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DIVISION OF ECONOMICS, SCHOOL OF SOCIAL SCIENCES

Essays on Migration and Labour Markets

by

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ABSTRACT

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Doctor of Philosophy

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This thesis explores the relationships between immigration and labour markets. The work consists of three empirical papers that examine particular aspects of this relationship.
The first paper investigates the hypothesis that immigrants are attracted by a particular labour market institution, the minimum wage. The empirical analysis is implemented by assessing the impact that an exogenous increase in the federal USA minimum wage has on the immigration flows of low-skilled individuals. The main findings are that low-wage workers move to States where the growth of the minimum wage is larger, while high-wage individuals are insensitive to the policy.
The second paper analyses the effects of immigration in the host labour market, in particular on the mobility of previous residents. The main objective is to investigate if inflows of recent immigrants determine an out-migration of natives and earlier immigrants. This is achieved by analysing patterns of internal migration using information on the local authority of origin and destination and on the skill level of individuals. The analysis demonstrates that, while UK-born individuals and recent immigrants move to similar locations, earlier immigrants are instead displaced, suggesting closer substitutability with the newcomers.
The impact of ethnic networks on employment outcomes is the final topic of the thesis. The important feature of this study is to examine this effect separately for immigrants and natives. This is achieved by analysing detailed data on ethnic enclaves from two Censuses of England and Wales, which are used to construct an index that captures local interactions. The results show that, for the majority of immigrant groups, a larger informal network is associated with higher employment probabilities. For the group of natives, there is no evidence that living in an enclave is detrimental to employment, and the effect is, at worst, zero.

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DECLARATION OF AUTHORSHIP

I, *Corrado Giulietti*, declare that the thesis entitled *"Essays on Migration and Labour Markets"* and the work presented in the thesis are both my own, and have been generated by me as the result of my own original research. I confirm that:

- this work was done wholly or mainly while in candidature for a research degree at this University;
- where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
- where I have consulted the published work of others, this is always clearly attributed;
- where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
- I have acknowledged all main sources of help;
- where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
- none of this work has been published before submission.

Signed:..
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Chapter 1

Introduction

The aim of this thesis is to explore the relationships between immigration and labour markets.
Three main areas are covered in this research: the investigation of pulling factors of migration, i.e., the economic drivers that attract immigrants into the country; the analysis of the impact of immigration, i.e., the consequences in terms of labour market outcomes for individuals who live in the destination country; the analysis of assimilation, i.e., the process through which outcomes of immigrants converge to those of natives.
The first empirical analysis investigates the role of the minimum wage as a pulling factor for immigration. The aim of this study is to understand how a labour market institution in the host country can affect choices of potential immigrants and lead them to migrate. To this end, a simple theoretical framework is presented whereby inflows of immigrants are expressed as a function of the expected wage growth consequent to the minimum wage increase. An econometric specification is derived to empirically investigate the hypothesis that an increase in the minimum wage affects the inflow rate of low-wage immigrants. The analysis focuses on the USA federal minimum wage increase that took place between 1996 and 1997, and uses State data from the Current Population Survey and the Census. The estimation is carried out in two stages: first, the growth of expected wages is instrumented by the fraction of workers who earn between the new and the old minimum wage; second, the predicted value is used to estimate the change in immigration flows. The findings show that the 20% increase in the federal minimum wage led to a substantial increase in the expected wages of immigrants. States

where the growth of expected wages was relatively large (about 20%) exhibit inflow rate increases that are four to five times larger than States where the growth of the expected wages was smaller (about 10%). Placebo tests demonstrate that the policy did not affect immigration of workers who already earn wages above minimum.

After having explored what the drivers of migration are, an important question is to understand how these immigration flows impact on the host country. Migration can impact directly wages and employment outcomes of previous residents, but can also generate indirect consequences if individuals are induced to move out of the local labour market. The second empirical analysis investigates this hypothesis in the context of the local authority districts of England and Wales. To analyse the impact of immigration, a theoretical framework in which natives and immigrants are imperfect substitutes is adopted. The econometric analysis shows that immigration does not displace native working-age population; instead, flows of natives are complementary with those of new immigrants. There is evidence of displacement for earlier immigrants, with a substantial impact for those with no or low qualifications. Robustness tests are provided to validate the results.

Upon arrival in the country, immigrants face difficulties with adapting to the local culture, learning a foreign language and, more generally, interacting with other groups. In this context, immigrants usually rely on social networks, which protect them from discrimination and make the immigrant experience less traumatic. The third empirical analysis is interested in studying the effect that such networks, mainly composed of friends and relatives, have on the probability of being employed. A measure that captures local interactions is derived using detailed data from two Censuses of England and Wales. The impact on employment is analysed separately for immigrants and natives, and for females and males. The results show that most immigrant groups benefit from living in an enclave and the use of a larger informal network is associated with higher employment probabilities. For the group of natives, there is no evidence that living in an enclave is detrimental to employment, and the effect is, at worst, zero. Moreover, there are important differences across ethnic groups and between males and females.

The thesis is organised as follows: minimum wage and migration are studied in Chapter 2 while the "displacement" hypothesis is tested in Chapter 3; Chapter 4 analyses the relationship between ethnic networks and employment outcomes. Discussion of main results and final remarks conclude the thesis.

Chapter 2

Is the Minimum Wage a Pulling Factor for Migrants?

2.1 Introduction

Does an increase of the minimum wage constitute a pulling factor for low-skilled immigrants? A minimum wage set in the receiving country has ambiguous effects on immigration: on the one hand, average wages will increase, but on the other, employment perspectives might be adversely affected. The objective of this Chapter is to explore empirically this question in the context of the increase in the USA federal minimum wage that took place between 1996 and 1997.
There is extensive research about the determinants of immigration and, although it is difficult to define a taxonomy of these factors, there is a consensus that immigrants respond to both economic and non-economic incentives in the receiving country. Relatively favourable employment and wage conditions, along with the presence of network effects, distance from the origin country and immigration policies, are indicated as principal causes of immigration (Clark et al., 2002; Mayda, 2005). On the other hand, research on the role played by labour market institutions, such as the minimum wage, is rather exiguous. A minimum wage in the receiving country creates a disequilibrium in the labour market that may encourage or deter immigration. Economic theory predicts a growth in the average wages of low-wage workers; employment effects are, however, uncertain and depend on the labour market structure (Manning, 2003).

In this Chapter, a simple model that relates the minimum wage to immigration is developed and used to estimate the impact of the increase in the USA federal minimum wage on the inflows of low-wage workers. The model postulates that migrants take decisions in terms of expected wages, whereby the probability of finding employment is represented by the employment population ratio in the destination country. The change in the minimum wage has effects on the expected wages because it alters both the average wages and the probability of employment. The effects of the policy are analysed using the change in the USA federal minimum wage that took place between 1996 and 1997, a period during which both minimum wage impacts and immigration flows exhibited considerable variation across the 51 States[1]. The instrumental variable approach implemented in the analysis can be efficiently explained by two steps. In the first step, the growth of expected wages is regressed on the fraction of foreign-born individuals who earn between the old and the new minimum wage; in the second, the predicted values are correlated with changes in the inflow rate of immigrants. The main results show that the $0.90 top-up in the minimum wage led to an increase in the inflow rate of low-wage immigrants that varies from less than 0.01% in States with lower growth in expected wages to more than 0.08% in States where expected wages grew most. The robustness of these results is tested by including covariates for the changes in the macroeconomic conditions of each State in order to control for confounding factors. Furthermore, placebo tests are implemented to confirm that the growth of expected wages is not correlated with changes in the inflow rate of immigrants that earn wages above the minimum.

The Chapter begins with a review of the studies on the minimum wage and immigration. The theoretical model and the econometric specification are sketched in Sections 2.3 and 2.4. Section 2.5 provides a description of the data used in the analysis, followed by an illustration of facts about immigration and minimum wage. Section 2.6 presents the results of the estimation along with robustness tests. A brief discussion of the findings and directions for future research conclude the Chapter.

[1]Including District of Columbia.

2.2 Minimum wage and immigration

2.2.1 The effects of the minimum wage

Theories about the effects of the minimum wage are divided into two strands: on the one side are researchers who support the classical view, which builds upon the seminal model of Stigler (1946); on the other is a more recent literature strand known as the "new economics of the minimum wage" - named after the influential work of Card and Krueger (1995) - which contradicts the classical textbook framework. The core difference between the two views is the contrasting prediction in terms of employment effects.
The neoclassical model predicts that, under a binding minimum wage, firms are constrained to pay wages higher than the market clearing level and therefore employment would be reduced to the point where the marginal revenue product of labour equals the minimum wage. At this point, more individuals are willing to offer their work in exchange for the minimum and this will determine unemployment. Both wage and employment effects depend on the elasticity of the demand and supply. Advances to the classic model of the minimum wage date back to the 1970s, when some interesting extensions were built upon the basic framework, such as the introduction of an uncovered sector (Welch, 1974; Mincer, 1976). Recently, theoretical models became more structured with the extension to heterogeneous labour, where the introduction of the minimum wage determines a truncation of the skill distribution (Brown, 1999).
Scholars of the new economics of the minimum wage argue that firms face an upward-sloping labour demand curve because of frictions in the labour markets. Moderate increases in the minimum wage may thus lead to non-negative employment outcomes. Markets may be imperfect because of rigidity in the labour turnover, presence of mobility costs, or asymmetric information (Manning, 2003). The simplest model of imperfect competition is that of a monopsonistic labour market, with employers having some market power in setting wages. Card and Krueger (1995) build upon the classical monopsony framework and present a search model in which firms offer higher wages in order to discourage turnover. Alternative models of equilibrium wage settings have been developed, but the general implications of such models is that employment effects are not unambiguously negative as predicted by the classical framework[2].

[2] A comprehensive study is Manning (2003).

The contrast in these theories is embodied in the empirical analyses of the minimum wage, which are far from reaching consensus about the employment effects. Most of these works focus on teenage workers, and, although the target of the studies is always the same - the elasticity of employment with respect to the minimum wage - the methodologies used vary substantially[3]. For example, Card (1992) and Card and Krueger (1995) use the fraction of affected workers to assess wage and employment outcomes of the minimum wage. The fraction of affected workers is defined as the proportion of a given population that earns between the old and the new minimum wage. Using cross-state observations from the Current Population Survey (CPS) for the period just before and after the increase of the minimum wage, the authors show that the fraction of affected is a valid instrument to explain the "top-up" effect of the law in the average wages of teenage workers. When used to predict changes in employment, the elasticity is in most of the cases close to zero. Neumark and Wascher (1992) are among the first to introduce a state-year design: using observations from the CPS for the period between 1973 and 1989, they find negative values in the employment elasticity for teenagers (between -0.10 and -0.20) and young adults (between -0.15 and -0.20). The results of their fixed-effects model are robust to several alternative specifications. Using the same data, Card and Krueger (1995) demonstrate that the findings of Neumark and Wascher are sensitive to the inclusion of the proportion of individuals enrolled in school. By claiming that the enrolment ratio should be excluded from the estimation (since it depends on the minimum wage and not the opposite), they obtain non-negative values for the elasticity. The studies just described are the expression of the long debate about the effects of the minimum wage, which still accompanies much of the recent literature.

2.2.2 Linking minimum wage and immigration

One of the first studies to explore the links between minimum wage and mobility is the two-sector model of Harris and Todaro (1970), where the minimum wage is used to explain the persistence of high levels of urban unemployment in

[3]The literature focuses on employment rather than unemployment because the second is thought to be latent, since the minimum wage exerts, in the first instance, an effect on the labour force participation. If individuals are discouraged to enter/stay in the labour force, the unemployment effects would understate the true effect of the policy. On the other hand, the analysis of the employment rate of particular groups is a plausible measure for the labour market effects of the minimum wage, provided adequate control for macroeconomic factors is taken. A comprehensive survey on minimum wage is Neumark and Wascher (2006).

some developing countries. This framework assumes that agents take decisions in terms of expected wages. Workers continue to migrate from the rural sector until the urban expected minimum wage equals the agricultural earnings; the excess labour remains hence unemployed.

The only theoretical work that extends the Harris-Todaro framework to the context of international migration is Basu (1995); similarly, the empirical literature that explores this particular link is rather scarce. This is somewhat surprising, in light of the fact that welfare benefits are likely to influence the location choice of immigrants, as discussed by Borjas (1999). Borjas shows that immigrants are particularly responsive to welfare programs and that this can explain in part the clustering of immigrants in few States.

To date, Castillo-Freeman and Freeman (1992) is the only relevant study that investigates the relationship between minimum wage and immigration. The authors explore the changes in the migration out of Puerto Rico as a consequence of the extension of the U.S. minimum wage to the island. They document that the minimum wage impact substantially increased over the years, reaching 60% of the average wage in 1987 (this compares to less than 35% in the USA). By analysing migration and inter-industry employment patterns, the authors conclude that the increase of the minimum wage induced a movement of low-skilled workers towards the USA, preventing high levels of unemployment.

The framework presented in this Chapter is somewhat opposite to that of Castillo-Freeman and Freeman, in that minimum wage is studied as a pulling rather than a pushing factor. However, as effectively highlighted in their work, "Economic analysis has no clear prediction about how the volume of migration might respond to higher minimum wages."[4]. This statement embodies the fact that the effects of the policy are ambiguous and hence immigration could increase or decrease as a consequence of the minimum wage. In the next Section, such ambiguous effects are cast into a theoretical framework that links the policy with changes in immigrants' expected wages.

[4] Castillo-Freeman and Freeman (1992, p.189) use this statement in the context of emigration. They discuss the fact that, since an increase of the minimum wage implies both a reduction in employment and an increase in wages, less-skilled workers are more likely to emigrate, while relatively more-skilled workers are less willing to move.

2.3 Theoretical framework

The key feature of the model is that potential migrants take decisions in terms of expected wages, as in Harris and Todaro (1970). To keep the model as simple as possible, it is assumed that potential migrants belong to two skill groups, high (h) and low (l) skilled. At any time, high-skilled workers earn a wage above the minimum. The immigration flow to each State j at a given time can be represented by the following expression:

$$m^s_{jt} = F(\omega^s_{jt}, z_{jt}), \tag{2.1}$$

where $\omega^s_{jt} = w^s_{jt}e^s_{jt}$; the term ω^s_{jt} represents the expected wage of skill group s, and w^s_{jt} and e^s_{jt} are the wage and the employment population ratio of skill group $s \in \{l, h\}$ in the receiving country. The term z_{jt} represents characteristics of the State j or conditions in the sending countries. The migration function has the feature that $F_\omega(\omega, z) > 0$. At each time, and assuming that the federal minimum wage affects only the average wages, the effect on immigration can be represented by the following expression:

$$\frac{\partial m^s_j}{\partial \bar{w}} = F_\omega \frac{d\omega^s_j}{d\bar{w}}. \tag{2.2}$$

It is plausible to assume that $\frac{d\omega^h_j}{d\bar{w}} = 0$, i.e., the minimum wage will not affect the labour market of high-skilled workers[5]. The effect on immigration on low-skilled workers will hence depend on the magnitude and sign of $\frac{d\omega^l_j}{d\bar{w}}$, which can be decomposed into:

$$\frac{d\omega^l_j}{d\bar{w}} = \frac{\partial w^l_j}{\partial \bar{w}} e^l_j + \frac{\partial e^l_j}{\partial \bar{w}} w^l_j, \tag{2.3}$$

The expression 2.3 is unambiguously positive only if $\frac{\partial e^l_j}{\partial \bar{w}} > 0$. If this term is negative, the sign and the magnitude depend on the relative impacts of the wage and employment effects. Notice that this condition can be rewritten as: $\frac{d\omega^l_j}{d\bar{w}} > 0 \iff \frac{de^s_j}{dw^s_j}\frac{w^s_j}{e^s_j} < 1$, i.e., the labour demand elasticity is below unity. The economic rationale is that the incentive to migrate induced by higher wages might be offset by potential adverse effects on employment prospects.

[5]For simplicity it is assumed that $F^l_\omega = F^h_\omega$, i.e., low- and high-skilled workers react to changes in expected wages with the same magnitude.

2.4 Econometric implementation

The model presented in equation 2.1 explains the relationship between the changes in immigration flows and the growth of expected wages. This relationship can be cast into an econometric specification that uses variations across States:

$$\frac{\Delta m_j^s}{P_j} = \alpha + \beta \Delta \omega_j^s + \Delta Z_j + \varepsilon_j^s, \qquad (2.4)$$

where $\frac{\Delta m_j^s}{P_j}$ is the change in the immigration inflow rate, $\Delta \omega_j^s$ represents the growth in the expected wages, and Z_j is a set of covariates to control for changes in macroeconomic fundamentals of State j; ε_j^s represents a random component. The parameter of interest is β, which captures the sensitivity of the migration inflows to the growth of expected wages.

Some observations about equation 2.4 are necessary. First, the specification uses differences, which has the advantage of washing out fixed effects that characterize each observational unit (Dustmann et al., 2003). As an example, if immigrants move to States with persistent prosperous conditions, a regression of immigration flows on minimum wage could hide a spurious relationship or lead to an upward bias in the estimates. Using first differences allows to filter out such persistent components.

Second, the term $\Delta \omega_j^s$ is endogenous. This is because the growth of average wages and of employment population ratio are simultaneously determined by a change in the minimum wage (Card, 1992), hence creating measurement error in ω_j^s. In addition, immigration flows will lead to a simultaneity bias because they will affect equilibrium wage and employment in the destination country. To solve this problem, the expected wages are instrumented by the fraction of affected immigrants, i.e., immigrants who earn between the new and old minimum wage. Card (1992) uses the fraction of affected teenagers because this is thought to be correlated with the change in average wages, but exogenous to changes in employment. He obtains two reduced-form equations for changes in wages and changes in employment. The present work builds upon this methodology by combining wage and employment equations into a reduced form for changes in expected wages as a function of the fraction of affected immigrants:

$$\Delta \omega_j^s = a + \theta B_j^s + \upsilon_j^s. \qquad (2.5)$$

The Appendix shows that equation 2.5 is obtained by exploiting the additive property of OLS. The term B represents the fraction of affected immigrants and θ captures the causal effect of the minimum wage on expected wages or, more precisely, the semi-elasticity of the expected wages with respect to the fraction of affected workers. Equation 2.5 is the econometric equivalent of equation 2.3: it is important to note that the parameter θ combines the effect of the minimum wage on both changes in the average wages and in the employment probability in a given period. This can be decomposed into the two effects. The Appendix shows that θ corresponds to the sum of the semi-elasticity of the two reduced-form equations used by Card (1992) and gives mathematical proof of the ambiguity of its sign, as previously discussed.

The third observation is that the model uses inflow rates, i.e., immigration flows divided by the working population in each State before immigration. The use of a relative measure acknowledges the fact that immigration inflows are a function of the size of each State. As a robustness check, results are presented also for the differences in the level of immigration inflows.

A potential issue with the empirical analysis is the possibility that the policy is not exogenous with respect to the macroeconomic conditions of each State. This would be the case of a State minimum wage, where each government may decide to increase the level of the minimum wage in response to some macroeconomic events (for example, very low wages for certain groups of the population). Such a situation could lead to a spurious (perhaps negative) correlation between immigration and minimum wage, because immigrants will tend to move, *ceteris paribus*, where wages are higher. This is the reason why the analysis is focused on the federal minimum wage, the implementation of which can be thought to be exogenous to single State macroeconomic conditions.

2.5 Data description

This study focuses on the minimum wage increase that took place in 1996 and in 1997. The first increase from \$4.25 to \$4.75 took place in October 1996, followed by an increase to \$5.15 in September 1997.

The data used in the analysis come from the monthly Current Population Survey for the period 1994 to 1999 and from the 1990 and 2000 Censuses. Information on wages, employment status, unemployment and the fraction of affected immigrants is extracted from the CPS. This sample yields a total of more than 10,000,000 individual observations; this enormous amount is needed because cases of immigrants are, on average, 10% of the total sample and wage and employment information is collected only for the outgoing rotation groups (one sixth of the total). Since a limited amount of observations would create noise when deriving observations at State level, data have been pooled over the two years before and after the increase of the minimum wage. Each year starts in October and ends in September[6]. Sample weights are applied to make the data nationally representative.

From the CPS it is possible to derive different measures for hourly earnings. In this Chapter, two measures of hourly wages are used, which will be henceforth referred to as actual and constructed hourly wages. The actual hourly wages are derived using responses of individuals who report an hourly wage and are paid by the hour[7]. The constructed State hourly wages are obtained using information on weekly wages of workers paid at a frequency different from hourly and usual hours worked in a week. This measure is likely to be noisy, since both denominator and numerator are measured with error; however, it produces a larger amount of information. Since the effect of minimum wage is measured with higher precision with the actual hourly wages, these will be used as a benchmark in the estimation. Robustness tests will include the results using constructed hourly wages too. All wages below $1 are excluded; values beyond $30 and $40 are removed for the actual and constructed wages, respectively. This procedure is such that less than 1% of observations are censored, and it helps in moderating the measurement error. The growth of wages is defined as the difference of the log average wages before and after the increase of the minimum wage. The fraction of affected immigrants corresponds to the portion of immigrants (over the total reporting wages) who earn between the old ($4.25) and the new ($5.15) federal minimum wage in the period before the increase. The employment population ratio is defined as the proportion of employed immigrants over the working age immigrant population in each State. This excludes persons aged over 64 and under 16, but includes individuals that are enrolled in schools. The growth of employment is defined as the difference in the log of employment population ra-

[6]This particular timing allows the capturing of the exact period before the increase of the minimum wage (October 1996). The period after the increase is here computed from October 1997, although the second part of the increase in the minimum wage took place in September; this is done to allow comparability with the period before the increase and to rule out potential seasonal effects.

[7]In unreported results, the analysis has been carried out also including respondents who report an hourly rate but who are paid at a different frequency. Inferences are substantially identical.

tio. The growth of expected wages is then defined as the product of the growth of wages and the growth of employment. CPS data are also used to compute wage and unemployment changes for the group of prime-age natives in each State, which are used as control variables in some of the specifications.
Data from the 2000 Census are drawn from the 5% Public Use Microdata Samples. These are used to compute immigration flows before and after the increase of the minimum wage. Flows before the increase include individuals who immigrated into the USA between January 1995 and December 1996, while flows after the increase contain immigrants who entered the USA between January 1998 and December 1999[8]. Flows include only persons who report earnings and are classified depending on their hourly wage, which is obtained by dividing the reported earnings by the hours worked in a year[9].
Since flows are likely to be measured with some error, three different "treatment" groups are defined: I) with earnings between \$4.25 and \$6.50; II) with earnings between \$4.25 and \$7.15; III) with earnings between \$3.75 and \$5.65. Group I is considered the benchmark for the analysis since it includes all individuals that earn between the old minimum wage and the highest State minimum wage. The lower bound of \$4.25 is justified to account for the presence of sub-minimum wages or imperfect compliance. The upper bound of \$6.50 is set to include individuals who migrated because of the federal minimum wage but who, after immigration, earn a State minimum wage which is higher than the federal rate and thus binding at the moment of the Census[10]. Group II consists of all individuals of group I and of immigrants who might be affected by spillover effects. The upper bound of the group is set at \$2 above the federal minimum wage and hence captures potential "ripple" effects for individuals who earn a wage that is already 40% higher than the minimum. Group III includes a wage "window" that is \$0.50 below the old minimum floor and \$0.50 above the new one[11].
Three more groups are created, which include individuals who earn between:

[8]Census data can only be categorized by calendar year. This creates a small mismatch between CPS and Census data. However, three months is a plausible gap if immigrants tend to respond to minimum wage changes with a lag because of, for example, delay in the circulation of information.

[9]The hours worked in a year are calculated using average hours worked in a week and the weeks worked in a year.

[10]At the end of 1999, the State minimum wage in Massachusetts was \$5.25; in Alaska, Connecticut, Delaware and Rhode Island \$5.65; in California and Vermont \$5.75 and in Oregon \$6.50. The Appendix reports the value of the State minimum wage and the dates of the introduction of the law.

[11]Robustness checks have also been conducted on the group with earnings between \$4.65 and \$5.65 (i.e., \$0.50 above and below the new threshold). Results are very similar to those for Group III.

IV) \$6.51 and \$9.00; V) \$9.01 and \$14.00; VI) \$14.01 and \$30.00. Each of these groups corresponds to roughly one third of the total flows of immigrants who earn wages higher than individuals above group I and will be used to implement placebo tests.
Finally, data from Census 1990 come from the Tables computed by the USA Census Office and are used to construct variables for the historical settlement of immigrants, used in some specifications.

2.5.1 Facts about minimum wage and immigration

Table 2.1 presents the characteristics of different population groups in the period before the federal minimum wage increase. The first row reports the fraction of affected workers, defined as the proportion of individuals earning between the old and the new minimum wage. About 15% of the total population earns wages between \$4.25 and \$5.14. It must be noted that this share is relatively high if compared to other studies (e.g., Cortes, 2004); the reason is that the hourly wages used here are those reported from hourly workers, as this is thought to better capture the impact of the policy.

Table 2.1: Characteristics of minimum wage earners before the 1996/7 increase

	Immigrants	Total population	Women	Blacks	Hispanics	Teenagers
Fraction of affected workers	19.24	15.40	17.99	18.41	22.48	51.68
Hourly wages	8.41	9.25	8.44	8.61	7.95	5.35
Percentage less than high school	41.16	19.02	15.79	18.53	45.06	58.75
Working experience	17.62	16.04	16.57	16.48	15.20	0.22
Weekly hours worked	35.03	33.28	31.07	34.03	34.93	21.53
N	14,914	141,715	74,215	17,786	12,896	14,675

Source: monthly CPS October 1994 to September 1996. Sample weights are applied. Data refer to individuals aged 16 to 64 who report wages. The group of Blacks also includes mixed groups; Hispanic population corresponds to respondents indicating Hispanic origin, and may be of any race. Potential working experience is calculated according to educational attainment as follows: age minus 17 if less than 10^{th} grade; age minus 18 if between 11^{th} grade and High School Diploma; age minus 19 if some college; age minus 20 if Associate Degree; age minus 22 if Bachelor's Degree; age minus 24 if above Bachelor's degree.

Immigrants have a relatively high share of affected individuals (above 19%), which is slightly larger than that of the groups of women and Blacks, but slightly smaller than that of Hispanics (above 22%). Teenagers have the largest share of affected workers (above 50%); this is not surprising, given the fact that most young workers under 19 years are employed in industries where the minimum wage bites. Differences in the fraction of affected workers are reflected in the hourly wages of these groups. On average, immigrants earn slightly less than women and Blacks, but roughly $0.50 more than Hispanics. The hourly rate for teenagers is the lowest, and corresponds to roughly 60% of the population average.

Part of the gaps in the fraction of affected workers and in the hourly wages is attributed to different levels of education of the groups. If one excludes teenagers - since only a small part of them have completed secondary education - the groups of immigrants and Hispanics have the largest share of individuals with attainments lower than high school level. This proportion is much larger than those of other groups, such as women and Blacks. In terms of working experience and hours worked, however, immigrants report a value slightly larger than other groups (except teenagers, who have basically zero working experience).

In the period under consideration, the share of affected workers differed substantially across the 51 States. This can be effectively seen from the inspection of Figure 2.1, which represents the proportion of immigrants who earn between $4.25 and $5.15 in each State.

