

Should We Start Worrying?

Mass Higher Education, Skill Demand and the Increasingly Complex Landscape of Young Graduates' Employment

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I. Introduction

Recent decades have seen a massive expansion in the access to higher education (HE), fuelled by high social and individual expectations about its contribution to individual and social wealth and welfare (Becker, 1993; Grubb and Lazerson, 2004). However, recent years have also seen a growing concern about the risks that a very fast expansion of the number of graduates could lead to increasing graduate unemployment, falling earnings premiums and increasing inequality among graduates (Brown *et al.* 2011). Moreover, the unprecedented speed and scale of HE expansion has raised concerns about the emergence of potential mismatches regarding their skills and the competences required by the job structure (Schomburg and Teichler, 2006).

This paper analyses the effects of mass HE by looking at the transition to employment of a rapidly expanding cohort of graduates in Portugal during the period 2000-10. We look at changes in graduates' employment structure and their distribution across a typology of graduate jobs that we further characterise based on the intensity

and type of skill demand. We then explore the incidence of three inter-related but different (potential) problems in graduates' transition to the labour market, namely over-education (relative to graduates' perception of the adequate level of qualifications for their jobs), over-skilling, and education-job mismatches.

The remainder of this paper is structured as follows. The next section discusses the relevance of those three issues in the context of mass higher education and rising inequality in graduate labour markets. Section 3 briefly presents the data and methodology adopted to analyse demand heterogeneity in the context of mass HE in Portugal. Section 4 considers the transformation of graduates' job structure and Section 5 the incidence of over-education, over-skilling and education-job mismatches. We conclude by discussing the implications of our findings and the possible mismatches between current trends in graduates' transition to the labour market and the expectations supporting mass HE.

II. The increasingly complex picture of graduates' transition to the labour market in the context of Mass HE

The discourse about the individual benefits associated with higher education is usually based on a human capital approach that adheres to a neoclassical view of labour markets (Teixeira, 2007). According to the latter, firms can often be portrayed as mere abstract 'optimising machines' (Hall, 1994) and graduates' wages are expected to reflect individuals' skill and productivity levels. However, perfectly informed rational choices are a characteristic of fully functioning decentralised markets, which HE systems ultimately are not (Teixeira *et al.* 2004). Although recent years have seen a growing inclination among many governments to adopt market regulation in higher education (Bok, 2003), some markets can persistently produce too much or too little of goods and

services and present difficulties in correcting supply and demand mismatches. In the case of higher education this may be due to some peculiarities such as their limited transparency and information asymmetries (Weisbrod et al, 2008).

Hence, there has been a rising concern with the intensity and the potential risks of overeducation (Sloane, 2004; McGuinness, 2006). This literature has provided important insights by questioning the seamless encounter between supply and demand for qualifications at the level of the HE system and in the labour market. As Mehta *et al.* (2011) pointed out, overeducation matters as a concept if education-job mismatches contribute to lower returns for the ‘marginal’ graduate questioning the merits of these investments relative to alternative uses of resources. The human capital perspective, in turn, by focusing on ‘in-person’ skills (Borghans et al. 2001), largely blames greater inequality resulting from HE expansion on the increasing diversity of innate or education-related characteristics that presumably result in a greater dispersion of productivity potential. It largely disregards, in this sense, the expectations of such graduate segments which are potentially shaped by the experiences of earlier cohorts.

This debate about education and work has, in any case, moved beyond having or not a degree to encompass the issue of whether the actual skills of graduates may match labour market demands (Green, 2012). Looking directly at the heterogeneity of demand for skills, therefore, allows us to test i) whether there is evidence of significant overskilling or shortage of high-skilled jobs; but also ii) whether apparent overeducation co-exists with significant or generalised underskilling (Cerejeira *et al.*, 2009) as skill demand is not necessarily static nor homogeneous across the job structure, particularly as the supply of tertiary qualifications expands. Growing demand for advanced skills may indeed be the result of *existing* jobs becoming more complex, following technological and organisational changes (e.g.: Spitz-Oener, 2006). Graduates can be

recruited for *apparently* low-level positions (being apparently overeducated) because the range of skills needed in these jobs may have widened. For the UK, Elias and Purcell (2004) have shown that the growing employment opportunities in *new graduate jobs* (i.e., those in which a degree became the norm only among recently hired workers) largely contributed to sustain the relative benefits of investing in HE. Hence, mismatches in the graduate labour market may not be directly associated with the redundancy of HE degrees and there is significant evidence that the heterogeneity in the demand for HE skills has risen. New graduate job profiles are more likely to require a more intensive use of *strategic/managerial* or *interactive* skills (Elias and Purcell, 2004; Spitz-Oener, 2006) and therefore of *generic skills* such as computer-literacy, communication or self-management (Dickerson and Green, 2004; Green 2012).

This has happened against the backdrop of a generalised increase in the dispersion of earnings premiums of HE. Figueiredo et al. (2013), for example, show that, in the case of Portugal, while returns have remained high and stable for young graduates at the top of the earnings distribution, they have decreased considerably at the bottom. This trend fits wider international evidence (Machin, 2008; Green and Zhu 2010) despite the still relatively low levels of qualification of the Portuguese workforce and the late expansion of HE relative to other developed economies.

A fundamental research question is then why HE expansion does not have an homogenous impact in graduate labour markets. The degree of context-specific learning that occurs in the job and the resulting different degrees of substitutability that result may provide, we believe, an important contribution in answering such question. Graduates who are more easily substituted (Levy and Murnane, 2004) or whose jobs are more easily learned, monitored or codified (Polavieja 2005; Brown *et al.* 2011) are likely to be more exposed to the downward effect of HE expansion on wages, to

mismatched expectations or a growing resentment of past educational choices. It is also in this segment that self-reported over-education, over-skilling and education-job mismatches may be indicative of problems in the transition to the labour market, even if possibly still in the context of important pockets of underskilling. Graduates' could be recruited merely due to better generic skills or the flexibility acquired as a by-product of HE, for example.

This paper then aims to describe growing job heterogeneity in graduate labour markets as a stepping stone in constructing such an alternative demand-led explanation of wage inequality. We believe that it provides links with two different literature strands.

