Job Competition amongst University Graduates

Simonetta Longhi
Malcolm Brynin

ISER Working Paper
2007-18

Readers wishing to cite this document are asked to use the following form of words:

> Longhi, Simonetta and Brynin, Malcolm (August 2007) 'Job Competition amongst University Graduates', ISER Working Paper 2007-18. Colchester: University of Essex.

The on-line version of this working paper can be found at http://www.iser.essex.ac.uk/pubs/workpaps/

The Institute for Social and Economic Research (ISER) specialises in the production and analysis of longitudinal data. ISER incorporates

- MISOC (the ESRC Research Centre on Micro-social Change), an international centre for research into the lifecourse, and

- ULSC (the ESRC UK Longitudinal Studies Centre), a national resource centre to promote longitudinal surveys and longitudinal research.

ABSTRACT

We test whether in Great Britain the recent increase in the supply of university graduates has a negative impact on their wages, and analyse to what extent the local labour market for graduates should be seen as regional rather than national. We do this by computing two measures of job competition amongst graduates: the first assumes that the labour market for graduates is regional, while the second assumes that it is national. We then compare the two estimated wage impacts.
We find that job competition amongst graduates has a negative impact on graduate wages, that the labour market for graduates appears to be regional, and that a large part of the regional imbalance between labour supply and demand is corrected by commuting rather than migration. Also, the wage impact of job competition seems to differ by gender and across groups of occupations.

NON-TECHNICAL SUMMARY

The recent expansion of higher education in many countries has generated a great deal of research on the effects that this might have on wages of graduates. A large part of this literature compares wages of graduates and non-graduates and finds a substantial wage premium for graduates and also only a small change in this over time. This implies that the employment situation of graduates has not deteriorated despite the increase in graduate employment. It is possible, however, that imbalances between the supply of and demand for graduates do occur, and if they do these will affect the competitive position of graduates in the labour market. This can happen at the national level, but imbalances are also likely at the regional level.

Most of the literature analyses the wage impact of the increasing supply of graduates at the national level. Indeed, in the light of increasing globalisation it might be assumed that regional factors might become relatively unimportant. At the same time, though, job opportunities vary considerably across regions, while workers with specific skills tend to be attracted to certain areas. Imbalances between labour supply and demand may arise for various reasons (e.g. willingness to move to certain areas, or networks of contacts that might be regionally distributed), and regions might partially become bounded markets. On the other hand, disequilibria between labour supply and demand across regions might partly be offset by workers' commuting.

We use data from the quarterly Labour Force Survey (LFS) from 1997 to 2005 to measure job competition in Great Britain and to test whether the recent expansion of higher education had a negative impact on wages of graduates. We do this by computing two different measures of job competition: the first assumes that the labour market for graduates is local (regional), while the other assumes that the labour market for graduates coincides with the whole country. The comparison of these two measures will give insights into whether the local labour market for graduates is regional rather than national. We find that:

-   There seems to be inequality between the distribution of the supply and of the demand for university graduates across regions; such inequality is much larger in some periods than in others.

-   There is a negative correlation between job competition in the local labour market and local average wages: wages of graduates are on average lower in those local labour markets where job competition amongst graduates is higher. We also find that job competition amongst graduates has a negative impact on wages of graduates at the individual level.

-   The labour market for graduates seems to be partly regional, but imbalances between labour supply and demand for graduates – especially for men – are likely to be corrected with commuting rather than migration.

-   Job competition among people with lower education seems to have a large positive impact on wages of graduates. This suggests that higher competition among non-graduates should push graduates to look for better jobs, thus reducing the probability of overqualification. As opposed to the idea of 'bumping down' (highly qualified people taking jobs from the less qualified), in this case, graduates would be 'kept up' in better jobs when job competition amongst non-graduates is high. The results also suggest that women might be more likely than men to consider jobs requiring lower qualifications.

-   The negative wage impact of job competition in the graduate labour market seems to be unequally distributed across occupations. While demand for graduates in new graduate occupations might still be growing, traditional graduate occupations might be approaching saturation point.

1. Introduction

The aim of this paper is twofold. First, we test whether the recent expansion of higher education in Great Britain has a negative impact on wages of university graduates; second, we analyse to what extent the local labour market for graduates should be seen as regional rather than national.

Unlike unskilled people who might search for and obtain a job through word of mouth or personal contact, skilled workers are more likely to rely on national newspapers or websites (e.g. Boheim and Taylor, 2002). Further, as graduates tend to marry later than non-graduates, they have more limited family commitments, and therefore fewer constraints on their geographical mobility. At the same time, since regions specialise in certain industries and economic sectors, job opportunities are likely to vary considerably across regions, and in certain circumstances regions might fail to attract the right number of graduates. Imbalances between local demand and supply of university graduates might be generated from the supply side by lack of information, incorrect expectations, or too little propensity to migrate. On the other hand, disequilibria between labour supply and demand of neighbouring regions might partly be offset by workers' commuting.