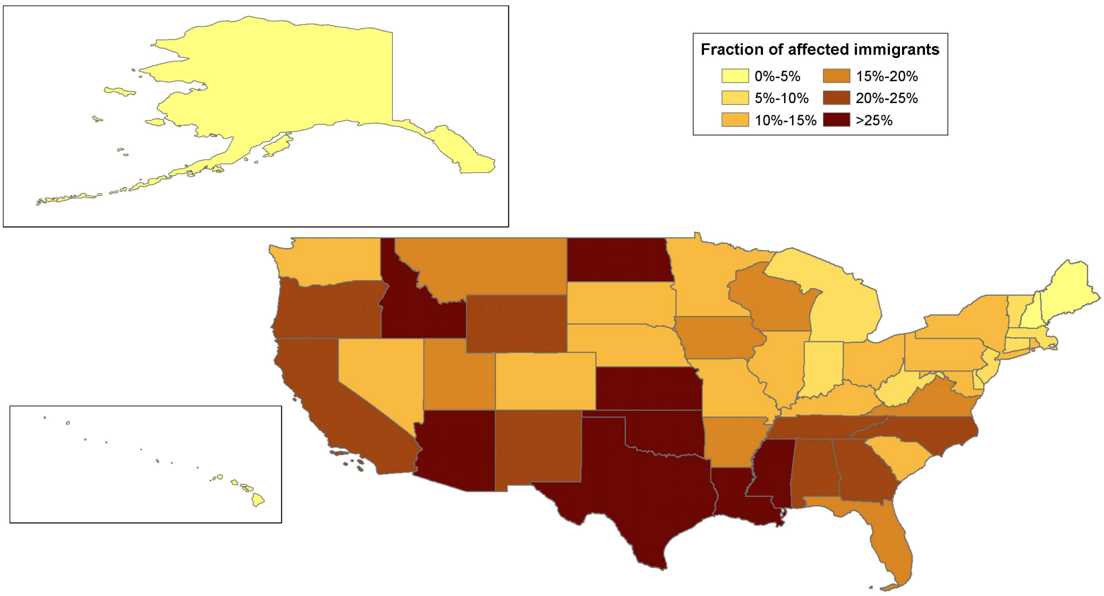


Figure 2.1: Fraction of affected immigrants in the 51 States
Source: CPS. Digital boundaries from http://www.Census.gov/geo/www/tiger/index.html

In all States of the Northeast region and in the Pacific (Alaska and Hawaii), the fraction of affected workers is under 10%. The Midwest region is quite hetero-

geneous, but shares do not exceed 20% except in two states (North Dakota and Kansas). Likewise, there are differences in the West region, with values that are, in general, higher than in the Northeast and Midwest. The region with the highest percentage is the South, where the majority of States have a fraction of affected immigrants above 20%. There are several elements that determine these differences. For example, States in the South have, in general, lower wages than the remaining areas in the USA; States in the West have higher immigration of low-wage workers than in the Northeast and the Midwest.
The fraction of affected immigrants represents a functional predictor for the impact of the change in the minimum wage. To have a preliminary understanding of the magnitude of the policy, it is useful to compare wages of immigrants before and after the increase. This is done in Figure 2.2, which represents the kernel wage densities for immigrants in the two periods; the vertical lines indicate the minimum wage before October 1996 and after September 1997. The portion of the density in blue colour that is contained between the vertical lines represents the nationwide proportion of affected immigrants.

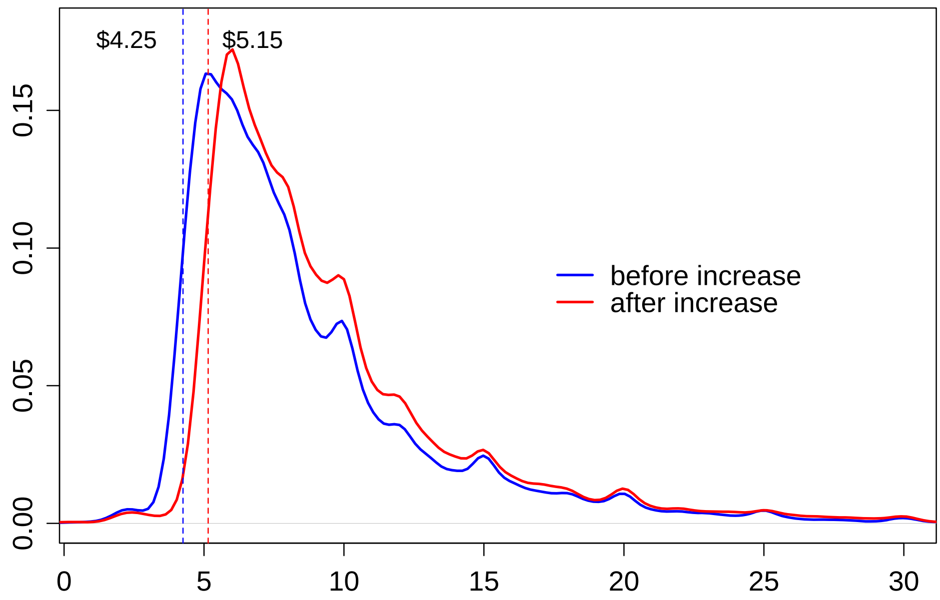


Figure 2.2: Kernel density of wages before and after the minimum wage increase
Source: CPS October 1994-September 1996 (before) and CPS October 1997-September 1999 (after)

Although the wage distribution does not exhibit the classic "spike" at the minimum wage level, the effect of the policy is quite substantial. This is evident from the erosion of the lower part of the wage distribution and the consequent ripple effect that shifts the density to the right. The average wage of immigrants increased from $8.41 before the change to $9.42 after the new minimum wage

was set. Assuming that, in the period under scrutiny, the minimum wage was the only determinant of wage growth, the policy determined an increase of about 12%. For comparison, wages of teenagers grew by about 16% in the same period. This is due to the fact that a wider fraction of teenagers gain from the minimum wage increase and this leads to a larger increase in the average hourly wage.
It is insightful to describe what has happened to immigration patterns before and after the change of the minimum wage. In the 1990s, as in the previous two decades, immigration to the USA increased substantially (Clark et al., 2002). The fact that recent immigrants have tended to concentrate in a few locations, where previous immigrants settled, is well documented (Bartel, 1989). However, in the 1990s, immigration became less focused and immigrants began to diffuse in a wider range of locations, as is shown in the case of Mexican immigration studied by Card and Lewis (2005). This process of diffusion can be observed through the dynamics of the flows across States.
Table 2.2 reports the immigration flows before and after the change of the minimum wage both nationwide and for the top twelve destinations[12]. Entries in the left-hand panel refer to immigrants of group I (i.e., low-wage workers), while the right-hand panel reports figures for the total of groups IV, V and VI (i.e., higher wage workers). For each skill group, the change in the inflow rate (i.e., $\frac{\Delta m_j^s}{P_j}$) is reported. Although the inflows of both groups increased by about the same amount (90,000 individuals), the dynamics were substantially different. The inflow rate of low-wage workers in the top five States (which are also the major immigration ports of entry) increased at a rate similar to the national average, except for New York, where there was a decline of 0.01%. Flows of higher-wage individuals in the top five States, on the other hand, increased by less than the national rate, with the exception of Illinois. In particular, there was a substantial decrease in the flows to New York. The small increase of the inflow rate in the top destinations was balanced by the relatively large growth in other destinations. The growth of the inflows in four States (Georgia, Massachusetts, North Carolina and Virginia) accounted for roughly one third of the nationwide increase.

[12]These States represent more than 70% of total flows in both periods and roughly 53% of the total working-age population before the minimum wage increased.

Table 2.2: Immigration in the twelve top destination States, by selected groups

State	Working age pop in 1995	Group I Flows in 1995/96	Group I Flows in 1998/99	Group I Δ inflow rate (%)	Group IV, V and VI Flows in 1995/96	Group IV, V and VI Flows in 1998/99	Group IV, V and VI Δ inflow rate (%)
USA	166,126,915	273,055	360,879	0.053	905,724	996,417	0.055
California	19,966,667	63,895	75,999	0.061	169,467	173,519	0.020
Texas	11,940,420	35,373	41,814	0.054	84,650	88,466	0.032
New York	11,569,819	28,915	27,730	-0.010	101,368	87,926	-0.116
Florida	8,631,746	28,118	33,227	0.059	84,895	83,187	-0.020
Illinois	7,477,960	14,599	18,308	0.050	50,528	55,811	0.071
New Jersey	5,070,594	11,800	14,575	0.055	45,696	47,163	0.029
Georgia	4,667,591	8,050	14,142	0.131	30,356	41,184	0.232
North Carolina	4,567,214	6,797	13,971	0.157	23,401	31,786	0.184
Virginia	4,243,680	4,505	6,831	0.055	21,637	27,675	0.142
Massachusetts	3,887,229	4,470	6,590	0.055	27,080	34,080	0.180
Washington	3,462,704	4,794	7,474	0.077	20,886	22,912	0.059
Arizona	2,587,427	8,252	11,585	0.129	20,349	21,793	0.056

Source: flows from Census 2000; population derived from CPS October 1994 to September 1996. Sample weights are applied. Flows before the minimum wage change refer to years 1995 and 1996; flows after the change refer to years 1998 and 1999. All flows consist of immigrants aged 16 to 64 who report earnings in the Census.

2.6 Analysis

This Section presents the results of the estimation; the Subsections report the estimates for the first stage regression (Subsection 2.6.1), for the second stage (Subsection 2.6.2) and for the robustness checks (Subsection 2.6.3).

2.6.1 Estimation of the growth of expected wages

The results from the first stage regression are represented in Figure 2.3, which plots the growth of expected wages against the fraction of affected workers, along with the regression line and its 95% confidence interval. The graph also reports the labels of largest immigration States and potential outliers.

The slope of the line - which represents the estimate for θ - is 0.445 (s.e. 0.110). The explanatory power of the fraction of affected is substantial, given the fact that the R^2 is about 0.25. The graph effectively represents the fact that the larger the fraction of affected immigrants, the larger, *ceteris paribus*, the growth of the expected wages. Using the additive property of OLS, it is possible to isolate the contributions of the fraction of affected on the wage and employment growth. These are represented in Figure 2.4. The results of the estimation of equation

2.5 are presented in this Subsection. This corresponds to a first stage where the growth of expected wages is regressed on the fraction of affected immigrants. Throughout the analysis, regressions will be weighted by the stock of immigrants in each State; this is done with the aim of controlling for the precision with which observations are measured. Un-weighted results will also be presented.

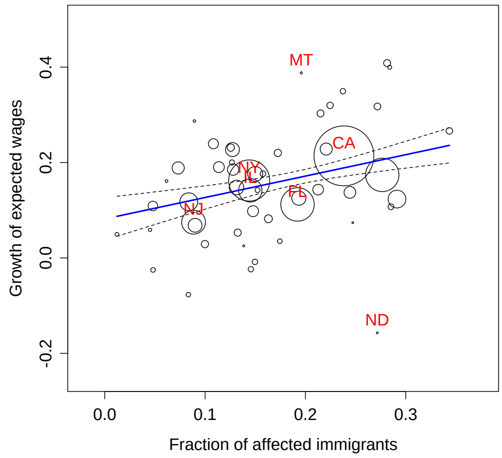


Figure 2.3: Weighted regression plot of equation 2.5

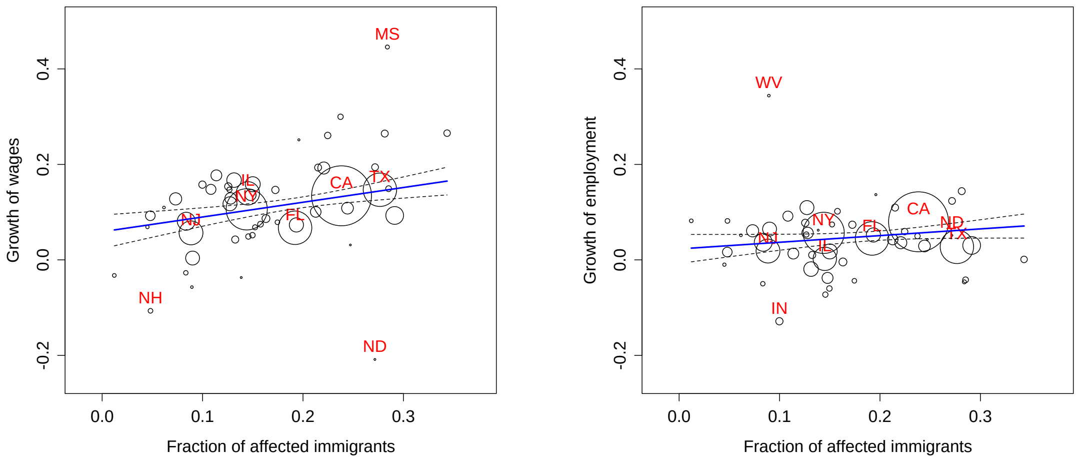


Figure 2.4: Wage and employment growth and fraction of affected immigrants

The slopes for wage and employment growth are 0.309 (s.e. 0.087) and 0.140 (s.e. 0.076) respectively, which means that an increase in the fraction of affected immigrants of 0.1 implies a growth of 0.031 for wages and of 0.014 for employment. The wage growth overstates the growth of wages in the economy (16.3%) and this can be attributed to spillover effects. The result for employment growth indicates that, in the period under consideration, the minimum wage had positive effects on the employment of immigrants. This result is comparable with the study for consequences on teenage employment by Card and Krueger (1995), although their estimates are somewhat smaller. One explanation is that wages of immigrants are affected by factors omitted in the simple regression. Hence, in Table 2.3, a series of alternative specifications is presented.

Column (a) reports the estimates of the parameter θ for the benchmark case just outlined. Specification (b) is the un-weighted regression of model (a); the estimates are 12 percentage points larger than the benchmark. From Figure 2.4 it can be seen that, by ignoring weights, the wage contribution would be much larger, yielding a higher slope. A comparison of the measures of fit suggests that the benchmark model is preferred, as it attributes less weight to outlying observations.

Table 2.3: OLS regression of expected wage growth

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
Fraction aff.	0.449***	0.578***	0.488***	0.444***	0.434***	0.415***	0.413***
	(0.110)	(0.206)	(0.127)	(0.111)	(0.110)	(0.104)	(0.106)
Unempl.				–0.032			–0.004
				(0.050)			(0.049)
Wages					–0.292		–0.041
					(0.232)		(0.247)
CPI						0.046***	0.044**
						(0.016)	(0.019)
Constant	0.082***	0.058	0.082***	0.075***	0.105***	–0.206*	–0.194
	(0.022)	(0.037)	(0.019)	(0.025)	(0.029)	(0.103)	(0.126)
R^2	0.25	0.14	0.23	0.26	0.28	0.36	0.36
N	51	51	51	51	51	51	51

Standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. The reported coefficient refers to the fraction of affected immigrants. All models except (b) are weighted by the stock of foreign-born population in each State. The macroeconomic controls are all measured in terms of their growth.

Model (c) uses constructed hourly wages; the coefficient is four points larger than in (a). This is explained by the fact that, although the average growth of constructed wages is slightly smaller than that of actual wages (10% vs 12%), the average fraction of affected immigrants is substantially smaller (14% vs 19%); hence the coefficient needs to be larger to explain the wage growth.

Models from (d) introduce macroeconomic variables to control for unobserved changes in the economy that could be omitted by the benchmark case. These are the growth of unemployment rate and of native wages in each State and the growth of the regional Consumer Price Index (CPI)[13]. Only the CPI is statistically significant for explaining the wage growth of immigrants, but this does

[13]Historical CPI data are downloaded from the website http://www.bls.gov/cpi/. The values of this index are only available for the four macro regions: West, Midwest, Northeast and South.

not affect substantially the estimate of θ, even when the control variables are estimated jointly. Interestingly, while the growth of unemployment rate has the expected sign, the wage growth of natives is negative, although it becomes essentially zero when all control variables are included.
The results presented above robustly support the fact that the increase in the minimum wage, as measured by the fraction of affected immigrants, leads to a substantial growth of expected wages. This large increase is attributable to the fact that, in the period under analysis, the minimum wage did not have negative effects on employment. The estimates imply a labour demand elasticity of 0.30, which is directly comparable with the value of 0.45 derived from the specification in the study by Card and Krueger (1995) that is mostly similar to the one in Table 2.3. The Appendix reports the derivation of this elasticity[14].

2.6.2 Estimation of the change in immigration flows

In this Section, the second stage of the model is estimated. This corresponds to estimating the regression equation 2.4, with the growth of expected wages instrumented by the fraction of affected workers. The aim is to obtain an estimate of the coefficient β, which measures the sensitivity of the change of the migration inflow rate with respect to the growth of expected wages.
Before presenting the results of the regression, it is useful to illustrate the problem of endogeneity and the need for using the instrumental variable approach. In Figure 2.5, the relationship between the growth of immigration inflow rate and the expected wages is represented. The left-hand panel contains the expected wage growth as calculated from the data (and hence endogenous); the right-hand panel represents the predicted values from the first stage. In both graphs the regression line and its 95% confidence interval along with the 95% prediction bands are represented. The graphs reveal that if the endogenous variable were used, the relationship would be basically non-existent. On the other hand, the relationship becomes positive when the predicted values of the growth of expected wages are used, with an estimate of β of about 0.005 (s.e. 0.002). These estimates are insensitive to the exclusion of the outliers represented by the observations outside the 95% prediction interval. To better understand the economic impact of the estimates, some examples are useful. The average increase

[14] The value of 0.46 can be derived from the estimates contained in columns (1) and (3) of Table 4.4 panel B, page 128 of Card and Krueger (1995).

in the inflow rate for the wage group I is 0.052%. In States such as Maine, where the predicted growth of expected wages is 10%, the immigration inflow as fitted by the regression line is relatively low (the change was 0.017%). In States such as California, where wages grew by about 19%, the regression line predicts an inflow rate change of 0.062%. This means that 9 percentage points growth of expected wages contributed to an inflow rate change that is 0.045% larger. In other words, if the expected wages in California grew by 10% only, there would have been, *ceteris paribus*, an inflow of about 3,000 low-wage immigrants against the actual 12,000.

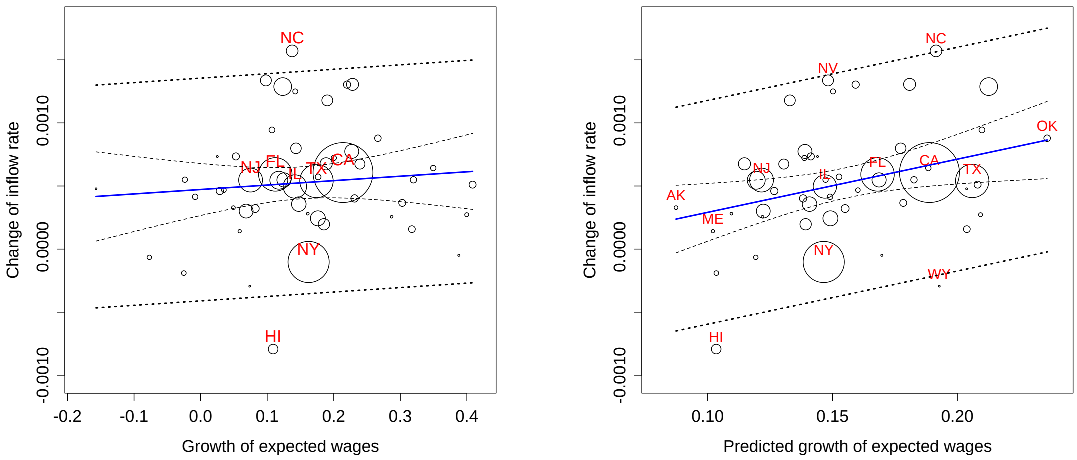


Figure 2.5: Change in the immigration inflow rate and growth of expected wages

The results of the second stage regression are reported in Table 2.4 for all models presented in Table 2.3 and for additional specifications. For illustration purposes, all estimates and standard errors, except those in column (h), are multiplied by a factor of 100. The comparison of columns (a), (b) and (c) reveals that the un-weighted estimates yield a smaller coefficient than the benchmark case while using the measure for constructed wages produces a larger value. On the other hand, the introduction of macroeconomic controls does not change substantially the value of the estimates, as can be seen from the models (d) to (g). It is interesting to note that, while the wage growth of natives is an important factor in explaining cross-states differences in the change of the inflow rate, the growth of unemployment rate and the CPI are not, although they both have the expected sign. In columns (h) and (i) the specifications for the immigrants in the wage groups II and III are presented. The reported value of β for group II is larger than the benchmark case. Since the upper limit of this group is \$2 larger than the federal minimum wage, it is possible that the presence of spillover effects also attracts immigrants who earn above the minimum wage. Consistently, the coefficient for group III is smaller than that for group I. This can be explained by the fact that the minimum wage window is narrower (the upper limit is \$5.65) and this would exclude all immigrants who were earning the State minimum wage at the moment of the Census[15]. Column (j) includes the concentration of immigrants in 1990, defined as the stock of foreign-born divided by the population in each State at the time of the 1990 Census. The rationale of adding this variable is to control for the presence of fixed effects that are not captured by using first differences. The estimate of β is actually larger than the benchmark case. The coefficient for the historical immigration concentration is negative although not significant. At first sight, the negative sign might appear a strange result, considering the tendency of new immigrants to move to where previous foreign-born populations had settled. However, it is important to recall the fact that the dependent variable in question is the change in the inflow rates. Hence, this means that flows grow relatively more in locations where immigration was historically lower[16]. This fact is also documented by Card and Lewis (2005) who found that Mexican immigrants (who represent the largest share of low-wage immigrants) progressively settle away from traditional immigration gateways. Finally, in column (k) inflows rather than inflow rates are used in a regression without weights[17]. Obviously the estimates are not comparable with those of the previous models, but they constitute a robustness test which demonstrates that, even without controlling for population size, the results are similar. The table also reports the values of the Durbin-Wu-Hausman (DWH) test for endogeneity. The null hypothesis is that the OLS estimator is consistent (under the assumption that the instrument is valid). The test is carried out by augmenting the second stage regression with the residuals of an ancillary regression in which the endogenous variable is regressed on all exogenous covariates (including the instrument). If the parameter accruing to the residuals is significantly different from zero, then the null is rejected. As can be seen, the hypothesis that OLS is consistent is strongly rejected in all specifications.

[15] For example, California has had a minimum wage of \$5.75 since March 1998.

[16] On the other hand, flows are highly correlated with historical stocks. As an example, a regression of the inflow rate after the minimum wage change (i.e., $\frac{m^s_{j1}}{P_{j1}}$) on the 1990 immigration concentration would yield an R^2 over 0.40.

[17] When the dependent variable is in level, weights would tend to overestimate the value of the parameter.

Table 2.4: IV regression of change in the inflow rate of immigrants (coefficients × 100)

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Expected wages growth	0.525**	0.327*	0.695**	0.507**	0.590***	0.550**	0.576**	0.668***	0.420**	0.694**	1.960*
	(0.220)	(0.178)	(0.290)	(0.216)	(0.224)	(0.242)	(0.229)	(0.256)	(0.166)	(0.273)	(1.080)
Unempl.				–0.057			–0.058	–0.045	–0.033	–0.068	0.000
				(0.044)			(0.044)	(0.049)	(0.032)	(0.048)	(0.210)
Wages					0.568**		0.546**	0.673***	0.212	0.184	–1.388
					(0.221)		(0.220)	(0.246)	(0.160)	(0.395)	(1.456)
CPI						–0.015	–0.004	–0.006	–0.017	–0.004	–0.036
						(0.020)	(0.020)	(0.022)	(0.014)	(0.022)	(0.104)
1990 immig. conc.										–0.222	
										(0.194)	
Constant	–0.037	0.003	–0.053	–0.048	–0.087*	0.055	–0.074	–0.076	0.064	–0.043	0.002
	(0.037)	(0.028)	(0.044)	(0.036)	(0.046)	(0.108)	(0.116)	(0.130)	(0.084)	(0.130)	(0.007)
DWH test	9.73	5.07	15.07	10.59	10.83	10.68	14.35	13.40	15.69	16.63	5.36
p-value	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
N	51	51	51	51	51	51	51	51	51	51	51

Standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. The reported coefficient refers to the growth of expected wages. The dependent variable is the change in immigration inflow rate except (k), where the difference in inflows is measured in levels. All models except (b) and (k) are weighted by the stock of foreign-born population in each State. The macroeconomic controls are all measured in terms of their growth. The DWH test statistics reports the values of the augmented regression test and its p-value.

2.6.3 Placebo tests

A counterfactual analysis of the previous results can be obtained by testing the effect of the policy on groups that are thought to be excluded by the treatment. This Section presents placebo tests using the wage groups IV, V and VI. These are groups formed by immigrants who earn a wage higher than the minimum and hence other factors, such as the change in macroeconomic characteristics, are expected to explain cross-state differences in their inflow rates. The regressions below present the results for models with and without control variables.

Table 2.5: Placebo tests (coefficients × 100)

	Group III)		Group IV)		Group V)	
Expected wages growth	–0.058	0.011	0.073	0.106	0.092	0.064
	(0.156)	(0.141)	(0.160)	(0.169)	(0.146)	(0.145)
Unempl.		–0.013		–0.025		–0.087***
		(0.027)		(0.032)		(0.028)
Wages		0.620***		0.379**		0.128
		(0.135)		(0.163)		(0.140)
CPI		–0.001		0.002		0.010
		(0.012)		(0.015)		(0.013)
Constant	0.000	–0.000	–0.000	–0.001	0.000	–0.001
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
N	51	51	51	51	51	51

Standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. The reported coefficient refers to the growth of expected wages. All models are weighted by the stock of foreign-born population in each State. The macroeconomic controls are all measured in terms of their growth. See text for a definition of the wage groups.

The results consistently demonstrate that the growth of expected wages - as instrumented by the fraction of affected immigrants - is not significant in explaining the change in the inflow rate of immigrants with earnings higher than the minimum wage. On the other side, the growth of prime-age native wages is very important in explaining the change in the inflow rate for group IV and V, while unemployment is very important for VI; the CPI has the expected sign only for group IV, but none of the estimates is significant.

2.7 Discussion and final remarks

The present Chapter studies an unexplored aspect of the minimum wage: its pulling effect for immigrants. The investigation of the linkages between migration and the minimum wage is of particular relevance in the context of recent socio/economic events that occurred in the US. The immigrant population rose systematically during the 1990s and as of 2000 the share of immigrants exceeded 11% of the total population[18]. In parallel to these events, the history of minimum wage legislations also experienced remarkable changes: after a steady decline in the 1980s, the two increases in 1991/1992 and 1996/1997 contributed to bring back the real value of the minimum wage to the level of 1980.

There are two main findings in this study: first, in the period under consideration, the minimum wage contributed significantly to the increase of the average wages of immigrants. In addition, there seems to be a positive effect on employment, and this result supports the hypothesis that there are frictions in the labour market which can be alleviated through the policy. These positive effects on the labour market outcomes have increased the gains that potential immigrants could attain by an average of 15% (as measured by the increase in the expected wages). The second result is that low-wage immigrants are responsive to the growth of expected wages. This quantity, as instrumented by the fraction of affected workers, robustly predicts cross-section differences in the change of inflow rates. Groups of immigrants who earn more than the minimum wage are instead insensitive to the expected gains produced by the policy.

There is much more to learn about immigration and minimum wages. The empirical analysis in this Chapter exploits a quasi-natural experiment consisting of an exogenous change in the policy, and hence is focused on the federal minimum wage. However, changes in the federal law are quite rare and hence future studies that want to look at this relationship should concentrate in a panel data design which contains both data across States and over time, as done in previous studies that investigate unemployment effects on teenagers (Burkhauser et al. 2000; Neumark and Wascher 1992). This approach would have two advantages: first, the cross-State data in the recent decades have been enriched by the presence of many States which set their own minimum wage and which have different immigration dynamics. The panel data design will be useful to accurately control for State fixed effects. Second, minimum wages effects are interesting also when the

[18]Data from Census 2000. In terms of civilian population, the CPS reveals that this figure is just above 10%, due to their different definitions.

nominal wage does not change; the model in the present Chapter predicts that the erosion of the nominal value will lead to a decrease in the expected wages of immigrants. Analysing the consequences on immigration of a decline in the real minimum wage is an interesting question to be explored in light of the fact that the federal minimum stood at the same level for nearly 10 years[19]. Hopefully this study will provide useful prescriptions for a better planning of policies related with immigration and with the minimum wage. The present Chapter demonstrates the existence of an important relationship, and policies intended to cope with the growing concentration of foreign-born, such as the monitoring of migration levels and the provision of social services, should take into consideration the fact that the minimum wage is an important asset for low-wage earners, capable of inducing them to move to another country.

[19]The federal rate was recently increased by a new minimum wage bill which established a three-stage increase: \$5.85 after July 2007; \$6.55 after July 2008; \$7.25 by August 2009. This corresponds to an increase in the nominal wage of more than 40%. On the other hand, during the past decade, several States passed laws that introduced a rate higher than the federal: in 1997 only 7 States adopted their own minimum wage; by 2006 this number was 18.