First, the earnings penalties associated with overeducation/overskilling are well documented (McGuinness, 2006), making such concepts important tools to describe growing earnings inequality in graduate labour markets. Research perspectives that integrate job heterogeneity, on the other hand, can be more easily reconciled with this overeducation literature (Sattinger and Hartog 2013). In this paper, we make that explicit link between the growing diversity of graduates' jobs characteristics and the perception of overeducation/overskilling. In doing so, we believe we add to the existing literature in providing a more multidimensional account of these concepts, particularly as changes in the types of skills demanded can contribute to simultaneous increases in *overskilling* and *underskilling*

Second, recent research on the effect of technology and computerisation of work on earnings inequality has adopted a task-based approach (Autor et al. 2003) that allows a richer description of changes in skill demand and that gives a more nuanced account of the upskilling effect of new technologies. It admits, in particular, that these can have a polarising effect by simultaneously increasing demand for high-level analytical,

knowledge-creating tasks and low-level interactive tasks at the expense of routine (data-processing) activities (Autor et al. 2008). While this hypothesis is clearly relevant within graduate labour markets – particularly as graduates may be increasingly called to fill traditionally middle-skilled and clerical occupations previously occupied by non-graduates as a result of such changes (Goldin and Katz, 2008) - there is no explicit account of how such changes increase inequality *within* graduate labour markets. This is, we believe, still an under-researched area. Rather than implicitly assuming that all graduates perform high-level knowledge creating tasks, we provide therefore a richer account of growing occupational diversity, changing skill requirements and the degree of substitutability within particular job groups.

III. Data and Methodology

The issue of educational qualifications has been a theme of significant political and academic interest in Portugal as the country has historically presented some of the lowest levels of qualifications among European countries (Kiker *et al.* 1997). Thus, the massive expansion that recently took place in the educational system has introduced a major break in the previous patterns and enlarged access significantly.

Insert Table 1 here

The changes were particularly significant at the higher education level with a massive expansion since the 1980s (Table 1). This was supported by very high expectations regarding the private (and public) benefits associated with a higher education degree (see Cardoso, 2007) and for many years higher education's graduates indeed enjoyed a significant wage premium (Hartog *et al.* 2001). The fast expansion of

HE now recommends, however, checking whether growing job heterogeneity resulted in welfare losses associated with education-job mismatches, especially when contrasting with previous assessments for the 1980s and early 1990s that have found some indications of low but rising problems of over as well as undereducation (Oliveira *et al.* 2000).

Data

Our analysis used two datasets: The first dataset - the Portuguese Labour Force Survey¹ administered by Statistics Portugal (INE) - is used to determine whether an occupation has been changing in terms of its share of graduates' over time, and to group together occupations with similar skill composition characteristics using a cluster analysis. After arriving at a classification for all occupations, we use the Flexible Professional in the Knowledge Society – REFLEX – dataset to assess how individuals in these different groups of occupations are more prone to – amongst other things – being overskilled or underemployed. Summing up, while we use the detailed REFLEX data to refer to the intrinsic demand characteristics of graduate occupations, we refer to more recent data to look both at the changing distribution of young (25-34) Portuguese graduates' jobs between 2000 and 2010 (see, for example, figure 1 later in the paper) as well as to the shifting skill composition of occupations across generations. After this initial clarification, we proceed by explaining our methodological steps in greater detail.

Firstly, using INE data, we constructed a typology of occupations based on the intergenerational changes in the skill intensity of those jobs, through a cluster analysis. We used the most recent data available at the time of the study (the last quarter of 2010) and two variables in particular to cluster jobs: i) the ratio between the proportion of

¹ The Portuguese Labour Force Survey ('Inquérito ao Emprego') is a large quarterly survey of a representative (random stratified) sample of all Portuguese residents. The final sample regularly includes more than 20000 observations spread over around 1400 residential areas.

graduates in the 25-34 and 45-54 age cohorts for the year 2010 and ii) the proportion of graduates in the 45-54 age cohort for the same year. Based on Elias and Purcell (2004), we take the former variable as a proxy for the degree of intergenerational change in recruitment patterns within jobs in order to distinguish between a) traditional graduate jobs that always required a degree from those b) where tertiary education is becoming the norm only among younger worker cohorts or c) where graduates are still a minority. Table 2 characterises the final three clusters according to these two variables with the cluster technique making a good job in distinguishing between those three aforementioned job profiles. It has the advantage of not relying on arbitrary thresholds of skill intensity. We performed a hierarchical cluster analysis using the Ward's agglomeration method which minimizes within-cluster variance. Based on these data, we constructed a typology that includes 3 final groups of graduate jobs which are characterised in the next sections of the paper.

Insert Table 2 here

Occupational data were available at the 3-digit level according to the ISCO-88 classification. We have aggregated occupations with very few workers in the dataset to its higher 2-digit or 1-digit coding until they reached the minimum dimension for publication as defined by INE. The ISCO-88 classification assigns the same code to occupations that are similar both in terms of area of study and in the competences required to perform those jobs (Elias and McKnight, 2001). We departed therefore from 26 job groups which were grouped as detailed in Table A.I (see the Appendix). Crossing this information with that of Table 2, it is apparent that cluster 3 seems to correspond to what Elias and Purcell (2004) called 'Traditional Graduate Occupations'

reflected in the very high percentage of graduates in both cohorts. Some examples include Architects, Engineers, Health Professionals (except Nursing) or Higher Education professionals. Cluster 2, in turn corresponds to ‘Modern’ or ‘New’ graduate jobs where the majority of younger workers now have a degree. In this group, the proportion of older graduates is nearly one third (Table 2), with the younger graduates accounting for about two thirds of the positions. Some of the occupations identified in this cluster include Corporate Managers and Business Professionals.

Cluster 1, in turn, is a residual set of occupations characterised by a relatively low share of graduate workers in both cohorts but that account for a significant share of young graduates' employment as HE expansion pushed some university workers towards these functions. Whether these jobs are ‘Latent Graduate Occupations’ or largely ‘Non-Graduate Jobs’ is in itself an empirical question within the paper. We keep, however, the former designation in the remainder of the paper to highlight the dynamic nature of skill demand that may also characterise these jobs (that include administrative associate professionals and clerical jobs, in particular).

