Impact of Cultural Diversity on Wages and Job Satisfaction in England

Simonetta Longhi

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Simonetta Longhi

Institute for Social and Economic Research, University of Essex

and IZA

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Abstract

This paper combines individual data from the British Household Panel Survey and yearly population estimates for England to analyse the impact of cultural diversity on individual wages and on different aspects of job satisfaction. Do people living in more diverse areas have higher wages and job satisfaction after controlling for other observable characteristics? The results show that cultural diversity is positively associated with wages, but only when cross-section data are used. Panel data estimations show that there is no impact of diversity. Using instrumental variables to account for endogeneity also show that diversity has no impact.

Keywords: Cultural Diversity; Wages; Job Satisfaction
JEL Classification: J28; J31; R23

1. Introduction

Empirical and theoretical studies analysing the impact of cultural diversity on economic performance suggest that in developed countries, with better institutions and more diversified production processes, cultural diversity might lead to higher growth and productivity, and therefore higher income levels (Alesina and La Ferrara 2005; Bellini et al. 2008). People with different cultural backgrounds might bring a wider variety of skills and problem-solving abilities in the production process and generate knowledge spillovers which might translate in higher productivity so that, under certain conditions, a more diverse group might outperform a more homogeneous one (e.g. Alesina and La Ferrara 2005). On the other hand, too much diversity might generate transaction costs and impede communication, thus reducing productivity. The expectation is therefore that moderate levels of diversity should have a positive impact, while too much diversity might be detrimental; there should be an optimum level of diversity which maximises productivity.

Ottaviano and Peri (2005) measure diversity by fractionalisation of languages across US cities and find that diversity has a positive impact on average wages; Ottaviano and Peri (2006) find that diversity measured by birthplace has a positive impact on average wages of US-born workers and on rental prices. For Germany, Suedekum et al. (2009) find that high skill foreign workers increase productivity while low skill foreign workers generate negative wage and employment effects, with some exceptions by nationalities. All this evidence, however, is based on the comparison of aggregates across regions within one country. Such data are often limited in the number and types of covariates that can be included in the empirical model.

Rather than using aggregate data, the empirical analysis of this paper uses individual panel data for England to analyse the impact of diversity on individual wages and on satisfaction with different aspects of the job. Such data allow us to control better for individual observable characteristics in the wage equations, and to analyse for the first time whether diversity has any impact on job satisfaction.

In using individual data this paper follows the political and sociological literatures estimating the impact of diversity on trust and social capital (Costa and Kahn 2003b, 2003a; Putnam 2007; Letki 2008). A drawback of this literature, however, is the use of cross-sectional data. Usually diversity is measured from census data and then merged with the individual data. Even when the individual data are available for multiple years, generally the measure of diversity is time-invariant (see e.g. Alesina and La Ferrara 2000; Sturgis et al.

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2011); and even in those cases where data from multiple censuses are used, the individual data are still made of repeated cross sections of individuals, rather than being longitudinal (see e.g. Alesina and La Ferrara 2002). Given the possible endogenous location of individuals across areas characterised by different levels of diversity, the results obtained using cross-sectional data might overestimate the impact of diversity.

The main contribution of this paper is the exploitation of panel data of individuals. Rather than using the census, this paper computes diversity from yearly population estimates, which are then merged into individual panel data of British households. Not only this allows a better control for unobserved individual heterogeneity, but it also solves the problem of scale comparability in the answers to the questions on job satisfaction, which might depend on individual personality (e.g. Winkelmann and Winkelmann 1998; Argyle 2001), and partly solves the problem of the endogenous location of individuals within the country (e.g. Card 2005; Dustmann et al. 2005a). This is likely to give a better estimate of whether diversity has any impact on wages and job satisfaction.

The analysis below shows the results of two sets of models. For comparison with the previous literature, the first set of models is estimated using cross-sectional data. These models show, in line with the previous literature, that diversity seems to have a statistically significant impact on individual wages which is positive but non linear. The second set of models, however, is estimated using panel data and accounting for individual heterogeneity. In these models the impact of diversity disappears, leading to the conclusion that diversity has no impact on wages and that the previous results found in the literature might be driven by individual heterogeneity. All cross-sectional and panel models show that diversity has no impact on job satisfaction. Instrumental variable estimations tackling the problem of endogeneity of the measure of diversity confirm that diversity has no impact on individual wages or on job satisfaction.

2. Theoretical Background

There are many reasons why we could expect cultural diversity to have an impact on wages. Cultural diversity can be considered both a production amenity and a consumption amenity, and in both cases it can be either positive or negative.

As a productive amenity diversity can have a positive impact on wages, as a culturally diverse workforce may contribute skills and problem-solving abilities that are complementary to those of natives. The interaction between culturally diverse workers might therefore foster

innovation and productivity, with a consequent positive impact on wages. For example, for Germany Niebur (2010) found that immigration promotes regional R&D, while for the US Peri (forthcoming) finds that immigrants increase total factor productivity. On the other hand, the management literature suggests that performance might be higher in homogeneous teams: although heterogeneity might promote creativity, it might hinder communication (Horwitz and Horwitz 2007). Because of cultural differences or the use of different mother tongues and a poor understanding of the common language, cultural diversity might increase communication costs, possibly creating misunderstandings, conflicts and uncooperative behaviour. This would have negative consequences on productivity and wages (e.g. Suedekum et al. 2009).

