

## UNIVERSITY OUTCOMES AND EMPLOYABILITY: IS A HARMONISATION FEASIBLE?

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**Abstract.** *Planning the tertiary educational offer in terms also, even if not only, of the actual numerical outcome, has been so far a somehow vexed question. Recently, though, formal requirement for sustaining youth placement, harassed by the long lasting difficult economic situation, has met the great and successful effort by national statistics agencies in identifying the labour market demand with reasonable approximation. The paper explores some statistical methods and informative sources apt to include into university trajectories also, even not only as easily understood, the perspective number of positions for graduates required by the labour market. The purpose is to face the issue of an efficient dual cooperative communication between the academic and the working spheres, in the direction of matching students' professional aspirations and their fulfilment, in new ways that help reduce the incidence of phenomena linked to rushed choices among graduates at work.*

**Keywords.** *Transition from university to the labour market, Tertiary education, Weighing system, Employability.*

### 1. INTRODUCTION

The quantitative assessment of the labour market's professional needs (Bresciani *et al.*, 1992), in terms of either the type or the number of job opportunities, is far from being explicitly embodied in the university curricula design. This is the state of art, despite an openly admitted need to modernise higher education with a view to meeting the real-world needs of the European job-market (Cedefop, 2008) and even though the European institutions stated long ago the high priority of a substantive professional needs forecast<sup>2</sup> (European Union, 2001), within the frame of a

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<sup>2</sup> With regard to European legislation on the issue, among the others, we mention here: the resolution of the Council of the European Union, 13 July 2001 on the role of education and training in policies pertaining to employment, G.U.C.E. C 204, 20/07/01; the Resolution of the Council of the European Union, 19 December 2002, on promoting wider European cooperation in education and professional training, G.U.C.E. C 13, 18/01/03.

common strategy of the European Union for employment. The European Community targeted at outdoing the 'double track' system based on two separate directions of the educational system and of the labour market, in favour of a unitary perspective of professional requirements systematically treating the need for knowledge within the framework of the right to education and the labour market's training requirements (ISFOL, 2003).

In order to analyse the request for jobs, it becomes a priority to identify both the instruments needed for developing specific professions and the actors that allow the balance between the demand and the offer of labour. So, this process results as the necessary starting point for coordinating employment and education and training interventions.

Institutionally, in Italy meaningful experiences on the theme of job requirements have been put recently into practice, besides Unions and Unioncamere<sup>3</sup>, by so called bilateral bodies, such as the Bilateral Committee for Education (established by Confindustria, the General Confederation of Italian Industry, together with trade unions) and the Bilateral Crafts Board (formed of crafts confederations). These experiences, developed within the framework of the contract stipulated by the Ministry of Labour in July 1966, the Regional Districts and Social Parts with the aim of specifying models and ways for a continuous survey on education and professional requirements, pertain a wider institutional frame in which the quantitative assessment of the labour market is an essential element in higher education programming.

At present, the issue of graduates' placement has permeated academic formal guidelines, in line with D.M. no. 270/04, even though the evaluation of the academic performance in terms of the real demand for specific jobs tends to represent a vexed question. It is widely known, indeed, that this decree stresses the need for coherence between the educational offer and the effective requirements of the labour market. In particular, it emphasises the *curricula studiorum* projects and it underlines the need, for the university system, to look even deeper to the real dynamic of the labour market. A composition of courses, in terms of both scientific areas and number of credits, has to be chosen in line with the declaratory of the pertaining area, so as to effectively respond to requirements of jobs stated in the offer. Only in this way, indeed, the probability for a graduate to find a suitable job, coherent with her/his training, is maximised. In order to reach the latter priority, the university system needs to move forward the labour market. In essence, once having

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<sup>3</sup> Unioncamere is the denomination for the domestic Union of Chambers of Commerce.

defined the profession the undergraduate is to be trained for, its characteristics are to be examined, the professional profiles operating in it and the required competencies are to be identified and, finally, all this information is to be included in the educational programme. The approach henceforth advanced aims at harmonising, in the design of the tertiary offer, the growth of students' professional aspirations linked to their effective achievement, in order to promote, safeguard and enhance resources and investment in education by younger generations. All the more so, in light of the urgency of an early identification and anticipation of skill needs (Cedefop, 2008).