We analyse the impact of the increasing supply of university graduates by estimating the wage impact of job competition amongst graduates in Great Britain. We use data from the quarterly Labour Force Survey (LFS) from 1997 to 2005 to compute two different measures of job competition. The first measure assumes that the labour market for graduates is essentially local (regional), while the other assumes that the graduate labour market coincides with the whole country. If the labour market for graduates were regional, we would expect both measures to have a negative impact on wages. A negative wage impact of the national measure but no wage impact of the regional measure would instead point to the existence of a national, rather than regional labour market for graduates.

After discussing, in Section 2, some of the issues surrounding the measurement of the wage impact of a change in the supply of university graduates, in Section 3 we describe and compare our two measures of job competition. The descriptive analysis in Section 4 focuses on regional imbalances between supply and demand of graduates, and estimates the spatial correlation between our measures of job competition and average wages in the local labour market. If graduates are spatially concentrated, and job competition decreases wages, a negative spatial correlation may be expected between the proportion of the labour force in the

local labour market that has a degree, and the wages of graduates in that local labour market. We then estimate the direct impact of job competition on individual wages in Section 5 by comparing models assuming that the labour market for graduates is regional, to models assuming that the labour market for graduates is national. We also analyse the impact of inter-regional commuting flows by including the spatial lag of the job competition measure in some of the model specifications (e.g. Anselin, 1988). The wage impact of job competition amongst graduates is estimated separately by gender, and by groups of occupations.

The findings, summarised in Section 6, suggest that job competition amongst graduates has a negative impact on graduate wages. The labour market for graduates appears to be regional, and a relatively large part of the regional imbalances between labour supply and demand seems to be corrected by commuting rather than migration. The wage impact of job competition seems to be rather different by gender and across groups of occupations.

2. Wage Impact of a Changing Supply of Graduates: Background

2.1. Impact of the Expansion of Higher Education

The recent expansion of higher education in many OECD countries has generated a great deal of research on the effects that this might have on wages of university graduates. A large part of the literature compares wages of graduates and non graduates and finds only small changes in the graduate premium (e.g. Walker and Zhu, 2005; O'Leary and Sloane, 2005 for the UK). Wage differentials across education levels, however, might reflect many factors, and the wage gap between graduates and non graduates can (partly) be explained by changes in the relative supply of highly educated workers (Card and Lemieux, 2001). The wage impact of an increasing supply of graduates, therefore, should also include a direct measure of job competition in the graduate labour market. In this paper we suggest two measures of job competition amongst graduates, and estimate their direct impact on graduate wages.

Most of the literature analyses the wage impact of the increasing supply of graduates at the national level. Indeed, in the light of increasing globalisation it might be assumed that regional factors might become relatively unimportant. At the same time, though, job opportunities vary considerably across regions. Since regions specialise in certain industries and economic sectors (see, e.g. Devereux et al., 2004 for recent evidence on the UK), the demand for graduates is likely to differ across regions. Regional labour market disparities are well documented, and some evidence exists that returns to education may differ across

regions (see e.g. Duranton and Monastiriotis, 2002). It has been found, furthermore, that workers with specific skills tend to sort in certain areas (e.g. Combes et al., 2006). Imbalances between labour supply and demand may arise for various reasons (willingness to move to certain areas, or networks of contacts that might be regionally distributed), and regions might partially become bounded markets. On the other hand, within-regions disequilibria between labour supply and demand might partly be offset by workers' commuting.

We measure job competition in the graduate labour market by estimating and combining labour supply and demand. Job competition is computed both at the regional and at the national level, and the wage impacts of the two measures are compared to identify whether the labour market for graduates should be seen as regional or as national.

2.2. *Labour Supply and Demand*

The literature has suggested different ways to measure labour supply and demand. Murphy and Welch (1992) measure supply by hours worked, and compute demand by multiplying the matrix of second partial derivatives of the production function by the supply matrix. Katz and Murphy (1992) measure supply using employment and hours worked in the aggregate economy, and demand by means of the occupation-industry structure of employment; a similar approach is also used to analyse male wage inequalities in the US and other nine OECD countries by Blau and Kahn (1996) and by Leuven et al. (2004). In these last two studies the supply index is computed to be proportional to each skill group in the labour force, while the demand index is a measure of the degree to which the occupation-industry structure favours certain skill groups over the others. Both indices are computed using data on employment and the labour force. More recently, Barth and Lucifora (2006) estimate supply by the labour force participation rate and demand by employment rates.