Such positive and negative mechanisms are likely to work simultaneously (Stahl et al. 2010), and which one would prevail is still an open question. Up to now the literature has found contrasting results. First of all, it has to be noted that the results of the economic literature are generally based on aggregate data, while the results of the management literature are generally based on case studies including a small number of observations. In addition, most of the analyses of the impact of diversity on team performance have been based on the assumption that diversity has a linear impact (Richard et al. 2007). It is possible that a moderate level of diversity might have a positive impact on wages and productivity, while too much diversity might have a negative impact. Furthermore, the impact of diversity might differ depending on the length of exposure to diverse cultures. While the short-run impact of diversity might be negative, as people gradually adapt to the presence of diverse cultures they might benefit more from such interactions.

The literature on compensating differentials suggests that people living in areas with better amenities will accept lower wages, while people living in areas with worse amenities will be compensated by comparatively higher wages (e.g. Schmidt and Courant 2006). Cultural diversity might be perceived as a positive amenity to the extent that it might lead to a larger variety of services offered such as shops and restaurants, and may indicate the presence of a tolerant local population (Florida 2002). On the other hand, diversity might be perceived as a negative amenity by people who fear that a culturally diverse population might generate social conflicts or increase crime (e.g. Alesina and La Ferrara 2002; Sturgis et al. 2011; Putnam 2007). Again, it is unclear whether, overall, we should expect diversity to have a positive or negative impact on wages, and none of the studies mentioned above is based on panel data of individuals.

When interpreted as production amenity diversity should be measured either at the workplace level, or in the active (or working age) population, while when interpreted as a consumption amenity it should be measured on the resident population. Ideally, we would then want to separate the two effects to analyse the direction of each, and which one prevails. Unfortunately, data limitations do not allow the measurement of diversity in the workplace, and since diversity in the whole population is very similar to diversity in the working age population, it is not possible to include both in the models. What can be measured, therefore, is the overall impact of diversity on wages.

If diversity has any impact on wages, it might also have an impact on job satisfaction. It seems reasonable to assume, for example, that workers receiving higher wages should be more satisfied with their pay. However, diversity might also have impact on other aspects of job satisfaction, since interaction with co-workers is an important aspect of people's jobs and an important component of job satisfaction (Argyle 2001). The management literature has suggested that people prefer to work with those who are similar to themselves (Stahl et al. 2010); if this is the case, higher diversity might have a negative impact on job satisfaction. On the other hand, if cultural diversity makes the type of work more diverse and enjoyable, it might have a positive impact on job satisfaction.

The final aspect considered here is employment. If diversity promotes growth and leads to higher wages (Alesina and La Ferrara 2005), we might also expect it to have a positive impact on employment. There is some cross-sectional evidence based on English cities suggesting that diversity in terms of country of birth might have a positive impact on employment growth (Lee forthcoming).

In an indirect way, this paper is related to the large literature estimating the impact of immigration on the labour market – e.g. wages, employment opportunities etc. – of the host country (e.g. Dustmann et al. 2005b; Carrasco et al. 2008; Longhi et al. 2010). As in this literature, a labour market outcome of natives is the dependent variable, while the explanatory variable of interest is a measure related to immigration. But while the literature on the impact of immigration focuses on the share of immigrants in a certain region at a certain time, this paper – and the literature on the impact of diversity – focuses on an index of fractionalisation. The theoretical backgrounds of these two types of literatures are substantially different, and so is the interpretation of the two measures and the expectations in terms of direction of the impact. The theoretical background for the analysis of the impact of immigration derives from demand-supply models and the expected impact depends on the degree of substitutability or complementarity between natives and immigrants. The

background for the analysis of the impact of diversity derives from the management literature and is based on the degree of cooperation among people belonging to different cultural groups. From an empirical point of view, cultural diversity, as measured in this paper, is based on the presence of ethnic minorities in the host country and includes both immigrants and second (or further) generations. The distinction is not based on the country of birth but on the subjective way people would classify themselves in one of the ethnic groups. This, rather than immigration status, should define their cultural background.

3. Data and Method

3.1. Data

This paper estimates the impact of diversity on wages and job satisfaction using the British Household Panel Survey (BHPS). The BHPS is a panel of households living in the UK which collects, amongst other information, individual data on job characteristics, such as occupation and wages, and on satisfaction with different aspects of the job. For each individual it is possible to identify the Local Authority District (LAD) of residence, to which a measure of cultural diversity can be associated. This analysis focuses on interviews with working age white British respondents living in 353 English districts in the period between 2002 and 2007.

Cultural diversity is computed at the district level using population estimates from 2001 to 2006. The estimates of the population by age and ethnicity at the district level produced by the Office for National Statistics (ONS) are based on the 2001 census; year-on-year population changes are estimated by ageing the population one year on, adding births, subtracting deaths, and adjusting for migration. Differences in fertility and in the propensity to migrate of different ethnic groups are estimated using the 2001 census, while age-specific mortality is assumed to be the same across ethnic groups within a district. These estimates are then adjusted to ensure consistency with the mid-year population estimates published by district by age and sex (for more details see Office for National Statistics 2010).