Appendix

a) *Derivation of equation 2.5*

The growth of expected wages can be decomposed into wage and employment growth as follows:

$$\Delta\omega_j^s = \Delta w_j^s + \Delta e_j^s, \tag{A1}$$

where Δw_j^s and Δe_j^s are the log difference of average wages and employment population ratio, respectively. Following Card (1992), the equations for labour demand and the reduced form for wage growth can be defined as:

$$\Delta e_j^s = a + \eta\Delta w_j^s + \nu_j^s, \tag{A2}$$

$$\Delta w_j^s = \alpha + \lambda B_j^s + \zeta_j^s. \tag{A3}$$

The term B_j^s is exogenous and hence can be used to estimate Δw_j^s; the predicted value is then inserted in the equation for the change in employment to obtain:

$$\Delta e_j^s = a + \eta\alpha + \eta\lambda B_j^s + \eta\zeta_j^s + \nu_j^s. \tag{A4}$$

To obtain equation 2.5, substitute A3 and A4 into A1 and use the OLS additive property to obtain:

$$\Delta\omega_j^s = c + \theta B_j^s + \upsilon_j^s, \tag{A5}$$

where $c = a + (1+\eta)\alpha$, $\theta = (1+\eta)\lambda$ and $\upsilon_j^s = (1+\eta)\zeta_j^s + \nu_j^s$.

b) *Derivation of elasticity*

The parameter η corresponds to the elasticity of the labour demand, $\eta \approx \frac{d(\Delta e_j^s)}{d(\Delta w_j^s)}$. This is because:

$$\Delta w^s = \log\left(\frac{w_1^s}{w_0^s}\right) \approx \frac{w_1^s - w_0^s}{w_0^s} = \frac{\Delta w}{w_0^s}$$

$$\Delta e^s = \log\left(\frac{e_1^s}{e_0^s}\right) \approx \frac{e_1^s - e_0^s}{e_0^s} = \frac{\Delta e}{e_0^s}$$

c) *Sign of θ*

Appendix a) has shown that θ depends on λ and η; the sign is however ambiguous. This is because, although the minimum wage has unambiguous positive effect on the average wages (i.e., $\lambda > 0$), its sign depends on η.

If $\eta < -1$, i.e., in the elastic part of the demand curve, expected wages decrease because the negative effect on employment more than compensate the positive benefits in terms of wage differentials.

If $-1 < \eta < 0$, the expected wages react positively to an increase in the minimum wages, but the increase of λ will be slowed down, i.e., $\theta < \lambda$.

If $\eta \geq 0$, the positive effect of employment adds up to that of wages. This only happens if employment changes are not demand-constrained, i.e., are measured along the supply curve, as in the case of monopsonistic labour markets.

d) *Mechanism of the fraction of affected immigrants*

For illustration, and following what Card (1992) did for the teenagers, consider how much of the wage increase to comply with the new minimum wage is predicted by the fraction of affected immigrants. The average wage in the economy after the minimum wage change is \$5.23. This value is larger than the federal minimum wage because during the period under consideration some States passed a law that increased the minimum wage to a value higher than \$5.15 and thus this weighted average takes into account the different times of the introduction of state and federal laws. The average wage of minimum wage immigrant workers in the period 1994/1996 was \$4.71; in order to comply with the new average minimum wage, average wages have to increase by 11%. Since the average fraction of affected immigrants was about 19%, one would expect wages to grow by $0.11 \times 0.19 = 2.09\%$. Instead, the growth of average wages was 11.75% (from \$8.41 to \$9.42); average wages grew for other reasons, but at least in the short run, one can assume that these causes are not State-specific. If so, they will be absorbed by the constant of the reduced form regression of wage growth on the fraction of affected workers. As shown in the text, the regression of equation A3 for wage growth yields a coefficient of the fraction of affected of about 0.31; by multiplying this result by the fraction of affected immigrants, one obtains a prediction of wage growth equal to 5.89%. This overestimates the "expected" increase by a factor of $5.89/2.09 = 0.31/0.11. = 2.82$. This is somewhat higher than the value found by Card (1992), i.e., $0.15/0.088 = 1.70$. This over-prediction can be ascribed to several factors: inspection of the data reveals that this overestimate is partially attributable to spillover effects.

e) *States with different levels of the minimum wage*

State	**Minimum wage**	**Date of introduction**
Alaska	5.65	Sep 1997
California	5.75	Mar 1998
Connecticut	5.65	Jan 1999
Delaware	5.65	May 1999
Hawaii	5.25	Jan 1994
Maine	5.25	Jan 1997
Oregon	5.50	Jan 1997
	6.00	Jan 1998
	6.50	Jan 1999
Rhode Island	5.65	Jul 1999
Vermont	5.25	Jan 1998
Washington DC	6.15	Jan 1998

Chapter 3

Immigration and Displacement across Local Labour Markets

3.1 Introduction

The impact of immigration is at the centre of public debate in all developed and developing countries. Mainstream studies about the consequences of immigration focus on the impacts on labour market outcomes of the host country such as wages, employment and participation. However, as observed by several authors (e.g., Filer, 1992; Borjas, 2003), even if immigration flows do not have adverse effects on wages or employment, they could exert pressures on the labour market that induce out-migration of previous residents towards areas with lower immigrant concentrations. The question of immigration to the UK induces displacement in local labour markets has received the attention of scholars only recently (e.g., Hatton and Tani, 2005; Lemos and Portes, 2008). The aim of this Chapter is to contribute to this literature by exploring some methodological and empirical issues that have not been addressed before. This is done by proposing a framework with the following features: 1) labour markets are identified by local authority districts (LAD)[20]; 2) each LAD is segmented into qualification/age groups; 3) the impact of immigration is studied separately for natives and earlier immigrants.

Most UK studies are based on regional data, since widely used sources of migration data such as the Labour Force Survey (LFS) and the General Household Survey (GHS) are published on this geographical scale. However, a great deal of labour-based migration occurs between more finely delineated areas than regions: data from the 2001 Census of England and Wales show that among the fraction

[20] A map of the LAD of England and Wales is reported in the Appendix.

of migrants who changed LAD between 2000 and 2001, only 45% moved across Governmental Office Regions (GOR). One of the advantages of using LADs is that they can better identify differences across local economies (such as pushing and pulling determinants for migration) that are usually ignored on a regional scale. A region such as the North West, for example, includes thriving LADs with favourable employment prospects, along with more depressed areas characterised by high unemployment rates. A finer definition of local labour market is also important for measuring immigrants' concentration: as an example, Greater London - which is the main region of destination for international migrants - includes LADs with high immigration rates such as Kensington & Chelsea and peripheral LADs with relatively low concentrations, such as Bexley. A potential drawback is that movements between neighbouring LADs could mask changes of residence rather than migrations to different labour markets. This problem is addressed by testing the sensitivity of the results with a geography formed by travel to work areas (TTWA).

A key issue about the study of the displacement effect is the analysis of different types of labour. In order to acknowledge the fact that workers are heterogeneous in their skill levels, LADs are segmented into qualification and age cells. Workers with different skill levels face different competition pressures on their labour market outcomes: other things being equal, young and poorly educated workers are more exposed to the risk of wage and employment declines than a skilled labour force. As a consequence, the potential reaction triggered by immigration is likely to be dissimilar for these two groups. An advantage of analysing different skill groups is to better account for the particular composition of international migration. Similarly to the case of other countries, new immigrants to the UK are relatively young: the Census table commissioned for the analysis shows that nearly 93% of the flows of foreign-born immigrants who arrived in England and Wales between 2000 and 2001 are younger than 45 years. Perhaps differently from many other countries, however, the large majority of these new immigrants are relatively highly educated: more than 70% of the new foreign-born immigrants hold at least an A-level (or its UK equivalent). This contrasts with less than 30% of the total resident population in 2000 holding such qualifications.

An important feature of this work is the distinction between the impact of immigration on natives and on earlier immigrants (defined as those immigrants who arrived before the year 2000). Newly arrived immigrants are more likely to have characteristics that are similar to earlier immigrants than to natives. In particular, they are likely to have analogous skill profiles and choose similar occupations.

This fact is embodied in the analysis by allowing for imperfect substitutability between immigrants and natives. Immigrants are also likely to choose similar destinations due to the existence of social networks shared by new and previous immigrants. As an example, Census data show that eight out of the ten top destinations are the same for new and earlier immigrants, as well as six out of the bottom ten. Hence, the analysis of substitution effects between new immigrants and resident population requires us to account for the different effect on natives and earlier cohorts of foreign-born persons. To date, no study has addressed in such detail the displacement effect question for the case of England and Wales. Works such as Hatton and Tani (2005) exploit time series variation of migration data, but only consider regionally based flows; on the other hand, Lemos and Portes (2008) use data at LAD level, but only for aggregated flows, without distinguishing between skill level or country of birth.
The analysis of displacement is carried out by firstly proposing a theoretical framework that models the mechanism through which wages and employment of previous residents adjust in response to immigrant inflows. The empirical analysis is implemented by the aid of an econometric model where internal movements are related with immigration flows, which measure the penetration of recently arrived foreign-born persons into the local labour market.
The issue of potential endogeneity arising from the correlation between unobserved LAD/skill-specific factors and migration flows is addressed by introducing fixed effects and by instrumenting the current immigration flows with historical settlements of foreign-born persons. To this aim, a dataset that combines information from Census migration tables and Census microdata are used. Two features render this dataset unique: first, migration rates are derived using 100% of the observed working-age population flows instead of using small samples such as those from the LFS or the International Passenger Survey (IPS). Second, data have been obtained from the Office for National Statistics (ONS), under special conditions, without the application of the small cell counts confidentiality routine, which could otherwise affect estimations that involve small areas[21].
The results of the analysis show that international migration does not displace native working-age population; instead, both natives and new immigrants move to the same local labour markets. However, there is evidence of displacement for

[21]ONS applies a confidentiality routine to all tables from 2001 Census, consisting of an adjustment to small cell counts. Details on disclosure protection measures can be found athttp://www.statistics.gov.uk/Census2001/discloseprotect.asp. At Local Authority District Level, this procedure is likely to affect most of the migration indices, such as the net migration rates considered in this Chapter. A thorough discussion of the effects of small cell adjustment on migration interaction data is in Duke-Williams and Stillwell (2007).

earlier immigrants, particularly for workers with no or low qualifications. These findings corroborate the conjecture that immigrants and natives are imperfect substitutes in production.
The next Section contains a brief review of the literature on displacement. A theoretical model which explains the mechanism through which an increase of immigration affects wages and employment rates in the local labour market is outlined in Section 3. This is used in Section 4 to derive the econometric specification which is the base for the estimation. Section 5 contains a description of the data, along with summary statistics. Analysis is carried out in Section 6, where different OLS and IV specifications are estimated and results are contrasted. The subsequent Section contains the sensitivity analysis, which is performed by removing the student population, using TTWA as definition for local labour markets, analysing origin-destination specific flows, and implementing predicted occupation groups. Section 8 summarises the results and proposes potential avenues for future research.

3.2 Reviewing the literature on displacement

The literature on the consequences of immigration in the labour market is well established, especially for the case of the USA. A seminal approach has involved the use of the spatial correlation method, which consists of studying the correlations between wages and employment and some measure of immigration in the local labour market. On the basis of this methodology, the majority of studies have concluded that immigration has no or negligible adverse effects on wages or employment of natives.
Filer (1992) criticises the spatial correlation approach claiming that it ignores the fact that, by exerting downward pressure on wages and reducing employment opportunities in the local labour market, immigration induces previous residents to move towards areas with lower immigration concentration. The study of the spatial correlations will then fail to capture the true impact of migration simply because its effects are diluted countrywide. Using data from the 1980 USA Census for the standard metropolitan statistical areas (SMSA), Filer analyses the correlations between immigration and net migration by ethnic group, qualification attainment and occupation, and estimates models which include several control variables. His regression results suggest that a 10% increase in the SMSA labour supply induced by immigration leads to a net out-migration of natives of about 12%, with effects that are larger among poorly-educated workers.

A series of studies have followed since Filer's pioneering work, with mixed findings. Card (2001) proposes a theoretical model where each SMSA is a single output producer with labour inputs consisting of CES-type aggregated occupations. He derives a reduced form that correlates the effect of immigration on internal migration, wages and employment rates of natives and earlier cohorts of immigrants. Using data from the 1991 USA Census, Card estimates several models where total population growth and migration measures (i.e., net migration, out-migration and in-migration) are expressed as a function of the immigration rate in each SMSA/occupation cell. To control for potential unobserved demand factors that might be correlated with both internal and international movements, he uses an instrumental variable approach where historical settlements of immigrants - arguably exogenous with respect to present demand shocks - are a predictor for current immigration flows. The results show no evidence of displacement effects, with internal movements of natives and earlier immigrants almost insensitive or somewhat complementary to immigration flows. This also corresponded to moderate effects on the labour market outcomes of the two groups: Card's findings are consistent with a negative, but very modest, impact of immigration. In cities with a high immigrant concentration, the negative impact on wages and employment of low-skilled workers is about 3%.

Along these lines, Borjas (2003) develops a CES-type structural model where the national labour market is segmented into nested education and experience cells. The advantage of his framework is that it allows for imperfect substitutability between and within education groups. Using data from four Censuses from 1960 to 1990, Borjas first estimates the elasticities of substitutions for each skill group and then simulates the effects of immigration on wages. His results imply that an immigration inflow that induces a 10% increase in the labour supply reduces wages by 4% on average and by 9% for high school dropouts. Using USA Census data from 1960 to 2000 and a framework similar to the previous one, Borjas (2006) finds analogous wage impacts of immigration. He estimates a series of models that correlate the migration rates of natives with immigration within each region/skill group. As in his earlier work, skills are broken down by education and experience groups, while labour markets are represented by Metropolitan Areas, States and Census Divisions. Borjas finds evidence of a substantial displacement effect: the estimates of the model for internal migration show that, for any 100 additional immigrants in each region/skill cell, between 20 and 60 natives migrate towards areas with lower immigration concentration, with effects that increase with the size of the labour market.

Borjas' results have been criticised by Sparber and Peri (2007) on the grounds that, in the set of estimated equations, there exists a mechanical negative correlation between the response variable (log employment) and the main migration explanatory variable (immigration rate). They prove this by simulating results using arbitrary values of such correlation. They also estimate alternative specifications with the same data used by Borjas and find no evidence of displacement; instead, they found that an increase of 100 immigrants in each region/skill cell is accompanied by an increase of 30 to 40 natives.

There are only a few studies that explore the displacement effect of immigration outside the USA context. Stillman and Maré (2007) consider the case of New Zealand: using data from 1996 and 2001 Census at local labour market area (LMA) level and an econometric framework similar to Borjas (2006), they estimate the impact of immigration on internal movements of natives and earlier immigrants. They use two different definitions of skill groups: one based on age/qualification and one based on occupations. Endogeneity issues are mitigated by using the instrumental variable approach proposed by Card (2001). Their results indicate no evidence of displacement for natives or earlier immigrants; in each LMA/skill group, population grows at a rate higher than immigration, implying that both previous residents and new immigrants move to the same areas. These results are robust across different types of labour market definitions.

To date, only a few studies have investigated the displacement effect in the UK. Hatton and Tani (2005) build a model where net internal flows between regions are a function of the net international migration. They use data from the IPS and from the National Health Service Central Register (NHSCR) for the period 1982-2000. One advantage of their dataset is that it is possible to exploit time series variation, which allows a better control for persistent demand shocks; another benefit is that emigration rates can be included in the analysis. These data, however, also have some issues. IPS are only available at regional level, with no breakdowns by skill, and they are constructed using a sample of 0.2% of all travellers into and out of the UK[22]. NHSCR are high-frequency data, but they only contain information about age and sex of migrants, with some issues of undercounting of young males[23]. With these caveats, they estimate a series

[22] This corresponds to roughly $250,000$ interviews annually, see ONS website http://www.statistics.gov.uk

[23] The undercounting of young males creates potentially biased estimates if the age and/or sex distribution of migrants varies by areas. Tabulations at regional level from SAR reveal that age profiles are different from the average profile (i.e., at country level), particularly in the case of London. Since this region has a large proportion of immigrants and internal migrants, migration rates will be measured with error.

of models, with and without control variables such as house prices and job vacancies, and they found that net internal migration is negatively correlated with the net immigration to the region. However, this effect is significant only when restricted to the Southern Regions (which are high immigration areas); according to their estimates, for an additional 100 (net) immigrants, more than 50 previous residents will move to another region.

Lemos and Portes (2008) analyse the impact that immigration from the Eastern European countries that recently joined the European Union has on the UK labour market. They use data from the Worker Registration Scheme and the National Insurance Number (NINO) Registrations database. These datasets have the advantage of being published at LAD level, allowing a detailed study of local labour markets. They first estimate the impact of immigration on wages and unemployment, finding no significant adverse effect even for the low-skilled or young labour force. They then investigate whether immigration leads to a displacement of the native labour force. The results of their preferred specification confirm the findings of Hatton and Tani (2005), although the magnitude of displacement effect is substantially smaller (between 4 and 9%, for LADs and region, respectively). These results are vulnerable to criticism for two reasons: first of all, the displacement hypothesis is tested using the aggregated population, without skill or occupation breakdown. Second, as pointed out also by the authors, the issue of endogeneity has not been addressed, and hence local demand shocks are likely to bias the true effect.

Set aside from the studies of displacement effect is the work of Manacorda et al. (2008). This study is relevant as it offers an alternative explanation for the absence of immigration effects: the imperfect substitutability between immigrants and natives. Using data from the GHS and the LFS for the period 1973 to 2005, they first estimate the elasticity of substitution between immigrants and natives and then simulate the impact of immigration on the wages of both natives and the previous cohorts of immigrants. They conclude that, in the period under examination, immigration increases the wage differential between native and earlier immigrants by about 5.5%. An important corollary of imperfect substitutability is that, since competition between new and earlier immigrants is stronger than between new immigrants and natives, the displacement effects should be larger among previous cohorts of foreign-born persons.

3.3 Theoretical framework

The model combines those of Card (2001), Card and Lemieux (2001) and Borjas (2003). Each LAD j produces a single output by the means of the following technology:

$$Y_j = L_j^{\alpha} K_j^{1-\alpha},$$

where K and L represent capital and labour, respectively. In each LAD, labour is a CES-type aggregate of inputs represented by schooling qualification groups s:

$$L_j = \left(\sum_s \nu_{js} L_{js}^{\frac{\rho-1}{\rho}} \right)^{\frac{\rho}{\rho-1}},$$

where ν_{js} represent LAD/qualification relative efficiency, with $\sum_s \nu_{js} = 1$ and ρ is the elasticity of substitution between qualifications. Each of these inputs is an aggregate of imperfect substitutable types of labour, represented by age intervals a:

$$L_{js} = \left(\sum_a \lambda_{sa} L_{jsa}^{\frac{\delta-1}{\delta}} \right)^{\frac{\delta}{\delta-1}},$$

where λ_{sa} corresponds to qualification/age relative efficiency, $\sum_a \lambda_{sa} = 1$ and δ is the elasticity of substitution across age groups. Within each qualification/age cell, natives (N) and migrants (M) are imperfect substitutes:

$$L_{jsa} = \left(\sum_k \psi_{jsak} L_{jsak}^{\frac{\eta-1}{\eta}} \right)^{\frac{\eta}{\eta-1}},$$

where $k \in \{N, M\}$, ψ_{jsak} and η are the relative efficiency and the elasticity of substitution between immigrants and natives, respectively, with $\sum_k \psi_{jsak} = 1$. This feature follows the works of Ottaviano and Peri (2006a) and Manacorda et al. (2008). Cultural diversity, ethnic segregation, language gap and other factors could determine different productivity and occupational choices for immigrants, hence resulting in their imperfect substitutability with natives. Profit maximisation yields the following equation for the marginal product of natives' and migrants' labour inputs (see Appendix):

$$\ln w_{jsak} = \ln \left(q_j \frac{\partial Y_j}{\partial L_j} \right) + \frac{1}{\rho} \ln L_j + \left(\frac{1}{\delta} - \frac{1}{\rho} \right) \ln L_{js} + \left(\frac{1}{\eta} - \frac{1}{\delta} \right) \ln L_{jsa} - \frac{1}{\eta} \ln L_{jsak} + \kappa, \quad (3.1)$$

where $\kappa = \ln \nu_{js} + \ln \lambda_{sa} + \ln \psi_{jsak}$ and q_j is the price of the output in each LAD. The labour participation function is expressed as follows:

$$\ln L_{jsak} = \varepsilon \ln w_{jsak} + \ln P_{jsak}, \tag{3.2}$$

where P represents the working-age population in each LAD/qualification/age cell for both natives and migrants, and ε is the elasticity of labour supply which, for simplicity, is assumed to be constant across groups. By combining equations 3.1 and 3.2, the following expressions for wage and employment are obtained:

$$\ln w_{jsak} = \frac{\eta}{\varepsilon + \eta}\left\{ \ln\left(q_j \frac{\partial Y_j}{\partial L_j}\right) + \frac{1}{\rho} \ln L_j + \left(\frac{1}{\delta} - \frac{1}{\rho}\right) \ln L_{js} + \left(\frac{1}{\eta} - \frac{1}{\delta}\right) \ln L_{jsa} + \kappa \right\} - \frac{1}{\varepsilon + \eta} \ln P_{jsak} \tag{3.3}$$

$$\ln \frac{L_{jsak}}{P_{jsak}} = \frac{\varepsilon\eta}{\varepsilon + \eta}\left\{ \ln\left(q_j \frac{\partial Y_j}{\partial L_j}\right) + \frac{1}{\rho} \ln L_j + \left(\frac{1}{\delta} - \frac{1}{\rho}\right) \ln L_{js} + \left(\frac{1}{\eta} - \frac{1}{\delta}\right) \ln L_{jsa} + \kappa \right\} - \frac{\varepsilon}{\varepsilon + \eta} \ln P_{jsak} \tag{3.4}$$

Notice that these expressions are very similar to Card (2001) and Borjas (2003) when $\eta \to 0$. A percentage increase in the working-age population of migrants ($d \ln P_{jsaM}$) affects the equilibrium wage and employment of migrants and natives in the same qualification/age group, but also of migrants and natives in other qualification/age groups. The total effect for a city is found by considering the impact on different education and age cells. Following Ottaviano and Peri (2006a) and assuming that the capital-labour ratio in the short run is not affected by immigration, it is possible to express the effects of the inflows of immigrants on a given qualification and age group in each LAD as follows:

$$\frac{d \ln w_{jsaN}}{d \ln P_{jsaM}} = \frac{\eta}{\varepsilon + \eta}\left\{ \frac{1}{\rho} \sum_s \sum_a \underbrace{\frac{\partial \ln L_j}{\partial \ln P_{jsaM}}}_{+} + \pi \sum_a \underbrace{\frac{\partial \ln L_{js}}{\partial \ln P_{jsaM}}}_{+} + \mu \underbrace{\frac{\partial \ln L_{jsa}}{\partial \ln P_{jsaM}}}_{+} \right\} \tag{3.5}$$

$$\frac{d \ln(\frac{L_{jsaN}}{P_{jsaN}})}{d \ln P_{jsaM}} = \frac{\varepsilon\eta}{\varepsilon + \eta}\left\{ \frac{1}{\rho} \sum_s \sum_a \underbrace{\frac{\partial \ln L_j}{\partial \ln P_{jsaM}}}_{+} + \pi \sum_a \underbrace{\frac{\partial \ln L_{js}}{\partial \ln P_{jsaM}}}_{+} + \mu \underbrace{\frac{\partial \ln L_{jsa}}{\partial \ln P_{jsaM}}}_{+} \right\} \tag{3.6}$$

The terms $\pi = \frac{1}{\delta} - \frac{1}{\rho}$ and $\mu = \frac{1}{\eta} - \frac{1}{\delta}$ are both negative as long as the elasticity within group is larger than the elasticity between groups, i.e., $\eta > \delta > \rho$, which is a standard assumption in similar models. The Appendix shows that the components $\frac{\partial \ln L_j}{\partial \ln P_{jsak}}$, $\frac{\partial \ln L_{js}}{\partial \ln P_{jsak}}$ and $\frac{\partial \ln L_{jsa}}{\partial \ln P_{jsak}}$ are all positive.

The corresponding effects for earlier immigrants are:

$$\frac{d\ln w_{jsaM}}{d\ln P_{jsaM}} = \frac{\eta}{\varepsilon+\eta}\left\{\frac{1}{\rho}\sum_s\sum_a\underbrace{\frac{\partial\ln L_j}{\partial\ln P_{jsaM}}}_{+} + \pi\sum_a\underbrace{\frac{\partial\ln L_{js}}{\partial\ln P_{jsaM}}}_{+} + \mu\underbrace{\frac{\partial\ln L_{jsa}}{\partial\ln P_{jsaM}}}_{+} - \frac{1}{\eta}\right\} \quad (3.7)$$

$$\frac{d\ln(\frac{L_{jsaM}}{P_{jsaM}})}{d\ln P_{jsaM}} = \frac{\varepsilon\eta}{\varepsilon+\eta}\left\{\frac{1}{\rho}\sum_s\sum_a\underbrace{\frac{\partial\ln L_j}{\partial\ln P_{jsaM}}}_{+} + \pi\sum_a\underbrace{\frac{\partial\ln L_{js}}{\partial\ln P_{jsaM}}}_{+} + \mu\underbrace{\frac{\partial\ln L_{jsa}}{\partial\ln P_{jsaM}}}_{+} - \frac{1}{\eta}\right\} \quad (3.8)$$

Equations 3.5 to 3.8 summarise the important aspect that immigration in a given qualification/age group also affects other qualification and age groups. Some observations are necessary:

1. other things being equal and as long as there is no perfect substitution between immigrants and natives (i.e., $\eta < \infty$), then $\frac{d\ln w_{jsaN}}{d\ln P_{jsaM}} > \frac{d\ln w_{jsaM}}{d\ln P_{jsaM}}$ and $\frac{d\ln(\frac{L_{jsaN}}{P_{jsaN}})}{d\ln P_{jsaM}} > \frac{d\ln(\frac{L_{jsaM}}{P_{jsaM}})}{d\ln P_{jsaM}}$, i.e., the adverse effect of immigration is worse for immigrants because they are perfect substitutes with newcomers;

2. the sign of both expressions is ambiguous, as there are positive and negative terms. As noted by Ottaviano and Peri (2006a), the expression might be positive when the components $\frac{\partial\ln L_j}{\partial\ln P_{jsaM}}$ are particularly large, i.e., there is a large spillover to the total labour force caused by imperfect substitutability. In all other cases the effect will be negative due to the crowding out of similar workers. A corollary to equations 3.5 to 3.8 is that the impact of immigration on wages and employment depends on how the skills distribution of new immigrants compares to that of previous residents. If previous residents have skills similar to immigrants, the negative effects will be relatively large.

3. a plausible assumption is that previous residents respond to the total effect of immigration. Natives and earlier immigrants of a given qualification/age group will migrate to (out of) a LAD if the total effect of immigration on their wage and employment outcomes is positive (negative). Hence the correlation between internal migration and immigration of a given qualification/age group captures the combined effects across and within groups.

The empirical analysis of the Chapter will assess the effect of an increase in the supply of immigrants on the mobility of natives and earlier migrants in the same LAD/qualification/age group.

3.4 Econometric model

The econometric framework is based on Card (2001), with the distinction of considering that the labour market is segmented in qualification and age groups rather than occupations. The starting point is the definition of population growth between 2000 and 2001. In each qualification/age group, natives and migrant working-age populations grow according to the following equation:

$$P_{jN}^{2001} = P_{jN}^{2000} + P_{jN}^{L} - P_{jN}^{O},$$

$$P_{jM}^{2001} = P_{jM}^{2000} + P_{jM}^{L} - P_{jM}^{O},$$

where L and O represent indices for in-migration and out-migration across LADs, respectively. By indicating with R_j the immigration flows in the LAD, total population growth is represented by:

$$\begin{aligned} \frac{P_j^{2001}}{P_j^{2000}} &= 1 + \frac{P_{jN}^{L} - P_{jN}^{O}}{P_{jN}^{2000} + P_{jM}^{2000}} + \frac{P_{jM}^{L} - P_{jM}^{O}}{P_{jN}^{2000} + P_{jM}^{2000}} + \frac{R_j}{P_{jN}^{2000} + P_{jM}^{2000}} \\ &= 1 + n_j e_j + m_j(1 - e_j) + r_j \end{aligned} \tag{3.9}$$

where $n_j = \frac{P_{jN}^{L} - P_{jN}^{O}}{P_{jN}^{2000}}$; $m_j = \frac{P_{jM}^{L} - P_{jM}^{O}}{P_{jM}^{2000}}$; $e_j = \frac{P_{jN}^{2000}}{P_{jN}^{2000} + P_{jM}^{2000}}$. The growth rate is expressed as a linear combination of net internal migration rates of natives and earlier immigrants (n_j and m_j, respectively) where the weights correspond to the relative shares (e_j and $1 - e_j$) of the two groups. Equation 3.9 assumes that the working-age population of previous residents is constant between 2000 and 2001. If natives and migrants of a given qualification/age group are insensitive to immigration flows, then $n_j e_j + m_j(1 - e_j) + r_j = r_j$, i.e., the local population grows only because of immigration.

The estimation of this equation involves potential endogenous issues arising from the presence of unobserved LAD- and/or qualification/age-specific shocks that are correlated with the immigration rate. A strategy to control for group-specific shocks is to pool observations over all qualification and age groups and introduce fixed effects; however, LAD/qualification/age-specific demand shocks might still be correlated with r_{jsa}. Endogeneity bias can be mitigated by using an instrument that is orthogonal to local demand shocks. As discussed in Card (2001), a robust instrument is constituted by country of birth-specific historical settlement of immigrants. This can be used to predict the part of current immigration flows that is exogenous to contemporaneous demand conditions.