These studies, however, assume that individuals have complete control over the number of hours that they want to supply, and that the unemployed do not enter the equation since they have decided to supply zero hours. For our analysis, in contrast, we use a measure of supply based on the number of individuals potentially willing to work, since this is closer to the idea that individuals compete for the same jobs despite the number of hours they want to supply. We estimate labour supply by the number of workers who are actively looking for a (new) job, and labour demand at time t by the number of persons hired between t and $t+1$. The LFS represents an almost ideal dataset in this respect since it collects information on

whether the respondent is actively looking for a job. This information is collected not only from the unemployed, but also from workers who already have a job or are classified as temporarily inactive. The number of people looking for a (new) job seems a good proxy for the number of individuals who might be in competition for the same jobs. From the demand side, the LFS provides data on the month and year in which each worker started his/her current job, thus allowing the computation of a good proxy for labour demand.

Since workers with similar education but different levels of experience are unlikely to be close substitutes (Welch, 1979; Card and Lemieux, 2001), we compute labour supply and demand – and therefore job competition – separately for workers with different potential labour market experience. We compute potential experience as the difference between age and the age at which full time continuous education has been completed, and divide them into four groups: 0-5 years; 6-15 years; 16-30 years; and more than 30 years. Such groups should reduce the problem that potential experience might be over-estimated for women, who are more likely than men to have career interruptions.

3. Measuring Competition in the Graduate Labour Market

We compute two measures of job competition; the first considers regions as separate local labour markets:

$$C_{ert} = \frac{S_{ert} - D_{ert}}{AP_{ert}} \tag{1}$$

where S_{ert} measures supply of graduates with potential experience e at time t, and D_{ert} measures demand for graduates with potential experience e at time t. AP_{ert} is the number of individuals in experience group e in the active population at time t.[1] Since the LFS collects information on both the place of residence and of work; it allows the identification of 18 regions, and of commuting flows across them. The subscript r refers to the region where the person lives in the measure of supply, and to the region where the job is in the measure of

---

[1] The active population is measured here as the sum of the number of employees, self-employed, workers participating in government training programs, unpaid family workers, and unemployed. All measures of job competition are computed taking into account 'person-weights' (see Office for National Statistics, 2003).

demand. To avoid small cell size problems, all cells in which the measure of competition would be computed on less than ten observations have been dropped.

We contrast the regionally based measure of job competition with a national one. Job competition at the regional level (C_{ert}) should be of relevance only if the labour market for graduates is not wholly national: graduates in one region might migrate to other regions when competition is lower elsewhere, for instance if they fear that the increasing proportion of graduates in their own region might have a negative impact on their wages. In this case the regional measure would not be able to capture the wage impact of job competition. The LFS shows that interregional migration is much larger for graduates than for non graduates. While only 1.95 percent of the population moves across British regions every year, the proportion of graduates who move is 4.54 percent. Such large proportion of movers across graduates might in certain cases be sufficient to equilibrate labour supply and demand of graduates across regions; we return on this point in the next section. We compute the measure of job competition at the national level as:

$$C_{et} = \frac{S_{et} - D_{et}}{AP_{et}}$$

(2)

where S_{et} measures supply, and D_{et} measures demand for graduates with potential experience e at time t. AP_{et} is the number of individuals in experience group e in the active population at time t. Both measures of job competition range between minus 1 and plus 1, increase following an increase in labour supply, and decrease following an increase in labour demand. Positive values indicate excess supply, while negative values indicate excess demand. Although the regional one has a much larger standard deviation, the two measures of job competition have similar means. The regional measure (C_{ert}) has a mean of 4.52 percent, with a standard deviation of 4.74. It ranges from a minimum of -70.60 percent to a maximum of 40.30 percent. Because it averages out regional differences in labour supply and demand, the national measure (C_{et}) ranges from -2.21 percent to 15.93 percent, with a mean of 4.56 percent and a standard deviation of 2.79.

In the next section, we analyse the importance of regions, firstly through showing that there is an imbalance between the demand for and supply of graduates at the regional level, and secondly by verifying that, on average, regions with higher job competition have lower wages.

4. Descriptive Analysis

4.1. Spatial Distribution of Labour Supply and Demand

We can analyse the spatial distribution of the supply of graduates in relation to the spatial distribution of the demand by means of the dissimilarity index (e.g. Duncan and Duncan, 1955), which is often used to analyse whether industries are concentrated in few regions (e.g. Krugman, 1991). We compute the index as in Watts (1998):

$$D_t = \left(\frac{1}{2}\right)\sum_r \left| \frac{GS_{rt}}{GS_t} - \frac{GD_{rt}}{GD_t} \right| \tag{3}$$

where GS_{rt} and GD_{rt} are the supply and the demand for university graduates in region r at time t; while GS_t and GD_t are the total supply and demand at time t. The dissimilarity index ranges from zero to one, where a value of zero indicates equal distribution of labour supply and demand across regions, thus suggesting a situation of spatial equilibrium across regional labour markets. The index reaches its maximum of one if labour supply and demand are located in different regions, so that graduates supplying work would need to migrate or commute to other regions to meet the demand. The dissimilarity index can also be interpreted as the percentage of graduates who would have to change region in order to equalise the spatial distribution of labour supply and demand.