Clearly, at the moment the reliability of the population estimates is difficult to quantify since the new census took place only in May 2011 and the data are not yet available. Nevertheless, according to the ONS, the population estimates should provide more reliable estimates for small groups within local authority districts than those produced using sample data (see also Office for National Statistics 2010). Hence, at the moment, the annual population estimates are the most appropriate data for the purpose of this analysis.

3.2. Measuring Diversity

Here cultural diversity is measured by the ethnic composition of the resident population: a society characterised by a mixed ethnic structure should host multiple socio-religious backgrounds and should therefore enjoy a higher level of cultural diversity. Clearly, this includes not only immigrants, but also second and further generations.

Since the focus here is on wellbeing in the workplace, cultural/ethnic diversity is computed including only the working age population (aged 16 to 64 for men and 16 to 59 for women).[1] As common in the literature, the level of diversity in district r at time t is measured using the index of fractionalisation (F_{rt}):

$$F_{rt} = 1 - \sum_{k=1}^{K} \left(\frac{EthnicGroup_{krt}}{Population_{rt}} \right)^2$$

(1)

The index ranges between zero and one and measures the probability that two persons randomly drawn from the active population have the same ethnicity. Fractionalisation in district r depends on the number of ethnic groups (K) in the area, and on their size (see e.g. Alesina et al. 2003).[2] The ethnic groups included are: white British (87.0% of the total population); white others (3.9%); Caribbean (1.6%); African (1.2%); Indian (2.1%); Pakistani and Bangladeshi (2.0%); Chinese (0.4%); and other ethnic groups (1.8%).

Cultural diversity does vary across districts and over time. As shown in Figure 1, diversity is higher in London and its surrounding areas and is generally lower in the North of the country, although it is relatively high in some of the districts. The figure also shows that diversity has increased in almost all districts between 2001 and 2006.

FIGURE 1 ABOUT HERE

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[1] Although the active or employed population might be a more appropriate choice, information on economic activity is not available in the population estimates.

[2] Hence, an area in which 90 percent of the population belong of ethnic group A and 10 percent belong to ethnic group B, fractionalisation would be lower than in an area in which 90 percent of the population belong to ethnic group A, 2.5 percent belong to ethnic group B, 2.5 percent belong to ethnic group C, and 2.5 percent belong to ethnic group D.

As shown in Table 1, in 2001 the index of fractionalisation varies between 2.7 percent (in Berwick-upon-Tweed, North East) and 82.1 percent (in Brent, London). The mean of the index is 17.2 percent, while the median is 10.7 percent. In 2006 the index ranges between 4.5 percent (in Easington, North East) and 82.0 percent (in Newham, London). The mean of the index has now increased to 22.8 percent, and the median to 16.9 percent. Figure 2 confirms that the distribution of the index gradually moves to the right over time, indicating an increase in diversity between 2001 and 2006.

TABLE 1 ABOUT HERE

FIGURE 2 ABOUT HERE

3.3. Estimating the Impact of Diversity on Wages and Job Satisfaction

To analyse the impact that cultural diversity has on wellbeing in the workplace we can estimate regression models in which the dependent variable is either log wages (W_{irt}), job satisfaction (JS^*_{irt}), or the probability of being in employment (E^*_{irt}), and among the explanatory variables we include the index of fractionalisation in the previous year (*t-1*):

$$W_{irt} = \alpha_{1i} + \beta_{11}Fractionalisation_{r,t-1} + \beta_{12}Fractionalisation^2_{r,t-1} + \gamma_1 Controls_{irt} + \varepsilon_{1irt}$$

$$JS^*_{irt} = \alpha_{2i} + \beta_{21}Fractionalisation_{r,t-1} + \beta_{22}Fractionalisation^2_{r,t-1} + \gamma_2 Controls_{irt} + \varepsilon_{2irt}$$

$$E^*_{irt} = \alpha_{3i} + \beta_{31}Fractionalisation_{r,t-1} + \beta_{32}Fractionalisation^2_{r,t-1} + \gamma_3 Controls_{irt} + \varepsilon_{3irt}$$

$$(2)$$

It is worthwhile to compare two different types of wages: basic hourly wages and usual hourly wages.[3] The first refers to the hourly wage rate for basic hours of work, excluding overtime, for those workers who are paid hourly. Although this variable is theoretically more appropriate for this analysis, not all jobs or occupations are paid by the hour. Respondents reporting basic hourly wages are underrepresented among managers and administrators, professional and technical occupations, and overrepresented among

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[3] Wage data are deflated at 2007 prices using Consumer Price Indices provided by the Office for National Statistics (http://www.statistics.gov.uk/default.asp).