The instrument is represented by the following expression:

$$R_{jsa} = \hat{R}_{jsa} + \xi_{jsa} = \sum_{b} \gamma_{jb}\theta_{sab}R_b + \xi_{jsa} \tag{3.10}$$

where γ_{jb} is the fraction of historical flows from country b that settled in local authority j, θ_{sab} represents the countrywide share of current migrants belonging to qualification s and age a, and R_b represents the current flows from country b. The term $\hat{R}_{jsa}$ predicts how current immigration flows would be redistributed across LADs and qualification and age groups in the absence of local demand shocks, represented by ξ_{jsa}. Hence the key identifying assumptions are:

$$E\{\gamma_{jb}, \theta_{sab}, R_b | \xi_{jsa}\} = 0 \tag{3.11}$$

The instrumental variable approach just described has been extensively used in the migration literature. In this Chapter, an instrument based on ethnic-specific historical settlement of immigrants is proposed in addition to the one based on country of birth. This is thought to be more appropriate for the UK, given the tendency of immigrants to cluster in ethnic enclaves and due to the fact that different ethnic groups may originate from the same country of birth. As will be discussed in the Section 3.6, both instruments yield similar results. Using equation 3.9, it is possible to express the components of population growth (i.e., in-migration, out-migration and net migration) as functions of r_j for both natives and earlier immigrants. By implementing the instrumental variables approach, the following reduced form regression can be estimated:

$$g_{jsa} = \beta r_{jsa} + \mathbf{Z}_{jsa}\boldsymbol{\chi} + \tau_j + \tau_s + \tau_a + \tau_{sa} + \upsilon_{jsa} \tag{3.12}$$

where g_{jsa} is a component of population growth (inflow, outflow, net migration rates) for natives and earlier immigrants; τ_j, τ_s and τ_a represent LAD, qualification and age effects; the interaction τ_{sa} is used to control for the fact that age is only a proxy of potential experience, which can vary substantially within each qualification cell; $\mathbf{Z}$ is a set of variables to control for local demand shocks. [24]. The parameter of interest is β, which captures the effect of immigration on the various components of population growth.

[24]Equation 3.12 is the baseline for estimation. The analysis has been carried out also using the model $g_{jsa} = \beta r_{jsa} + \mathbf{Z}_{jsa}\boldsymbol{\chi} + \tau_j + \tau_s + \tau_a + \tau_{js} + \tau_{sa} + \upsilon_{jsa}$ where τ_{js} represents the interaction between LAD and qualification. This second specification, which is similar to Borjas (2003), yields consistent results across all models. Computation of F-tests across alternative models reveals that numerous interactions reduce the robustness of the instrument. Hence specification 3.12 is an optimal balance between a parsimonious model and a good fit.

3.5 Data description

Data used in the analysis come from several sources. The main source is the Census Table C0949, which has been commissioned from the Office for National Statistics (ONS). This table contains counts of migrants between LADs of England and Wales cross-tabulated by highest level of schooling qualification, age and foreign-born status, i.e., individuals born inside or outside the UK[25]. This table is used to construct in-migration, out-migration, net migration, and immigrant flows in England and Wales. Table C0949 has the important feature of not being especially contaminated by random small cell adjustment, which is usually implemented by ONS in all tabular outputs to prevent the release of confidential information.

Another important source of data is the Controlled Access Microdata Sample (CAMS). This consists of sample microdata from Census, only accessible in safe settings at ONS, which contains more detailed and disclosive information than the Samples of Anonymised Records (SARs) and the Small Area Microdata (SAM), which are available under end-user licence. CAMS data are used to derive LAD/skill-specific covariates for both natives and earlier immigrants. These include the unemployment rate, the share of non-white population, the proportion of Council houses, the percentage of females and the proportion of foreign-born population in each LAD/qualification/age group (the last variable is the same for natives and earlier immigrants).

The remaining information comes from different Census sources: Census Table C0736 is used to derive the population one year before the Census, which serves to construct migration rates. Information such as ethnic group and country of birth of immigrants, necessary to derive the instrumental variable, is obtained from Tables MG103 and C0737, while historical immigrants' settlements are derived from 1991 Census Table L06 and L07. Population excluding students has been estimated using data from Census Table MG105.

[25] Persons born in Scotland or Northern Ireland are considered natives although these two countries are excluded from the analysis. The choice of the UK rather than England and Wales as definition of country of birth is driven by the need to use a harmonised definition across data sources.

3.5.1 Definitions

The base geography is constituted by 374 LADs[26]. These areas are not uniform in terms of population and size: there are LADs with large populations such as Birmingham and Leeds, and areas far less populous, such as Berwick-upon-Tweed and Teesdale. London is formed by 32 boroughs, each of them corresponding to a LAD. To control for this inhomogeneous size, the analysis will be based on weighted regressions, using the population in each LAD as weight.
Table C0949 is designed to contain three broad qualification groups: no or other schooling qualifications, low qualifications (i.e., below A-level) and high qualifications; these correspond to aggregated Census categories[27]. There are two important observations about these definitions. First, the group with no or other qualifications could be affected by measurement issues if schooling qualifications were erroneously reported as "other"; this problem could be quite significant for the group of immigrants, due to difficulties in translating foreign schooling degrees into the UK system. However, as discussed by Manacorda et al. (2008), this issue affects mainly survey data, while the impact is thought to be negligible for Census data. Second, although the A-level threshold between low and high qualification is somewhat arbitrary, it is useful to isolate the low-skilled group; this also corresponds to the classification used in several UK studies of migration, such as Dustmann et al. (2005).
Three age categories are then nested into each qualification group: 16 to 24, 25 to 44 and 45 to 64 years old. Age groups are only a broad proxy for labour experience; a finer definition would require knowledge of the age at which individuals left full-time education, which is not available from Census tabulations. Nevertheless, these three age intervals are useful to capture different migration events over the life cycle: the group 16-24 includes movements of the young and inexperienced labour force; the group 25-44 contains migrations up to the stages of career development, mostly characterised by movements of the whole house-

[26] England and Wales are formed by 376 LADs. Due to their relatively small size, the local authorities of City of London and Isles of Scilly have been aggregated with Westminster and Penwith, respectively.

[27] "No or other qualification" includes: No academic, vocational or professional qualifications. Other qualifications/level unknown: Other qualifications (e.g., City and Guilds; RSA/OCR; BTEC/Edexcel); Other Professional Qualifications. "Low qualification" include 1+ 'O' levels/CSE/GCSE (any grade); NVQ level 1; Foundation GNVQ; 5+ 'O' levels; 5+ CSEs (grade 1); 5+ GCSEs (grade A - C); School Certificate; 1+ A levels/AS levels; NVQ level 2; Intermediate GNVQ or equivalents. "High qualifications" include 2+ 'A' levels; 4+ AS levels; Higher School Certificate; NVQ level 3; Advanced GNVQ or equivalents; First degree; Higher Degree; NVQ levels 4 – 5; HNC; HND; Qualified Teacher Status; Qualified Medical Doctor; Qualified Dentist; Qualified Nurse; Midwife; Health Visitor or equivalents. All categories are derived from the 2001 Census question "Highest level of qualification".

hold; the group 45-64 tracks patterns of career change or pre-retirement. The other advantage of this classification is that it can be perfectly matched with the age groups contained in other data sources, such as SARs. Occupations, which are used in some computations, are defined according to the SOC2000 9 major groups or the 81 minor groups.

The analysis focuses on flows of working-age populations, which consist of labour force and inactive persons aged 16 to 64, including students; this is different to the approach followed by Stillman and Maré (2007) which exclude them. Since a substantial share of students belong to the labour force, their inclusion is useful to account for the potential impact exerted on the labour market by this group[28]. Sensitivity tests to compare results without student population are carried out.

The word immigrant (or new immigrant) is used to indicate a foreign-born individual who moved to the UK during the year before the Census date. UK-born immigrants who moved to England and Wales are excluded. Earlier immigrants consist of foreign-born persons who migrated into the UK more than one year before the 2001 Census. Natives include individuals who are born within the United Kingdom. In-migration and out-migration consist of counts of internal movements between LADs in England and Wales. These flows can either accrue to natives or foreign-born persons; net migration is the difference between in-migration and out-migration.

In each LAD/qualification/age group, the immigration rate is defined as the count of new immigrants over the total population before immigration. Total population growth is defined as the ratio of population in 2001 over the population in 2000. Migration rates for natives and earlier immigrants correspond to the ratio of the flows over their respective populations in 2000, e.g., native out-migration is derived as the ratio of internal outflows of natives over the native population in 2000.

3.5.2 Some facts about migration in England and Wales

Immigration to England and Wales increased rapidly during the 1990s, while emigration was fairly stable. The resulting increase in the stock of foreign-born persons between 1990 and 2000 accounted for half of the population growth in these two countries. Figure 3.1 presents immigration, emigration and net immigration in England and Wales for the period 1991-2006. The analysis contained in this Chapter focuses only on immigration of foreign-born persons, and does

[28]According to 2001 Census data, 22% of new immigrants and 36% of previous residents who are full-time students are also either working or actively seeking for jobs.

not consider emigration patterns. This approach is different from Hatton and Tani (2005), who consider net migration rates; however, as shown in the Figure, which is constructed using IPS data for the period 1991-2006, international net migration is mostly driven by immigration patterns, at least at aggregate level. The other component of international migration - the immigration of UK-born persons - is set out in the right-hand side of the Figure. As can be seen, aggregate patterns are stable over time. As discussed earlier, these flows will not be considered.

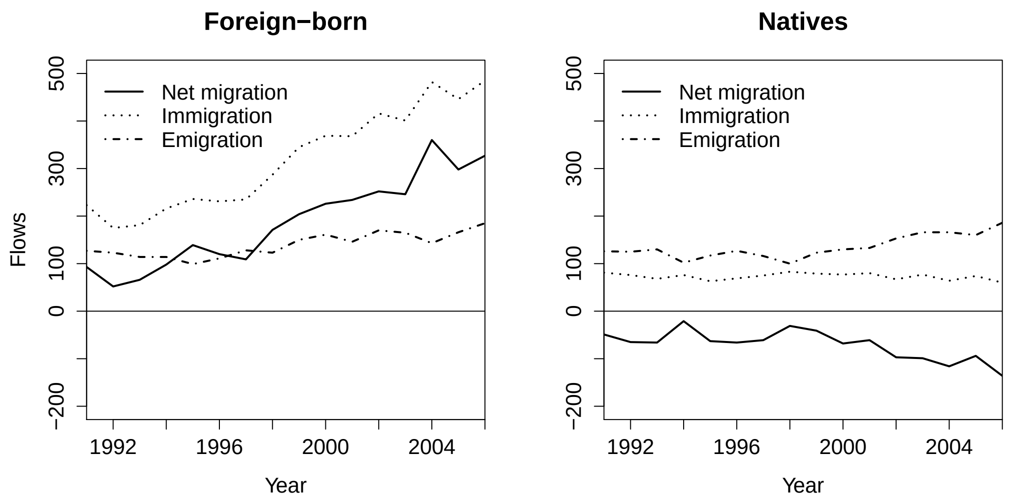


Figure 3.1: Immigration flows of foreign-born and natives, thousands. Source: IPS

Table 3.1 reports the distributions of immigrants, total population, natives and earlier immigrants by qualification and age, occupation and LAD of residence in 2001. In the year preceding the 2001 Census, more than $220,000$ immigrants aged 16 to 64 moved to England and Wales; this flow corresponds to roughly 0.67% of the total residents before immigration. The skill composition of new immigrants is very different from that of the resident population. More than 70% of new immigrants are highly qualified, while this percentage is much lower for the other two groups (43.5% for earlier immigrants and 28% for natives). Less-qualified persons constitute the largest share of natives (about 41%), while accounting only for 24% of earlier immigrants and 13% of new immigrants. On the other hand, the share with no/other qualifications among natives and earlier immigrants is two times larger than for immigrants. Within each educational group, the age profile reveals that more than 90% of new immigrants are younger than 44 years. For the groups of earlier immigrants and natives, this percentage is about 70% for low or high qualifications, and falls to about 40% for the category of no/other qualifications. To provide insight into the distribution of new immigrants, the Appendix reports a graphical representation of the immigration rates for different groups.

The occupation profiles are also very different across groups[29]. More than 56% of recent immigrants are in the managerial and professional occupations, while this percentage falls to about 43% for earlier immigrants and less than 36% for natives. Only 3% of immigrants are in the processing and machine-operating occupations, while this share is three times larger for earlier immigrants and natives. The percentage in elementary occupations is similar across the three groups.

The shares of total population of each group which accrue to the top ten populated LADs are set out in the bottom part of the table. These LADs include more than 12% of recent immigrants, 13.5% of earlier immigrants and 9% of natives. The top LAD for all three groups is Birmingham, but the share of earlier immigrants is twice as much as that of natives. Interestingly, the shares of new immigrants are very different to those of earlier immigrants in all LADs, while in the case of four top LADs (Leeds, Sheffield, Bradford and Liverpool) they are similar to natives. Among the reasons that could explain this is the fact that earlier immigrants have moved out of the LADs where they firstly arrived. The figures for the total population resemble very much the profile for natives, except for certain LADs where the concentration of earlier immigrants is particularly large. For example, the percentage of poorly-educated individuals in the total population is slightly smaller than among natives, (39 vs 41%), due to the fact that the proportion of low-skilled persons among earlier immigrants is substantially lower than natives. The same argument applies to those LADs with percentages that differ between the total population and natives. For example, the shares of total population of Birmingham and Ealing are relatively larger compared to those of natives, due to the high concentration of earlier immigrants. The occupation profile is nearly identical between natives and the total population.

A preliminary description of the relationship between immigration and internal movements is set out in Table 3.2. This table reports, in descending order of flows, the LADs with largest immigration and internal migration for the groups with low and high qualifications. With the exception of Birmingham, all destinations for poorly-educated new immigrants are situated in London. Six out of ten of such LADs are also top destinations for earlier immigrants. However,

[29] The definition of SOC2000 occupation groups can be found in the ONS website http://www.ons.gov.uk/about-statistics/classifications/current/ns-sec

eight out of ten of the main origins of internal migration are also among the London boroughs. With few exceptions, the top origins and destinations of low-qualified natives differ from those of new immigrants and are situated mainly in the Metropolitan Counties (e.g., Manchester and Leeds).

Table 3.1: Skill distribution and geographic dispersion for different groups

		Recent immigrants	Earlier immigrants	Natives	Total population
Total		222,942	3,374,241	29,726,880	33,324,063
Qualification	**Age**				
No/other qualif.		15.9	32.4	31.2	31.2
	16-24	49.3	9.6	9.6	8.5
	25-44	41.7	27.7	29.0	40.2
	45-64	9.0	62.7	61.3	51.3
Low qualif.		13.1	24.1	40.8	39.0
	16-24	52.6	21.5	21.5	19.9
	25-44	40.0	54.3	54.0	50.9
	45-64	7.4	24.2	24.5	29.2
High qualif.		70.9	43.5	28.0	29.8
	16-24	32.1	20.0	19.2	13.3
	25-44	60.6	50.9	52.1	58.1
	45-64	7.2	29.1	28.7	28.7
Occupations					
Managers and senior officials		13.1	14.9	13.6	13.7
Professional occup.		23.2	14.0	9.6	10.1
Ass. profess. and technical occup.		19.6	13.7	12.4	12.6
Administrative and secretarial occup.		12.1	12.2	13.7	13.6
Skilled trades occup.		4.3	8.6	11.3	11.0
Personal service occup.		6.7	6.8	7.5	7.4
Sales and customer service occup.		6.0	7.5	8.8	8.7
Process, plant and machine operatives		2.8	8.7	9.0	8.9
Elementary occup.		12.3	13.6	14.1	14.1
Top ten populated LAD					
Birmingham		2.10	3.48	1.63	1.82
Leeds		1.42	0.99	1.44	1.39
Sheffield		1.08	0.67	1.03	1.00
Bradford		0.75	1.23	0.83	0.87
Liverpool		0.72	0.41	0.90	0.85
Manchester		1.65	1.18	0.73	0.78
Bristol		1.11	0.66	0.76	0.76
Kirklees		0.34	0.69	0.75	0.74
Croydon		0.92	1.64	0.53	0.65
Ealing		1.94	2.52	0.40	0.62

Source: Census Table C0949 and C0737. Occupations defined according to SOC2000.

For the group with high qualifications, the majority of destinations for new immigrants are situated in London, but the list also includes Oxford and Cambridge. Another interesting aspect is that the ranking of the destinations within London is somewhat inverted: while the top LADs for low-qualified immigrants are located in Outer London, those for the highly qualified belong to the inner part. A similar ranking is found in the migration patterns of earlier immigrants, with both top destinations and origin in the Inner London area. The migration pat-

Table 3.2: LADs with highest migration flows for different groups

	Rank	Recent	Earlier immigrants		Natives	
		Immigrants	In-migration	Out-migration	In-migration	Out-migration
High qualif.						
	1	Westminster	Westminster	Westminster	Wandsworth	Wandsworth
	2	Kensington & Chelsea	Wandsworth	Camden	Leeds	Birmingham
	3	Camden	Camden	Wandsworth	Lambeth	Leeds
	4	Wandsworth	Lambeth	Hammersmith & Fulham	Manchester	Lambeth
	5	Hammersmith & Fulham	Hammersmith & Fulham	Kensington & Chelsea	Birmingham	Manchester
	6	Oxford	Kensington & Chelsea	Brent	Bristol	Camden
	7	Brent	Southwark	Southwark	Nottingham	Bristol
	8	Ealing	Barnet	Lambeth	Sheffield	Sheffield
	9	Southwark	Brent	Ealing	Camden	Nottingham
	10	Cambridge	Ealing	Haringey	Southwark	Barnet
Low qualif.						
	1	Brent	Newham	Brent	Birmingham	Birmingham
	2	Newham	Brent	Newham	Leeds	Leeds
	3	Birmingham	Ealing	Haringey	East Riding of Yorkshire	Manchester
	4	Ealing	Barnet	Lambeth	Manchester	Bristol
	5	Barnet	Lambeth	Ealing	Bristol	Croydon
	6	Wandsworth	Enfield	Wandsworth	Medway	Bromley
	7	Westminster	Redbridge	Southwark	South Gloucestershire	Wandsworth
	8	Southwark	Westminster	Barnet	Bromley	Lewisham
	9	Kensington & Chelsea	Croydon	Hackney	Nottingham	Liverpool
	10	Lambeth	Harrow	Westminster	Liverpool	Hillingdon

Source: Census Table C0949 and C0737.

tern of highly qualified natives is rather diverse, with four of the top origins and destinations located mostly in Inner London and the rest situated in areas similar to those of low-qualified natives. The descriptive evidence in Table 3.2 reveals that migration patterns differ substantially by qualification group and country of birth; moreover, it reiterates the importance of analysing the relationships between immigration and internal migration at LAD level.

3.5.3 Assessing the substitution of skill groups

The model in Section 3.4 is built on the assumption that there is imperfect substitution between qualification and age groups. The nested structure of the model suggests that substitutability is larger within groups and smaller between; this corresponds to the findings of works such as Borjas (2003). The model also assumes that immigrants and natives are imperfect substitutes in the same age cell. This feature was recently incorporated into structural models for the case of the USA by Ottaviano and Peri (2006a), who estimated an elasticity of substitution between 5 and 6 and for the UK by Manacorda et al. (2008), who found a value of about 7.

There is no single metric to gauge the substitution between and across groups; a simple and effective method, used previously by Borjas (2003) and Ottaviano and Peri (2006a), is to construct an index of congruence on the lines of that originally proposed by Welch (1999), which measures the affinity in the occupational distributions of different groups. The rationale is that groups composed of individuals with similar occupations are closer substitutes than groups with dissimilar distributions, and hence face higher competition in the labour market. The index of congruence is:

$$F_{hl} = \frac{\sum_g \frac{(f_{hg}-f_g)(f_{lg}-f_g)}{f_g}}{\sqrt{\sum_g \frac{(f_{hg}-f_g)^2}{f_g} \sum_g \frac{(f_{lg}-f_g)^2}{f_g}}},$$

with $F_{hl} \in [-1, 1]$. Here f_{hg} and f_{lg} are the shares of group h and l in occupation g. The term f_g is the proportion of total population in occupation g. The index is constructed in a way such that $F_{hl} = 1$ if occupations of group h have the exact distribution of group l and $F_{hl} = -1$ if the two groups have completely different distributions. It is possible to construct this index for all the sub-aggregates of the labour input.

Table 3 reports the value of F_{hl} between natives and earlier immigrants within the same education and age group. The index is calculated using the 81 minor groups (three digit) of the SOC2000. The congruence index between natives equals 1 for individuals in the same qualification/age group and is larger for contiguous cells. For example, for the group of low-skilled, the index between natives aged 16-24 and 25-44 is 0.22 and between those aged 25-44 and 45-64 it is 0.55, while the index between natives aged 16-24 and 45-64 is −0.31, revealing a smaller degree of substitution. The degree of substitution across qualification groups can be assessed in a similar way. Cells that are relatively far from the diagonal have relatively smaller values, indicating less substitutability between different groups. The imperfect substitution between natives and immigrants is observed along the diagonal of the lower panel of Table 3.3. The index ranges from 0.60 to 0.94, indicating imperfect substitution between the two groups. In general, values are larger for the highly qualified than for the low-qualified.

Table 3.3: Congruence index between natives and immigrants

		Natives								
		No/other qualif.			Low qualif.			High qualif.		
		16-24	25-44	45-64	16-24	25-44	45-64	16-24	25-44	45-44
Natives										
	16-24	1.00								
No/other qualif.	25-44	0.75	1.00							
	45-64	0.52	0.90	1.00						
	16-24	0.75	0.32	0.17	1.00					
Low qualif.	25-44	0.01	0.11	0.23	0.22	1.00				
	45-64	-0.56	-0.45	-0.16	-0.31	0.55	1.00			
	16-24	0.19	-0.30	-0.41	0.68	0.03	-0.09	1.00		
High qualif.	25-44	-0.65	-0.76	-0.81	-0.58	-0.54	0.00	0.02	1.00	
	45-44	-0.53	-0.60	-0.64	-0.55	-0.71	-0.13	-0.16	0.81	1.00
Immigrants										
	16-24	0.76	0.48	0.29	0.66	-0.04	-0.41	0.32	-0.51	-0.41
No/other qualif.	25-44	0.52	0.60	0.53	0.29	0.02	-0.31	-0.12	-0.54	-0.42
	45-64	0.54	0.79	0.79	0.16	0.06	-0.26	-0.34	-0.67	-0.50
	16-24	0.64	0.22	0.10	0.94	0.12	-0.26	0.73	-0.50	-0.48
Low qualif.	25-44	0.09	0.09	0.20	0.35	0.65	0.43	0.22	-0.52	-0.61
	45-64	-0.27	-0.13	0.12	-0.14	0.49	0.77	-0.12	-0.27	-0.30
	16-24	0.14	-0.34	-0.43	0.57	-0.11	-0.09	0.94	0.09	-0.09
High qualif.	25-44	-0.54	-0.67	-0.73	-0.47	-0.54	-0.07	0.09	0.87	0.61
	45-44	-0.51	-0.58	-0.60	-0.52	-0.68	-0.14	-0.16	0.78	0.81

Source: SARs. The two panels refer to total resident population in 2000.

3.6 Analysis

In the analysis, the increase in the supply of migrants is represented by the immigration rate, defined as the number of immigrants in a LAD/qualification/age cell over the resident population in the same cell. The response of previous residents to immigration can be gauged by their propensity to enter or tendency to leave the local labour market, which is represented by the in-migration and out-migration rate, respectively, or by the net migration rate. A useful starting point for the analysis can be effectively made by representing the raw correlation between the immigration rate and the net migration of the groups of interest. Using the prediction of the identity 3.9 and the reduced form 3.12, a regression of total population growth on r_{jsa} will yield a coefficient of 1 with an intercept of 1 in case immigration does not cause displacement. Figure 3.2 uses observations for the 374 LADs in England and Wales for all qualification/age groups to compare the case of no off-setting migration with the fitted values derived from the simplest version of equation 3.12. Regressions use the populations in each LAD as weights. The resulting coefficient is 1.568 (s.e. 0.048), with $R^2 = 0.24$; for the un-weighted OLS, these values are somewhat smaller (1.314, s.e. 0.055 and $R^2 = 0.14$). It can be seen that even at levels with relatively large immigration, there is no evidence of a negative effect.

These patterns are, however, aggregate; hence it is useful to consider the effects of immigration flows on the groups of natives and earlier immigrants. Figure 3.3 represents scatter plots of net internal migration of these two groups against the immigration rate.

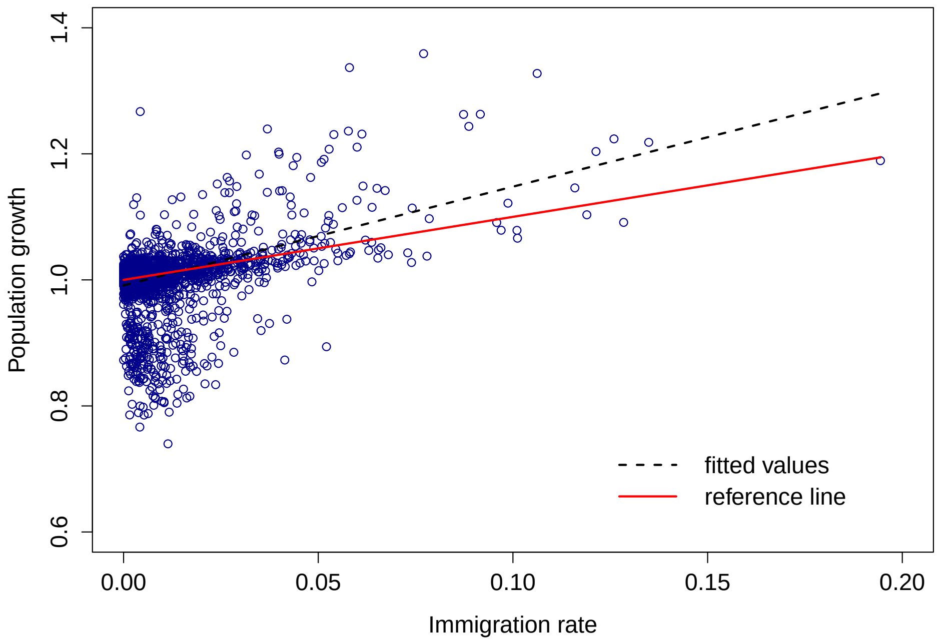


Figure 3.2: Total population growth and immigration, weighted estimates, all groups

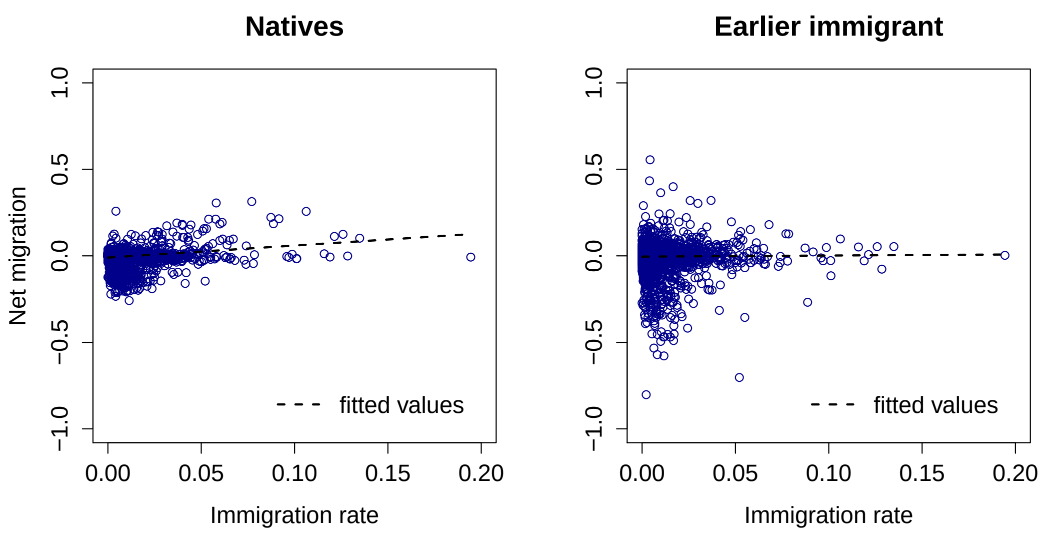


Figure 3.3: Net internal migration and immigration, weighted estimates, all groups

3.6.1 Estimation Results

The present Subsection contains the results of the estimation of the model in equation 3.12 for a series of alternative specifications. Robustness checks are carried out in the next Section.