The dissimilarity index computed by quarter is shown in Figure 1. Although the dissimilarity index should not be used to analyse trends over time (Watts, 1998), Figure 1 shows that there seems to be inequality between the distribution of the supply and of the demand for university graduates across regions; such inequality is much larger in some periods than in others.

FIGURE 1 ABOUT HERE

The dissimilarity index is always rather close to zero, and ranges from 0.050 in the fall quarter of 2002 to 0.157 in the spring quarter of 2001. The average over the whole period is around 0.10, suggesting that around ten percent of graduates should move to other

regions to reach equal concentration of supply and demand of graduates.[2] This proportion seems rather high if we consider that in the UK on average only 4.54 percent of graduates change region of residence each year.

4.2. Impact of Job Competition on Average Local Wages

We now analyse the spatial correlation between wages and the measures of job competition by regressing aggregate characteristics of the local labour market on average wages:

$$\ln w_{ert} = \alpha + \beta \, JC_{t-1} + \mathbf{X}_{ert} \, \gamma + \varepsilon_{ert} \qquad (4)$$

where the dependent variable ($\ln w_{ert}$) is the log of average hourly wages of graduates with potential experience e, employed in region r at time t, and JC_{t-1} is either the regional, or the national measure of job competition. The measure of job competition is lagged one quarter to avoid problems of endogeneity that might arise if employment decisions of firms depend on job competition itself. To correct for composition effects, the vector $\mathbf{X}_{ert}$ contains characteristics of the local labour market identified by the experience-region cells. These are: average age, experience, and years of job tenure, as well as the proportion of women, part-timers and married workers in that specific cell. Graduates are assumed to be close substitutes for other graduates with similar potential experience, while they are not good substitute for graduates with different levels of experience, or employed in different regions in the case of the regional measure. The coefficient β is expected to be negative or zero: wages should be comparatively lower in those experience-region cells where the relative supply of graduates is higher (e.g. certain regions, or younger cohorts with less potential experience). On the other hand, a higher relative supply might have no relevant impact on average wages if firms pay efficiency wages (e.g. Campbell and Orszag, 1998;Shapiro and Stiglitz, 1984). If the labour market for graduates is national, we would expect no wage impact of the regional measure of job competition, and a negative impact of the national one.

The results of the estimation of equation (4) are shown in Table 1. The equations are estimated by OLS, with robust standard errors.

---

[2] If supply and demand were equal at the national level, the ten percent of graduates moving to regions with higher demand would be needed to reach equilibrium in each regional labour market.

TABLE 1 ABOUT HERE

The national and regional measures of job competition give consistent results. The regression coefficients suggest that there is a negative correlation between job competition in the local labour market and local average wages, with the national measure suggesting a much bigger wage impact. Wages of graduates seem to be on average lower in those local labour markets where job competition amongst graduates is higher. This aggregate analysis is complemented in the next section by a disaggregated analysis using individual data. First, we analyse the impact of graduate competition on individual wages of all graduates, distinguishing by gender. Secondly, we focus on graduate men to analyse the impact of job competition on graduates working in different types of graduate job.

5. Impact of Job Competition on Individual Wages

5.1. All Jobs

Table 1 suggests that on average wages of graduates should be lower in those local labour markets where job competition amongst graduates is higher. At the individual level we can analyse the relationship between hourly wages and job competition in the graduate local labour market by means of a Mincer regression of the type:

$$\ln w_{it} = \alpha + \beta_1\, JC_{t-1} + \beta_2\, {}^{NG}JC_{t-1} + \beta_3\, WJC_{t-1} + \mathbf{X}_{it}\, \gamma + \mathbf{E}_{it} + \mathbf{O}_{it} + \mathbf{R}_{it} + \mathbf{T} + \varepsilon_{it} \qquad (5)$$

where the dependent variable is the natural log of individual hourly wages. Since 1997, earning questions in the LFS have been asked both in the first and last interview; however, to avoid problems of almost perfect correlations across wages of the individual, we use here only wage data collected from the first interview. JC_{t-1} is either the regional or the national measure of job competition. Consistently with the findings of Devereux and Hart (2005), we assume that labour market conditions affect wages in a way which is more consistent with a standard spot market model than with a contract model: wages should be affected more by contemporaneous than initial labour market conditions. Also in this case the measure of job competition is lagged one quarter to avoid possible problems of endogeneity.

Among the explanatory variables in equation (5) we also include a measure of job competition among people with lower education (individuals with diplomas in higher

8

education, teaching, nursing and other diplomas): $^{NG}JC_{t-1}$. This measure is computed in a way similar to the measure of job competition among graduates. We include this further explanatory variable to test whether high job competition among graduates but lower job competition among 'non-graduates' induces some graduates to consider jobs for which they are overqualified, and which pay comparatively lower wages (e.g. Hartog, 2000).