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occupations at the lower end of the distribution such as sales occupations, plant and machine operatives etc. Besides reducing the number of observations, this might introduce bias if workers employed in such jobs or occupations are affected by cultural diversity differently from workers in other types of jobs or occupations. Hence, the results obtained for this variable should be compared to those obtained from usual hourly wages. This last variable is likely to include a wider variety of jobs and occupations but might be a less precise measure since it refers to the monthly wage divided by usual weekly hours worked multiplied by four, and could therefore include measurement error. This might generate underestimations of the impact of cultural diversity if there is a correlation between diversity and e.g. hours worked by natives. However, we have no reasons to suspect this should be the case.

The models also compare different types of job satisfaction: satisfaction with total pay; job security; the work itself; with hours worked; and job satisfaction overall. Job satisfaction is measured on a 7-point scale, ranging from one (not satisfied at all) to seven (completely satisfied). For the sake of completeness, the models also analyse whether diversity has an impact on the probability of being in employment. In this case the dependent variable is one for employed and self-employed people, and zero for those who are either unemployed or inactive.

In contrast with the previous literature, the measure of diversity in this case varies over time, and a choice has to be made between contemporaneous and lagged measures of diversity. Since it is plausible that wages and employment – and especially job satisfaction – adjust to the changing conditions of the labour market only with a lag, diversity in the previous year seems in this case a better choice. Nevertheless, when the contemporaneous measure of diversity is used instead of the lagged one in equation (2), the results are even more consistent than those shown in the tables below.

Non-linearities in the impact of cultural diversity are captured by the index of ethnic fractionalisation and its square. Among the other control variables the models include (where appropriate) age and its square, dummies for women, whether married, part-time, ten qualifications, eight occupations, and a dummy for London.

Since migrants and ethnic minorities tend to concentrate in larger cities, a positive impact of the measure of cultural diversity on wages might actually be due to agglomeration forces (e.g. Krugman 1991). Although this is more likely to be a problem in the wage than in the satisfaction models, the explanatory variables also include population density to pick up the effect of agglomeration. Population density is computed by dividing the total population – as in the population estimates – by the size of the district in square kilometres.

The wage models are estimated by pooled OLS for comparison with the previous literature, and by means of fixed effects models to analyse to what extent previous results are due to individual unobserved heterogeneity. The job satisfaction models are estimated by correlated random effect ordered probits (see e.g. Frechette 2001; Taylor 2006), while the employment model is estimated by a fixed effects logit.

3.4. Endogeneity

A well-known problem in the literature on neighbourhood effects is that of the endogeneity of the measure of diversity, which might occur if people self-select into areas on the basis of specific characteristics. For example, more productive white British people might live in areas offering on average higher wages which, for this reason, might also be preferred by immigrants when settling in the country (e.g. Card 2005; Dustmann et al. 2005a). If this is the case, estimates that do not take into account the endogenous location of white British people are likely to be biased upwards. The availability of panel data will partly help to reduce this problem of omitted variable bias by allowing the models to include individual unobserved heterogeneity. Besides the endogenous location of British people, the endogenous location of ethnic minorities is also likely to be a problem. If there is a relationship between the economic performance of an area and the share of ethnic minorities living in that area, estimates that do not account for such correlation are likely to be biased downwards. This endogeneity problem can be tackled directly using instrumental variables.

One of the most common instruments in the literature analysing the impact of diversity and the impact of immigration on the host country is a lag of the diversity measure itself (see e.g. Card 2005; Dustmann et al. 2005a). This type of instrument rests on the assumption that the location choice of immigrants depends more on historical patterns that generate clusters of previous waves of immigrants than on the current economic condition of the region. However, if this were the case, the endogeneity of the location of immigrants and ethnic minorities might become debatable. Another reason why the lag is unlikely to be a good instrument is that regional disparities in economic performance are persistent: regions that have performed well in the past are likely to generally perform above average (Longhi et al. 2005a, 2010). The novel instrument used in this paper is the proportion of ethnic minorities joining the 'New Deal Programme' in each district and year (the instrument refers to the same year of the measure of diversity: *t-1*, from 2001 to 2006). The New Deal Programme is a government programme to get selected groups of unemployed and inactive people back to work. The data, provided by the Office for National Statistics, is based on

administrative statistics, and instrument used here includes the three main parts of the programme: the 'New Deal for Young People'; the 'New Deal for the Long Term Unemployed'; and the 'New Deal for Lone Parents' (for more information on the programme see http://www.neighbourhood.statistics.gov.uk/dissemination/). The proportion of ethnic people joining the programme is highly correlated with the proportion of ethnic people in the area, but is unlikely to have an impact on wages. Since endogeneity is less likely to be a problem when we look at the impact on job satisfaction, instrumental variables results are shown only for the models estimating the impact of diversity on wages.

4. Impact of Diversity on Wages, Job Satisfaction and Employment

The estimated impacts of diversity on wages are shown in Table 2; while the first two columns estimate the impact of diversity on basic hourly wages, columns (3) and (4) focus on the impact on usual hourly wages. Consistently with the previous literature, in both cases the OLS model computed on the pooled dataset suggests that diversity has a positive impact on wages, which is statistically significant: on average, people living in areas with higher diversity tend to earn comparatively higher wages. The impact of diversity, furthermore, is non linear. The turning point is for a level of fractionalisation of 0.65 for basic hourly wages, and of 0.40 for usual hourly wages. For usual hourly wages levels of fractionalisation higher than 0.85 would decrease wages. In 2006, 43 of the 353 districts had a level of fractionalisation higher than 0.40; only 17 had a level of fractionalisation higher than 0.65, while none had a level of fractionalisation higher than 0.85.