## **2. DATA SOURCES ON JOB NEEDS: THE FOCUS ON JOB FORECAST**

The gap between the amount of graduates and the number of jobs offered changes its values in relation to different degree courses. The reduction or, at least, the decrease of this discrepancy requires the scopes of the quality of education to coexist and be coherent with the accessibility to the labour market (Cedefop, 2001; Palomba *et al.*, 2003). In line with this approach, the objectives of both project and effective coherence between educational and professions have been dealt (Civardi *et al.*, 2008) moving from the information derived from the O\*Net system set on line by the U.S. Department of Labour (United States Department of Labour, 1982). In this way, each U.S. job, identified for the specific sectors of economic activity, can be associated with the knowledge required for its hiring and, from the latter ones, with the Italian scientific areas (SSD) that group disciplines (courses and other didactic activities) to be included in the regulation of the degree course).

The most important professional profiles were selected for a specified economic area from the O\*Net database, on the ground of the "*Relevance*" Score (RS), where the *relevance* of a job is defined as its consistency with the sector of economic activity under exam, within the U.S. domestic economics. It is therefore an indicator, with a score on a scale from 0 to 100, of the relevance degree of the profile within the sector in that context. Entering in O\*Net the keywords that describe the sector in exam, a list of  $n$  consistent job profiles is obtained, in decreasing order of RS values. A suitable *cut off* value is fixed according to a threshold, determining a vector of *Relevance Scores* related to each job profile.

Then, the position of a job within the sector is obtained from O\*Net by means of Social Network Analysis (SNA), providing information on the overlapping of disciplinary knowledge with other jobs or, on the contrary, on its uniqueness. At the core of this choice lies the concept of a sector as a set of jobs (and of corresponding workers operating in it), where the examination of both the position occupied by a

job within the sector and its connections with other jobs allows one to improve the understanding of its real role. The analysis of SNA relational data provides useful information, when programming the educational offer, both to the description of the sector and to the adjustment of the weight to be given to each job, so as to increase its original RS values in line either with the amount of knowledge in common with other jobs or with its occurrence in several sectors of activity. The results, named Corrected Relevance Score, CRS, represent the first approximation weights.

This note intends to provide an analytic tool for smoothing possible departures of the CRS from the actual chances of entering jobs in line with the educational title gained, in the direction of an harmonisation of the number of graduates in a time interval with the number of demanded jobs, henceforth assumed, for simplicity's sake, in a given time interval, typically a year. First approximation results need therefore to be recomputed, in light of the actual demand for the specified jobs in the labour market. Under a static point of view, the misrepresentation bias is typically adjusted introducing a weighing system for reshaping the relevance of each job in the light of the employment availability in a defined time period and in the territorial context of destination of these job profiles. As a weighing variable, we adopt job needs (in relative terms) expressed by enterprises with reference to the next future, typically the next solar year, so that weights are a suitable function of the probabilities for enterprises to employ the specific jobs. This weighing system is henceforth termed of second approximation, since it corrects the first approximation scores so as to make them consistent with the sector and to maximise graduates' chances to find a job that matches the human capital accumulated at university.

The prospect is to approach numeric *coherence*, allowing the outcome amount with specific competencies to converge to the number of the corresponding demanded positions as expressed by the labour market. This information cannot be derived by mere extrapolation of employment data referred to the most recent periods as collected through the Eurostat labour force surveys. Besides time series not being often long enough to the purpose, the latter surveys reproduce companies' current events but do not reflect their viewpoints and plans. Indeed, the quantification of data related to enterprises hiring strategies requires *ad hoc* surveys (Cedefop, 2008). Quantitative information on the composition of the demand for professional profiles is therefore needed, in terms of the forecasted jobs that companies are about to hire in the next future, usually in the subsequent calendar year.

Several statistical instruments have been applied in the context of the European Union (Cedefop, 2008). On a domestic ground, this data need has been largely met by Unioncamere through the Excelsior Information System, a permanent system for employment and training created by Unioncamere jointly with both the