To account for commuting across regions, in some of the models in which the measure of job competition is computed at the regional level we also include the spatial lag of the measure of job competition (WJC_{t-1}) amongst the explanatory variables. The spatial weights are organised in a block-diagonal weight matrix in which we assume correlation across all experience groups, but no correlation across education groups. The matrixes forming the blocks are all equal, and the elements of each of these spatial weight matrixes are the total flows of commuters across regions. In case of missing education-experience-time combinations, the weight is zero, and can be interpreted as a situation of equilibrium between labour supply and demand: these cells should therefore have no influence on the neighbours. Since the spatial lag is computed on one of the explanatory variables, it is not expected to generate any problem of endogeneity.

The reason for including the spatial lag of job competition among the explanatory variables is that imbalances between labour supply and demand within a region might partly be corrected by commuting. Large numbers of interregional commuters suggest that the administrative regions used in the analysis are unlikely to correctly identify 'local' labour markets. Since data on travel-to-work areas is not available for our analysis, we use the spatial lag of job competition to correct the misspecification related to the use of administrative regions. The analysis of the coefficient of the spatial lag of job competition will also allow a more complete way to analyse to what extent the labour market for graduates is regional rather than national.

Finally, the vector $\mathbf{X}_{it}$ includes age, years of potential experience, years of tenure on the job, a dummy for female, a dummy for part-timers, and a dummy for whether married. The vectors $\mathbf{E}_{it}$, $\mathbf{O}_{it}$, and $\mathbf{R}_{it}$ are dummies for economic sector, occupation, and region of work of individual i at time t, while $\mathbf{T}$ is a yearly trend. Occupations are defined as the major – one digit – groups of the 1990 Standard Occupations Classification, while the economic sectors are defined as the major divisions – one digit – of the 1980 Standard Industrial Classification (see Office for National Statistics, 2003, Vol. 5 for more details).

The model is estimated by OLS separately for men and women, and the standard errors correct for correlation within regions and experience groups (Moulton, 1990). The results are shown in Table 2. While the first panel of Table 2 estimates the impact of job competition on wages of men, the second panel estimates the impact on wages of women.

While the regional measure of job competition in column (1) suggests a small positive impact of job competition on wages of both men and women, the national measure in column (3) suggests a rather large negative impact, which is only slightly larger for men than for women. The small impact computed at the regional level and the large impact computed at the national level might suggest that the market for graduates is national rather than regional. In column (2) of Table 2 we include the spatial lag of job competition in the regional regression. The spatial lag of job competition has a negative coefficient, which is statistically significant only for men. This suggests that the labour market for graduate men is likely to be regional, and that imbalances between labour supply and demand for graduates are more likely to be corrected with commuting rather than with migration. The results, which suggest that the labour market for graduate women is more likely to be national than regional, are consistent with the recent results by Faggian et al. (2007), who find that in the UK female graduates are more likely to be repeated migrants than male graduates.

TABLE 2 ABOUT HERE

Competition among people with lower education seems to have a large positive impact on wages of graduates. Although this result might at first seem puzzling, it but is consistent with the idea that higher competition among non graduates should push graduates to look for better jobs, thus reducing the probability of overqualification amongst graduates. As opposed to the idea of 'bumping down', in this case, graduates would be 'kept up' to better jobs if the competition amongst non graduates is high. However, while the coefficient is always statistically significant for women, it is statistically significant for men only when job competition is measured at the national level, thus suggesting that women might be more likely than men to consider jobs requiring lower qualifications, and might therefore be more influenced by job competition amongst non graduates.

Since the LFS does not include the information needed to analyse whether workers are overqualified, up to now we have assumed that all jobs filled by graduates are "graduate jobs" and that no graduate works in "non-graduate" jobs. In the next section we explore the

impact of job competition amongst graduates across different kinds of occupations using the classification developed by Elias and Purcell (2003, 2004).

5.2. Graduate and Non-graduate Jobs

Using data from the UK Labour Force Survey, Elias and Purcell (2003, 2004) classify occupations in five broad categories on the basis of the skills required in each occupation. The five categories identified are: 'traditional', 'modern', 'new', 'niche' graduate occupations, and 'non graduate' occupations. While a degree is typically needed for those jobs classified as traditional and modern graduate occupations, a degree is considered unnecessary for the remaining occupations. Elias and Purcell (2004) find however that more and more graduates are hired in some specific occupations, which they classify as new graduate occupations. More uncertainty characterises the category of niche since normally a degree is not needed for those jobs, while they regard a degree as inappropriate for the so-called non-graduate occupations. Because these are growing, we might expect demand for graduates to be greatest in niche and modern graduate occupations, where demand might still outstrip supply. Traditional graduate occupations, in contrast, might be approaching saturation point and becoming increasingly competitive. We expect the impact of job competition to differ across such groups of occupations; wages in traditional graduate occupations are expected to be more sensitive to job competition than wages in the other occupational groups. The results of separate regressions for the five occupational groups are shown in Table 3. The model is computed for men only.