The advantage of combining the population estimates with the BHPS is that we can now control for unobserved individual heterogeneity by means of individual fixed effects. As expected, including individual unobserved heterogeneity in the model decreases the regression coefficients. The impact of diversity on basic hourly wages remains positive, while the impact on usual hourly wages is now statistically insignificant and very close to zero. When the models in columns (3) and (4) are estimated including only the selected group of workers who also report having basic hourly wages (i.e. those in columns (1) and (2)), the results confirm that diversity has no impact when estimated using fixed effects. This might suggest that in regions with lower diversity – and possibly comparatively lower basic hourly wages – workers compensate, or are compensated in a way such that their usual wages are not affected.

The comparison between OLS and fixed effects suggests that most of the impact of diversity is due to individual heterogeneity. At this point we could already speculate that people who earn comparatively higher wages tend to be clustered in areas that are more diverse, and that fixed effects might partly solve the problem of endogeneity, which has attracted large attention in this literature. As shown below, instrumental variable estimates confirm the absence of a real impact of diversity.

TABLE 2 ABOUT HERE

The next step is the analysis of the impact of diversity on job satisfaction; the focus here is only on the results of the panel estimators. The marginal effects of correlated random effects probit models are shown in Table 3. The table suggests that workers in areas with higher diversity do not seem to have higher levels of satisfaction with their pay. The regression coefficient is not statistically significant and very small. Diversity seems to have a positive impact on satisfaction with work, but a negative impact on satisfaction with job security, hours, and on overall job satisfaction. None of these coefficients, however, is statistically significant. The satisfaction variables can be dichotomised to one for those who are satisfied, and zero for those who are dissatisfied or nor satisfied neither dissatisfied with that particular aspect of their job. The results do not change when these models are estimated by fixed effects logit or by linear probability models.

The last column of Table 3 shows the marginal effects of the fixed effects logit model on the probability of being in employment. The marginal effects are very close to zero, and not statistically significant.

TABLE 3 ABOUT HERE

5. Sensitivity Analysis

5.1. Endogenous Location of Individuals

The results of the previous analysis suggest that diversity does not have a relevant impact on wages when individual unobserved heterogeneity is accounted for. However, as already mentioned, these results might be biased by endogeneity of the index of fractionalisation.

Table 4 shows the results of the OLS and fixed effect models with their counterpart using the proportion of ethnic minorities joining the New Deal Programme as instrument.

At the aggregate level – over time and across districts – the correlation between the index of fractionalisation and the proportion of ethnic minorities joining the New Deal Programme is 0.936. The bottom part of Table 4 shows that the first stage regressions produce a positive and statistically significant correlation between the instrument and the endogenous variable. The results of the wage equations on the top part of Table 4 show that the impact of fractionalisation is statistically significant only in the OLS cross-sectional estimations, while it is statistically insignificant when instruments are used. The coefficients remain statistically insignificant when individual heterogeneity is accounted for by individual fixed effects. This confirms the previous conclusion that diversity has no impact on wages. Since workers reporting basic hourly wages are a selected group, from now on the analysis will concentrate on usual hourly wages.

Endogeneity is less likely to be a problem for job satisfaction. Linear probability models on the dummies for whether the worker is satisfied with different aspects of her job (not shown here), estimated using instruments confirm that there is no impact of diversity.

TABLE 4 ABOUT HERE

When using panel data with fixed effects, the identification of the impact of diversity is due to changes in the level of diversity over time for those who do not change their district of residence, and to changes in the level of diversity across districts for those who do change their district of residence. In this sample, about 66 percent of people never change district of residence between 2001 and 2007, about 26 percent move only once, and the remaining 8 percent move more than once. Of all the moves, 43 percent are to a district with lower level of diversity, while 57 percent are to a district with higher level of diversity compared to the previous one. Hence, there does not seem to be clear evidence that white British people move from high- to low-diversity districts or vice versa. Since movers might be a highly selected group, it is interesting to estimate the models on movers and stayers separately.[4]

The first two columns of Table 5 contrast the impact of diversity on those who move, and on those who stay. Fixed effects wage models suggest that for those who never move

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[4] It has to be noted, however, that a large proportion of these moves are residential moves, not related to a job change. A more thorough comparison of residential and job-related moves, however, is beyond the scope of this paper.

diversity has a positive and statistically significant impact on usual hourly wages. For movers, there is no impact of diversity. This might indirectly suggest that the positive impact of diversity is likely to appear after an initial period of adaptation to the presence of different cultures. To better analyse this idea, the remaining columns of Table 5 add interaction terms between the measure of fractionalisation and dummies for the length of stay in the same district. The fractionalisation index and its square are multiplied by a dummy which is one for those who have lived in the same district for the current and the previous year in column (3); for the current and previous 2, 3, and 4 years in columns (4), (5), and (6) respectively. The interaction terms are small and not statistically significant, thus suggesting that it is not the length of the stay that makes stayers profit more from diversity. Rather, the difference between movers and stayers seems due to self-selection. Those who decide not to move are generally those who are more likely to profit more from diversity.