Secondly, we used the Flexible Professional in the Knowledge Society REFLEX (Allen and Van der Velden, 2011) dataset to characterize the nature of skill demand within each group of jobs. REFLEX data was used mainly to qualify the impact of such changes in the distribution of young graduate jobs both in terms of skill requirements and whether these carry growing risks of overeducation, overskilling or further education-job mismatches. Data refers to the situation of students that graduated in 1999/2000, five years after their graduation. The original REFLEX project collected comparable information for 16 different countries. In the case of Portugal, the dataset includes 645 observations with 567 of those individuals employed at the time of the study. Graduates from public institutions are somewhat overrepresented in this sample

in both the polytechnic and university sectors, though the distribution of students among polytechnic and university subsectors seems to be very similar in the population and the sample.ⁱ Regarding fields of specialisation, there are minor imbalances in particular areas, with engineering, for example, being over-represented. These aspects can potentially introduce some slight optimistic biases to our findings about the picture of graduate integration into the labour market. New graduate jobs in particular appear to be over-represented in the REFLEX dataset, with the opposite being true for Latent graduate jobs where graduates are still a minority. Regarding the regional distribution, the major concern is raised by the under-representativeness of the graduates from HEIs located in Lisbon (NUTS II) which may have a pessimistic bias effect.

Measuring Overeducation, Overskilling and Education-Job Mismatches

A widely discussed issue when analysing overeducation refers to the empirical strategies to adopt. A mere statistical definition of overeducation that compares graduates' current level (or years) of educational attainment with that of the average, median or modal worker can overestimate overeducation rather significantly in a way that can be misleading for policy makers. Since firms' recruitment practices may change overtime, many young graduates may be in jobs which actually require a tertiary degree as the minimum qualification and still be classified as overeducated (Oliveira *et al.* 2000). Mass micro-data labour sets with information on workers' education are particularly vulnerable to this problem. The same goes for measures of overeducation based on dictionaries of occupations which can get rapidly outpaced by changes in skill demand within jobs (Elias and McKnight, 2001). Subjective measures of overeducation, while vulnerable to measurement or self-selection biases, may be then particularly relevant in contexts such as that of the Portuguese economy where the educational

attainment of the population has been rising rapidly. Even if graduates compare jobs' skill requirements with their expectations this is relevant especially if graduates do not trade-off staying in those jobs and the potentially lower wages for other compensating characteristics (McGuinness and Sloane, 2011) or if educational investments were motivated by these expectations. It is also unlikely that this would be a major concern in those cases where a degree (or a post-graduate degree) is clearly a mandatory recruitment requirement. The REFLEX data, specifically, asks graduates which level of educational attainment they think is more appropriate for their jobs and allows us, therefore, to capture these subtler dimensions of overeducation.

The original questionnaire also asked graduates: i) if they felt that their knowledge and skills were relevant in their actual job and ii) if they felt that their job demanded a higher level of knowledge and skills than their current level. The data allows us, therefore, to incorporate detailed measures of both skill-acquisition and skill-deployment at work and to distinguish overskilling from overeducation. Furthermore, graduates were asked to rate their 'own' and the 'required' level in their jobs of a detailed list of competences which allows us to test the nature of education-job mismatches in addition to how widespread they are. That list allows us, in particular, to distinguish between skills traditionally acquired in universities and traditionally required in graduate jobs from other more generic competences learned at work or indirectly in HE (namely strategic/managerial, interactive or self-management skills).

Finally, we considered measures of graduates' perceptions of the usefulness of their degrees in their current job. REFLEX graduates were asked directly if their study programme was a good basis to perform current work tasks and if at that day, the worker's choice of study programme and institution would be the same. We take the first question as a direct measure of the mismatch between skills taught in the degree

and skills needed in the work and the second as a proxy of the overall satisfaction with educational choices. We then discuss whether changes in the composition of graduate employment have exacerbated the mismatch between competences acquired in universities and in the job.

IV. The Changing Landscape of Young Graduates' Employment

Analysing the transition to employment of a rapidly expanding cohort of graduates in Portugal is particularly interesting since the country has experienced over the last decade a risky combination of mass access to higher education and slower economic growth and job creation. Figure 1 illustrates the evolution of the distribution of young graduates across the three groups of occupations from 2000 to 2010. In 2000, more than half of all young graduates were concentrated in 'Traditional Graduate Occupations' and the remaining young graduates were more or less equally distributed between the other two types of occupations. Over the last decade, and following the massive expansion of higher education, an increasing share of young graduates occupied New or Latent Graduate Jobs.

Insert Figure 1 here

This shift is associated with the growing representation of the private sector as a source of graduate jobs. In fact, while the majority of traditional graduate jobs in the REFLEX data are found in the public sector, the opposite is true in the other job groups and in New Graduate Jobs in particular (see Table 3). Figueiredo *et al.* (2011) also show that such 'Traditional Graduate Jobs' accounted in 1995 for 51% of all young graduate jobs in the private sector while in 2009 the respective figure was close to 41%. Data on the mean and median hourly earnings in the current job show, in turn, that these

occupational changes may have directly led to the increase in graduates' earnings dispersion. Graduates in Latent Graduate Occupations, in particular, appear to earn significantly less than graduates in Traditional Graduate Occupations, particularly if the latter are employed in the public sector (see Table 3)ⁱⁱ. Graduates' earnings in Latent and New Graduate Occupations in particular are also more dispersed.

Insert Table 3 here

We have argued before that jobs in which significant context-specific learning takes place clearly provide 'shelter' to the effect of the growing supply of graduates in the labour market since employers cannot easily replace workers due to longer learning periods. The REFLEX data allow us to test directly for such differences among these job groups. We observe that Latent Graduate Jobs, in particular, require much less learning time, with half of the workers thinking that an individual could become an expert in their job in less than one year. For Traditional Graduate Jobs that percentage is much lower and more than two thirds consider that their job needs at least 3 years to be mastered. The perceptions among individuals working in New Graduate Occupations seem to be halfway between these two groups, though closer to the Traditional Graduate group.