Ministry of Labour and Social Policies and the European Social Fund (Centro Studi Unioncamere, 2012). Excelsior data are gathered from chambers of commerce, from other administrative archives, and from interviews conducted directly in over 100,000 companies with at least one employee, classified with reference to the economic sector and company size. Interviewed companies are asked to communicate in detail their job needs for the current year. Interviews performed by Excelsior with entrepreneurs make it possible to forecast incoming and outgoing flows of employees and professional profile requirements (on characteristics of recruitment, on jobs, on the sector and on their territorial allocation). The link between Excelsior data and the ISTAT labour force survey allows the Excelsior System results to be framed in a wider context of demand/supply matching in the labour market, giving rise to both methodological advances and consolidation in data collection. With reference to profession types, Excelsior specifies also a classification (as in the corresponding dictionary of professions) comparable with other sources and official classifications and at the same time sufficiently flexible to capture changes in the job market. Since the 2001 edition of the survey (referring to forecasts for 2002), elementary professions have been classified according to the European classification ISCO-88 (International Standard Classification of Occupations), whose promoting board is the International Labour Office (ILO) in Geneva. In some cases, descriptions associated with codes are modified according to the ISTAT guidelines, the purpose being to explicit them better, to highlight specific features of the phenomenon under study (mainly with reference to private employment) and to include professional groups that were not – or not sufficiently – considered before.

Owing to the extent and depth of its field, Excelsior is an important tool for investigating the conjuncture of the labour market and the relative structural adjustments in term of emerging professions and training needs. In this regard, we need only consider that the information it produces is a fundamental part of the “National system of permanent observation of training and occupational needs in Italy”. The system is built on collection and optimisation of project outcomes and available information on skill needs anticipation. It was developed by ISFOL under assignment of the Ministry of Labour and Social Security within the European Social Fund (ESF) programme 2000-06. It is designed as an interface available from the Internet (<http://fabbisogni.isfol.it>) to provide a flow of information (qualitative, quantitative and estimates) on training needs emerging from economy and the labour market. This system combines data and information coming from different sources: descriptions of training needs arising from national survey conducted by social partners established in bilateral bodies; short-term hiring forecasts of the project Excelsior realised by Unioncamere; mid-term (five years)

forecasts of economic employment trends for sectors of activity based on reports conducted by ISFOL; mid-term (five years) forecasts on employment career's perspectives both at national and regional level based on reports conducted by ISFOL.

The strong points of the national system of estimation of needs include the possibility to proceed to a systemic intervention able to integrate sectorial dimensions into the national context. Nevertheless, some obstacles are still to be addressed, such as the need to harmonise initiatives at the national and at the local level.

**Table 1. Employment forecast of O\*Net jobs in the Marketing sector, in Lombardy, in absolute values and as a percentage of the total number of newly employed for: a) the sector, b) three neighbouring sectors (Marketing, Advertising, Trade Fairs and Events Organisation), c) the whole economic sector ATECO74**

Job type	Absolute values	Percentage		
		a	b	c
Commercial manager	14	8.33	2.50	0.07
Project manager in the service sector	5	2.98	0.89	0.02
Clients technical assistant	60	35.71	10.73	0.29
Sales manager	1	0.60	0.18	0.00
Market research analyst	11	6.55	1.97	0.05
Payroll clerk	1	0.60	0.18	0.00
Human resources assistant	8	4.76	1.43	0.04
Administrative assistant	20	11.90	3.58	0.10
Tax advisor	9	5.36	1.61	0.04
Accountant	7	4.17	1.25	0.03
Data entry keyer	3	1.79	0.54	0.01
Engineering technician	2	1.19	0.36	0.01
Computer and information specialist	1	0.60	0.18	0.00
Budget analyst	1	0.60	0.18	0.00
Secretary	15	8.93	2.68	0.07
Stock clerk	11	6.55	1.97	0.05
<b>Total number of new jobs</b>	168	168	333	3651
<b>Column % on total number of new jobs</b>	–	100	30.03	0.83

Source: our computations on Excelsior data

Nonetheless, the key role of Excelsior in the statistical assessment of job needs is undeniable. Henceforth, the Lombardy Region is regarded as an area of absorption of graduates in the three macro-sectors of Market research, Trade fairs

and Event organization and advertising, belonging to the sector 74 of “industrial services” in the Ateco 2007 classification<sup>4</sup> (Tab. 1).

### **3. EMPLOYABILITY AS A WEIGHING SYSTEM**

In order for the university outcome to approach numerical coherence with the job offers, the basket of professional profiles that defines the academic offer needs to encounter job needs expressed by enterprises for the next future, since the enterprises intentions are a suitable approximation of their probabilities of hiring specified jobs (Civardi and Crippa, 2008). In a statistical outlook, this spectrum of jobs offered by a university can be conveniently shaped as a weighing system, each weight conveying the quantitative importance of a single job profile in light of the labour market requests in a given period and in a specific geographical area. The process leading to the identification of weights moves from the notion of relevance of a profession, with respect to the sector of economic activity under study. The weights for the  $n$  professional profiles in a sector of activity can then be formulated in terms of a vector of scores, on a 0-100 measurement scale. In order to adopt the CRS previously introduced as weights with regard to each job, though, a new proportion needs to be assigned to every CRS in order to inflate or deflate it in agreement with the requirements of the job market, as expressed by companies. The total number of jobs involved, of course, is determined by the respective total amount of different professions in the Market research sector, chosen here as an example.