TABLE 5 ABOUT HERE

Finally, despite receiving comparatively higher basic hourly wages, stayers in districts with higher diversity do not seem to be more satisfied with their job. Similarly, diversity seems to have no impact on employment.

5.2. Impact by Education and Occupation

It is interesting to analyse whether the impact of cultural diversity differs by qualification levels. Diversity might have a different impact on professional and technical occupations than on skilled trades or on elementary occupations, where team diversity might not only be unnecessary, but even counterproductive if tasks are easy (e.g. Horwitz and Horwitz 2007). It might also be argued that people with different levels of education might be more or less able – or have higher or lower need – to profit from higher levels of diversity.

Including interactions with broad qualification levels in the models estimating the impact of diversity on wages show overall no impact on usual hourly wages. Similarly, in all the models including interactions with education, diversity does not seem to have any statistically significant impact on any of the measures of job satisfaction or on the probability of being in employment. Including interactions with occupations also reveal no impact of diversity on wages, satisfaction, or employment.

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These results, however, should be interpreted with caution. Since the population estimates available do not allow the computation of qualification-specific or occupation-specific indices, the measure of diversity is here computed for the whole population. If, as is plausible, ethnic people have on average different qualification levels than white British people, and cluster in specific occupations (see e.g. Longhi et al. forthcoming) diversity in the working age population might not be the most appropriate measure. One solution would be to compute the index of diversity using survey data which includes details on occupation and qualification levels of respondents. However, this would incur further problems related to sample sizes that are too small to yield reliable estimates of aggregate measures.

5.3. Size of the Geographical Area

Most of the literature using individual data to analyse the impact of diversity uses rather small geographical areas: neighbourhood or wards. This paper, instead, is based on districts which, geographically, are much larger than wards. Nevertheless, these may still be too small for the purpose of this analysis: if many people live in one district and work in another, the measure of diversity in the district of residence is not the appropriate one, while the measure of diversity refers to the district of residence rather than to the district of work. Unfortunately, there are no details on the district of work in the BHPS data, or on travel-to-work areas in the population estimates. Nevertheless, it is possible to analyse the sensitivity of the results to the choice of the geographical area in two ways.

The first solution is to keep the analysis at the district level and include among the explanatory variables a weighted average of the fractionalisation index in the neighbouring districts (e.g. Anselin 1988). The spatial weights used here are the inverse of the distances among the centroids of each district, with a cut-off point of 40 kilometres (i.e. only districts closer than 40 kilometres are used in the computation of the weighted average). Again, fixed effects models suggest that diversity has no impact on usual hourly wages; the weighted average of the diversity index in the neighbouring districts does not seem to have any statistically significant impact on wages either.

As a second method, the models can be re-estimated using larger geographical areas; diversity is in this case measured across 87 counties instead of 353 districts. When measured at the county level, and again using a fixed effect model, diversity has no impact on wages.

5.4. Other Measures of Diversity

Which is the best statistical index of diversity is still an open question. This paper has used the fractionalisation index, which is the one most commonly used in this literature. The index is based on the share of ethnic groups in the population, majority included (i.e. white British in our case). Since white British people represent 87 percent of the whole population, they might play an overwhelming role when included in the index of fractionalisation. As an alternative, the index of fractionalisation can be computed after excluding the white British majority; the total share of the non white British population is therefore added as further regression in the models. The results do not change: diversity has no impact when individual heterogeneity is accounted for.

A further index can be used to measure diversity: the specialisation index as proposed by Krugman (1991). This index is commonly used to measure the level of industrial specialisation across regions (e.g. Longhi et al. 2005b), but it can easily be adapted to measure ethnic diversity. Nevertheless, also this alternative index does not change the conclusions of the previous sections: diversity has not impact on either basic or usual wages, when individual unobserved heterogeneity is accounted for.

6. Conclusions

This paper analyses the impact that cultural diversity has on wages, job satisfaction, and employment opportunities of white British people living in England. Diversity is measured by ethnic fractionalisation across English districts, and computed using the population estimates for England from 2001 to 2006. This time-varying measure of diversity is then combined with longitudinal data from the British Household Panel Survey. Hence, in contrast to the previous literature, which only focuses on cross-sections, the empirical models in this paper are able to account for both observed individual characteristics and unobserved individual heterogeneity. This also partially solves the problem of the endogenous location of workers in districts characterised by high wages/high diversity.

While cross-section data would suggest a positive non linear impact of diversity on wages, panel data suggests that diversity has no statistically significant impact on overall

wages, job satisfaction, or on the probability of being in employment. Instrumental variable estimations confirm that there is no impact of diversity. There is some evidence that people who tend to move across districts differ significantly from those who tend to stay: those who have never changed district in the period of analysis seem to benefit from diversity in terms of wages – but not in terms of job satisfaction or employment opportunities – while those who move do not seem to have any gain from diversity. Interaction terms suggest that this result is not related to the length of the stay in the same district. Furthermore, cultural diversity might have a larger impact on wages of workers with higher qualifications. This latter aspect, however, needs to be analysed with more detailed data. The choice of the size of the geographical areas on which to compute the measure of diversity does not seem to have a large impact on the results.