TABLE 3 ABOUT HERE

Table 3 shows mixed results, depending on the occupation group. Assuming that, also when moving, workers do not intend to change occupation, the results suggest that the market is national for those workers employed in traditional and in niche graduate occupations. The market seems to be regional for workers employed in non graduate occupations, as well as for workers employed in modern graduate occupations though, in this last case, commuting seems to play a much larger role.

In general it seems that graduates employed in traditional graduate occupations suffer more from job competition, ceteris paribus, than graduates employed in other kinds of occupations, followed by graduates employed in modern and niche graduate occupations. In

new graduate occupations the impact of job competition is still negative, although it is never statistically significant. Job competition among workers with lower level of education still seems to have a positive impact on wages of graduates working in graduate occupations, but not on wages of graduates working in non graduate occupations.

In summary, our results suggest that job competition amongst university graduates has a negative impact on graduate wages. Probably due to the relatively high propensity of graduates to move across regions to profit from the best opportunities in the local labour market, the wage impact of job competition is more clearly estimated when the measure is computed at the national – rather than at the regional – level. However, the results also suggest that (a large) part of regional imbalances between labour supply and demand is corrected by commuting rather than migration. The negative wage impact of job competition in the graduate labour market seems to be unequally distributed across occupations. Wages in traditional, modern and niche graduate occupations seem to be more affected than wages in new and non graduate occupations, thus suggesting that while demand for graduates in new graduate occupations might still be growing, traditional graduate occupations might be approaching saturation point. Finally, job competition among workers with lower education seems to have a positive effect on graduate wages on average, thus suggesting a lower probability of graduates to accept jobs for which they are overqualified when job competition amongst non graduates is high.

6. Conclusions

In this paper we estimate the direct impact of job competition amongst university graduates on graduate wages in the UK and analyse to what extent the local labour market for graduates is regional rather than national. We suggest measures of job competition which exploit the variability of supply and demand for graduates across regions, experience groups and over time. We then estimate the direct impact of job competition on individual wages in the framework of a Mincer regression by comparing models assuming that the labour market for graduates is regional, to models assuming that the labour market for graduates is national.

The spatial correlation between our measures of job competition and average wages of graduates suggests that graduates in those local labour market characterised by higher levels of job competition earn lower wages on average.

The analysis at the individual level suggests that job competition amongst graduates has a negative impact on graduate wages; the impact is more clearly estimated when the measure is computed at the national – rather than at the regional – level. Nevertheless, the results suggest that the labour market for university graduates is regional, and that part of the regional imbalances between labour supply and demand is corrected by commuting rather than migration. Competition among people with lower education seems to have a large positive impact on wages of graduates thus suggesting that graduates might be willing to accept non-graduate jobs if competition among non graduates is lower; and that women might be more likely than men to consider jobs requiring lower qualifications.

The negative wage impact of job competition in the graduate labour market seems to be unequally distributed across occupations. Wages in 'traditional', 'modern' and 'niche' graduate occupations seem to be more affected than wages in 'new' and 'non' graduate occupations, thus suggesting that while demand for graduates in new graduate occupations is growing, traditional graduate occupations might be approaching saturation point.

References

Anselin, L. (1988) *Spatial Econometrics: Methods and Models*. Dordrecht (the Netherlands), Kluwer Academic Publishers.

Barth, E. and Lucifora, C. (2006) Wage Dispersion, Markets and Institutions: The Effects of the Boom in Education on the Wage Structure, IZA Discussion Paper No. 2181.

Blau, F.D. and Kahn, L.M. (1996) International Differences in Male Wage Inequality: Institutions Versus Market Forces. *Journal of Political Economy* 104(4): 791-837.

Boheim, R. and Taylor, M.P. (2002) Job Search Methods, Intensity and Success in Britain in the 1990s, Dept. of Economics Johannes Kepler University of Linz Working Paper No. 0206.

Campbell, C. and Orszag, J.M. (1998) A Model of the Wage Curve. *Economics Letters* 59: 119-125.

Card, D. and Lemieux, T. (2001) Can Falling Supply Explain the Rising Return to College for Younger Men? A Cohort-Based Analysis. *Quarterly Journal of Economics* 116(2): 705-746.

Combes, P.-P., Duranton, G. and Gobillon, L. (2006) Spatial Wage Disparities: Sorting Matters! London, CEPR Discussion Paper No. 4240 (2004).

Devereux, M.P., Griffith, R. and Simpson, H. (2004) The Geographic Distribution of Production Activity in the UK. *Regional Science and Urban Economics* 34(5): 533-564.

Devereux, P.J. and Hart, R.A. (2005) The Spot Market Matters: Evidence on Implicit Contracts from Britain, IZA Discussion Paper 1497.

Duncan, O.D. and Duncan, B. (1955) A Methodological Analysis of Segregation Indexes. *American Sociological Review* 20(2): 210-217.