The first two columns of Table 3.4 contain the estimates for the cases of standard and weighted OLS, where the weights are represented by the size of the population in each LAD. All migration rates for natives are significant at the 0.1% level. In-migration rates are high, implying that for every new immigrant, nearly 3 natives enter the same LAD; out-migration rates, although high, are just above 2. As a consequence, the estimated coefficient for net migration, which is roughly the difference between the in-migration and the out-migration coefficients, is significantly positive. In-migration rates for earlier immigrants are very similar to those for natives; however, out-migration rates are much larger, indicating that nearly 3 persons leave for every new immigrant who enters the local labour market. This yields an estimate for net migration that is essentially zero, although its sign is sensitive to the type of weights used. The last row reports the value for population growth; the weighted estimate corresponds to the dotted line in Figure 3.2. In the rest of the Chapter, results will be presented for weighted regressions, as weights help adjusting for the inhomogeneous sizes of LADs and yield better fits. However, the pattern of the results does not substantially change when un-weighted OLS is used.

Column (c) introduces dummies for each LAD, qualification and age group, with the aim of controlling for unobservable effects which are specific to each groups.

The introduction of these fixed effects partially attenuates the coefficient of in-migration and substantially decreases the coefficient for out-migration. As a consequence, the estimate for net-migration is highly significant for both natives and earlier immigrants. These estimates, however, could be affected by the correlation between immigration and LAD/qualification/age specific shocks, hence creating issues of endogeneity. As an example, an outward shift in the demand for certain skills in a LAD will attract both immigrants and previous residents, hence creating upward bias in the estimates of in-migration. As discussed in the previous Section, this bias can be reduced by instrumenting the current immigration with a flow measure that is independent of current economic conditions.

Table 3.4: Impact of immigration on internal migration

	(a)	(b)	(c)	(d)	(e)	(f)
Natives						
In-migration	2.513***	2.891***	2.163***	0.828***	0.516***	0.583***
	(0.067)	(0.067)	(0.068)	(0.125)	(0.133)	(0.160)
Out–migration	2.101***	2.195***	0.034	–0.218**	–0.129	–0.147
	(0.085)	(0.073)	(0.041)	(0.071)	(0.073)	(0.084)
Net-migration	0.412***	0.697***	2.129***	1.047***	0.645***	0.731***
	(0.055)	(0.049)	(0.074)	(0.133)	(0.141)	(0.159)
N	3366	3366	3366	3366	3366	2130
Earlier immigrants						
In-migration	2.677***	2.758***	1.567***	1.018*	0.880*	1.630***
	(0.151)	(0.153)	(0.237)	(0.412)	(0.425)	(0.195)
Out–migration	2.871***	2.696***	0.117	0.694***	0.942***	1.927***
	(0.135)	(0.110)	(0.114)	(0.198)	(0.205)	(0.185)
Net-migration	–0.194	0.063	1.450***	0.324	–0.061	–0.298
	(0.155)	(0.149)	(0.240)	(0.418)	(0.433)	(0.189)
N	3366	3366	3366	3366	3366	1045
Population growth	1.314***	1.568***	2.931***	1.799***	1.419***	1.476***
	(0.055)	(0.048)	(0.072)	(0.130)	(0.138)	(0.135)
N	3366	3366	3366	3366	3366	2841
OLS/IV	OLS	OLS	OLS	IV	IV	IV
Fixed effects	N	N	Y	Y	Y	Y
Weights	N	Y	Y	Y	Y	Y
Controls	N	N	N	N	N	Y

Standard errors in parentheses. *** significant at 0.1%; ** significant at 1%; * significant at 5%. The reported coefficient refers to the immigration rate. Models (b) to (e) are weighted by the population in each LAD. Model (d) is instrumented by historical settlements of foreign-born by country of birth; models (e) and (f) by historical settlements of foreign-born by ethnic group. Controls included in (f) are logs of: unemployment rate, share of non-white population, percentage of Council house and fraction of women for both native and earlier immigrants group and the share of foreign-born population common to the two groups.

Specifications (d) and (e) in Table 3.4 include two different instrumental variables. In (d), the instrument is derived by combining information on the shares of foreign-born population in 1991 by countries of birth (which corresponds to R_b in 3.10), the share of new immigrants from country of birth in each LAD (γ_{jb}) and the countrywide proportion of immigrants from a given country of birth allocated to each qualification/age group (θ_{sab})[30]. As can be seen, the instrumental variable in (d) substantially reduces the estimates, especially those of in-migration. For natives, the coefficient of net migration is positive and significant; for earlier immigrants the estimate is positive too, but not significantly different from zero. Specification (e) proposes another instrument, which is constructed by using information on ethnicity of immigrants. This is thought to be a refinement of (d) due to the close relationship, in England and Wales, between immigration and existing enclaves of the same ethnic group (Stillwell and Duke-Williams, 2005). The variable is derived in the same fashion as in (d), with the difference that b represents the ethnic group; R_b is the stock of population in 1991 that belongs to each ethnic group, γ_{jb} the proportion of recent foreign-born immigrants in ethnic group b and θ_{sab} the distribution by ethnic group and skill[31].

Table 3.5 reports the results from the first stage for net internal migration for both instruments. The estimation refers to the full specification (i.e., model (f) in Table 3.4). The table also contains the partial R^2 (Shea, 1997) and the Wald statistic for weak identification of the instrument (Cragg and Donald, 1993). As can be seen, the predictive power of the two instruments is substantially similar, which translates into minor changes in the estimates. In the remaining analysis, only results based on the ethnic group instrument will be reported.

Column (f) introduces a vector of covariates that aims at controlling for observable group-specific characteristics in each LAD/qualification/age cell. These variables are similar to those used in previous studies such as Card (2001) and Stillman and Maré (2007); they are obtained from CAMS data and include unemployment rate, share of non-white population, percentage of females (which vary for natives and earlier immigrants) and the percentage of foreign-born (which has the same value for natives and earlier immigrants). As a further control, the proportion of Council houses in each cell has been added, in order to control for shocks associated with the housing market. Inspection of the results in

[30] The countries of birth considered are: Eastern Europe, Western Europe, Africa, South Asia, Rest of Asia and Other countries. This classification allows a perfect match between 1991 and 2001 Censuses.

[31] The ethnic groups considered are: White, Blacks, South Asian and Chinese and Other. The use of broad classes is dictated by the fact that ethnic groups are only partially comparable between 1991 and 2001, since the ethnic classification experienced major changes.

column (f) suggests that these variables are important in explaining migration patterns and have a substantial impact on the estimates. The coefficients of in-migration and out-migration for natives are much smaller, but the coefficient of net migration is still significantly positive. This fact suggests that this group is not adversely affected by immigration; instead, there appears to be a pattern of complementarity, since natives and immigrants move to the same locations. This finding is reinforced by the fact that earlier cohorts of foreign-born are displaced by recent immigrants, as demonstrated by the negative (although not significant) coefficient for net migration. This result implies that, on average, for every ten immigrants who enter a given LAD/qualification/age cell, roughly seven natives are added to the population, while about three earlier immigrants leave.

Table 3.5: First stage regression of IV estimation

	Country of birth		**Ethnic group**	
	Natives	Earlier imm.	Natives	Earlier imm.
β	0.635***	0.565***	0.647***	0.580***
se_β	(0.020)	(0.028)	(0.021)	(0.030)
partial R^2	0.364	0.355	0.344	0.333
Wald	998.91	407.39	918.70	377.90
N	2130	1045	2130	1045

Standard errors in parentheses. *** significant at 0.1%; ** significant at 1%; * significant at 5%. The reported coefficient refers to the first stage regression of historical settlement of foreign-born by country of birth and historical settlements of foreign-born by ethnicity, respectively. All regressions are weighted by the population in each LAD and include fixed LAD, qualification and age effects. The Wald statistic refers to the test for weak identification of the instrument.

To investigate these findings in more depth, Table 3.6 presents a set of models that can be considered "restrictions" of the full specification contained in column (f) of Table 3.4. The first column confines the analysis to the 250 most populous LADs. The aim is to prevent the results in Table 3.4 being affected by the measurement error associated with the added covariates, since these might contain some noise due to small cell size. As can be seen, results are very similar to those in the last column of Table 3.4. The second column focuses on the top 150 destinations for immigrants. These include 87% of new immigrants, 82% of earlier immigrants and 55% of native population. Migration rates for natives are still sensitive to immigration, but the standard error is too large to reject the null hypothesis of no effect. On the other hand, the impact on earlier immigrants is consistent with previous specifications and displacement is larger and significant. Similar values and signs of the estimates appear for the case of London, although

Table 3.6: Impact of immigration on internal migration - cases

	Top 250 pop.lad	Top 150 pop.imm	London boroughs	South England	No/other low qualif.
Natives					
In-migration	0.667***	0.069	0.509	0.407	–0.054
	(0.175)	(0.236)	(0.387)	(0.210)	(0.062)
Out–migration	–0.121	–0.265*	0.067	–0.385***	–0.305***
	(0.091)	(0.123)	(0.142)	(0.111)	(0.045)
Net-migration	0.788***	0.335	0.442	0.791***	0.251***
	(0.174)	(0.234)	(0.344)	(0.215)	(0.056)
N	1660	1075	280	1143	1432
Earlier immigrants					
In-migration	1.619***	1.629***	0.476	0.975***	0.871***
	(0.200)	(0.214)	(0.339)	(0.252)	(0.141)
Out–migration	1.930***	2.211***	0.893***	1.486***	1.345***
	(0.190)	(0.199)	(0.216)	(0.201)	(0.139)
Net-migration	–0.311	–0.582**	–0.417	–0.511*	–0.475**
	(0.195)	(0.202)	(0.267)	(0.229)	(0.156)
N	947	763	277	633	702
Population growth	1.544***	0.887***	1.185***	1.584***	1.067***
	(0.156)	(0.216)	(0.308)	(0.178)	(0.055)
N	2092	1288	288	1510	1902

Standard errors in parentheses. *** significant at 0.1%; ** significant at 1%; * significant at 5%. The reported coefficient refers to the immigration rate instrumented by historical settlements of foreign-born by ethnic group. All models are weighted by the population in each LAD and include fixed LAD, qualification and age effects, and the control variables as in Table 3.4 column (f). South England comprises East of England, South East, South West and London.

results are not significant. The fourth column restricts the analysis to the South of England, an area with relatively high immigration rates. For natives, the estimates for in-migration and out-migration are similar to the benchmark case in Table 3.4; for earlier immigrants, the estimates for in-migration are substantially lower, yielding a large significant negative coefficient for net migration. The final column focuses on the group with no, other or low qualifications. The coefficient for in-migration of natives is negative, although not economically or statistically significant. The estimate for out-migration is negative too, indicating that the propensity to leave is inversely related to immigration. This yields a value for net migration that is positive, although lower than in the benchmark case. Conversely, for the case of earlier immigrants, displacement is negative and implies that an inflow of ten low-skilled immigrants leads to an outflow of five earlier immigrants.

3.7 Sensitivity analysis

This Section addresses issues that might affect the estimation. In the first Subsection, models in Table 3.6 are estimated excluding students, hence eliminating the confounding effect generated by individuals that move solely for educational purposes. The second Subsection proposes a definition of local labour market based on Travel to Work Areas, which prevents commuting patterns being captured by migration flows. The third Subsection reports the estimates using bilateral migration flows (i.e., from LAD to LAD), to control for the presence of origin-destination effects and to analyse intra- and inter-regional flows separately. Finally, a classification of skill groups based on predicted occupations as in Card (2001) is introduced. All robustness checks confirm that there is no displacement for natives; on the other hand, results confirm that some groups of earlier immigrants move out from LADs in response to recent immigration.

3.7.1 Controlling for student migration

A substantial fraction of immigrants and internal migrants is constituted by students. Table 3.7 shows that a large proportion of the flows in each qualification/age cell are still in education, but with differences across groups.

Table 3.7: Percentage of students for different groups

			Internal immigrants		Net migration	
		Recent immigrants	Natives	Earlier immigrants	Natives	Earlier immigrants
Qualification	**Age**					
No/other qualif.						
	16-24	47.0	23.2	39.4	45.9	37.1
	25-44	15.8	1.2	6.2	1.0	3.0
	45-64	4.3	0.6	1.2	0.2	0.4
Low qualif.						
	16-24	58.3	24.7	46.3	38.2	55.9
	25-44	10.8	1.5	7.5	1.1	3.7
	45-64	6.6	0.8	1.8	0.4	0.8
High qualif.						
	16-24	61.1	53.1	57.7	39.5	58.5
	25-44	21.0	3.7	10.9	2.3	8.0
	45-64	5.7	1.4	2.5	0.6	1.3

Source: CAMS.

To investigate how student population affects the results, the analysis of the previous Section is repeated for the non-student population. Since information on student status is not available in table C0949, flows of non-student migrants are estimated by combining data from the Census and from SAM and SARs microdata. The Appendix describes in detail the algorithm used. Estimation results are presented in Table 3.8, where results are reported for net migration only. Although derivation of the non-student population is quite an accurate procedure, it could still generate some measurement error; as a consequence, this sensitivity check should be used to compare whether the patterns of Table 3.6 are corroborated rather than to obtain a point estimate of the parameters.

Table 3.8: Impact of immigration on internal migration - excluding students

	Top 250 pop.lad	Top 150 pop.imm	London boroughs	South England	No/other low qualif.
Natives					
Net-migration	1.200***	1.313***	0.355	0.909***	0.120*
	(0.122)	(0.152)	(0.281)	(0.157)	(0.052)
N	1508	1003	278	1037	1255
Earlier immigrants					
Net-migration	0.266	0.332*	–0.689**	–0.309	–0.327**
	(0.156)	(0.166)	(0.247)	(0.186)	(0.124)
N	861	692	264	575	637

Standard errors in parentheses. *** significant at 0.1%; ** significant at 1%; * significant at 5%. Dependent variable is the net migration rate of respective groups. The reported coefficient refers to the immigration rate instrumented by historical settlements of foreign-born by ethnic group. All models are weighted by the population in each LAD and include fixed effects, and the control variables as in Table 3.4 column (f). South England comprises East of England, South East, South West and London.

Estimates for the 250 most populous LADs show that the coefficient for natives is larger than that in Table 3.6; this is also true for earlier immigrants, since the coefficient is now positive (although significant only at 10%). A similar pattern emerges from the results for the 150 top immigrant LADs. The case of London is rather interesting: for natives, the impact on net internal migration is positive but insignificant; in contrast, for earlier immigrants the estimate is statistically significant, with a magnitude of about 0.70. The coefficients for the South Regions confirm the results of Table 3.6, although only in the case of natives is the relationship significant. Finally, for the group of no/other or low qualifications, the coefficient is positive (although small) for natives, while it is negative (although smaller than that in Table 3.6) for earlier immigrants. The conclusion is that inferences in Table 3.8 are very similar to those presented in Table 3.6.

3.7.2 An alternative definition of local labour market

A potential drawback with the use of migration data at LAD level is that movements between LADs could capture a change in the current residence rather than a movement to a new labour market. As an example, one person could decide to move from a LAD inside London to a peripheral LAD, where house prices are lower, but continue to work in central London, commuting each day. In this case, migration flows between LADs will overestimate the flows out of London. A solution is to use self-contained labour markets, i.e., areas where commuters live and work. UK Government Office Regions match this definition, but perhaps in too broad a sense, since there are plenty of sub-regional labour markets within them. In addition, self-containment at regional level is problematic when considering areas such as the East of England and the South East, where commuting to London may hinder an exact delineation [32]. Perhaps the natural size of a local labour market stands between LADs and regions. Acknowledging this fact, ONS has derived a geography, the Travel to Work Areas (TTWA), which correspond to self-contained labour markets. These are constructed by aggregating Lower Super Output Areas (areas with $1,500$ people on average) using commuting data from the 2001 Census. The criteria to define a TTWA include supply- and demand-side self-containment which correspond, respectively, to the percentage of employed residents working in the same area and the percentage of jobs that go to local residents[33]. There are 186 TTWAs in England and Wales and, similarly to LADs, these are not homogenous. Perhaps the most striking case is London, which is considered as a single TTWA. The advantage of using TTWAs is that they give quite a precise approximation of the local labour market; the disadvantage is that their boundaries intersect those of LADs, at which level most of the statistics are collected[34].

To test the sensitivity of the results, the models in Table 3.6 are estimated using a customised definition of TTWA, henceforth referred as to TTWAD. This corresponds to TTWAs with boundaries that are adjusted to fully encompass one or more local authorities. This geography is constructed by matching the 374 LADs with the 186 TTWAs using the employed population in each LSOA

[32] See:http://www.statistics.gov.uk/about/methodology_by_theme/labour_market/sub_nat_lmissues.asp.

[33] In a “commuting” migration matrix, where “origins” consists of the residence of individuals and the “destinations” are their workplace, the supply-side self-containment is the ratio of the diagonal elements to row sum while the demand-side self-containment is the ratio of the diagonal elements to column sum. A description of the procedure can be found at: http://www.statistics.gov.uk/geography/ttwa.asp.

[34] Only recently has ONS started to release labour market indicators also at TTWA level.

as weight[35]. Each LADs is divided into shares of employed population to each TTWA: the largest share determines the pertinence of the LAD to the TTWA[36]. The final TTWAD geography consists of 162 areas, since 26 are cancelled out due to the fact that they are formed by small fractions of LADs. The conversion is likely to generate some measurement errors, most of which accrue to those LADs that belong to two or more TTWAs, since it is not possible to distinguish which part of migration within or between a LAD corresponds to migration between or within a TTWA. This problem does not exist for LADs completely encompassed by TTWA boundaries. With this caveat in mind, a measure of the efficacy of the conversion algorithm is obtained by analysing the change in the measure of self-containment achieved by using TTWADs rather than LADs. Self-containment for LADs and TTWADs is calculated using commuting data from the 2001 Census. The supply-side self-containment across the 374 LADs is 60%, while the demand-side self-containment is 65%. The TTWAD geography reaches a value of about 76% and 79%, respectively[37]. Although this value mechanically increases with fewer areas considered, this derived geography represents local labour markets well if one considers that supply- and demand-side self-containment for the ONS' TTWAs are 77% and 81%, respectively. Hence TTWADs are a good approximation of the current definition of local labour market. As a further refinement, one of the specifications is restricted to a subsample of TTWADs formed by LADs with a value of inclusion of at least 50%. Finally, covariates at LAD level have been aggregated to TTWAD by summing the values in levels and deriving weighted averages for rates, with weights represented by the populations in 2000. Table 3.9 contains the results of the estimation using TTWADs. From the estimates in the first three columns, it can be seen that the coefficients are much larger than in Table 3.6. Although part of this fact could be attributed to the measurement error related to the definition of TTWAD, larger estimated effects are expected when considering a wider area, as noted by Sparber and Peri (2007). According to these findings, for every new immigrant who enters the TTWAD, more than one native is added to the population. The coefficients for earlier immigrants are significantly positive, although much smaller than those of natives. In the case of individuals with no/other or low qualifications, however, the negative impact is remarkably larger than that in Table 6. This result is substantially unchanged when only TTWADs that are good overlaps of LADs are considered.

[35]Employed population excludes full-time students. Using other weights, such as total population or labour force yields exactly the same TTWAD geography.

[36]There are only 13 cases with LAD shares under 50% attributed to a TTWA.

[37]The results do not change when TTWADs are derived using total population rather than employed population.

These findings confirm that there is no displacement effect for natives, although the estimates are somewhat larger than those in Table 3.6. For the case of earlier immigrants, evidence of displacement is confirmed only for the group with lowest skills, with a coefficient that is about three times larger.

Table 3.9: Impact of immigration on internal migration - travel to work areas

	Top 250 pop.lad	Top 150 imm. LAD	South England	No/other, low qualif.	50% self contained
Natives					
Net-migration	1.995***	1.823***	2.659***	0.346***	0.306***
	(0.150)	(0.230)	(0.224)	(0.060)	(0.072)
N	745	415	485	705	462
Earlier immigrants					
Net-migration	0.670***	0.681**	1.134***	–1.471***	–1.489***
	(0.189)	(0.241)	(0.332)	(0.318)	(0.383)
N	484	321	302	436	313

Standard errors in parentheses. *** significant at 0.1%; ** significant at 1%; * significant at 5%. Dependent variable is the net migration rate of respective groups. The reported coefficient refers to the immigration rate instrumented by historical settlements of foreign-born by ethnic group. All models are weighted by the population in each TTWAD and include fixed effects and the control variables as in Table 3.4. South England comprises East of England, South East, South West and London.

3.7.3 Place-to-place migration

So far, the analysis has used destination- and origin-specific flows. Each of these flows can be decomposed into bilateral migrations between LADs so that it is possible to relate the net migration flows between two LADs with their difference in the immigration rates. The advantage of segmenting flows in such a fashion is that it enables controlling for origin-destination fixed effects, allowing for a further robustness check of the estimates in Table 3.6. These fixed effects capture the connectivity existing between two specific LADs that is generated by the existence of similar economic conditions or by the presence of social networks that link them. Equation 3.12 can be rewritten as follows:

$$g^i_{jsa} = \beta r^i_{jsa} + \mathbf{Z}^i_{jsa}\boldsymbol{\chi} + \tau^i_j + \tau_s + \tau_a + \tau_{sa} + \upsilon^i_{jsa} \qquad (3.13)$$

Where g^i_{jsa} represents the net migration rate between LAD j and i (i.e., flows from i to j minus flows from j to i divided by half the total population of i and j) in each qualification/age cell; r^i_{jsa} is the net immigration rate (i.e., immigration

rate in j minus immigration rate in i); the matrix $\mathbf{Z}$ contains differences in the covariates (expressed in logs); origin-destination fixed effects are captured by τ_j^i, which correspond to a set of dummies for each pair of bilateral flows.
Table 3.10 reports the results of the estimation of equation 3.13 for all models of Table 3.6. In general, the reported coefficients are smaller in magnitude because, as discussed in Hatton and Tani (2005), when estimating bilateral net migration flows, the displacement effect is spread across all other LADs.

Table 3.10: Impact of immigration on internal migration - LAD to LAD flows

	Top 250 pop.lad	Top 150 imm. LAD	London boroughs	South England	No/other, low qual. Intra-reg	Inter-reg
Natives						
Net-migration	0.002	0.004	–0.003	0.003	0.000	0.001
	(0.001)	(0.002)	(0.004)	(0.001)	(0.002)	(0.001)
N	81904	38975	3407	45080	14198	58304
Earlier immigrants						
Net-migration	–0.008**	–0.009**	–0.015*	–0.008*	–0.019**	–0.014*
	(0.003)	(0.003)	(0.006)	(0.004)	(0.006)	(0.007)
N	15723	13086	3250	9823	3022	5530

Standard errors in parentheses. *** significant at 0.1%; ** significant at 1%; * significant at 5%. Dependent variable is the net migration rate of respective groups. The reported coefficient refers to the differential in immigration rates between LADs instrumented by the differential in historical settlements of foreign-born by ethnic group. All models are weighted by the average population of LAD pairs and include fixed origin-destination, qualification and age effects, and control variables as in Table 3.4 (in differences). South England comprises East of England, South East, South West and London.

In the first column, the coefficient for natives is positive (although significant at 10% only), while the estimate for earlier immigrants is negative and significant. For the case of 150 top immigrant LADs, results are in line with those of Table 3.6. For London, the effect for natives is slightly negative, but not statistically significant, while for earlier immigrants there is evidence of displacement, with quite a substantial impact. The results for the South England show that the estimate for natives is positive (significant at 10%), while the coefficient for earlier immigrants is consistent with that in Table 3.6.
Another important advantage of using origin-destination flows is that it allows separating between intra- and inter-regional flows. For the estimates of low-skilled, coefficients are reported for migrations within and between regions. The impact on natives is essentially zero, while for earlier immigrants there is a substantial negative effect, consistent with all models previously estimated. Interestingly, the impact for migrants within the region is larger than that between

regions. This suggests that the effect of immigration on the local labour market can be substantially different between and within regions. Studies that use regional data usually ignore this difference.

3.7.4 Predicted occupations

To test the sensitivity of the results to the particular type of skill groups used, in this Subsection an alternative classification using predicted occupations is proposed. Occupations are derived following the procedure described in Card (2001); this consists of estimating a multinomial logit model where the probability of being in an occupation is modelled using micro-level data. The rationale of using predicted and not effective occupations is that individuals might shift to a new occupations (also) in response to immigration. In order to derive predicted occupation groups, detailed data from CAMS at LAD level have been accessed. Probabilities are modelled for all the groups of interest (non-movers, internal migrants and recent immigrants) using information about age, sex, school qualification, ethnic group, country of birth and a dummy for residing in London. Table 3.11 reports the estimates for net migration of all models in Table 3.6.

Table 3.11: Impact of immigration on internal migration - predicted occupations

	Top 250 pop.lad	Top 150 pop.imm	London boroughs	South England	Low qualif. occup.
Natives					
Net-migration	0.639***	0.719*	2.090	1.825***	0.360*
	(0.179)	(0.343)	(1.096)	(0.471)	(0.165)
N	1815	1178	287	1269	1008
Earlier immigrants					
Net-migration	–0.976	–0.921	–1.617*	–3.830*	–0.298
	(0.644)	(0.699)	(0.699)	(1.871)	(0.583)
N	865	715	278	598	441

Standard errors in parentheses. *** significant at 0.1%; ** significant at 1%; * significant at 5%. Dependent variable is the net migration rate of respective groups. The reported coefficient refers to the immigration rate instrumented by historical settlements of foreign-born by ethnic group. All models are weighted by the population in each LAD and include fixed LAD and occupation effects and the control variables as in Table 3.4. Low qualification occupations are: personal service occupations; sales and customer service occupations; process, plant and machine operatives; elementary occupations. South England comprises East of England, South East, South West and London.

Results substantially confirm the empirical evidence contained in Table 3.6, although the estimated coefficients are not directly comparable. In particular, it should be noted that the estimated coefficients and their standard errors are larger than those in Table 3.6, resulting in a lower precision of the estimates. For all the models of UK-born individuals the coefficient is positive; for the model of 250 most populous LADs the estimates are close to those of Table 3.6, while for the model that refers to South England, the coefficient is rather large. This is somewhat mirrored in the large negatives estimate for earlier immigrants. Although the remaining estimates for earlier immigrants are not statistically significant (most of them are at the borderline of 10% significance level), the pattern across models is very similar to that of Table 3.6.

3.7.5 Reconciling the empirical evidence on displacement

The results of the empirical analysis are conclusive of the fact that immigration does not induce displacement of native population. In high immigration areas such as London and the South of England, as well as for individuals with lower skills, the effect on native population is, at most, close to zero. This evidence clashes with the empirical findings of previous studies such as Hatton and Tani (2005), which found significant displacement effects. In this Section, the two different approaches are compared; the conclusion is that the use of data with information about skills of migrants yields completely different results.

Hatton and Tani (2005) report a displacement of 30 to 35 previous residents for every 100 new (net) immigrants; this figure increases and becomes significant (to about 50) for the case of 6 Southern Regions. In their paper, they use regional migration data from 1982 to 2000 extracted from NHSCR and IPS, which only report flows by age and sex. Will analysis containing information on skill level produce different results? To answer the question, in Table 3.12 some of the models previously estimated have been estimated with and without information on qualification and age. Although this analysis is only partially comparable with Hatton and Tani (2005) and is based on a very small number of observations, the resemblance to their findings is striking[38].

The first two columns show that a regression of net migration on immigration rate across nine regions yields a slope of −0.340 (s.e.0.146) for the 9 regions. [39]. Consistent with the findings of Hatton and Tani (2005), displacement is larger in the Southern Regions (−0.442, s.e.0.175). The next two columns report the re-

[38] The immigration variable in Hatton and Tani (2005) is constituted by net immigration (i.e., excluding emigration) and includes all UK regions.

[39] Due to limited degrees of freedom of the first two columns, control variables cannot be used and they are hence excluded to keep results comparable across the different specifications.

sults of the same regressions when flows are segmented by qualification and age. The results are very different: there is evidence that, for every 10 immigrants, more than 17 previous residents move in the same region/qualification/age cell. Interestingly, this positive effect is even larger when the 6 Southern Regions are considered. To better compare these results with those in Table 3.6, the last two columns report the estimates for the groups with no or low qualifications, for both natives and earlier immigrants. It can be seen that the estimates are consistent with the general findings of the analysis, although the magnitude of the coefficients is somewhat different and the estimates for earlier immigrants are not significant. One potential explanation for this fact is that migrations within regions are ignored.