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Figures and Tables

Table 1: Fractionalisation in 2001 and 2006

Year	2001	2002	2003	2004	2005	2006
Min	0.027	0.032	0.032	0.040	0.042	0.045
Median	0.107	0.129	0.129	0.146	0.156	0.169
Mean	0.172	0.194	0.194	0.205	0.217	0.228
Max	0.821	0.820	0.820	0.820	0.820	0.820
N	353	353	353	353	353	353

Table 2: Impact of diversity on wages

	(1) Basic hourly wage OLS	(2) Basic hourly wage FE	(3) Usual hourly wage OLS	(4) Usual hourly wage FE
Fractionalisation	0.560*	0.706*	0.651*	-0.044
	(0.122)	(0.240)	(0.129)	(0.172)
Fractionalisation^2	-0.435$^+$	-0.852*	-0.786*	-0.106
	(0.201)	(0.322)	(0.213)	(0.248)
R^2 (within)	0.412	0.213	0.420	0.079
Observations	5390	5390	16871	16871

Standard errors in parenthesis, clustered by individuals in the OLS model; + Significant at 5%, * Significant at 1%; other control variables: age and its square, job tenure, dummies for married, part-time, occupations, a dummy for London, and population density. OLS models also include dummies for female and qualification level.

Table 3: Impact of diversity job satisfaction and employment

	Satisfaction Pay	Satisfaction Security	Satisfaction Work	Satisfaction Hours	Satisfaction Overall	Probability Employed
Fractionalisation	-0.032	-1.044	0.331	-0.368	-0.716	-0.000
	(0.723)	(0.736)	(0.728)	(0.720)	(0.736)	(0.000)
Fractionalisation^2	0.470	1.762	-0.812	0.964	0.714	0.000
	(1.049)	(1.061)	(1.052)	(1.043)	(1.065)	(0.000)
Log Likelihood	-26104	-25478	-24523	-26153	-23844	-2409
Observations	17846	17790	17851	17857	17871	6878

Marginal effects of a correlated ordered random effect probit model for satisfaction; marginal effects of a fixed effect logit model for the probability of being employed; standard errors in parenthesis; + Significant at 5%, * Significant at 1%; other control variables: age and its square, population density, dummies for married, part-time, London, occupations.

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Table 4: Impact of diversity on wages, instrumental variables

	(1) OLS	(2) IV	(3) FE	(4) IV FE
Basic hourly wages				
Fractionalisation	0.560*	0.292	0.706*	1.653
	(0.122)	(0.250)	(0.240)	(3.932)
Fractionalisation^2	-0.435$^+$	-0.016	-0.852*	-1.896
	(0.201)	(0.407)	(0.322)	(4.339)
Observations	5390	5390	5390	5390
Usual hourly wages				
Fractionalisation	0.651*	0.314	-0.044	-1.290
	(0.129)	(0.268)	(0.172)	(1.171)
Fractionalisation^2	-0.786*	-0.285	-0.107	1.450
	(0.213)	(0.410)	(0.248)	(1.468)
Observations	16871	16871	16871	16871
First stage				
Ethnic New Deal Starts		0.391*		0.070*
		(0.013)		(0.004)

Standard errors in parenthesis; + Significant at 5%, * Significant at 1%; other control variables: age and its square, population density, dummies for married, part-time, London, occupations. OLS models also include dummies for female and qualification level. The instrument is the proportion of ethnic minorities joining the 'New Deal Programme' in each district and year (the instrument refers to the same year of the measure of diversity: t-1, from 2001 to 2006).

Table 5: Impact of diversity on usual hourly wages, length of stay in the district

	(1) Stayers	(2) Movers	(3) Interaction (2 years)	(4) Interaction (3 years)	(5) Interaction (4 years)	(6) Interaction (5 years)
Fractionalisation	0.854$^+$	-0.365	-0.065	-0.093	-0.011	-0.135
	(0.360)	(0.221)	(0.185)	(0.183)	(0.180)	(0.181)
Fractionalisation^2	-1.182$^+$	0.320	-0.149	-0.087	-0.169	0.050
	(0.539)	(0.317)	(0.281)	(0.267)	(0.262)	(0.262)
Fractionalisation * I$^+$			0.044	0.111$^+$	0.104*	-0.041
			(0.092)	(0.055)	(0.054)	(0.056)
Fractionalisation^2 * I$^+$			0.032	-0.135	-0.126	-0.018
			(0.181)	(0.108)	(0.100)	(0.102)
Observations	12744	4127	16871	16871	16871	16871