Finally, we consider the skills most often required in these job groups as surveyed in the REFLEX questionnaire. The respondents were asked to evaluate, using a scale from 1-7 at which level each of the skills was required in their current job. Figure 2 reports standard-deviations from the mean (mean z-scores) for each group of jobs as well as the actual mean for the whole sample. Competences are ordered

according to the magnitude of the z-scores for traditional graduate jobs and the graph provides a clear contrast between the different job types.

Comparing the three types of occupations, it is clear that graduates in Latent Graduate Jobs report lower skill requirements across most competences, namely regarding responsibility and coordination needs as well as analytical or field-specific competences. Using the measure of academic skills proposed by Barone and Ortiz (2011)ⁱⁱⁱ, we calculated that latent graduate jobs scores are close to 0.2 standard deviations behind the mean of all groups. It is also visible, however, that skill demands in New Graduate Jobs are distinctive from Traditional Graduate Jobs, with the former appearing to make a more intensive use of interactive (foreign languages, computer and the internet), strategic (alertness to new opportunities, new ideas, negotiate effectively) or self-management and autonomy skills (perform well under pressure, use time efficiently). The latter group, however, still appears to be associated with higher responsibility positions and, as expected, with skills such as writing and presenting ideas. Overall, these results suggest the existence of some important skill demand differences between these three groups of graduate occupations. This leads us to analyse the relevance of overeducation, overskilling and education-job mismatches among these three groups.

Insert Figure 2 here

V. A Growing Risk of Educational and Skill Mismatches?

Overeducation and overskilling are far from being widespread among Portuguese graduates^{iv}. In any case, Table 4 shows that it is mostly concentrated among graduates in Latent Graduate Occupations. Considering the broader measure of overeducation, more than one-third of graduates in Latent graduate jobs were in this situation. We

should again bear in mind that the REFLEX data may have underestimated the share of graduates in these jobs and that INE data show that these already account for nearly one fourth of all young graduates' jobs in Portugal (cf. Figure 1). A high proportion of workers in New and particularly in Traditional Graduate Occupations seem to hold the adequate education degree or are undereducated.

About the frequency on which the skills demanded by their jobs are larger than the skills possessed (Table 5), the results show that more than 40% of workers in the Latent Graduate Occupations group considered that their knowledge limits are rarely stretched, clearly contrasting with the two other groups. Combining the results of Tables 5 and 6 we see that all groups also have a high proportion of workers whose jobs demand more knowledge and skills than the workers can actually offer. This is in line with the idea that education-acquired skills and the skills needed to perform correctly a job may be significantly different. So, when comparing overeducation with overskilling, Tables 4 and 6 show a similar pattern but with a different magnitude. When asked if their knowledge and skills were utilized in their current work (Table 6), practically only those in Latent Graduate Occupations reported significant overskilling. Furthermore, the workers proportion of graduates in that group that considered that their skills were used very regularly was much below those found for the other two groups.

Insert Tables 4, 5, and 6 here

We also produced more detailed measures of over or underskilling for particular job competences and tested for differences among groups. Respondents were asked to evaluate in a 1-7 scale how competent they consider themselves to be regarding a set of 17 competences required in the labour market. Those in Latent Graduate Occupations report larger overskilling for most of the items, which is in line with the under-

utilisation of skills and the lower earnings per hour reported above. As shown in Figure 3, although overskilling seems to be less evident in Traditional and New Graduate Jobs, the latter group appear to require a more advanced ability to use computers and the internet or to be alert to new opportunities. Graduates in Traditional Graduate Jobs report lower mismatches regarding analytical and human resources mobilisation skills. On average, for all the three groups the difference is positive in almost all skills, meaning that, overall, workers have the perception that they have more skills than those required in their jobs. With a few exceptions, those differences are statistically different from zero for most of the skills and for all groups of occupations. Competences with non-significant overskilling, in new graduate jobs in particular, include the “ability to perform well under pressure”, the “ability to use time efficiently” or “the ability to make your meaning clear to others”.

Insert Figure 3 here

These results raise the possibility that some workers can be employed in an occupation having a higher education level than required even if lacking some skills that would be needed to better perform their job. For this reason, we have additionally crossed the information on overeducated workers and their self-reported mismatch at each particular skill, to find to what extent there are simultaneous cases of overeducation and underskilling in the sample. Figures 4 and 5 present the share of overeducated workers in New and Latent Graduate Job reporting overskilling or underskilling in specific competences with significant underskilling mainly for the former^v. Regarding overskilling, the analysis of the differences between owned and required skills may indicate whether the competences acquired at universities are regarded by graduates as

the most adequate for the labour market, especially for those workers that have expressed the view that they are overeducated for their current job.

Insert Figures 4 and 5 here

Finally, the differences between the three groups of occupations are striking regarding graduates' perceptions about the adequacy of their choice of degree to perform adequately their job tasks and the overall satisfaction with their degree. Figure 5 shows that, in 'Latent Graduate Occupations', the study programme was less frequently found to be a good basis for performing current work tasks. Additionally, less than 60% of all respondents in these occupations would choose the same programme and the same institution and, as before, the 'Latent Graduate Occupations' group has a clearly higher proportion of dissatisfied graduates (and a higher proportion of respondents that would change both the study programme and the institution). Clearly, the mismatch between skills taught in higher education and the skills needed in the labour market is one possible hypothesis to explain these results.

In order to better understand this dissatisfaction with the programme and/or with the institution of higher education, we have also analysed the differences in characteristics between satisfied and dissatisfied respondents. Those who are more dissatisfied have more frequently an education background in Humanities and experienced a period of unemployment larger or equal to 6 months. Those who seem to be more satisfied are those individuals who had very good final grades, whose programme was vocational-oriented and prestigious (see Table A.II in the Appendix). It could suggest that the growing complexity and difficulties faced by several graduates in their transition to the labour market is nurturing a significant level of regret regarding

the training provided by higher education while also pointing out to important supply-side differences in the distribution of graduates' characteristics.

