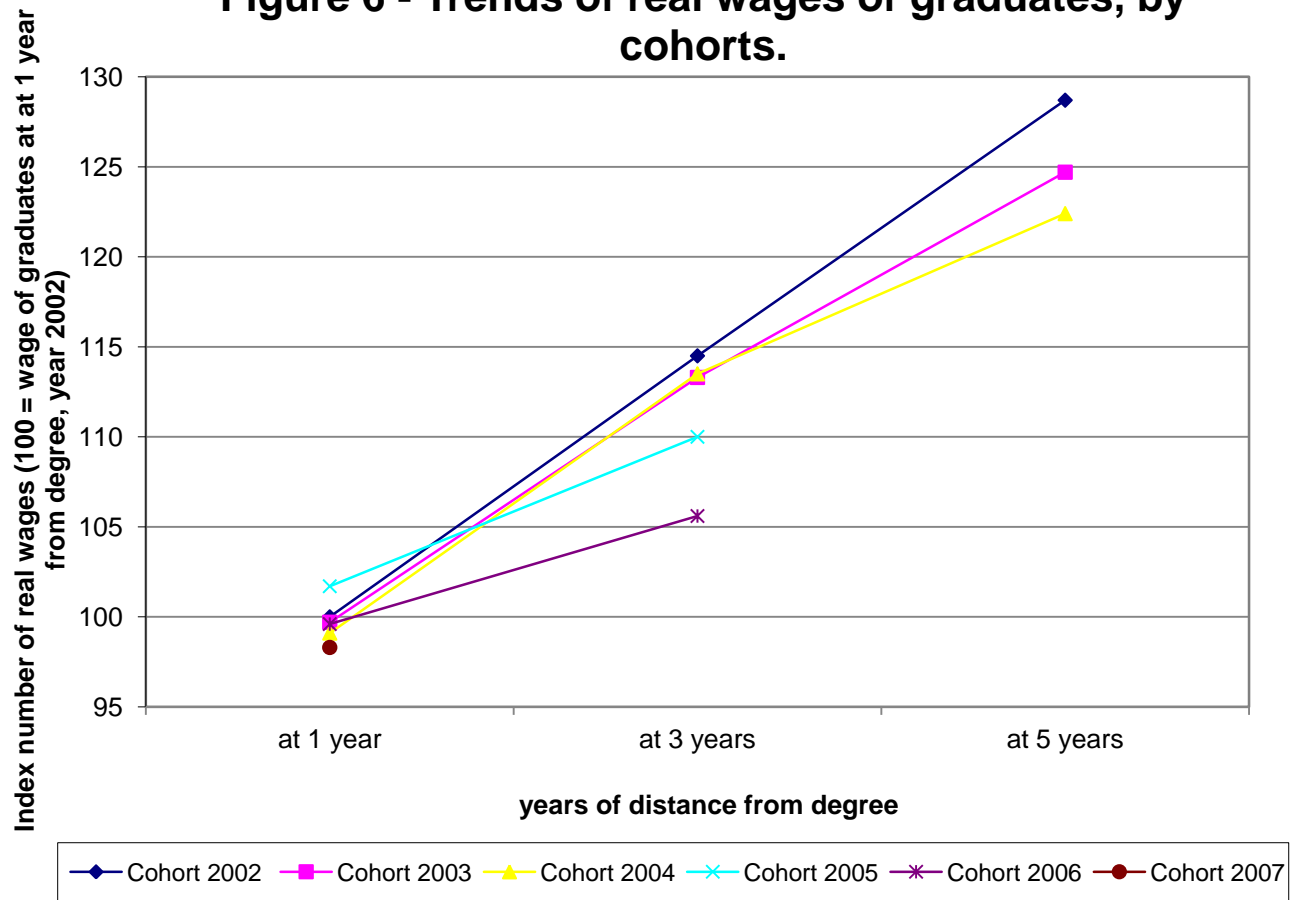


Figure 6 - Trends of real wages of graduates, by cohorts.