The first step in reassigning a proportion requires the assumption, underlying the vector **CRS**, of a discrete uniform distribution of profession, *id est* of all professions equally required. Hence, the range of the increase or the decrease of the original weights CRS will be commensurated to the distance, in relative terms, from the situation of uniformity.

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<sup>4</sup> The acronym ATECO stands for “Statistical classification of economic activities in the European Community”. It is the subject of legislation at the European Union level, which imposes the use of the classification uniformly within all the Member States and it is based on classifications of the UN Statistical Commission (UNSTAT). In our work we refer to NACE classification (Rev. 1.1) approved in the Commission Regulation n. 29/2002, published in the *Official Journal of the European Communities* Series L n.45, 10/1/2002. Data available at the time of the survey in the paper refer to this version. The current Istat updating of this classification of economic activities is the ATECO 2007, come into force the 1st January 2008. This classification constitutes the National version of the European nomenclature, NACE rev.2, published on the Official Journal on the 30rd of December 2006. The performance of the survey precedes in time this update.

In order to illustrate our proposal, let us denote:

$n_r$ : jobs in the  $r$ -th sector of activity that the university indicates as an occupational outlet for future graduates;

$\mathbf{CRS}_r$ : the vector of dimensions  $(n_r, 1)$  of corrected weights  $CRS$  of the  $n_r$  professional profiles; the element  $CRS_r(i, 1)$  represents the  $CRS$  assigned to the  $i$ -th job belonging to the sector of activity  $r$ .

$\mathbf{ASR}_r$ : the vector of dimensions  $(n_r, 1)$  of the overall number of jobs forecasted by companies for each  $n_r$  professional profile in the sector.

$\mathbf{AS3}_r$ : the vector of dimensions  $(n_r, 1)$  of the number of jobs predicted by companies in all the three sectors of activity for the  $n_r$  job in sector  $r$ .

$\mathbf{AST}_r$ : the vector of dimensions  $(n_r, 1)$  of the number of jobs predicted by companies in all ATECO74 sectors for the  $n_r$  job.

$\mathbf{TASR}_r = \mathbf{1}' \cdot \mathbf{ASR}_r$ : the total number of forecasted jobs in sector  $r$ , where  $\mathbf{1}'$  is the unitary row vector of dimensions  $(1, n_r)$ .

$\mathbf{TAS3}_r = \mathbf{1}' \cdot \mathbf{AS3}_r$ : the total number of forecasted jobs in the three sectors.

$\mathbf{TAST}_r = \mathbf{1}' \cdot \mathbf{AST}_r$ : the total number of forecasted jobs in all ATECO74 sectors.

$\mathbf{MASR}_r = \mathbf{1} \cdot \mathbf{TASR}_r/n_r$ : the vector of dimensions  $(n_r, 1)$  whose elements are the average number of forecasted jobs in sector  $r$  for each  $n_r$  profile.  $\mathbf{1}$  is the unitary vector of dimensions  $(n_r, 1)$ .

$\mathbf{MAS3}_r = \mathbf{1} \cdot \mathbf{TAS3}_r/n_r$ : the vector of dimensions  $(n_r, 1)$  whose elements provide the average number of forecasted jobs in the three.

$\mathbf{MAST}_r = \mathbf{1} \cdot \mathbf{TAST}_r/n_r$ : the vector of dimensions  $(n_r, 1)$  whose elements represent the average forecasted jobs in the whole ATECO74 sectors for each  $n_r$  profile.

$\gamma = 1/n_r =$  weighing parameter<sup>5</sup>

Alternatively, we determine:

$$\mathbf{FJR}_r = \mathbf{1} + [\mathbf{ASR}_r - \mathbf{MASR}_r] / (\gamma \cdot \mathbf{TASR}_r) \quad (1)$$

the vector of dimensions  $(n_r, 1)$  of the first variant of the weighing system of second approximation<sup>6</sup>, where  $0 < \gamma < 1$ .