Insert Figure 6 here

VI. Conclusions

In this paper we have analysed the effects of the rapid massification of higher education for the transition of graduates to the labour market by looking at the incidence of self-reported over-education, over-skilling, and education-job mismatches. Our findings suggest that, so far, there is little evidence of a generalised increase of combined overeducation *and* overskilling. New graduate jobs appear to show sufficient dynamism to keep these in check and at the moment overeducation coexists with significant pockets of underskilling. Our findings also suggest, however, that for a significant part of the young graduates' labour market in Portugal that dynamism may be limited, thus leading to greater heterogeneity in the job market. We have shown that growing occupational diversity is associated with a growing presence of the private sector and changing tasks and skill requirements. Demand has increased, namely, for market-related strategic, coordination, interactive and self-management skills. Our results also suggest a greater degree of complexity in the relationship between higher education and work. These constitute separate (possibly complementary) learning contexts and increasing heterogeneity in work-specific learning contexts, in turn, can result in different degrees of substitutability. Furthermore, such greater heterogeneity at the workplace reinforces the importance of the process of assignment (Sattinger 1993) or sorting of university graduates to jobs, with both factors contributing to differences in employment outcomes, for example, by field of study. Therefore, the debate on

inequality among graduates needs to consider, we believe, this growing heterogeneity in demand and ultimately such process of assigning workers to these different jobs.

The explanations for these trends may be varied however. It may be due to having an increasingly large and more diverse population going through higher education and then entering the labour market. New graduate cohorts have been enrolled in a more diverse set of higher education institutions (e.g. vocational orientation, reputation, qualification of the academic staff) and those differences may amplify heterogeneity. There is also the possibility, however, that greater complexity arises from changes in the demand for qualified labour reflecting productive, technological and organizational shifts in the economy.

A question emerges about the extent to which those disadjustments may be solved in the labour market. Although the characteristics of the workers may promote the transformation of jobs, this adjustment is likely to be limited (see for example Card *et al.* 2012 for a relevant discussion). Hence, more research is needed in order to understand if we are moving closer to a situation in which the burden for flexibility and adaptability is placed upon the shoulders of new cohorts of graduates or if we should expect a reasonable degree of flexibility in a changing labour market to accommodate to the existing supply of qualifications and skills.

The greater potential mismatch between the supply and demand of graduate skills suggests that there is also a greater potential for dissatisfaction among more recent cohorts of graduates regarding not only their current work situation, but also their past training. Data point out that those graduates who are more likely to express regrets about their past degree choices are those that have been more affected by periods of unemployment and that are less satisfied by their current job. Issues such as the type of institutions from which they have graduated (and its reputation), the vocational

orientation and the field of studies of those graduates (e.g: humanities degrees) also seem to be relevant to understand the degree of satisfaction expressed by recent graduates about the matching between higher education and work. The rising levels of youth and graduate unemployment in many European countries indicates that this problem is likely to get worse in the coming years and that a growing portion of graduates may be more inclined to blame the shortcomings of their training for their labour market difficulties. We should therefore start worrying about this increasing potential for dissatisfaction, given that in the future we may expect a substantial increase for young graduates, while the labour market may still be presenting limited absorption capacities. We may then expect higher levels of mismatches which will lead to overqualification and/or underemployment for this group.

The results suggest that higher education markets still present a significant degree of opacity for many potential students and that student choices still seem to be taking place in a context of significant imperfect information. These indications have important policy implications, especially at a time when higher education may be facing a more sceptical social and political context. It calls for further attention of both policy-makers and researchers on how the career opportunities of younger graduates have been changing over time and how perfect is the match between the employment that young graduates get and the skills and knowledge they have acquired in higher education.

ENDNOTES

ⁱ The sample was constructed in order to account for about 1/6 of the graduates of that year with the final number of valid answers (645), however, corresponding to a success rate of approximately 11%..

ⁱⁱ The only significant (P-value<0.10) difference found in the groups' mean hourly wages is between Latent and Traditional Graduate Occupations. See also supplementary appendix table 4.

ⁱⁱⁱ The authors consider the 'mastery of a specific field', the 'knowledge of other related fields', 'abstract, analytical thinking' and the 'ability to rapidly acquire new knowledge' to construct an overall measure of academic skills.

^{iv} Compared to other countries in the international REFLEX data, Portugal presents the lowest proportion of overeducation and overskilling. Also, Portugal, as of 2009, still had one of the lowest proportion of graduates both in the 25-64 (15%) and 25-34 (23%) age cohorts (OECD, 2011, p. 40), indicating that the level of massification in the Portuguese higher education system was still lower relative to other countries. Ultimately, however, we are interested on differences across job groups as to test whether changes in the occupational structure have the potential to increase inequality within graduate labour markets.

^v We do not show the data for Traditional Graduate Jobs since there are very few of such workers who reported being overeducated.

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TABLES

TABLE 1
Evolution of enrolments in Portuguese higher education

	1981		1991		2001		2011	
	No.	%	No.	%	No	%	No.	%
Public Universities	64,659	76.8	103,999	47.0	176,303	44.5	193,633	48.0
Public Polytechnics	12,195	14.5	31,351	28.7	108,486	27.3	120,399	29.8
Private institutions	7,319	8.7	51,430	24.3	111,812	28.2	89,413	22.2
Total	84,173	100.0	186,780	100.0	396,601	100.0	403,445	100.0

Source: Ministry of Education and Science

TABLE 2
Skill intensity by occupational cluster

	<i>Proportion of graduates 25-34/ Proportion of graduates 45-54</i>	<i>Proportion of graduates 45-54</i>
Cluster 1: 'Latent Graduate Occupations'	4.255	0.022
Cluster 2: 'New Graduate Occupations'	2.007	0.323
Cluster 3: 'Traditional Graduate Occupations'	1.021	0.963

Notes: Data refers to the year 2010.