Table 3.12: Impact of immigration on internal migration - regional level

	No skill breakdown		Qualification and age		No/other, low qualif.	
	All regions	6 regions	All regions	6 regions	Natives	Earlier imm.
Net-migration	–0.340*	–0.442	1.747***	2.241***	0.407**	–0.798
	(0.146)	(0.175)	(0.303)	(0.426)	(0.127)	(0.647)
N	10	6	90	54	60	60

Standard errors in parentheses. *** significant at 0.1%; ** significant at 1%; * significant at 5%. Dependent variable is the net migration rate of respective groups. The reported coefficient refers to the immigration rate instrumented by historical settlements of foreign-born by ethnic group. All models are weighted by the average population of LAD; models in the last four columns include fixed LAD qualifcation and age fixed effects. The six regions refer to the Southern Regions defined by Hatton and Tani (2005), i.e., West Midlands, East Midlands, East of England, South East, South West and London.

3.8 Conclusions

The impact of immigration on internal movements of natives and foreign-born persons in England and Wales has been analysed. Immigration might cause downward pressures on wages and employment and thus displace previous residents from their local labour market. This mechanism has been described through a model that stratifies each local authority district into qualification and age cells, where immigrants and natives are imperfect substitutes. The model predicts that pressures to leave an area will be larger when the total effect of migration - transmitted within and between skill groups - is larger. Adverse effects of immigration are more likely to affect those groups with similar skill distribution, such as earlier immigrants.

Using confidential detailed 2001 Census data available only under special conditions, the displacement hypothesis has been tested through an econometric model which relates internal migration measures such as out-migration, in-migration and net-migration to the relative immigrant flows in each LAD/qualification/age cell. The main findings are that an increase in immigration does not lead to an outflow of natives from the local labour market. Natives and immigrants are instead attracted to the same areas, and this substantiates their complementarity in production. This is further corroborated by evidence of displacement for earlier immigrants, especially for individuals with no or low qualifications.
The findings of this study are similar to those that have tested the displacement hypothesis in other countries. Comparability with the findings of USA studies such as Card (2001) is somewhat problematic because of the different composition of immigrants. Results could be compared with the study of Stillman and Maré (2007) about New Zealand, since recent immigration is mainly composed of young educated individuals. The evidence of displacement effect for earlier immigrants is unique to this study. Previous literature either did not find negative effect (Card, 2001; Stillman and Maré, 2007) or did not analyse the effect on foreign-born persons (Borjas, 2003; Hatton and Tani, 2005). The findings contained in this paper are of particular interest for the case of England and Wales. It is well known that recent and earlier immigrants move to similar areas because they share the same social networks (Stillwell and Duke-Williams, 2005). On the other hand, competition triggered by increased immigration and imperfect substitution leads to higher pressures on wages (Manacorda et al., 2008). Especially for the group of low-skilled migrants, the second effect seems to prevail, forcing them to migrate out of the labour market; the exact dynamics, however, remain unknown and require further research.
It is important to emphasize that the findings of this study are limited to a particular period, which corresponds to the last Census of England and Wales. When detailed data about recent migration from Eastern Europe becomes available, further research will be needed to understand if and how the dynamics of the labour markets have changed. A substantial change in the skill composition of new immigrants might affect the competition pressures in the local labour market. The total effect depends on the extent to which such change might alter the skill composition of earlier immigrants and native population. If the economy has sufficiently flexible labour markets, this impact is thought to be indiscernible in the long run, but it could create inbalances in the short run.
To conclude, the substantial contribution of this Chapter has been to highlight

the importance of analysing migration patterns using a fine definition of local labour market and differentiating between types of workers. Using detailed data that are appropriate to the theory under discussion is a suitable starting point for investigating the equilibrating mechanism of local labour markets in response to heterogeneous immigration, and futures studies should take this into account.

Appendix

a) *Derivation of equation 3.1*

The F.O.C of profit maximisation for each of the L_{jsak} inputs are:

$$q_j \frac{\partial Y_j}{\partial L_j} \left\{ \frac{\rho}{\rho - 1} \left(\sum_s \nu_{js} L_{js}^{\frac{\rho}{\rho-1}} \right)^{\frac{1}{\rho-1}} \frac{\rho - 1}{\rho} L_{js}^{\frac{1}{\rho}} \nu_{js} \right\} \times$$
$$\left\{ \frac{\delta}{\delta - 1} \left(\sum_a \lambda_{sa} L_{sa}^{\frac{\delta}{\delta-1}} \right)^{\frac{1}{\delta-1}} \frac{\delta - 1}{\delta} L_{jsa}^{\frac{1}{\delta}} \lambda_{sa} \right\} \times$$
$$\left\{ \frac{\eta}{\eta - 1} \left(\sum_k \psi_{jsak} L_{jsak}^{\frac{\eta}{\eta-1}} \right)^{\frac{1}{\eta-1}} \frac{\eta - 1}{\eta} L_{jsak}^{\frac{1}{\eta}} \psi_{jsak} \right\} = w_{jsak}$$

Taking logarithms of both sides of the equation yields:

$$\ln w_{jsak} = \ln \left(q_j \frac{\partial Y_j}{\partial L_j} \right) + \frac{1}{\rho} \ln L_j + \left(\frac{1}{\delta} - \frac{1}{\rho} \right) \ln L_{js} + \left(\frac{1}{\eta} - \frac{1}{\delta} \right) \ln L_{jsa} - \frac{1}{\eta} \ln L_{jsak} + \kappa$$

where, $\kappa = \ln \nu_{js} + \ln \lambda_{sa} + \ln \psi_{jsak}$ and q_j is the price of the output in each LAD.

b) *Derivation of effects of immigration on wages and employment*

This expression is derived for equation 3.6, but the argument applies to equations 3.5 to 3.8. Consider equation 3.4:

$$\ln \frac{L_{jsak}}{P_{jsak}} = \frac{\varepsilon \eta}{\varepsilon + \eta} \left\{ \ln \left(q_j \frac{\partial Y_j}{\partial L_j} \right) + \frac{1}{\rho} \ln L_j + \left(\frac{1}{\delta} - \frac{1}{\rho} \right) \ln L_{js} + \left(\frac{1}{\eta} - \frac{1}{\delta} \right) \ln L_{jsa} + \kappa \right\} - \frac{\varepsilon}{\varepsilon + \eta} \ln P_{jsak}$$

Derivation w.r. to $\ln P_{jsaM}$ yields:

$$\frac{d \ln(\frac{L_{jsaN}}{P_{jsaN}})}{d \ln P_{jsaM}} = \frac{\varepsilon \eta}{\varepsilon + \eta} \left\{ \frac{1}{\rho} \frac{\partial \ln L_j}{\partial \ln P_{jsaM}} + \left(\frac{1}{\delta} - \frac{1}{\rho} \right) \frac{\partial \ln L_{js}}{\partial \ln P_{jsaM}} + \left(\frac{1}{\eta} - \frac{1}{\delta} \right) \frac{\partial \ln L_{jsa}}{\partial \ln P_{jsaM}} \right\}$$

where $\frac{\partial \ln L_j}{\partial \ln P_{jsaM}} = \underbrace{\frac{\partial \ln L_j}{\partial L_{js}}}_{+} \underbrace{\frac{\partial L_{js}}{\partial L_{jsa}}}_{+} \frac{\partial L_{jsa}}{\partial \ln P_{jsaM}}$ and $\frac{\partial \ln L_{js}}{\partial \ln P_{jsaM}} = \underbrace{\frac{\partial \ln L_{js}}{\partial L_{jsa}}}_{+} \frac{\partial L_{jsa}}{\partial \ln P_{jsaM}}$.

The partials $\frac{\partial \ln L_{()}}{\partial L_{(\cdot)}}$ and $\frac{\partial \ln L_{()}}{\partial \ln L_{(\cdot)}}$ are all positive, as they are production functions increasing in their input.

Positivity of $\frac{\partial L_{jsa}}{\partial \ln P_{jsaM}}$ is found by using the labour supply:

$$\begin{aligned}
L_{jsaN} &= w^{\varepsilon}_{jsaN} P_{jsaN} \\
L_{jsaM} &= w^{\varepsilon}_{jsaM} P_{jsaM} \\
L_{jsaN} + L_{jsaM} &= w^{\varepsilon}_{jsaN} P_{jsaN} + w^{\varepsilon}_{jsaM} P_{jsaM} \\
L_{jsa} &= w^{\varepsilon}_{jsaN} P_{jsaN} + w^{\varepsilon}_{jsaM} P_{jsaM} \\
\frac{\partial L_{jsa}}{\partial P_{jsaM}} &= w^{\varepsilon}_{jsaM} > 0 \\
\frac{\partial L_{jsa}}{\partial \ln P_{jsaM}} &= \frac{\partial L_{jsa}}{\partial P_{jsaM}} P_{jsaM} > 0
\end{aligned}$$

c) *Estimation of population and flows without students*

Models are estimated using Iterative Proportional Fitting (IPF). Students population is the unknown object, indicated by $DSACX$, which is a cross-tabulation between LAD (D), qualification (S), age (A), country of birth (C) and student status (X). Available Census data from Table C0949 and MG105 are $DSAC$ and DX; interactions from SARs are SAX, CX an SC. The object of interest can be estimated with a two-step procedure. In the first part, some interactions are estimated using Census margins as constraint:

$$\begin{aligned}
\ln(\phi^{SAX}_{wyz}) &= \phi^{SA}_{wy} + \phi^{X}_{z} + \ln(u^{SAX}_{wyz}), \\
\ln(\phi^{CX}_{mz}) &= \phi^{C}_{m} + \phi^{X}_{z} + \ln(u^{CX}_{mz}), \\
\ln(\phi^{SAC}_{wym}) &= \phi^{SA}_{wy} + \phi^{C}_{m} + \ln(u^{SAC}_{wym}),
\end{aligned}$$

where ϕ represent parameters, for which data from Census tables provide sufficient statistics. The terms u are offsets of the model and correspond to association structures borrowed from SARs. The predicted values obtained are used as constraints in the second step.

$$\ln(\zeta^{DSACX}_{kwymz}) = \overbrace{\phi^{DSAX}_{kwym}}^{\text{C0949}} + \overbrace{\phi^{DX}_{km}}^{\text{MG105}} + \overbrace{\ln(\hat{\phi}^{SAX}_{wyz}) + \ln(\hat{\phi}^{CX}_{mz}) + \ln(\hat{\phi}^{SAC}_{wym})}^{\text{Step 1}}$$

This procedure is similar to that developed in Raymer et al. (2008). The precision of the algorithm can be assessed by comparing the estimates with the counts from SARs; this comparison is however possible only at regional level. The following graph reports the estimates for $DSACX$ for the non-student foreign-born population in London.

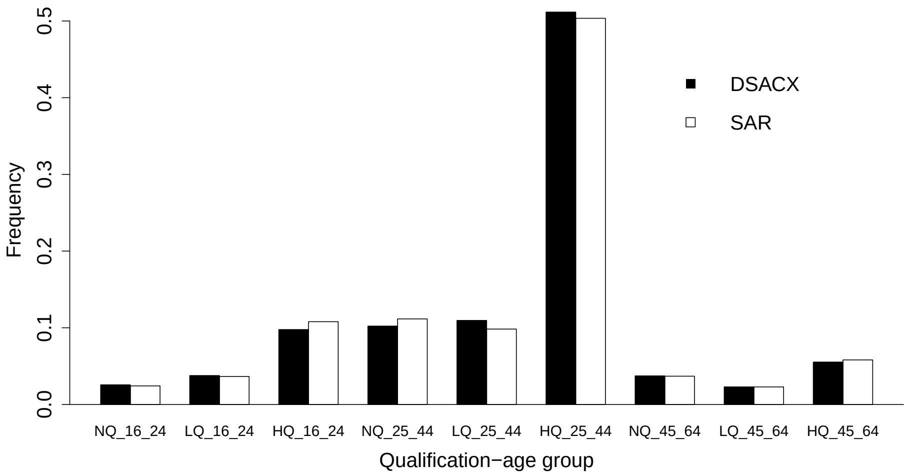


Figure 3.4: Comparison of IPF estimates and SARs
Source: own computations and SARs.

NQ=No, other or unknown qualifications;LQ=Low qualifications;HQ=High qualifications

Figure 3.5: Local authority districts in England and Wales (inset: London)
Digitalised boundaries from UKBorders (http://borders.edina.ac.uk/)

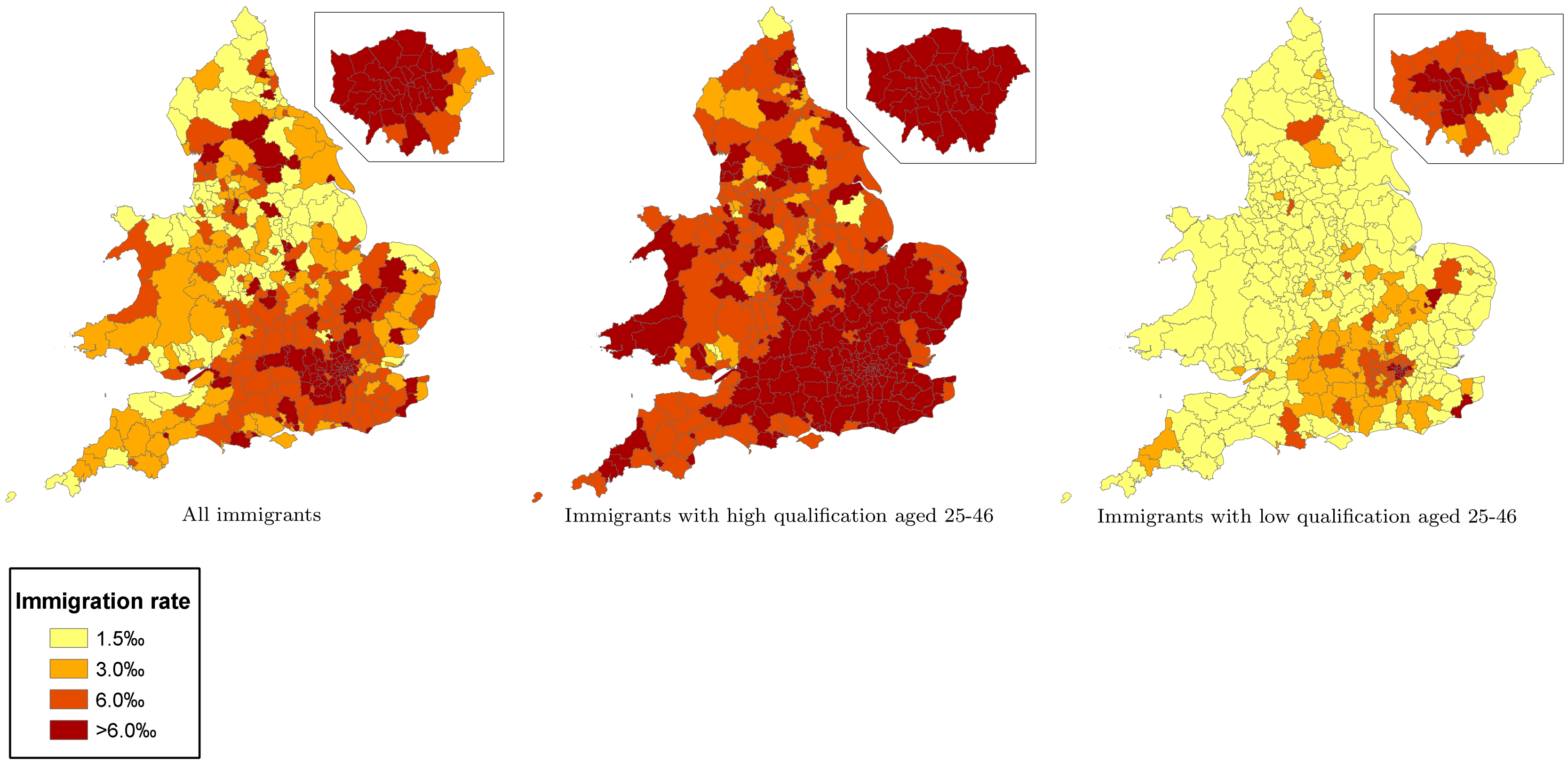
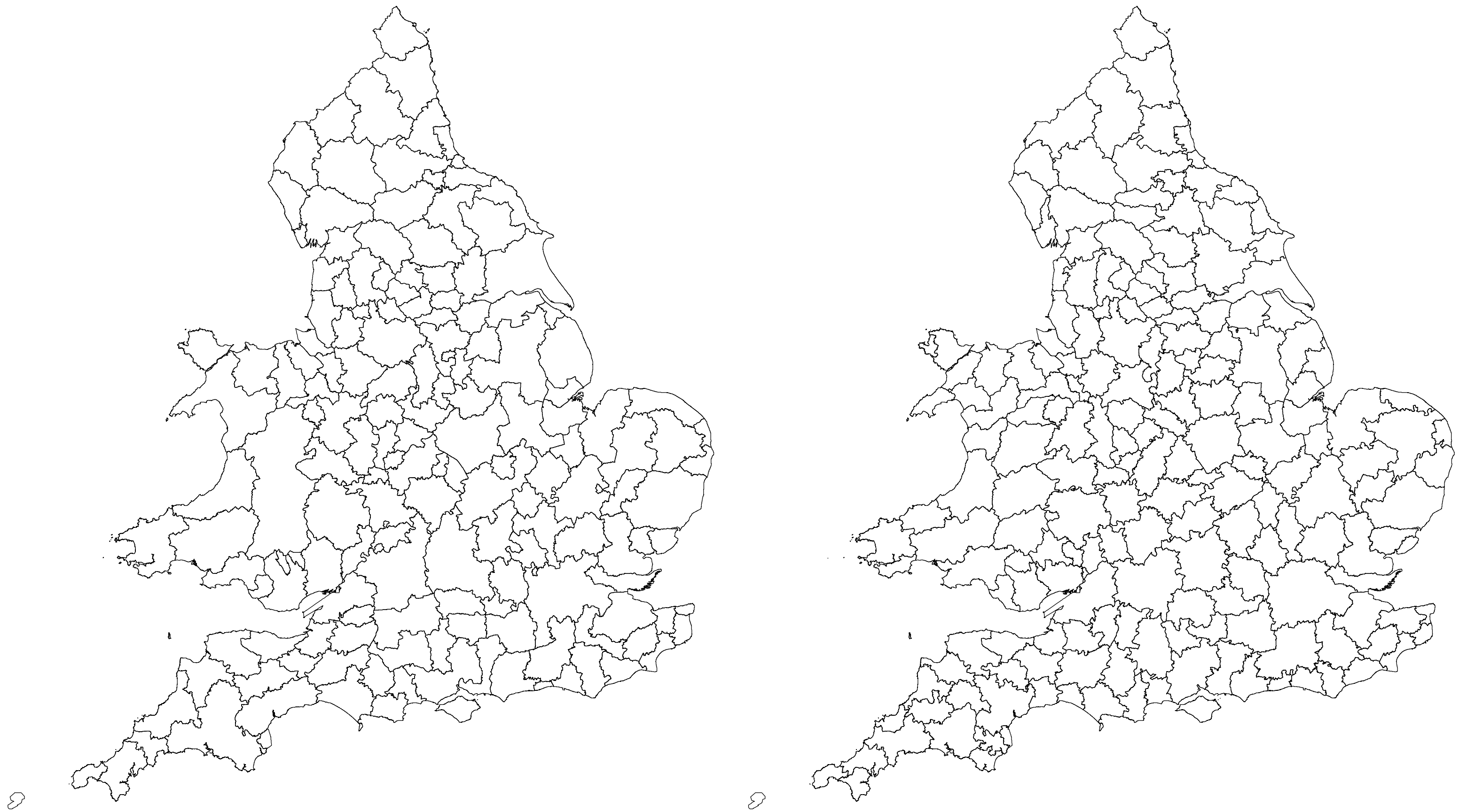


Figure 3.6: Immigration rates, Local Authority Level in England and Wales
The legend refers to the quartiles of immigration rates for all qualification and age groups (map on the left); inset: London boroughs. Digitalised boundaries from UKBorders (http://borders.edina.ac.uk/)



Derived Travel to Work Areas (TTWAD)

ONS Travel to Work Areas (TTWA)

Figure 3.7: Travel to Work Areas

Source: http://borders.edina.ac.uk/

Chapter 4

Network or Segregation? Analysing Employment Outcomes of Ethnic Groups

4.1 Introduction

In many developed countries, the economic success of immigrants and ethnic minorities is an issue of great importance due to their growing participation in the labour force. Although it is well known that the majority of these groups are clustered in ethnic enclaves within metropolitan and urban areas, it is an open question how this spatial concentration affects their labour market outcomes. Edin et al. (2003) discuss possible mechanisms through which ethnic concentration affect outcomes. Most of these mechanisms make contrasting predictions in terms of labour market performance of the enclave's members. On the one hand is a positive role of the enclave, which constitutes a social network of friends, relatives and members of the community, and provides information about jobs and employee referrals (Rees, 1966). On the other hand, spatial concentration of certain groups is also associated with negative aspects, such as reduced interaction with natives and other ethnic groups, slower acquisition of language skills and self-segregation in deprived areas (Cutler and Glaeser, 1997).

These ambiguous aspects have been extensively explored by economists, who have developed models and methodologies to study the casual effect of living in an enclave on wages and employment (Cutler and Glaeser, 1997; Edin et al., 2003; Wahba and Zenou, 2005). The present Chapter contributes to this literature in several ways. First, the impact on labour market outcomes is analysed separately for foreign- and native-born ethnic groups in England and Wales. This distinction has been so far disregarded in the literature, which focuses either on the outcomes of all immigrants or on those of ethnic minorities in general. This ignores the expectation that the impact of living in an enclave will be different depending on the country of birth of individuals. Due to differences in terms of human capital, language ability, cultural assimilation and residential patterns, the intensity with which immigrants and natives interact with other members of the enclave is likely to be very different. For example, because of their language gap or due to the difficulty of assimilating in the country, one would expect foreign-born individuals to heavily rely on friends and relative, especially of their own ethnicity, when looking for a job. On the other hand, native persons would find it more convenient and productive to use formal job search methods, such as job centres and employment agencies. Attitudes of employers towards immigrant job-seekers are also likely to be different. Abstracting from any issue related to discrimination, employers would find it quite difficult to obtain complete information about the skills of individuals who received their education and training abroad. More generally, the imperfect transferability of qualifications into the host country and the difficulties related to cultural assimilation translate into higher costs of looking for a job using formal channels, inducing immigrants to rely on social networks. Natives, on the other hand, will experience less difficulties in searching for jobs. Since they have been educated in the country and exposed to its language and culture, costs of using formal job search methods are expected to be substantially lower. However, there could be differences even across natives, depending on which ethnic group they belong, as this is strictly related with their level of social and economic integration and their religious background. Similarly, differences in the job search methods could be very pronounced between males and females, depending on their ethnicity. This is indeed the case of Britain, where the major ethnic groups differ profoundly in terms of their economic development, cultural assimilation, religious practices and attitudes towards women.

The second contribution of this research is the use of a local measure of exposure, capable of capturing the degree of interaction among members of the same group at a detailed geographic level. Previous work that has studied the relationship between ethnic enclaves and outcomes has used measures such as density (Clark and Drinkwater, 2002) or concentration (Patacchini and Zenou, 2008) at Local Authority District (LAD) level, with no detail of the distribution of ethnic groups at a more disaggregated level. The index developed in the present Chapter has the feature of being constructed using detailed Census ward level data, which are then aggregated to obtain a measure to LAD level. This approach has the advantage of capturing the intensity of interactions within each ethnic group and at the same time bypasses issues related with the sorting across wards, i.e., with the fact that individual do not randomly locate within a LAD.

The third aspect of this research is to address some methodological problems related to the causal nature of the relationship between living in an enclave and labour market outcomes. Depending on the extent with which unobserved factors (such as ability) lead to sorting of individuals into areas where employment is higher, standard OLS techniques will lead to biased estimates. This issue is addressed in several ways: first, unobserved area-specific characteristics are controlled by using data data from two Censuses. Second, an instrumental variable approach is used to address the potential endogeneity originating from the correlation between employment and ethnic/area-specific unobserved characteristics. Third, a series of robustness checks are performed in order to test the sensitivity of the results to the spatial dependence across LADs.

The results of the analysis show that the impact of living in an enclave differs substantially across groups. For the majority of immigrants there is evidence of a positive effect on employment, with magnitudes that vary from 0.3% to 1% for every percentage increase in the index that is developed to measure the networks. There is evidence of a positive effect also for native-born individuals, but in general the magnitude is quite low. Pakistanis & Bangladeshi appear to be the only group for which living in an enclave is detrimental for employment, although results are not particularly robust.

The Chapter is organised as follows: Section 4.2 surveys the relevant literature; in Section 4.3 the mechanism through which costs and benefits of living in an enclave affect the probability of finding a job is outlined, followed by a description of the econometric specification in Section 4.4. Section 4.5 describes the data and presents summary statistics. The analysis is divided in two parts: in Section 4.6, the impact on labour market outcomes is studied using OLS and IV techniques; in Section 4.7, several robustness checks are performed. Section 4.8 concludes the Chapter.

4.2 Enclaves and outcomes in the literature

There are numerous studies that explore the role of enclaves in developed countries. The intention of the empirical literature is to find what the consequences are, in terms of wages and outcomes, for persons belonging to the

enclave or, more generally, for individuals who live in areas with high concentration of a given ethnic group. The findings are in general mixed.
Cutler and Glaeser (1997) study the impact of racial segregation on labour market outcomes of the Black population across USA cities. They developed a model in which outcomes at metropolitan statistical area (MSA) level are correlated with a measure of segregation that is derived using detailed data from Census tracts. After addressing causality through a set of instrumental variables, they found substantial negative effects of segregation on education, income and single mother status. Using 1980 and 1990 Census data, Borjas (2000) looks at immigrants' wage growth across MSAs. In the most detailed specification, he finds that living in enclaves where segregation increases by 10%, reduces wage growth by up to 4%. Chowdhury and Pedace (2007) explore the impact of ethnic concentration on wages of immigrants in California, drawing a 5% sample from the Integrated Public Use Microdata Series. They found that any positive effect obtained from OLS estimates is offset when using instrumental variables and fixed effects for each MSA, although positive spillovers across ethnic groups persist. The impact of ethnic enclaves in the context of the Canadian labour market is analysed by Warman (2007). Adopting an approach similar to Borjas (2000), he finds that wage growth of immigrants to Canada is negatively affected by segregation, with an impact somewhat larger than the USA case.
Several studies have been carried out in European countries. Edin et al. (2003) exploit a Swedish dispersal policy for refugees which allows to address the issue of endogeneity. The negative impact implied by the OLS estimation turns into positive when the instrumental variable approach is adopted. This consists of using a measure for ethnic concentration that refers to the municipality at the time when refugees were randomly assigned there. A similar approach is used to control for ability sorting by Damm (2009) using data about a refugee dispersal policy implemented in Denmark. By instrumenting current segregation using flows rather than stocks, she finds that a change in the standard deviation in the size of ethnic population is associated with an increase in earnings of about 18%.
Few studies have been carried out in the UK. This is somewhat surprising, given the raising concern about the integration of ethnic minorities in this country (see, for example, Manning and Roy, 2007; Georgiadis and Manning, 2009). Using data for England and Wales drawn from the 1991 Census and from the Fourth National Survey of Ethnic Minorities, Clark and Drinkwater (2002) found that employment (unemployment) probabilities are lower (higher) in wards with greater ethnic clustering. However, since endogeneity issues and sorting have not

been addressed, these results are only indicative of a correlation, rather than of a true causal relationship. Using the theoretical framework originally proposed by Calvó-Armengol and Jackson (2004), Patacchini and Zenou (2008) estimate a specification in which employment probabilities in a given area are modelled as a function of the ethnic concentration in the same and in the neighboring areas. In their analyses, they use a panel of data at LAD level constructed from the labour force survey (LFS); issues of sorting across LADs and endogeneity are addressed in their paper by using instrumental variables and including fixed LAD effects. Their main findings show that for all ethnic groups except Whites, employment is higher in LADs where the concentration of individuals of the same group is larger, as well as in neighboring LADs, within 90 minutes driving time.

4.3 Costs and benefits of enclaves

The purpose of this Section is to sketch the economic intuition that captures the costs and benefits of living in an enclave in terms of employment outcomes. Suppose that the probability of finding a job depends on the effort that each individual puts in using formal (ϕ) and informal (χ) job search methods:

$$y = f(\phi, \chi) \tag{4.1}$$

Informal methods include, for example, referrals from employees, while formal methods consists of job centres and employment agencies. A plausible assumption is that formal methods are more productive than informal methods:

$$\frac{df}{d\phi} > \frac{df}{d\chi} > 0 \tag{4.2}$$

Informal methods depend positively on the number of personal contacts N through the function $\chi = \chi(N)$, with $\frac{d\chi}{dN} > 0$. Without loss of generality, it is possible to assume that the cost of having personal contacts are very small or zero for all groups. On the other hand, formal job methods have a cost that is inversely proportional to the country-specific human capital, such as language.