Source: AlmaLaurea (several years)

**Table 1 – Utilization of competencies acquired during academic formation.
Percentage distribution. Year 2008**

Level of competencies utilized:	Cohort at 1 year from degree	Cohort at 3 years from degree	Cohort at 5 years from degree
High level	44.7	47.8	52.2
Reduced level	37.4	39.6	38.6
Not at all	17.8	12.5	9.1
Total	100.0	100.0	100.0

Source: AlmaLaurea, survey of 2008 (pre-reform Bologna Process degrees)

Table 2 – Hedonic functions of earnings by graduates
(dependent variable: log of net average monthly earnings)

Independent variables:	[1] OLS	[2] OLS	[3] 2SLS^{+, ++}	[4] OLS
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 ²	0.001 ***	0.000	0.024	- 0.001 *
High level of utilization of competencies acquired during academic formation (1=high level; 0=reduced level/not at all)		0.019 ***	0.025 **	0.019 ***
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 and is continuing the work she/he did before the degree (1=yes; 0=no)		0.115 ***	0.165 ***	0.118 ***
Controls	no	yes	yes	yes
Constant	4.458 ***	4.691 ***	- 6.769	6.996 ***
Number of observations	16311	14288	14043	14013
R ²	0.038	0.359		0.353
F	212.161 ***	362.523 ***		331.548***
Wald Chi ² (22)			2931.98	
Prob > Chi ²			0.0000	
<i>Testing for regressor endogeneity: parents' years of schooling =0; age = 0; age² =0</i>				
1° stage: years of schooling F (3. 14020) (Prob>F)			77.1 (0.0000)	
1° stage: labour market experience F (3. 14020) (Prob>F)			9717.8(0.0000)	
1° stage: labour market experience ² F (3. 14020) (Prob>F)			472.7 (0.0000)	
<i>Formal tests for weak instruments</i>				
- Official years of schooling				
Partial R ²			0.126	
Robust F (3.14020)			77.097	
Prob >F			0.0000	
Shea's partial R ²			0.0004	
- Experience in LM				
Partial R ²			0.945	
Robust F (3.14020)			9717.85	
Prob >F			0.0000	
Shea's partial R ²			0.0008	
- Experience ² in LM				
Partial R ²			0.892	
Robust F (3.14020)			472.70	
Prob >F			0.0000	
Shea's partial R ²			0.0009	

Legend: p_value *** ≤ 1%, ** ≤ 5%, * ≤ 10%.

⁺ : instrumented variables: official years of schooling, experience and experience-squared.
instruments: parents' years of schooling, age and age-squared (at the time of interview).

⁺⁺ 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.

Source: AlmaLaurea. Cohorts of graduates 2004, interviewed at 1° October 2009.

Tab. 3 - 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	-0.181***	-0.162***
Establishment size	0.028***	0.131	0.027***	0.028***
Temporary contract (1=yes, 0=no)	-0.00009	-0.00009	0.009	-0.001
Part time (1=yes, 0=no)	-0.491***	-0.383	-0.501***	-0.498***
Years of schooling	4.083	6.246	3.943*	3.415
Years of schooling ²	-0.102	-6.240	-0.098*	-0.085
Years of experience in LM	0.018***	0.219	0.023**	0.027**
Seniority	0.008	0.079	0.003	0.001
Level of overall expressed competencies	0.202***	0.261	0.205***	0.184***
Controls	yes		yes	yes
Constant	-34.217	0.261	-32.843	-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 chi² (24)</i>			685.656	703.672
<i>p_value</i>	0.0000		0.0000	0.0000
<i>R²</i>	0.743			
<i>Sargan test</i>			2.419 (p_v=0.120)	
<i>Hansen J test</i>				1.397 (p_v=0.237)
<i>Shea's partial R²</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> experience in LM, seniority and overall competencies				
<i>Instruments:</i> age, dev_seniority from the sectoral mean, dev_seniority, dev_competencies from the mean of professional occupations.				

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).