TABLE 3
Summary statistics by occupational cluster

	Mean Hourly Wage median	% of Individuals Reporting that Can Become Experts in their Jobs in Up to 12 months	% of Public Sector Jobs
Traditional Graduate Occupations	9,3 8,28	11,6%	54,9%
New Graduate Occupations	8,4 6,99	23,3%	19,9%
Latent Graduate Occupations	7,3 5,31	50,0%	37,3%
	sig. (ANOVA) .055	sig. (Kruskal-Wallis*) .000	sig. (Qui2) .000

Source: own calculations based on REFLEX data; * performed on the original ordinal variable.

TABLE 4
Overeducation and undereducation by occupational cluster

	<i>Latent Graduate Occupations</i>	<i>New Graduate Occupations</i>	<i>Traditional Graduate Occupations</i>
Undereducation	15%	7.6%	19.8%
Perfect Match	50%	81.5%	77.6%
Overeducation (tertiary level needed)	6.7%	3.8%	1.6%
Overeducation (no tertiary level needed)	28.3%	7.1%	1%

Source: Own elaboration based on REFLEX data

TABLE 5
To what extent does your current work demand more knowledge and skills that you can actually offer?

	<i>Latent Graduate Occupations</i>	<i>New Graduate Occupations</i>	<i>Traditional Graduate Occupations</i>
Not at all	18.3%	7.6%	3.2%
-	23.3%	18.5%	10.4%
-	23.3%	25.1%	28.5%
-	18.3%	31.3%	41.4%
To a very high extent	16.7%	17.5%	16.5%
Kruskal-Wallis	0.000		

Source: Own elaboration based on REFLEX data. The Kruskal-Wallis test reports the statistical difference between the three groups in the table. We have also tested the statistical difference between all possible pairs using Mann-Whitney tests, and concluded that Latent and Traditional are significantly different at 1% level, while between Traditional and New; and Latent and New, the differences are significant at a 5% level.

TABLE 6
To what extent are your knowledge and skills utilized in your current work?

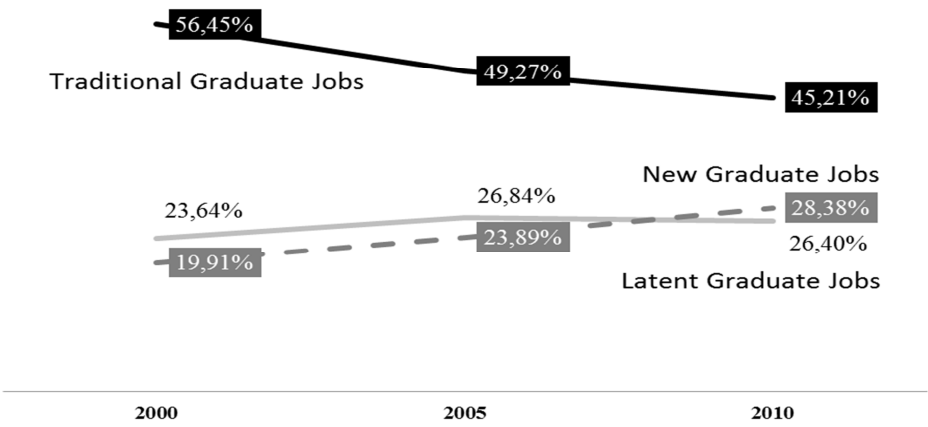
	<i>Latent Graduate Occupations</i>	<i>New Graduate Occupations</i>	<i>Traditional Graduate Occupations</i>
Not at all	8.3%	0.9%	0%
-	6.7%	1.4%	0.6%
-	21.7%	10.8%	4.8%
-	35.0%	41%	29%
To a very high extent	28.3%	45.8%	65.5%
Kruskal-Wallis	0.000		

Source: Own elaboration based on REFLEX data. The Kruskal-Wallis test reports the statistical difference between the three groups in the table. We have also tested the statistical difference between all possible pairs using Mann-Whitney tests, and concluded that the three groups of occupations are all different between each other at 1% significance level.

FIGURES

FIGURE 1

Distribution of graduates 25-34 across occupational clusters



Source: Own calculations based on INE data

FIGURE 2

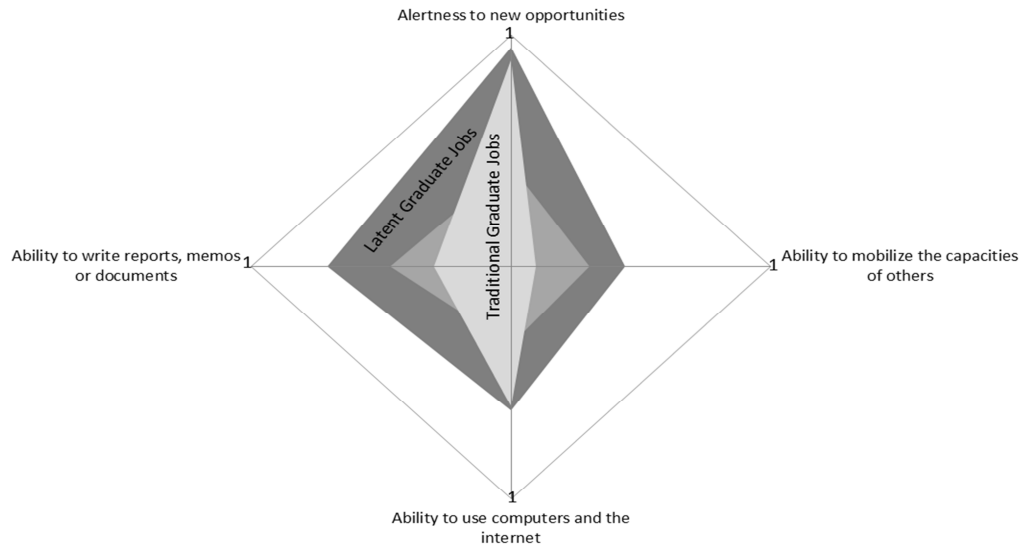
Required skills by occupational cluster (mean z-scores)



Source: Own elaboration based on REFLEX data. Values in brackets are the mean values of the answers to the questions 'to what extent each of these competences is required in your current job?'. All the answers assumed values between 1 and 7, except for the four first competences in the plot (which varied between 1 and 5). ***, ** and * denote, respectively statistically significant differences among groups at the .01, .05 and .1 significance levels.