Formal methods also depend on the number of contacts, i.e., $\phi = \phi(N)$; in this case, however, $\frac{d\phi}{dN} < 0$, i.e., a larger network is detrimental to this method of looking for jobs. The rationale is that formal and informal methods are substitutes: by spending time in using friends and relatives to look for a job, individuals will have less resources to invest in formal methods.

Hence, the general prediction of the model is that living in an enclave produces two counteracting effects in terms of employment: one positive, which stems from the social interaction within the ethnic network; the other negative, which is a consequence of greater segregation and lower interaction with the local culture. The sign and magnitude of this effect are ambiguous, and will be positive if:

$$\frac{\partial f}{\partial \chi}\frac{\partial \chi}{\partial N} > \frac{\partial f}{\partial \phi}\frac{\partial \phi}{\partial N}, \tag{4.3}$$

i.e., when the increase in the probability of finding a job through informal channels more than compensates the reduction due to a less intensive use of formal methods. The net effect will depend on factors such as country of birth, ethnicity and gender, and hence is expected to vary greatly across groups.

For example, since immigrants are endowed with a relatively low level of country-specific skills, one would expect them to extensively rely on friends and relatives as a job search method. A larger number of contacts N will hence generate a higher probability of employment. However, the negative effect could be large too. The reason is that an intensive use of informal networks will reduce the exposure of immigrants to the local culture and language, and hence to the use of formal methods. This, in turn, will decrease the likelihood of finding a job.

Natives, on the other hand, are expected to rely less on friends and relatives, since formal channels are more productive and less costly compared to immigrants. However, even within this group, there could be differences across ethnic groups or gender because of, say, the different level of cultural assimilation.

In order to test how the impact of the enclave on the employment probabilities varies across groups, an econometric framework is outlined in Section 4.4.

4.4 Econometric implementation

4.4.1 Measuring enclaves

To test the predictions outlined in the previous Section, it is necessary to employ a measure that captures the intensity with which individuals of a given ethnic group interact. Several indices have been used by economists, most of which build upon measures used by the sociology literature (for a survey, see Massey and Denton, 1988). For example, Cutler and Glaeser (1997) construct an index of segregation for Black people at MSA level using data on Census

tracts within each area[40]. Borjas (2000) uses indices of exposure and of relative clustering that are based on the concentrations of individuals of a given country of birth in an area[41].
In order to measure how individuals interact at local level, an index based on information of ethnic groups at ward level (a finer geography than LAD) is constructed[42]. This measure, sometimes named index of isolation, is defined as:

$$P^{\star}_{jk} = \sum_i \frac{M_{ijk}}{M_{jk}} \frac{M_{ijk}}{M_{ij}}, \tag{4.4}$$

where M indicates the number of persons, i indicates the ward within each LAD j, and k represents the ethnic group.
The index $P^{\star}_{jk}$ has at least two advantages with respect to measures previously used in the literature. First, it captures the strength with which members of each ethnic group are exposed to each other (Massey and Denton, 1988). A measure of concentration at LAD level such as the one used by Patacchini and Zenou (2008), for example, would not be able to distinguish the intensity of interactions, as these are likely to happen at a very local level (Topa, 2001). The second advantage is that since the index is aggregated at LAD level, problems of sorting across wards are attenuated, as pointed out by Cutler and Glaeser (1997). This procedure, however, may generate problems related with the sorting across LADs and this is discussed in the next Subsection.

4.4.2 Sorting and causality

The issue of sorting originates from the fact that unobservable characteristics which attract individuals to certain areas can be correlated with the outcome variable, such as employment. Failing to control for such factors will generate an omitted variable bias, the sign and magnitude of which are unknown a priori.
This issue is usually addressed by using fixed effects regression models, which include area specific indicators to eliminate the persistence of unobserved characteristics. As detailed in the next Section, the strategy adopted in the analysis is to construct first differences using data from two Censuses. With two periods, this procedure is identical to the least square dummy variable estimation.
It is however insightful to illustrate the importance of addressing the problem of

[40] This is defined as: $P^s_{jk} = \frac{1}{2}\sum_i |\frac{M_{ijk}}{M_{jk}} - \frac{M_{ij\bar{k}}}{M_{j\bar{k}}}|$, where M indicates the number of persons, i and j indicates sub-areas and areas, respectively, and $\bar{k}$ is an ethnic group different from k.

[41] The first is defined as: $P^e_{jk} = \frac{M_{jk}}{\sum_k M_{jk}}$; the second measure is defined as $P^r_{jk} = \frac{M_{jk}}{\sum_k M_{jk}} / \frac{M_k}{\sum_{jk} M_{jk}}$.

[42] See Appendix for a map of ward LADs of pertinence in England and Wales.

sorting with an example from the data that will be used in the analysis. A series of regression models of employment rate on the index $P^{\star}$ have been estimated separately for the 1991 and 2001 Censuses for all the groups of interest. Results of these regressions are reported in the Appendix (Tables 4.6 to 4.13). Interestingly, the cross-sectional analysis reveals the presence of a negative relationship between employment and $P^{\star}$ in most of the specifications and for both years. This example is useful to interpret the results of some studies such as Clark and Drinkwater (2002), who found a negative relationship between employment outcomes and living in an enclave. Although their specifications include a rich set of covariates, their models could still suffer of omitted variable bias. As it will be shown in the analysis in Section 4.6, most of the negative patterns found with single cross-sections will be reverted when fixed effects are used.

4.4.3 Econometric specification

The simple model sketched in the previous Section is estimated using the following econometric specification for each ethnic group k:

$$\Delta e_j = \alpha + \gamma \Delta P_j^{\star} + \Delta \mathbf{X}_j \boldsymbol{\beta} + \Delta \varepsilon_j, \tag{4.5}$$

where e_j measures the employment population ratio in each LAD j, $P_j^{\star}$ is the index defined in Section 4.3; $\mathbf{X}_j$ includes a set of LAD/ethnic specific covariates such as the percentage of individual with a university degree, the unemployment rate and the share of home owners; ε is a random component. The parameter of interest is γ, which measures the percentage change in employment due to a percentage change in $P^{\star}$.

The equation is estimated using first differences. A constant is included in the model, in order to capture time effects. In the large majority of the specifications, the coefficient for the constant term is highly significant; given the fact that differences are calculated using a ten year window, the constant should capture trends in the employment rate.

Separate estimations are carried out for UK-born and immigrants, and for males and females. While all control variables vary by gender and country of birth, $P^{\star}$ is fixed across these groups and varies only by ethnicity. The rationale is that, since ties are particularly strong within ethnic groups, one would expect natives and immigrants (irrespective of gender) to share the same network.

Even though specification in equation 4.5 controls for the presence of unobserved

LAD effects correlated with both employment and $P^\star$, there could be unobserved characteristics in each ethnic group (such as ability or religious background) that could lead individuals to move in an enclave. If these unobserved factors are positively correlated with employment, OLS estimates of γ will be upwardly biased. The literature proposes several solutions to this problem. For example, Edin et al. (2003) and Damm (2009) exploit the random sorting originated from a dispersal policy for refugees. In this case, individuals do not choose their residential location (in the first instance) and the analysis of outcomes for those that do not change residence will inform about the causal impact of living in an enclave. When data about such a natural experiment are not available, an alternative solution is to find an instrument which has the feature of being a predictor of the endogenous variable (the measure of network) and being uncorrelated with the outcome variable. Several instruments have been proposed by the literature, mainly in the context of immigration studies; for example, Card (2001) uses historical settlement of immigrants by country of birth, while Ottaviano and Peri (2006b) use distance from the nearest port of entry.

A similar strategy is followed in the present Chapter and two instruments for $P^\star$ are used: the change in the share of immigrant population between 1980 and 1990 by country of birth and the distance from the nearest port of entry. For example, the change in the share of foreign-born population from the Caribbean and Africa between 1980 and 1990 is used to instrument $P^\star$ for the group of Blacks. Similarly, information about immigration growth from India (Pakistan and Bangladesh) is used to instrument the index for Indians (Pakistanis & Bangladeshi). In addition, a second instrument, represented by the distance from the closest gateways, is proposed. The port of entries consist of the main airports in England and Wales along with seaports that have played an important role in immigration.[43].

Another potential source of endogeneity is related with spatial dependence. For example, employment rates could be correlated across contiguous LADs; likewise, the size of enclaves is expected to be similar to that of neighboring areas. Depending on which variables are spatially correlated across LADs and on the magnitude of this dependence, estimates of γ will be biased or inefficient. For this reason, a series of robustness checks that indirectly address the problem of spatial dependence will be presented after the IV estimation.

[43]These are: Heathrow, Manchester, Gatwick, Luton, Stansted, Birmingham, Dover, Liverpool, Newham, Southampton, Felixstowe and North East Lincolnshire. The instrument corresponds to the Euclidean distance between the centroids of the LADs where the ports are located.

4.5 Data and summary statistics

Data used in the analysis come from several sources. To construct the index $P^{\star}$, data on ethnicity at ward level are needed over time. This is usually quite problematic given the frequent boundary changes in England and Wales. Luckily, a project at the Cathie Marsh Centre for Census and Survey Research (CCSR) has been carried out to obtain reliable estimates of ethnic population over time. This was done by converting 1991 Census data to the ward geography as of 2001[44]. This has allowed to compare the data from 1991 with those from 2001 downloaded from Nomisweb[45].

The employment rate, the percentage of university degrees, the share of home owners and occupational categories are obtained from the Samples of Anonymised Records (SARs) for 1991 and from the Small Area Microdata (SAM) for 2001. These are Census microdata (2% and 5% sample, respectively) that have the advantage of recording the LAD of residence of individuals, a detail that is usually missing in survey data due to confidentiality reasons[46]. Due to a change in the coding of many variables, however, a perfect comparison between 1991 and 2001 is not possible. For this reason, only those variables less prone to measurement error have been selected. For example, the employment rate has been constructed by excluding all students (even part time workers), since Census 1991 records students at their home address, while Census 2001 at their term time address. Similarly, since the categories about highest level of qualification are not comparable between the two years, the possession of a university degree - a threshold common in both definitions - has been used to construct an indicator for education. Finally, due to the change in the classification of occupations, and indicator for the two top-wage groups has been constructed, as these can be matched over time with little error[47].

Due to the small size of some cell, only major ethnic groups have been considered: these are Blacks, Indians, Pakistanis & Bangladeshi and Whites[48].

Finally, only those LADs with a suitable number of observations and that were comparable between 1991 and 2001 were selected[49]. The final sample is such

[44]The details of the project are on http://www.ccsr.ac.uk/popla/TimeSeriesOutput.shtml

[45]https://www.nomisweb.co.uk/

[46]An exception is the Special Licence Labour Force Survey, which has data at LAD level. However, since this is available from 2003 only, analyses at local level are still constrained by the small amount of observations, especially when data on ethnicity are needed.

[47]According to ONS, more than 80% of the sub-occupations within these two groups are defined in the same way in 1991 and 2001. Source: OOSS user guide 2000, 22

[48]The group of Blacks consist of Black Caribbeans and Black Africans.

[49]Some LAD boundaries changed in 1998.

that it comprises 91.6% of total Black population aged 16 to 64; the same figure is 84.7% for Indians, 85.2% for Pakistanis & Bangladeshi and 74.9% for Whites. The selected areas are represented in Figure 4.1 for each ethnic group. As can be seen, ethnic minorities are focused in few LADs, mainly in the London Boroughs, the Metropolitan Districts and other Unitary Authorities (such as Bristol, Cambridge and Cardiff), while White population is more diffused across the districts.

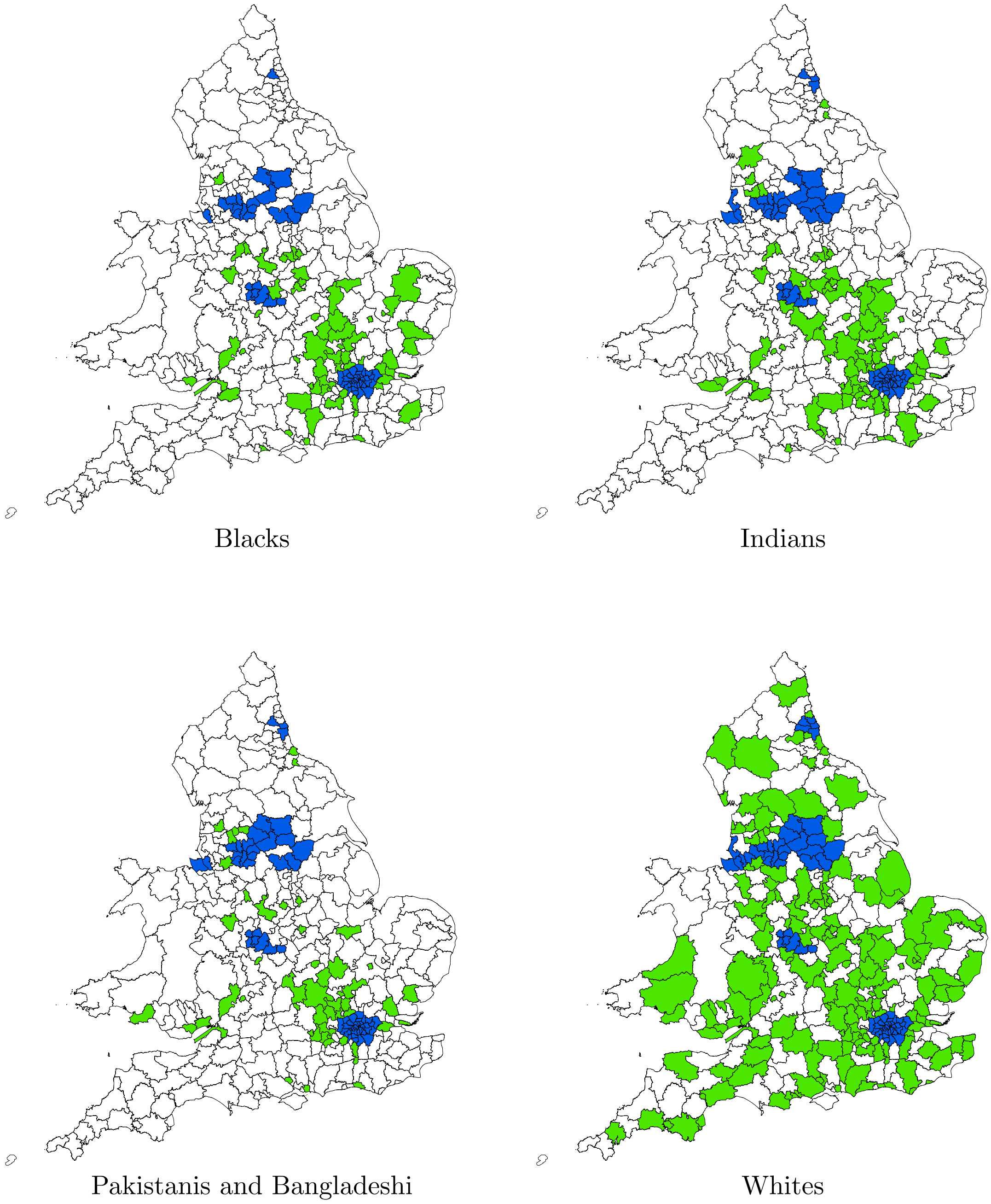


Figure 4.1: Selected LADs for each ethnic group
Blue: Metropolitan Districts and London Boroughs; Green: other LADs
Source: 1991 SARs and 2001 SAM. Digitalised boundaries from UKBorders (http://borders.edina.ac.uk/)

Table 4.1 reports summary statistics for selected variables; the figures refer only to the observations used in the analysis. Employment varies substantially across groups, with the lowest rates found among Pakistanis & Bangladeshi and the highest among Whites. Between 1991 and 2001, there has been an increase in employment rates, especially among ethnic minorities. Interestingly, for Blacks and Indians, rates in 1991 were higher among immigrants than among natives, while the opposite was observed in 2001. The index $P^{\star}$ varies slightly across the three ethnic minority groups. During the period under analysis, it increased, particularly for the group of Pakistanis & Bangladeshi. For Whites, on the other hand, there was a decrease of about 1%[50].
Interesting aspects emerge also from the inspection of the skill levels of individuals. As for education, an important result from the previous Chapter was that immigrants in 2001 were more educated than natives. Data in the table confirm this result even when groups are broken down by ethnicity. The only exception is the group of Pakistanis & Bangladeshi, especially males, for which the figure for UK-born is much larger than for immigrants. Between 1991 and 2001, there was a substantial increase in the percentage of individuals holding a degree, except for Whites, for which the increase was negligible.
When considering the percentage of individuals in the top two occupations, the largest percentage for Blacks and Indians is seen among immigrants; however, the increase over time was larger for natives. Another interesting aspect is that among the Whites this percentage is much higher for the UK-born despite their lower educational attainment; this could signal an imperfect transferability of educational qualifications for White immigrants.
Perhaps due to underreporting, figures of unemployment are higher for males than for females (except for the group of Pakistanis & Bangladeshi)[51]. Unemployment decreased substantially for all groups between 1991 and 2001.
Some ethnic groups such as Indians have a higher likelihood of owning a house than any other group, even than UK-born Whites. On the other hand, Blacks are among those with the lowest rate of home ownership.
Summary data reveals that there are many differences across the groups considered; the regression analyses in the next Sections will control for these.

[50]Although $P^{\star}$ has the same value for males and females, as well as for UK- and foreign-born, the tables reveal small differences. This is due to the different number of LADs used in the analysis for these groups.

[51]According to a recent ONS report (http://www.statistics.gov.uk/cci/nugget.asp?id=462) the only case of female unemployment larger than for males was the group of Pakistanis; this seems to corroborate the statistics in the table.

Table 4.1: Summary statistics

	1991				2001			
	Males		Females		Males		Females	
	UK-born	F-born	UK-born	F-born	UK-born	F-born	UK-born	F-born
				Blacks				
empl. rate	0.58	0.66	0.56	0.65	0.68	0.63	0.66	0.55
$P^\star$	0.06	0.05	0.07	0.05	0.07	0.06	0.08	0.06
higher degree	0.07	0.19	0.13	0.24	0.24	0.34	0.31	0.33
top 2 occup.	0.16	0.24	0.22	0.36	0.31	0.29	0.33	0.26
unempl. rate	0.31	0.19	0.16	0.08	0.15	0.14	0.09	0.10
% home owner	0.55	0.56	0.48	0.58	0.54	0.47	0.48	0.47
N	85	101	74	95	85	101	74	95
				Indians				
empl. rate	0.48	0.78	0.44	0.57	0.62	0.79	0.60	0.59
$P^\star$	0.07	0.05	0.08	0.05	0.08	0.05	0.09	0.06
higher degree	0.14	0.30	0.10	0.18	0.33	0.47	0.35	0.37
top 2 occup.	0.18	0.42	0.15	0.21	0.33	0.45	0.29	0.28
unempl. rate	0.25	0.11	0.15	0.10	0.09	0.05	0.08	0.06
% home owner	0.77	0.80	0.83	0.80	0.75	0.73	0.76	0.76
N	76	137	70	125	76	137	70	125
				Pakistanis and Bangladeshi				
empl. rate	0.57	0.31	0.34	0.58	0.59	0.37	0.50	0.67
$P^\star$	0.05	0.09	0.08	0.06	0.06	0.12	0.11	0.08
higher degree	0.18	0.05	0.09	0.13	0.37	0.19	0.24	0.24
top 2 occup.	0.10	0.07	0.23	0.07	0.20	0.15	0.21	0.09
unempl. rate	0.10	0.33	0.38	0.26	0.06	0.16	0.20	0.12
% home owner	0.80	0.77	0.72	0.70	0.76	0.67	0.69	0.62
N	72	59	109	90	72	59	109	90
				Whites				
empl. rate	0.77	0.72	0.62	0.58	0.78	0.75	0.66	0.62
$P^\star$	0.96	0.95	0.96	0.95	0.95	0.93	0.95	0.94
higher degree	0.17	0.20	0.13	0.21	0.20	0.37	0.20	0.37
top 2 occup.	0.32	0.23	0.36	0.29	0.35	0.28	0.43	0.33
unempl. rate	0.11	0.12	0.06	0.08	0.06	0.06	0.04	0.05
% home owner	0.73	0.63	0.73	0.67	0.74	0.59	0.73	0.62
N	234	178	234	188	234	178	234	188

Own computations from SARs, SAM, and Census data. Figures are weighted by the number of individuals in each LAD. Employment refers to the employment population rate, unemployment to the unemployment rate, higher degree to the percentage of individuals holding at least an university degree, home ownership to the share of individuals owning a house.

4.6 Analysis

Table 4.2 reports the estimates of equation 4.5. For each ethnic group, the left-hand panel presents the estimates without control variables, while the specifications in the right-hand panel contain the share of individuals with a university degree, the unemployment rate and the percentage of home owners, all expressed as differences. The Appendix reports full estimates of the models with control variables. All models have been estimated separately for males and females and for UK- and foreign-born individuals.

In the case of UK-born Blacks, the coefficient of $P^\star$ has opposite sign for males and females, but its magnitude is relatively low and is not statistically significant, even after adding control variables that substantially improve the general fit of the model. On the other hand, for Black immigrants, the estimated coefficient is significantly positive for both males and females. Even after controlling for ethnic-group/area specific characteristics, estimates are economically and statistically significant. For Black males, a 1% increase in $P^{\star}$ determines an increase of 0.8% in employment, while for females, this impact is just below 0.6%.

Table 4.2: OLS estimates of ethnic networks effects on employment

	Without controls				With controls			
	Males		Females		Males		Females	
	UK-born	F-born	UK-born	F-born	UK-born	F-Born	UK-born	F-Born
				Blacks				
$P^{\star}$	–0.179	0.953**	0.190	1.013***	–0.261	0.817***	–0.006	0.591**
	(0.439)	(0.423)	(0.445)	(0.328)	(0.254)	(0.279)	(0.427)	(0.289)
R^2	0.00	0.05	0.00	0.09	0.68	0.63	0.25	0.37
N	85	101	74	95	85	101	74	95
				Indians				
$P^{\star}$	0.253	0.681***	–0.146	0.270	0.388	0.386**	0.082	0.311
	(0.543)	(0.223)	(0.567)	(0.281)	(0.400)	(0.167)	(0.525)	(0.248)
R^2	0.00	0.06	0.00	0.01	0.50	0.50	0.22	0.26
N	76	137	70	125	76	137	70	125
				Pakistanis and Bangladeshi				
$P^{\star}$	–0.569	–0.143	–0.996*	–0.191	–0.666**	–0.359**	–0.196	0.091
	(0.442)	(0.237)	(0.506)	(0.200)	(0.289)	(0.174)	(0.426)	(0.162)
R^2	0.02	0.00	0.06	0.01	0.62	0.52	0.48	0.44
N	72	109	59	90	72	109	59	90
				Whites				
$P^{\star}$	0.037	0.472**	0.088	0.710***	0.140*	0.554***	0.176**	0.787***
	(0.086)	(0.199)	(0.076)	(0.190)	(0.079)	(0.163)	(0.073)	(0.173)
R^2	0.00	0.03	0.01	0.07	0.32	0.45	0.21	0.32
N	233	178	233	188	233	178	233	188

Standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. The reported coefficient refers to the network measure $P^{\star}$. The control variables used are the unemployment rate, the share of individuals with higher degree and the percentage of house owners. Models are weighted by the population of each ethnic group in the LAD.

The estimated coefficients for Indians are all similar, except for UK-born females; however, the standard errors are quite large and the null hypothesis of no effect is rejected only for the group of male immigrants. Similarly to the case of Blacks, the introduction of control variables attenuates the estimate of the coefficient, but the pattern is unchanged.

In contrast to the two ethnic groups mentioned above, for Pakistanis & Bangladeshi the impact of living in an enclave appears to be detrimental for their employment, especially for males, with an effect that is substantially larger (in absolute value) for UK-born than for immigrants.

Finally, for all groups of Whites the effect of living in an area where they are more likely to interact with other Whites is positive. The impact is however much larger for the foreign-born.

The conclusion from the OLS estimation is that, with the exception of Pakistanis & Bangladeshi, the impact of living in an enclave yields positive outcomes in terms of employment, with a magnitude that varies across groups but that in most of the cases is larger for the foreign-born than for natives.

As discussed earlier, the use of first differences eliminates the presence of fixed effects and helps addressing the problem of sorting across LADs. However, there could still be unobserved factors correlated with both employment and $P^{\star}$ and this will lead to inconsistent estimates of the parameter of interest. For this reason, the models shown in Table 4.2 have been estimated using the instrumental variable approach described in Section 4.5. Table 4.3 reports the IV estimates using only the past change of immigration flows and adding the distance from the nearest port of entry as second instruments. All models are estimated controlling for the variables used in the right-hand panel of Table 4.2. The Wald test for the weak identification of the instruments is included in both panels; in the case of two instruments, it is possible to test for overidentifying restrictions and hence the values for the Sargan test are also reported.

The pattern that emerged from OLS estimation is in general confirmed, although some of the estimates are sensitive to the use of instruments. In the case of Black immigrants, the IV estimate is slightly smaller than the OLS for males, while it is about twice as large for females. For Indians, the estimated coefficient is larger for all groups, but is statistically significant only for immigrants. Estimates for Pakistanis & Bangladeshi are particularly sensitive to the use of IV, as demonstrated by the substantial increase (in absolute value) of all coefficients. However, an inspection of the Wald statistic reveals that most of the models for this group are close to non-rejection of the null hypothesis that the instruments are relevant. One potential explanation for this is that Pakistanis & Bangladeshi are one of the most recent ethnic group to migrate to Britain, with a peak in the arrival time of immigrants between the 1970s and 1980s. As a consequence, there could be insufficient variation in the instrumental variable (which is measured by the change in the immigrant shares between 1980 and 1990), especially if the initial settlement of this group was focused in few LADs. Estimates for the group of Whites are very similar to the OLS case, although the coefficient is slightly smaller. The only exception is constituted by UK-born males, for which the estimate is essentially zero. However, this is also the only group for which the Sargan test rejects the joint null hypothesis (at the 5% significance level) that the instruments are exogenous.

Table 4.3: IV estimates of ethnic networks effects on employment

	One instrument				Two instruments			
	Males		Females		Males		Females	
	UK-born	F-born	UK-born	F-born	UK-born	F-Born	UK-born	F-Born
				Blacks				
$P^{\star}$	–0.185	0.559	–0.436	1.247***	–0.219	0.713*	–0.351	1.130***
	(0.320)	(0.394)	(0.578)	(0.434)	(0.316)	(0.379)	(0.562)	(0.418)
Wald	117.76	88.31	73.45	71.70	61.66	50.27	40.31	39.56
Sargan					0.48	2.25	0.44	1.27
N	85	101	74	95	85	101	74	95
				Indians				
$P^{\star}$	0.715	0.441**	0.505	0.517*	0.715	0.439**	0.507	0.522*
	(0.488)	(0.192)	(0.646)	(0.285)	(0.488)	(0.192)	(0.646)	(0.285)
Wald	121.36	360.56	106.06	320.05	59.84	179.85	52.30	158.95
Sargan					0.01	0.12	0.02	0.54
N	76	137	70	125	76	137	70	125
				Pakistanis and Bangladeshi				
$P^{\star}$	–1.401	–1.352**	1.172	0.481	–1.270*	–1.179**	1.233	0.240
	(0.910)	(0.566)	(2.654)	(0.477)	(0.699)	(0.458)	(1.551)	(0.373)
Wald	7.67	14.01	1.56	11.27	6.71	10.36	2.42	9.26
Sargan					0.05	0.35	0.00	0.77
N	72	109	59	90	72	109	59	90
				Whites				
$P^{\star}$	0.011	0.343*	0.151*	0.605***	–0.017	0.349*	0.141	0.677***
	(0.096)	(0.195)	(0.087)	(0.206)	(0.095)	(0.186)	(0.087)	(0.203)
Wald	451.28	382.26	503.93	401.67	237.91	207.81	263.13	219.69
Sargan					4.68	0.78	0.87	4.38
N	233	178	233	188	233	178	233	188

Standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. The reported coefficient refers to the network measure $P^{\star}$ as instrumented by the change in the country-specific population stocks between 1980 and 1990 and the distance from the closest port of entry. Models are weighted by the population of each ethnic group in the LAD. The Wald statistic refers to the test for weak identification of the instruments. The Sargan statistic refers to the test for overidentifying restrictions.

The instrumental variable analysis confirms that the effect of living in an enclave is positive for immigrants, while for the UK-born, the impact is in most cases statistically insignificant. The exceptions for the group of male Pakistanis & Bangladeshi are also confirmed, although the instrumental variable approach is not robust and hence the estimates obtained could be biased.