<sup>5</sup> The weighing parameter  $\gamma$  conveys the intensity of the correction related to  $CRS$  weighing system. Its lower bound prevents  $\gamma$  from assuming negative values. The distance between weights grows as  $\gamma$  grows, possibly due to the rise in the differential relevance pertaining the temporary most required labour sector and, at the same time, deflates the relative weight for the temporary least demanded sectors.

<sup>6</sup> It should be noted that, in general,  $n_r > 1$  since the educational offer specifies more than one professional profile. Therefore, when the requested profiles exceed the average number of positions,  $\mathbf{FJR}_r > 1$  and, if the requests are below the average,  $0 < \mathbf{FJR}_r < 1$ . In the borderline case of  $n_r = 1$ ,  $\mathbf{ASR}_r(1, 1) = \mathbf{TASR}_r = \mathbf{MAS}_r(1, 1)$  and, therefore,  $\mathbf{FJR}_r = 1$ .

$$\mathbf{FJ3}_r = \mathbf{1} + [\mathbf{AS3}_r - \mathbf{MAS3}_r] / (\gamma * \mathbf{TAS3}_r) \quad (2)$$

the vector of dimensions  $(n_r, 1)$  of the second variant of the weighing system of second approximation

$$\mathbf{FJT}_r = \mathbf{1} + [\mathbf{AST}_r - \mathbf{MAST}_r] / (\gamma \mathbf{TAST}_r) \quad (3)$$

the vector of dimensions  $(n_r, 1)$  of the third variant of the weighing system of second approximation.

For simplicity's sake,  $\mathbf{FJ}_r$  will hereafter denote the vector  $(n_r, 1)$  of the chosen weighing system of second approximation. On the basis of formulas [1]-[3], each element of  $\mathbf{FJ}_r$  will assume value 1 when the number of forecasted jobs for the corresponding professional profile equals the average (of the sector, of the three sectors, of the whole ATECO74 sector respectively). Its value will be  $< 1$  when the number of forecasted jobs is below the average, whereas it will be  $> 1$  when the number of forecasted jobs for the profiles is above the average. With particular reference to the first variant (weights  $\mathbf{FJR}_r$ ), the minimum weight corresponds to profiles with zero forecasted jobs (element  $ASR_r(i)=0$ ) that equals  $[1 - MASR_r(i) / \gamma TASR_r = 1 - 1 / \gamma n_r]$ . On the other hand, the maximum weight would occur in the border case where all forecasted jobs pertain the  $i$ -th profile only, so that  $ASR_r(i)=n_r$  and  $ASR_r(j)=0$  for  $j \neq i$ ; in the latter case, the weight for the  $i$ -th profile would equal  $[1 + (1 - 1 / n_r) / \gamma]$ .

The numerical synthesis of the two weighing levels is obtained by multiplying each element of the vector  $\mathbf{CRS}_r(n_r, 1)$  by the corresponding element of the vector  $\mathbf{FJ}_r(n_r, 1)$ , hence determining the vector  $\mathbf{RSD}_r$  of dimension  $(n_r, 1)$ :

$$\mathbf{RSD}_r = \hat{\mathbf{CRS}}_r \cdot \mathbf{FJ}_r \quad (4)$$

where  $\hat{\mathbf{CRS}}_r$  is the diagonal matrix of the elements of the vector  $\mathbf{CRS}_r$ . The element  $RSD_r(i)$  represents the final weight to be assigned to the  $i$ -th professional profile.

#### 4. CHANGES IN QUALIFICATIONS AND PROFESSIONAL PROFILES: TRACKING CONTINUITY

The issue of changing skills needs for changing job profiles has become a target for the European Union that promoted the initiative 'New Skills for New Jobs' in order to improve both anticipation of future skills needs and matching skills and labour market needs (Council of the EU, in Cedefop, 2008, p. 4). This target highlights a crucial theme, i.e. comparability in time and place among jobs, that can differ substantially even when masked by a similar, or even by the same, formal designation. This is all the more relevant in the present competitive environment

with large, complex organisations, where jobs comparability is based on a competency-based approach and where the capabilities that individuals need to acquire and develop should be the major focus (Lawler, 1994).