FIGURE 3

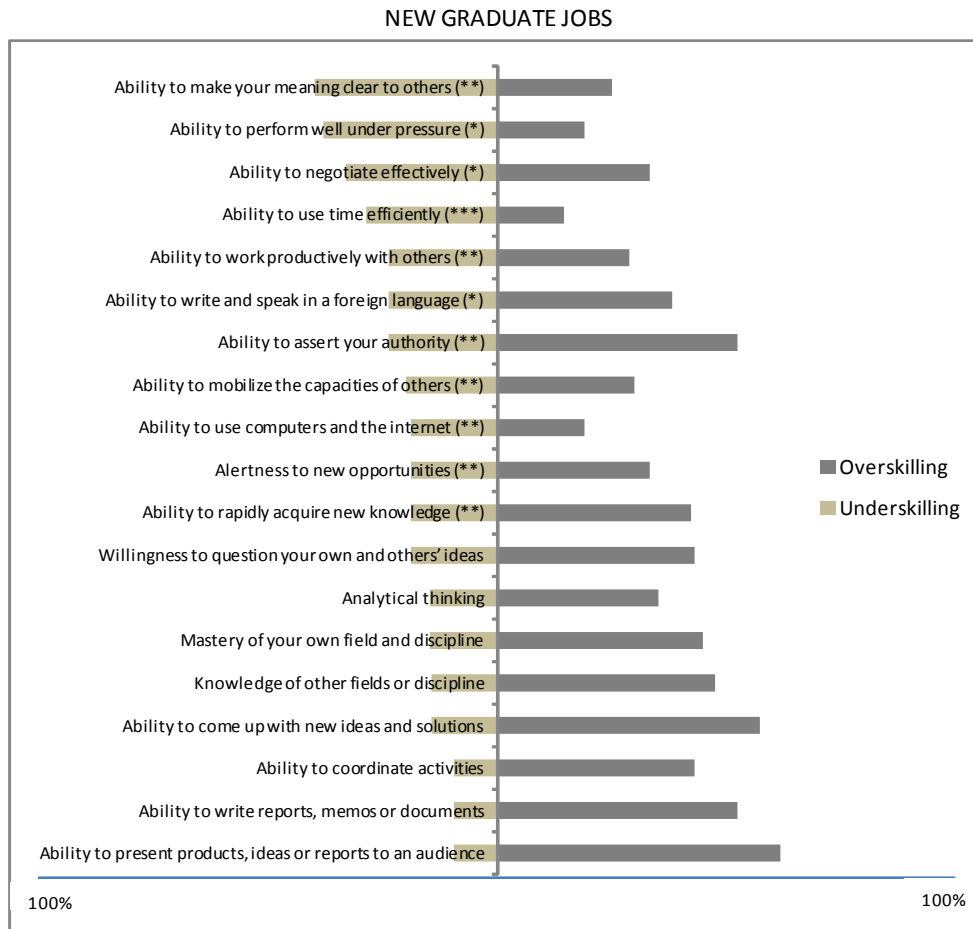
Mean Differences Between Own and Required Skills by Occupational Group for
Selected Competences



Source: Own calculations based on REFLEX data. Respondents were asked to report on a scale from 1-7 the extent to which specific competences were required in their jobs and their actual level with the difference taken as a measure of overskilling. The graph only considers skills with statistically significant differences (sig.<.1) in overskilling among occupational groups.

FIGURE 4

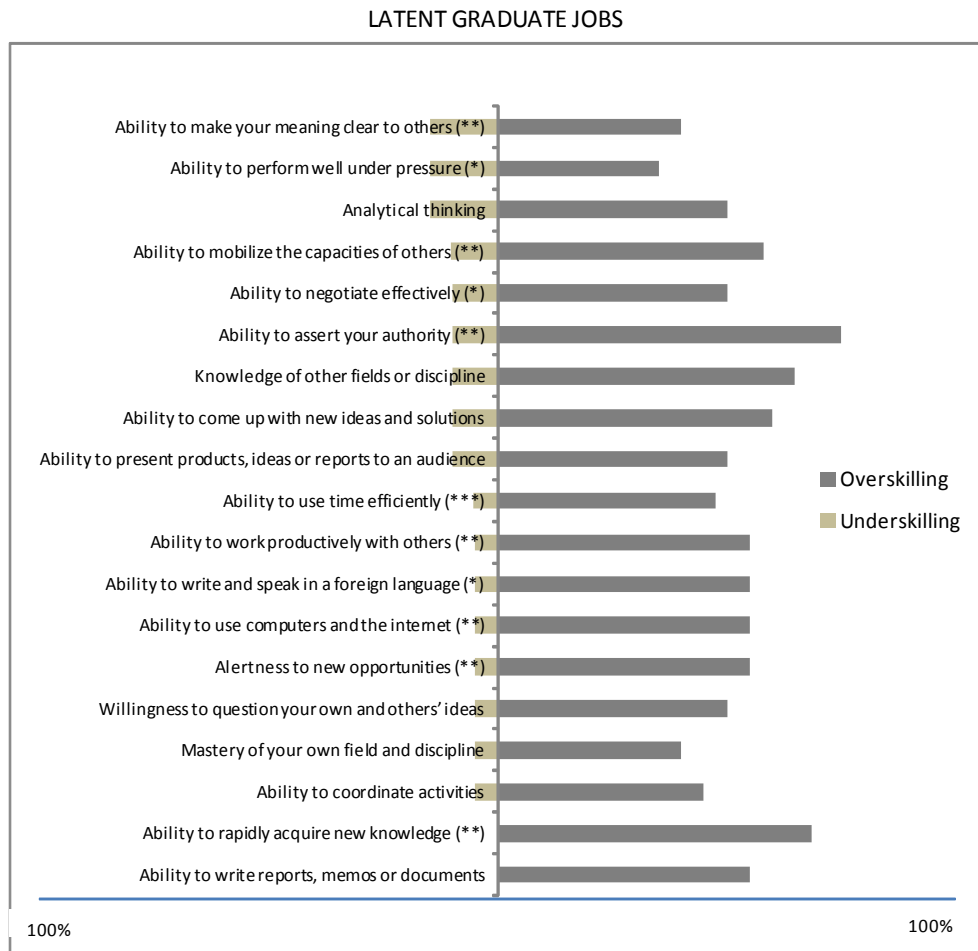
Underskilling and Overskilling Among Overeducated Workers in New Graduate Jobs



Source: Own elaboration based on REFLEX data. A worker was considered to be over (under) skilled in a given skill if the difference between skills owned and required was positive (negative).