Duranton, G. and Monastiriotis, V. (2002) Mind the Gaps: The Evolution of Regional Earnings Inequalities in the U.K., 1982-1997. *Journal of Regional Science* 42(2): 219-256.

Elias, P. and Purcell, K. (2003) Measuring Change in the Graduate Labour Market, Researching Graduate Careers Seven Years On, Research Paper No. 1.

Elias, P. and Purcell, K. (2004) SOC (HE): A Classification of Occupations for Studying the Graduate Labour Market, Research Graduate Careers Seven Years On, Research Paper No. 6.

Faggian, A., McCann, P. and Sheppard, S. (2007) Some Evidence That Women Are More Mobile Than Men: Gender Differences in U.K. Graduate Migration Behavior. *Journal of Regional Science* 47(3): 517-539.

Hartog, J. (2000) Over-Education and Earnings: Where Are We, Where Should We Go? *Economics of Education Review* 19(2): 131-147.

Katz, L.F. and Murphy, K.M. (1992) Changes in Relative Wages, 1963-1987: Supply and Demand Factors. *The Quarterly Journal of Economics* 107(1): 35-78.

Krugman, P. (1991) *Geography and Trade*. Cambridge, MIT Press.

Leuven, E., Oosterbeek, H. and van Ophem, H. (2004) Explaining International Differences in Male Skill Wage Differentials by Differences in Demand and Supply of Skill. *The Economic Journal* 114(April): 466-486.

Moulton, B.R. (1990) An Illustration of a Pitfall in Estimating the Effects of Aggregate Variables on Micro Units. *The Review of Economic and Statistics* 72: 334-338.

Murphy, K.M. and Welch, F. (1992) The Structure of Wages. *The Quarterly Journal of Economics* 107(1): 285-326.

Office for National Statistics (2003) *Labour Force User Guide*. London, ONS.

O'Leary, N.C. and Sloane, P.J. (2005) The Changing Wage Return to an Undergraduate Education, IZA Discussion Paper No. 1549.

Shapiro, C. and Stiglitz, J.E. (1984) Equilibrium Unemployment as a Worker Discipline Device. *American Economic Review* 74: 433-444.

Walker, I. and Zhu, Y. (2005) The College Wage Premium, Overeducation, and the Expansion of Higher Education in the UK, IZA Discussion Paper No. 1627.

Watts, M. (1998) Occupational Gender Segregation: Index Measurement and Econometric Modeling. *Demography* 35(4): 489-496.

Welch, F. (1979) Effects of Cohort Size on Earnings: The Baby Boom Babies' Financial Bust. *Journal of Political Economy* 87(5-2): S65-S97.

Tables

Table 1
Impact of Job Competition on Average Local Wages

	(1)	(2)
Measure of Job Competition:	Regional: C_{ert}	National: C_{et}
Job Competition	-0.441***	-1.146***
	(0.093)	(0.124)
Adjusted R^2	0.481	0.485

Observations: 2732. The measure of job competition ranges between -1 and +1. Robust standard errors in parenthesis; * Significant at 10%, ** Significant at 5%, *** Significant at 1%
Other explanatory variables: average age, experience, years of tenure; the proportion of women, part-timers and married workers.

Table 2
Impact of Graduate Competition on Individual Wages

	(1)	(2)	(3)
Measure of Job Competition:	Regional: C_{ert}	Regional: C_{ert}	National: C_{et}
Men			
Job Competition	0.085	0.146	-0.487***
	(0.093)	(0.117)	(0.171)
Competition Lower Education Group	0.097	0.127	0.918***
	(0.070)	(0.077)	(0.130)
Spatial Lag Job Competition		-0.312**	
		(0.143)	
Adjusted R^2	0.402	0.402	0.402
Women			
Job Competition	0.130	0.175	-0.468***
	(0.080)	(0.107)	(0.155)
Competition Lower Education Group	0.144***	0.164***	0.826***
	(0.046)	(0.053)	(0.176)
Spatial Lag Job Competition		-0.241	
		(0.229)	
Adjusted R^2	0.435	0.435	0.435

Observations: 25743 for men; 15055 for women. The measure of job competition ranges between -1 and +1. Standard errors in parenthesis are adjusted for within groups correlation; * Significant at 10%, ** Significant at 5%, *** Significant at 1%
Other explanatory variables: age, years of potential experience, years of tenure on the job, a dummy for part-timers, and a dummy for whether married; dummies for economic sector, occupation, and region of work; and a yearly trend.