The comparability issue is at the core of our models, as the vectors  $CRS_r$  e  $FJ_r$  must have the same dimension, in order to determine the vector  $RSD_r$ . This implies that, for the sector  $r$ , the job forecast coincides with the amount of professions considered by universities. If the profiles selection that leads to the vector  $CRS_r$  could be based on the National System of Permanent Monitoring of Job Needs (Isfol, 2008), this requirement would be satisfied with respect to both the number and the nomenclature of jobs. In fact, data concerning the 811 professional units identified by this system refer to the Italian job market. At present, however, due to its recent introduction, the ISFOL system is not complete yet. Consequently, as aforesaid, the vector  $CRS_r$  has been determined referring to the U.S. market as presented by O\*Net<sup>7</sup>. The Excelsior System is the reference for determining the vector  $FJ_r$  discussed in the previous paragraph. For this reason, for determination of the vector  $FJ_r$ , professional profiles of the Excelsior forecast must match those in the vector  $CRS_r$ , in a biunivocal correspondence.

Overall, with respect to Market research sector, the criterion of correspondence applied in the comparison between Excelsior and O\*Net jobs seems satisfactory, since the levels of detail of the two nomenclatures are generally similar. However, the setting of a system of equivalences raises both methodological and operational questions. Firstly, flaws in correspondence arise not only from numerical discrepancies<sup>8</sup> but also from different dictionaries, the one-to-one correspondence implying an intervention not free from subjective judgment. We encountered different circumstances (Fig.1).

Firstly, a correspondence may be lacking, as in the case of the actuary job, among O\*Net professions but not the Excelsior ones, in the sector for the year considered. Otherwise, a perfect equivalence may be lacking, as in the case of the profession “Industrial relations psychologist, a specialisation that can be ascribed to the more general job Work psychologist” in Italy. Again, a single O\*Net profession may correspond to a maximum of 6 Excelsior professions, while a single Excelsior job may correspond to a maximum of 3 O\*Net professions. Finally, it may happen that two (or more) Excelsior jobs correspond to the same set of O\*Net professions.

<sup>7</sup> The O\*Net system is here taken as a reference. For domestic references at this regard, see the Atlas of Profession by the University of Turin, that maps professional profiles throughout its study programme offer (see <http://www.atlantedelleprofessioni.it/index.php?ID=2>).

<sup>8</sup> For instance, 67 jobs were identified in the Market research sector in 2006 it considered, one less than the 68 identified through O\*Net.

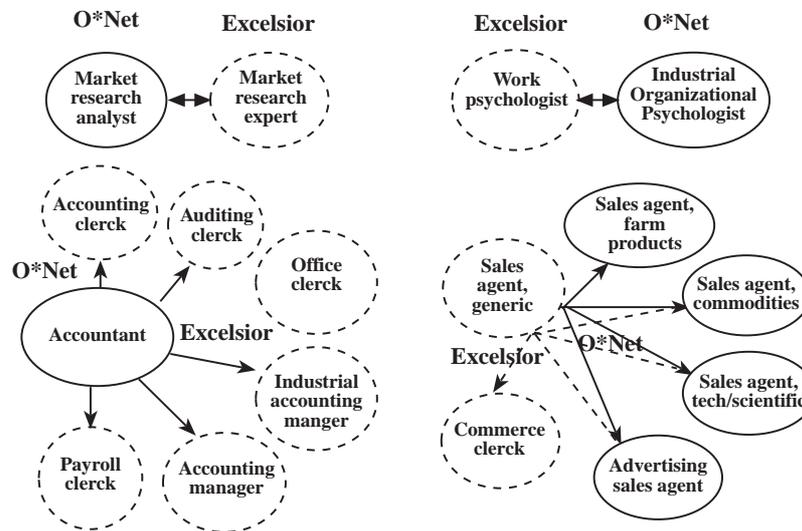


Figure 1: O\*NET and Excelsior equivalence system typology a) 1:1 equivalence, b) ‘indistinct’ equivalence, *i.e.* without the same level of specialization, c) one profession corresponding to more professions, d) many to many possible equivalence