Standard errors in parenthesis; + Significant at 5%, * Significant at 1%; other control variables: age and its square, population density, dummies for married, part-time, London, occupations. $^+$ The index is multiplied by a dummy which is one for those who have lived in the same district for the current and the previous year in column (3); for the current and previous 2, 3, and 4 years in columns (4), (5), and (6) respectively.
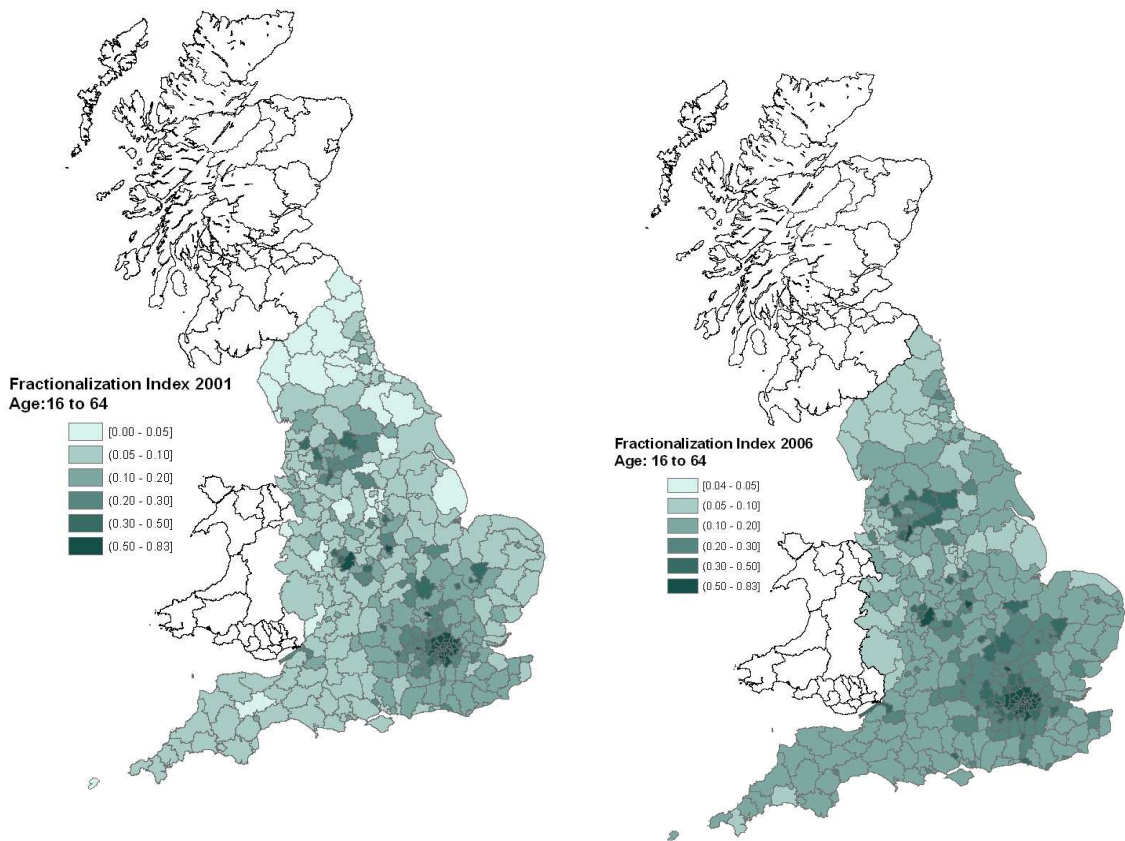
Figure 1: Fractionalisation across English districts (2001 and 2006)
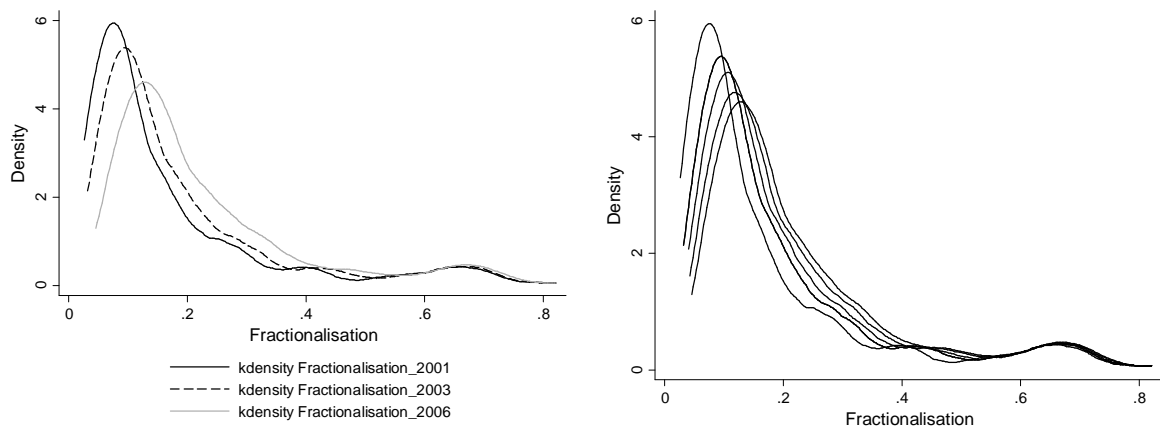

Figure 2: Distribution of the fractionalisation index between 2001 and 2006