Table 3
Wage Impact of Graduate Competition by Occupation Groups (Men only)

Measure of Job Competition:	(1) Regional: C_{ert}	(2) Regional: C_{ert}	(3) National: C_{et}
Traditional Graduate Occupations			
Job Competition	0.322	0.369	-1.049*
	(0.249)	(0.269)	(0.573)
Competition Lower Education Group	0.024	0.048	1.841***
	(0.149)	(0.153)	(0.439)
Spatial Lag Job Competition		-0.245	
		(0.324)	
Adjusted R^2	0.252	0.252	0.254
Modern Graduate Occupations			
Job Competition	-0.001	0.142	-0.146
	(0.145)	(0.170)	(0.337)
Competition Lower Education Group	0.076	0.146	0.423
	(0.110)	(0.116)	(0.297)
Spatial Lag Job Competition		-0.635***	
		(0.200)	
Adjusted R^2	0.325	0.327	0.326
New Graduate Occupations			
Job Competition	0.207*	0.276*	-0.384
	(0.120)	(0.148)	(0.241)
Competition Lower Education Group	0.187*	0.221**	0.849***
	(0.095)	(0.104)	(0.234)
Spatial Lag Job Competition		-0.324	
		(0.205)	
Adjusted R^2	0.331	0.332	0.331
Niche Graduate Occupations			
Job Competition	0.196	0.214	-0.544*
	(0.128)	(0.147)	(0.305)
Competition Lower Education Group	0.120	0.128	1.336***
	(0.093)	(0.097)	(0.294)
Spatial Lag Job Competition		-0.089	
		(0.180)	
Adjusted R^2	0.302	0.302	0.304
Non Graduate Occupations			
Job Competition	-0.172*	-0.144	-0.347
	(0.094)	(0.098)	(0.246)
Competition Lower Education Group	0.001	0.016	0.232
	(0.085)	(0.088)	(0.315)
Spatial Lag Job Competition		-0.212	
		(0.182)	
Adjusted R^2	0.408	0.408	0.408

Observations: 3264 for workers in Traditional Graduate Occupations; 5753 for Modern Graduate Occupations; 6628 for New Graduate Occupations; 5890 for Niche Graduate Occupations; 3940 for Non Graduate Occupations. The measure of job competition ranges between -1 and +1. Standard errors in parenthesis are adjusted correlation within regions and experience groups; * Significant at 10%, ** Significant at 5%, *** Significant at 1%

Other explanatory variables: gender, age, years of potential experience, years of tenure on the job, a dummy for part-timers, and a dummy for whether married; dummies for economic sector, occupation, and region of work; and a yearly trend.
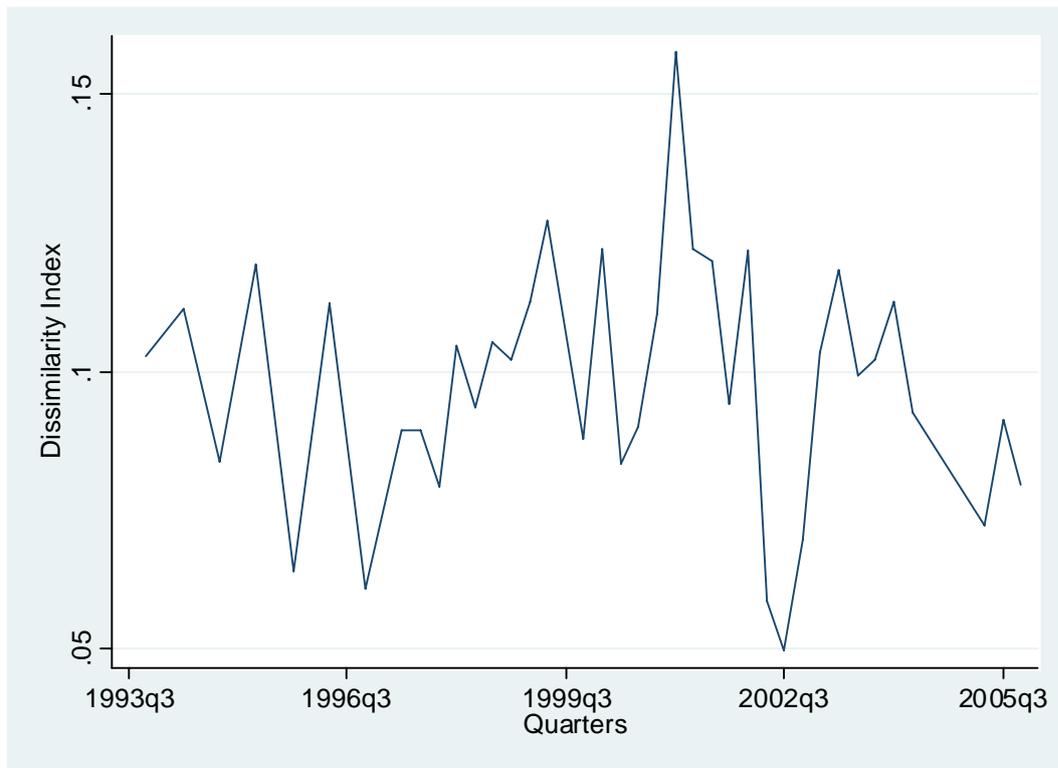
Figures

Figure 1
Dissimilarity Index