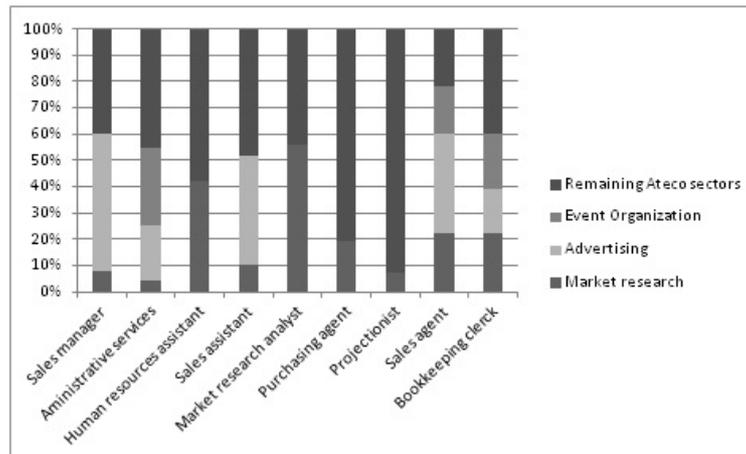
### 5. SHAPING EMPLOYABILITY INTO A UNIVERSITY PERSPECTIVE

As aforementioned, second approximation weights derive from the composition of the quantitative demand of professional profiles. The Excelsior source therefore appears to be the inevitable choice for computing and validating the second approximation weighing system and its forecast are taken into account with respect to jobs as introduced earlier in paragraph 2.

Certainly, among the priority objectives pursued by universities in job placement are the maximisation of both the number of graduates who find a job consistent with their degrees and the employability of graduates. The proposed second approximation weighing is a flexible analytical tool for decision-making by university governance bodies. Indeed, the three weighing alternatives refer to the number of jobs forecasted by companies with reference to each of the  $n_r$  professional profiles compared with the total job forecast in a specified geographical setting. Three scenarios are projected: the first considers the total number of new jobs in the  $r$ th sector only (*i.e.* Market research); the second takes into account the aggregation of three sectors (Market research, Advertising and Trade fairs, and Event organization); and the third considers the entire sector of advanced services for companies.

Computational solutions therefore stem from the potential economical area that the university outcome plans to address. In other words, governance bodies will pursue the target/s sector/s for their graduates in the labour market from three

distinct perspectives: maximising employability in the entire Ateco74 sectors, in the aggregation of three sectors, and in one only (Fig. 2).



**Figure 2: Distribution of relative weights of some O\*Net professions in in three subsectors and in the remaining Ateco74 (our calculations on Excelsior data)**

The prospect of employment and, consequently, the objective function, becomes more specialised the more it addresses niche sectors. The trade-off in university curricula between cross-job and specialised skills is greatly affected, not only by the characteristics of the job and the width of the relative market segment, but also by the economic conjuncture and by company size. In regard to the latter trait, let us consider the only fact that small and medium-sized enterprises require far more employee versatility than big companies do, as the latter assign a set of fixed tasks to distinct roles. Indeed, if the target market segment is a high-qualification niche, the demand for some specialised competencies will expand remarkably. The education and training system has the duty, and the challenge, to consider carefully its function in preparing young graduates. Consequently, it needs to incorporate forecasts on individual jobs in university curricula planning, in order to provide reference criteria for both university educational guidance and job placement systems.

## 6. CONCLUSIVE REMARKS

In this paper we explored some ways to shape university curricula in the light of forecasts on jobs, trying to identify a starting point towards quantitative integrated information on the demand for graduates into undergraduate profile strategies, so

as to facilitate graduates' talents and desires in translating into actual career paths. The phenomenon of intellectual underemployment (overeducation) – *i.e.* entry into a job requiring qualifications and abilities markedly inferior to those accumulated by graduates, is undoubtedly detrimental to the human capital of young people. Equally detrimental is the mismatch between the demand for and the supply of their work (Pietro and Urwin, 2006; Mariani and Zavanella, 2008), where the demand and supply of high-skilled labour diverges because of differences in professional positions and/or their different geographical locations.

When trying to find some cues for reframing university educational guidance, we have run into some issues that appear to be crucial for facing the matter. On the one hand, currently available sources for the regional system of job forecasting has shown irregularities both in classifications and in the nomenclature of jobs that pose comparability questions. On the other hand, the richness of these databases raises the chance of a fruitful application of statistical matching, recently focussing on merging of information from different sources (Sisto, 2006). Indeed, the available surveys, considered separately, often lack information necessary for exhaustive scrutiny of the object of interest, whereas recent developments have gone so far as considering statistical units that differ partially or even including variables not shared by all sources. To this regard, the so-called *propensity score* (Rubin, 1974; Rosenbaum and Rubin, 1983) has become the dominant approach (Biffignandi and Pratesi, 2003; Ichino *et al.*, 2004; Sisto, 2006). Merging sources, in a future advance as inner in this article, could reduce the limitations inevitably encountered when devising a weighing system whose purposes are convergence and harmonisation between the transition of young people to employment and their reception in the world of work.