FIGURE 5

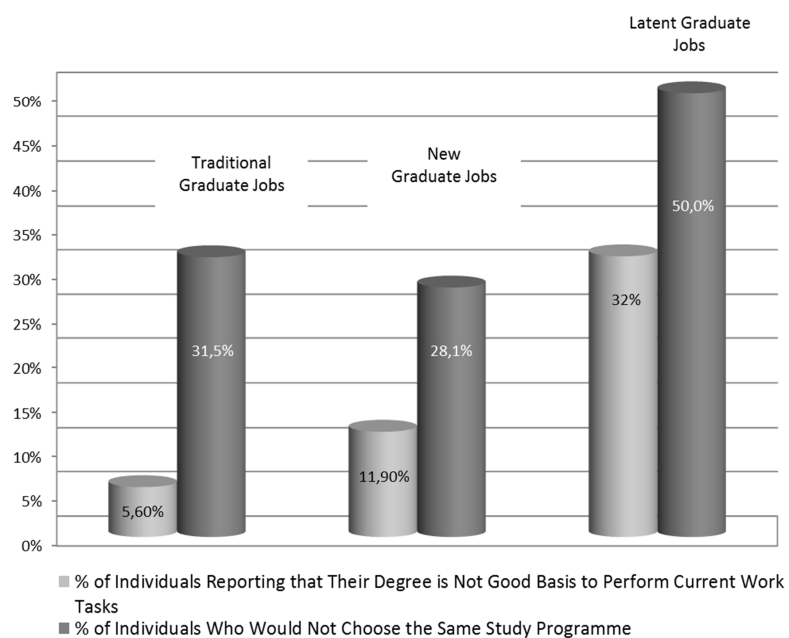
Underskilling and Overskilling Among Overeducated Workers in Latent Graduate Jobs



Source: Own elaboration based on REFLEX data. We considered a worker to be over (under) skilled in a given skill if the difference between skills owned and required was positive (negative).

FIGURE 6

Education-Job Mismatches by Occupational Group



Source: Own calculations based on REFLEX data

Appendix

TABLE A.I

26 groups of occupations and their corresponding cluster

Cluster	ISCO-88/ CNP-94	Percentage of cases (REFLEX dataset)	Description
1	11+13	1.5%	Legislators and Senior Officials; Managers of small enterprises
1	31	4.1%	Physical and Engineering Science associate professionals
1	343	3.1%	Administrative associate professionals
1	411+413+419	0.7%	Secretaries and Keyboard-Operating Clerks; Material-recording and transporting clerks; Other Office Clerks
1	412	0.3%	Numerical Clerks
1	42	0.7%	Costumer Service Clerks
1	5	0.4%	Service Workers and shop and market sales workers
1	6+7+8+9+0	0%	Skilled agricultural and fishery workers; Craft and related trades workers; Plant and machine operators and assemblers; Elementary occupations; Armed Forces
2	12	5.8%	Corporate Managers
2	211+212+213	3.4%	Physicists, Chemists and related professionals; Mathematicians, Statisticians and related professionals; Computing Professionals
2	241	16.8%	Business professionals
2	243+245+246 + 247	1.7%	Archivists, Librarians and related information professionals; Writers and Creative/Performing artists; Religious professionals; Public Service Administrative Professionals
2	32	2.7%	Life Science and Health associate professionals
2	333+334 (CNP-94: 339)	0%	Special Education teaching associate professionals; Other teaching associate professionals
2	341+342+344 + 345+347	4.8%	Finance and Sales associate Professionals; Business Services Agents and Trade Brokers; Customs, tax, and related government associate professionals; Police Inspectors and Detectives; Artistic, Entertainment and Sports
3	214	10.3%	Architects, Engineers and related professionals.
3	221	1.4%	Life Science Professionals
3	222	3.9%	Health Professionals (except Nursing)
3	223	5.8%	Nursing and Midwifery professionals
3	231	5.8%	College, University and HE teaching
3	232	8.6%	Secondary Education teaching
3	235	2.1%	Other teaching professionals
3	242	3.8%	Legal professionals
3	244	6%	Social Science and related professionals
3	331	0%	Primary Education teaching associate professionals
3	332	0.3%	Pre-Primary Education teaching associate professionals

Notes: Cluster 1 – Latent Graduate Jobs; Cluster 2 – New Graduate Jobs; Cluster 3 – Traditional Graduate Jobs

TABLE A.II.

*Distribution of graduates who would change or repeat the course in the same institution
on selected characteristics*

	<i>Would change the course and/or the institution</i>	<i>Would repeat the course in the same institution</i>
Science, Technology, Engineering and Maths	24,47%	25,28%
Humanities	29,79%	17,70%
Social Sciences Business and Law	30,85%	39,04%
Private Higher Education Institution	18,09%	23,60%
University (instead of Polytechnic)	52,13%	48,03%
Very good final grade	11,55%	15,71%
Vocational-oriented course	37,99%	53,98%
Prestigious course	43,01%	71,19%
Realized an internship during the course	61,15%	55,81%
Worked during study	18,35%	21,71%
Suffered unemployment (≥ 6 moths)	32,62%	14,89%
Public sector	42,02%	38,35%
Currently self-employed	11,87%	15,76%

Source: Own elaboration based on REFLEX data. Data refers to the share of individuals in each of these groups (those who would repeat the course in the same institution and those who would not) with the characteristic referred in each row. For example, 53,98% of all graduates that would repeat the course in the same institution completed vocational-oriented courses.