A quantitative approach to university outcome certainly cannot be regarded as a flawless remedy and should be integrated by other sources of information. Nonetheless it turns out as an essential basis, thanks, among the many aspects, to its suppleness in disclosing faces of a complex, multifaceted reality.

## REFERENCES

- Biffignandi, S. and Pratesi, M. (2003). Potentiality of propensity scores methods in weighing for Web surveys: A simulation study, *Quaderni del Dipartimento di Matematica, Statistica, Informatica e Applicazioni*, n. 1, Università di Bergamo.
- Bresciani, P., Gatti, M., Tagliaferro, C. and Taronna, P. (1992). Lineamenti per un modello di rilevazione dei fabbisogni professionali a livello locale, *"Osservatorio Isfol"*, (14): 131-161.
- Cedefop (2001). *The Transition from Education to Working life. Key Data on Vocational Training in the European Union*, Luxembourg, Office for the Official Publications of the European Communities.

- Cedefop (2008). *Systems for Anticipation of Skill Needs in the EU Member States*, Cedefop working paper, N.1.  
[http://www.cedefop.europa.eu/en/Files/WORKING\\_PAPER01\\_OCT2008.PDF](http://www.cedefop.europa.eu/en/Files/WORKING_PAPER01_OCT2008.PDF).
- Centro Studi Unioncamere (2012). Indagine Excelsior III trimestre 2011,  
<http://www.unioncamere.gov.it/P42A780C189S123/Indagine-Excelsior-III-trimestre-2011>.
- Civardi, M. and Crippa, F. (2008). Esiti universitari e fabbisogni professionali: verso un'armonizzazione. In: Civardi, M. and Fabbris, L. (Eds.), *Professionalità nei servizi per le imprese*, CLEUP, Padova: 1-16.
- Civardi, M., Zavarrone, E. and Zappa, P. (2008). Ottimizzare la coerenza tra profili formativi universitari e sbocchi occupazionali: proposta di una metodologia", In: Fabbris, L. (Ed.) *Definire figure professionali tramite testimoni privilegiati*, CLEUP, Padova: 169-194.
- European Union, Commission Regulation (EC) No 29/2002 of 19 December 2001 amending Council Regulation (EEC) No 3037/90 on the statistical classification of economic activities in the European Community, *Official Journal of the European Union*, Series L 6, (45): 3-34.
- Ichino, A., Mealli, F. and Nannicini, T. (2004). *Il lavoro interinale in Italia. Trappola del precariato o trampolino verso un impiego stabile?*, Regione Toscana, Giunta regionale Collana Studi e ricerche, Edizioni Plus-Università di Pisa.
- ISFOL (2003). *Il punto su ... Analisi dei fabbisogni*. ISFOL, Roma.
- ISFOL (2008). *Dieci anni di orientamenti europei per l'occupazione (1997-2007). Le politiche del lavoro in Italia nel quadro della Strategia europea per l'occupazione*, Roma.
- Lawler, E.E. (1994) From job-based to competency-based organizations, *Journal of Organizational Behavior*, (15): 3-15.
- Mariani, P. and Zavarella, B. (2008). Un indice per la misura del mismatch tra domanda e offerta di lavoro per laureati applicato alle fonti Excelsior e Centri per l'impiego. In: Fabbris, L. (Ed.) *Definire figure professionali tramite testimoni privilegiati*, CLEUP, Padova: 215-230.
- Palomba, L., Scarpitti, L. and Villante, C. (2003). *Approccio alla valutazione della qualità dei sistemi formativi*. Collana editoriale ISFOL Metodologie per la valutazione di programma, ISFOL - SL (SV) - 2/03, Roma.
- Pietro, G.D. and Urwin, P. (2006). Education and skills mismatch in the Italian graduate labour market, *Applied Economics*, (38): 79-93.
- Rosenbaum, P. and Rubin, D. (1983). The central role of the propensity score in observational studies for causal effects, *Biometrika*, (70): 41-55.
- Rubin, D. (1974). Estimating causal effects of treatments in randomized and non-randomized studies, *Journal of Educational Psychology*, (66): 688-701.
- Sisto, A. (2006). *Propensity score matching: un'applicazione per la creazione di un database integrato ISTAT-Banca d'Italia*. Working paper n. 63, Dipartimento di Politiche Pubbliche e Scelte Collettive - POLIS, Università del Piemonte Orientale "Amedeo Avogadro", Alessandria.
- United States Department of Labour (1982). *A guide to job analysis: A "how-to" publication for occupational analysts*. U.S. Government Printing Office, Washington DC.