4.7 Robustness checks

In this Section, potential issues that could affect the results presented are addressed. All these problems are to some extent related to spatial dependence. The first issue is commuting. According to Census data, an increasing percentage of employed individuals work in a local authority that is different from the one where he or she resides[52]. A person living in a given LAD but working in a neighboring LAD is likely to be part of multiple networks: one in the workplace and one in the place of residence. However, data will only record his or her pertinence to the network in the LAD of residence. More in general, commuting to a contiguous LAD generates spatial dependence in the index $P^{\star}$. One way to control for this is to estimate a spatial autoregressive model (see, for example, Topa, 2001); alternatively, it is possible to include information about the network size of neighboring LADs (Patacchini and Zenou, 2008). The approach adopted in this Chapter is to re-estimate the models by excluding commuters. Since information about the LAD of workplace is not available, distance to work is used to separate individuals that work within the LAD. Two cutoff points in terms of distance are available from the microdata and have been considered: below 5 Km and below 20 Km. Results are very similar and will be presented for the case of the 20 Km threshold, as this is a more conservative way to include a larger number of commuting areas around the LAD of residence.

The second issue is related to the spatial dependence of the response variable. The fact that areas with high employment or unemployment are clustered together is a well known and documented phenomenon (Topa, 2001). This is particularly true when the areas considered are relatively small. The correlation across observational units (i.e., employment in each LAD/ethnic cell) could create bias of the estimates. Again, one solution could be to use spatial autoregressive models. In this Chapter, an alternative method is proposed, which consists of using a variable to control for contiguity. In particular, since the majority of LADs with contiguous borders that are in the sample consist of the London boroughs and the Metropolitan Districts, an indicator for these areas is created and added to the estimation. The coefficient for this variable will indicate if there are differences in employment between LADs that are clustered together and LADs that are more isolated; more importantly, the estimate of the coefficient for $P^{\star}$ will show if the effect on employment of living in an enclave is different between these types or areas.

[52]Data from SARs and SAM show that the fraction travelling to a workplace for more than 20km was 12% in 1991 and 14% in 2001.

A third potential source of spatial dependence is internal migration. Some individuals will decide to change residence because of employment reasons; in other cases, however, people could move to neighboring LADs because of, say, lower house prices, and continue working in the LAD of previous residence. Similarly to the case of commuting, this will create spatial dependence in the measure of $P^{\star}$ across LADs. To address this problem, and similarly to the methodology used in the case of commuting, the models in Table 4.4 have been estimated excluding individuals who changed LAD in the previous year. Since information on the LAD of origin is not available, distance of move is used to separate stayers from migrants, with a cutoff of 20 Km[53].

Table 4.4 reports the results of estimations that address the issues mentioned above. The first panel contains the estimates of the equation 4.5 when the sample is restricted to individuals that are employed within the LAD. The second panel includes an indicator for the LADs that belong to the London Boroughs or to the Metropolitan Districts. Finally, the third panel excludes individuals who changed LAD of residence in the previous year.

Although these robustness checks only indirectly address the issues related with spatial dependence, it seems that estimates are not particularly affected by this issue. For example, in the case of Blacks, the coefficients in the first and third panel are very similar to those in Table 4.3. When controlling for contiguous areas, the change in the estimates is slightly larger for the groups of immigrants and is indicative of the fact that in more isolated LADs the impact of the enclave is 0.16 smaller for males and 0.20 larger for females. Similarly, for the group of Indians, the estimated coefficients are not dissimilar to those of Table 4.3. Perhaps the most interesting difference is for UK-born males, as the coefficient is largest within the group, although statistically significant only in one case. For Pakistanis & Bangladeshi, estimates are not particularly sensitive to the different specifications and the results confirm the negative impact for males, although it is important to recall the issues related to the weakness of the instruments discussed earlier. Finally, robustness checks for the groups of White immigrants confirm that there are positive effects of living in an enclave, although coefficients are very close to those estimated in Table 4.3 only for the model that excludes internal migrants, while in the other two cases the estimates are somewhat lower.

[53]In this case, the cutoff chosen is 20 Km since information from the microdata (available only for 2001) shows that the majority of persons who changed LAD move from a place that is more than 20 Km away.

Table 4.4: IV estimates of ethnic networks effects on employment - robustness checks

	Employed within the LAD				Controls for London & Metropolitan Districts				Excluding internal migrants			
	Males		Females		Males		Females		Males		Females	
	UK-born	F-born	UK-born	F-born	UK-born	F-born	UK-born	F-born	UK-born	F-born	UK-born	F-born
Blacks												
$P^\star$	−0.277	0.870**	−0.410	1.156***	−0.218	0.556	−0.342	1.335***	−0.171	0.722*	−0.517	1.057**
	(0.323)	(0.404)	(0.582)	(0.413)	(0.345)	(0.442)	(0.636)	(0.471)	(0.328)	(0.408)	(0.572)	(0.443)
N	75	90	70	90	85	101	74	95	80	94	70	90
Indians												
$P^\star$	0.838	0.480**	0.621	0.526*	0.724	0.444**	0.503	0.502*	0.856*	0.448**	0.422	0.475
	(0.512)	(0.197)	(0.658)	(0.287)	(0.486)	(0.191)	(0.650)	(0.283)	(0.502)	(0.178)	(0.646)	(0.294)
N	69	126	66	120	76	137	70	125	68	132	67	124
Pakistanis and Bangladeshi												
$P^\star$	−1.181*	−1.154**	1.281	0.267	−1.131	−0.878**	0.957	0.289	−1.316*	−1.289***	1.574	0.212
	(0.667)	(0.458)	(1.569)	(0.367)	(0.689)	(0.434)	(1.445)	(0.372)	(0.692)	(0.478)	(1.748)	(0.364)
N	70	105	59	88	72	109	59	90	71	108	56	88
Whites												
$P^\star$	−0.131	0.251	0.062	0.586***	−0.157	0.245	0.028	0.346	0.010	0.412**	0.155*	0.688***
	(0.108)	(0.197)	(0.092)	(0.210)	(0.110)	(0.235)	(0.098)	(0.253)	(0.091)	(0.193)	(0.089)	(0.214)
N	233	162	233	181	233	178	233	188	233	169	233	179

Standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. The reported coefficient refers to the network measure $P^\star$ as instrumented by the change in the country-specific population stocks between 1980 and 1990 and the distance from the closest port of entry. Models are weighted by the population of each ethnic group in the LAD.

4.8 Discussion and final remarks

The results from the OLS and IV analysis, as well as the robustness checks, indicate that the more intense is the use of informal job search methods, the higher will be the likelihood of being employed. This result is particulary strong for Black and Indian immigrants: one potential explanation for this is that the network of these two groups is well-established, since the groups of Blacks (especially Black Caribbeans) and Indians have a long history of migration which dates back to more than forty years ago. On the other hand, for Black and Indian natives the effect is, at worst, zero.

The findings about the group of Pakistanis & Bangladeshi are intriguing, because it appears that this group is suffering a penalty as a consequence of using informal network. One potential explanation related to the prediction of the model outlined in Section 4.3 is that the use of informal networks is detrimental to cultural assimilation and hence to formal methods of job search. This is a plausible explanation for both Pakistanis & Bangladeshi, as these two groups are notoriously more secluded and isolated than others. It is however strange that there is no effect for females; one possible explanation is that, due to cultural reasons and religious practices, females of this ethnic group do not actively participate in job search, as this activity is completely carried out by men.

Finally, an interesting result emerges from the analysis of Whites. There is no appreciable economic impact for UK-born individuals, which somewhat confirms previous results that were found for the aggregate group (Patacchini and Zenou, 2008). For immigrants, however, and especially for women, the positive impact of informal methods on employment outcomes is substantial. This is a new result and indicates that even for white immigrants - who should be more likely to integrate in the culture of Britain than other groups - the use of informal contacts is important. However, two aspects need to be discussed: first of all, there is a lot of heterogeneity within the group of White immigrants, that could not be disentangled given the available data. Second, the analysis in this Chapter refers to the period between 1991 and 2001; in more recent years the patterns of White immigrations have substantially changed, with a progressive decrease of immigrants coming from more traditional sources such as Ireland, and an exponential increase from the East European countries. Data available in the future will hopefully help analysing the same research question for more detailed groups of White immigrants.

Another important point of discussion is about the research question that this Chapter answers. Higher probability of obtaining a job does not necessarily imply that labour market performance of an individual has improved. For certain groups, living in an "encapsulated" economy such as an enclave provides a form of insurance against discrimination. However, the scarce exposure to local culture might, in the long run, harm the outcomes of the individual (Borjas, 2000). To address this question, one would need to follow over time the outcomes of individuals who live in an enclave. An indirect way to assess if informal job methods are harmful for the long-run economic status of individuals, is to look at the change in the occupational structure. Friends and relatives could be an important source for finding a better job; however, relying heavily on this source decreases the effort put on more formal (and successful) methods of search. To test this hypothesis, equation 4.5 has been re-estimated using the (change in the) fraction of individuals that work in the top two occupations as outcome variable. Results are presented in Table 4.5.

Table 4.5: IV estimates on probability of working in top two occupations

	Males		Females		Males		Females	
	UK-born	F-born	UK-born	F-born	UK-born	F-born	UK-born	F-born
	Blacks				**Indians**			
$P^{\star}$	0.875*	0.098	–0.361	1.692***	0.255	–0.316	0.058	0.069
	(0.466)	(0.477)	(0.551)	(0.441)	(0.492)	(0.264)	(0.460)	(0.231)
N	85	101	74	95	76	137	70	125
	Pakistanis and Bangladeshi				**Whites**			
$P^{\star}$	–0.907	0.005	–1.666	0.171	0.013	0.514**	–0.150**	0.014
	(0.718)	(0.478)	(1.089)	(0.297)	(0.092)	(0.261)	(0.069)	(0.170)
N	72	109	59	90	233	178	233	188

Standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. The reported coefficient refers to the network measure $P^{\star}$ as instrumented by the change in the country-specific population stocks between 1980 and 1990 and the distance from the closest port of entry. Models are weighted by the population of each ethnic group in the LAD. The Wald statistic refers to the test for weak identification of the instruments. The Sargan statistic refers to the test for overidentifying restrictions.

As can be seen, in the majority of cases the coefficient is positive and, for some groups such as immigrant Black women, the impact is quite substantial. When the estimate has a negative value, the magnitude of the coefficient is not very large, and is significant only in the case of UK-born White females. In this case, an increase by 1% in $P^{\star}$ will lead to a decrease of less than 0.15% in the probability of working in the top two occupations. Although this analysis is very simplistic and not comprehensive, it is indicative of the fact that informal networks are not detrimental even in the long run. A more thorough analysis would be required to look at some indicators such as wage growth. This will be possible when the availability of survey data at local level would be sufficient to perform a robust econometric analysis of wages at local level by ethnic group.

The analysis of this Chapter could be potentially improved by constructing a better measure to capture local interactions. This could be done by using very fine partition of a neighborhood (Patrick et al., 2008). In England and Wales this could be done by using Lower Level Super Output areas (which have 1,500 inhabitants on average) or even Output Areas (about 100 inhabitants on average). There are currently two obstacles that impede this: first, this particular geography is only available after 2001 Census, and hence it cannot be compared over time. Second, most of the cells for ethnic groups will be adjusted due to confidentiality reasons; this creates measurement error in the regressor and the magnitude and direction of the bias is difficult to predict (Williamson, 2007).

Another important aspect of $P^{\star}$ is that it is measured for the aggregate ethnic group. This means that the networks for UK-born and immigrants overlap. Since ties are particularly strong along ethnic lines, this was a plausible assumption that was used in the analysis. However, it would be interesting to investigate the extent to which these groups use a more "specialised" network. For example, it could be that UK-born ethnic groups, because of their exposure to the culture and to the educational system of the country, use the more "skilled/educated" part of the network, while immigrants use the more "unskilled". Unfortunately, data available in this research do not allow to test this question. In addition, it is plausible to think that some ethnic groups interact with each other and hence another interesting question would be to look at cross-ethnic interactions. This is a research question that has not had much attention so far.

Hopefully, the availability of data from the forthcoming Census, along with a richer amount and quality of survey data, will make it possible to explore these interesting questions. Ideally, data should provide detailed information about how individuals find jobs, their use of formal methodologies, their individual network and, of course, a greater detail about the immigrant "generation". Currently, data to study assimilation of immigrants in Britain are very limited and information about parental characteristics of individuals are mostly absent in survey data[54]. As a consequence, the investigation of how human capital is transmitted across generations is difficult and this hinders the understanding of the mechanisms of assimilation.

[54]The exception would be the Longitudinal Studies, that links four Censuses, but has limited amount of information about economic outcomes and the pilot project launched in the LFS in 2008 to collect information about parental country of birth.

Appendix

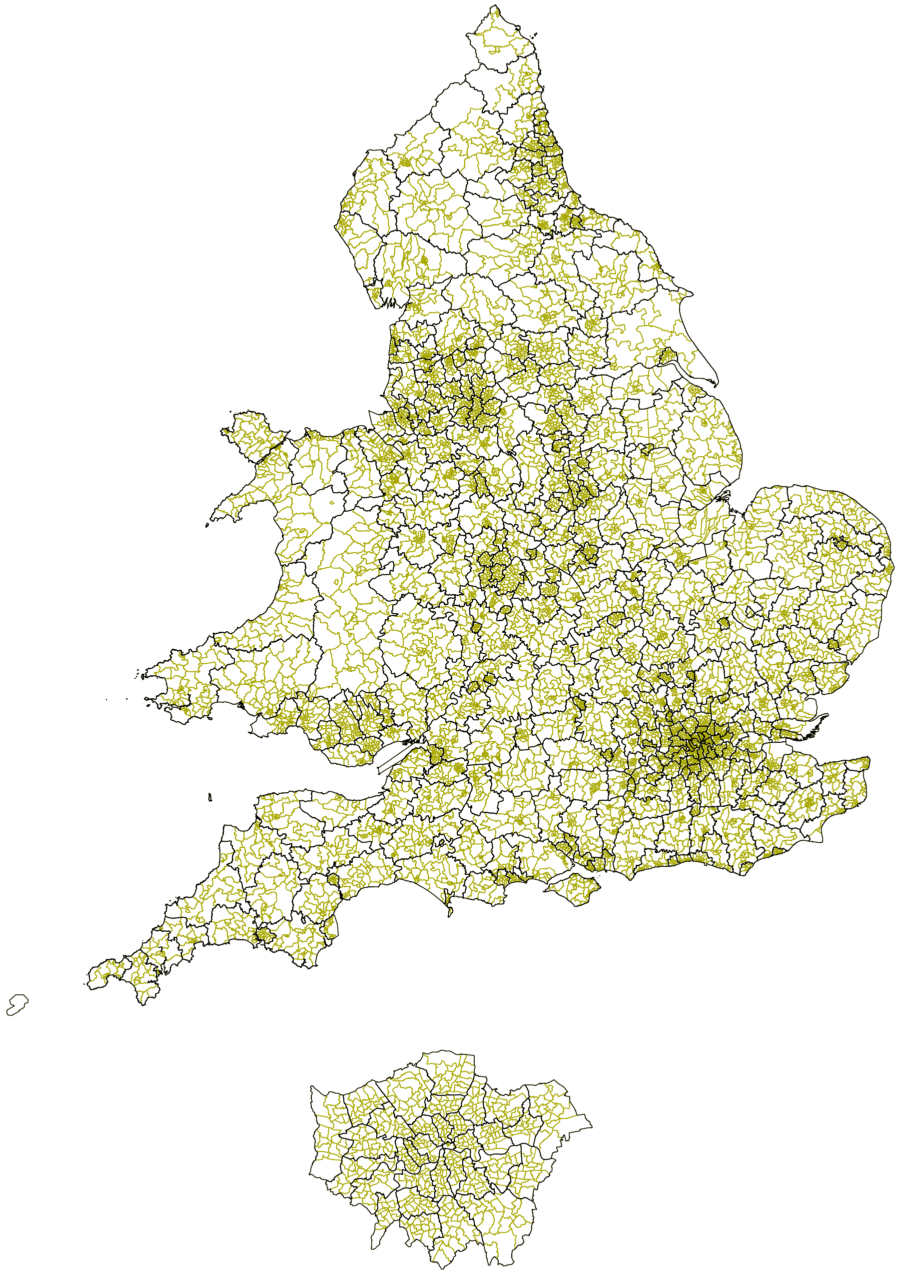


Figure 4.2: Wards and pertinent LADs in England and Wales (inset: London)

Digitalised boundaries from UKBorders (http://borders.edina.ac.uk/)

Table 4.6: OLS estimates, 1991 - Blacks

	Without controls				With controls			
	Males		Females		Males		Females	
	UK-born	F-born	UK-born	F-born	UK-born	F-Born	UK-born	F-Born
$P^\star$	–0.430**	–0.650***	–0.361**	–0.579***	–0.083	–0.191*	–0.046	0.216*
	(0.199)	(0.175)	(0.178)	(0.152)	(0.103)	(0.098)	(0.169)	(0.123)
higher degree					0.075	0.063	0.257*	0.164**
					(0.103)	(0.070)	(0.146)	(0.077)
unempl r					–0.771***	–0.828***	–0.548***	–0.691***
					(0.056)	(0.066)	(0.128)	(0.148)
% home owner					0.138***	0.187***	0.095	0.300***
					(0.039)	(0.042)	(0.066)	(0.048)
constant	0.614***	0.673***	0.589***	0.654***	0.744***	0.715***	0.584***	0.475***
	(0.029)	(0.026)	(0.027)	(0.023)	(0.038)	(0.042)	(0.057)	(0.044)
R^2	0.05	0.12	0.05	0.14	0.78	0.78	0.36	0.64
N	85	101	74	95	85	101	74	95

Standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. The reported coefficient refers to the network measure $P^\star$.

Table 4.7: OLS estimates, 1991 - Indians

	Without controls				With controls			
	Males		Females		Males		Females	
	UK-born	F-born	UK-born	F-born	UK-born	F-Born	UK-born	F-Born
$P^\star$	–0.018	–0.210***	–0.058	–0.113	–0.128	–0.049	–0.146	0.046
	(0.147)	(0.060)	(0.134)	(0.084)	(0.104)	(0.039)	(0.124)	(0.074)
higher degree					–0.058	0.115**	–0.171	0.333***
					(0.118)	(0.045)	(0.169)	(0.104)
unempl r					–0.617***	–0.861***	–0.413***	–0.833***
					(0.068)	(0.066)	(0.099)	(0.120)
% home owner					0.123*	0.206***	0.128	0.103
					(0.074)	(0.038)	(0.113)	(0.077)
constant	0.461***	0.781***	0.424***	0.549***	0.533***	0.673***	0.416***	0.499***
	(0.030)	(0.012)	(0.028)	(0.018)	(0.068)	(0.038)	(0.105)	(0.071)
R^2	0.00	0.08	0.00	0.01	0.58	0.71	0.25	0.42
N	76	137	70	125	76	137	70	125

Standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. The reported coefficient refers to the network measure $P^\star$.

Table 4.8: OLS estimates, 1991 - Pakistanis and Bangladeshi

	Without controls				With controls			
	Males		Females		Males		Females	
	UK-born	F-born	UK-born	F-born	UK-born	F-Born	UK-born	F-Born
$P^\star$	0.021	–0.557***	–0.092	–0.442***	0.076	–0.077	–0.273*	–0.237***
	(0.180)	(0.110)	(0.206)	(0.092)	(0.115)	(0.076)	(0.158)	(0.076)
higher degree					–0.261**	0.091	0.003	0.598***
					(0.114)	(0.077)	(0.217)	(0.136)
unempl r					–0.498***	–0.731***	–0.426***	–0.247***
					(0.045)	(0.063)	(0.063)	(0.038)
% home owner					–0.036	0.073**	–0.013	–0.016
					(0.052)	(0.029)	(0.070)	(0.030)
constant	0.329***	0.596***	0.296***	0.207***	0.571***	0.713***	0.467***	0.260***
	(0.031)	(0.019)	(0.037)	(0.016)	(0.049)	(0.036)	(0.065)	(0.033)
R^2	0.00	0.19	0.00	0.20	0.64	0.74	0.49	0.57
N	72	109	60	94	72	109	59	90

Standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. The reported coefficient refers to the network measure $P^\star$.

Table 4.9: OLS estimates, 1991 - Whites

	Without controls				With controls			
	Males		Females		Males		Females	
	UK-born	F-born	UK-born	F-born	UK-born	F-Born	UK-born	F-Born
$P^\star$	0.157**	0.260***	–0.036	–0.012	–0.152***	–0.247***	–0.208***	–0.309***
	(0.067)	(0.076)	(0.048)	(0.061)	(0.028)	(0.061)	(0.038)	(0.061)
higher degree					–0.056*	0.025	0.182***	–0.017
					(0.029)	(0.050)	(0.042)	(0.064)
unempl r					–1.331***	–1.060***	–1.236***	–0.716***
					(0.047)	(0.084)	(0.109)	(0.098)
% home owner					0.017	0.132***	0.066**	0.095***
					(0.021)	(0.033)	(0.028)	(0.035)
constant	0.611***	0.474***	0.656***	0.585***	1.054***	0.995***	0.831***	0.864***
	(0.064)	(0.069)	(0.046)	(0.055)	(0.032)	(0.061)	(0.043)	(0.061)
R^2	0.02	0.06	0.00	0.00	0.88	0.60	0.63	0.31
N	233	178	233	188	233	178	233	188

Standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. The reported coefficient refers to the network measure $P^\star$.

Table 4.10: OLS estimates, 2001 - Blacks

	Without controls				With controls			
	Males		Females		Males		Females	
	UK-born	F-born	UK-born	F-born	UK-born	F-Born	UK-born	F-Born
$P^\star$	–0.341***	–0.053	–0.082	0.001	–0.003	0.212***	0.149**	0.406***
	(0.111)	(0.102)	(0.101)	(0.101)	(0.063)	(0.064)	(0.071)	(0.077)
higher degree					–0.049	0.086	0.076	0.280***
					(0.067)	(0.062)	(0.090)	(0.084)
unempl r					–0.829***	–1.030***	–0.705***	–0.608***
					(0.095)	(0.098)	(0.155)	(0.156)
% home owner					0.184***	0.137***	0.226***	0.272***
					(0.038)	(0.043)	(0.043)	(0.052)
constant	0.681***	0.596***	0.660***	0.519***	0.716***	0.663***	0.587***	0.356***
	(0.019)	(0.018)	(0.018)	(0.018)	(0.038)	(0.045)	(0.040)	(0.046)
R^2	0.10	0.00	0.01	0.00	0.77	0.71	0.61	0.57
N	85	101	74	95	85	101	74	95

Standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. The reported coefficient refers to the network measure $P^\star$.

Table 4.11: OLS estimates, 2001 - Indians

	Without controls				With controls			
	Males		Females		Males		Females	
	UK-born	F-born	UK-born	F-Born				
$P^{\star}$	–0.105	–0.038	–0.071	–0.112	–0.194***	0.002	–0.027	0.111*
	(0.077)	(0.047)	(0.093)	(0.071)	(0.053)	(0.035)	(0.060)	(0.061)
higher degree					0.102	0.192***	0.408***	0.527***
					(0.067)	(0.038)	(0.077)	(0.068)
unempl r					–0.653***	–1.044***	–0.639***	–0.789***
					(0.124)	(0.130)	(0.175)	(0.196)
% home owner					0.441***	0.286***	0.326***	0.339***
					(0.053)	(0.038)	(0.071)	(0.079)
constant	0.628***	0.776***	0.583***	0.575***	0.325***	0.539***	0.259***	0.177**
	(0.017)	(0.011)	(0.021)	(0.017)	(0.053)	(0.041)	(0.077)	(0.081)
R^2	0.02	0.00	0.01	0.02	0.65	0.59	0.65	0.48
N	76	137	70	125	76	137	70	125

Standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. The reported coefficient refers to the network measure $P^{\star}$.

Table 4.12: OLS estimates, 2001 - Pakistanis and Bangladeshi

	Without controls				With controls			
	Males		Females		Males		Females	
	UK-born	F-born	UK-born	F-Born				
$P^\star$	–0.305***	–0.371***	–0.441***	–0.368***	–0.022	–0.150***	–0.150**	–0.103***
	(0.079)	(0.054)	(0.075)	(0.049)	(0.061)	(0.051)	(0.063)	(0.039)
higher degree					0.122	0.085	0.375***	0.485***
					(0.074)	(0.054)	(0.079)	(0.054)
unempl r					–0.703***	–0.795***	–0.420***	–0.209***
					(0.080)	(0.104)	(0.087)	(0.039)
% home owner					0.089**	0.119***	–0.033	–0.016
					(0.043)	(0.028)	(0.045)	(0.021)
constant	0.523***	0.679***	0.427***	0.238***	0.541***	0.675***	0.409***	0.179***
	(0.019)	(0.013)	(0.019)	(0.012)	(0.045)	(0.031)	(0.044)	(0.020)
R^2	0.17	0.30	0.38	0.39	0.69	0.68	0.72	0.76
N	72	109	59	90	72	109	59	90

Standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. The reported coefficient refers to the network measure $P^\star$.

Table 4.13: OLS estimates, 2001 - Whites

	Without controls				With controls			
	Males		Females		Males		Females	
	UK-born	F-born	UK-born	F-born	UK-born	F-Born	UK-born	F-Born
$P^{\star}$	0.097*	0.287***	–0.013	0.192***	–0.142***	–0.230***	–0.128***	–0.055
	(0.058)	(0.073)	(0.044)	(0.052)	(0.027)	(0.054)	(0.030)	(0.052)
higher degree					0.051*	0.105**	0.133***	0.196***
					(0.028)	(0.046)	(0.033)	(0.050)
unempl r					–1.988***	–1.700***	–2.138***	–0.984***
					(0.093)	(0.142)	(0.188)	(0.167)
% home owner					0.152***	0.296***	0.142***	0.239***
					(0.028)	(0.045)	(0.030)	(0.047)
constant	0.681***	0.484***	0.664***	0.443***	0.905***	0.862***	0.737***	0.504***
	(0.055)	(0.064)	(0.041)	(0.046)	(0.036)	(0.061)	(0.039)	(0.057)
R^2	0.01	0.08	0.00	0.07	0.85	0.69	0.71	0.40
N	233	178	233	188	233	178	233	188

Standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. The reported coefficient refers to the network measure $P^{\star}$.

Table 4.14: Full OLS and IV estimates, differences - Blacks

	OLS				IV			
	Males		Females		Males		Females	
	UK-born	F-born	UK-born	F-born	UK-born	F-Born	UK-born	F-Born
$P^\star$	–0.261	0.817***	–0.006	0.591**	–0.219	0.713*	–0.351	1.130***
	(0.254)	(0.279)	(0.427)	(0.289)	(0.316)	(0.379)	(0.562)	(0.418)
higher degree	0.002	0.232***	0.243	0.128	–0.000	0.237***	0.293*	0.119
	(0.088)	(0.078)	(0.162)	(0.083)	(0.086)	(0.078)	(0.166)	(0.083)
unempl r	–0.721***	–0.737***	–0.571***	–0.766***	–0.721***	–0.739***	–0.572***	–0.693***
	(0.060)	(0.075)	(0.143)	(0.156)	(0.058)	(0.073)	(0.138)	(0.160)
% home owner	0.108*	0.155**	0.228*	0.221***	0.108**	0.149**	0.223**	0.218***
	(0.055)	(0.070)	(0.116)	(0.076)	(0.053)	(0.070)	(0.112)	(0.075)
constant	–0.010	–0.095***	0.019	–0.079***	–0.011	–0.093***	0.021	–0.097***
	(0.019)	(0.017)	(0.034)	(0.019)	(0.019)	(0.018)	(0.033)	(0.021)
R^2	0.68	0.63	0.25	0.37	0.68	0.63	0.24	0.34
Wald					61.66	50.27	40.31	39.56
Sargan					0.48	2.25	0.44	1.27
p-value					0.49	0.13	0.51	0.26
N	85	101	74	95	85	101	74	95

Standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. The reported coefficient refers to the network measure $P^\star$ as instrumented by the change in the country-specific population stocks between 1980 and 1990 and the distance from the closest port of entry. Models are weighted by the population of each ethnic group in the LAD. The Wald statistic refers to the test for weak identification of the instruments. The Sargan statistic refers to the test for overidentifying restrictions.

Table 4.15: Full OLS and IV estimates, differences - Indians

	OLS				IV			
	Males		Females		Males		Females	
	UK-born	F-born	UK-born	F-born	UK-born	F-Born	UK-born	F-Born
$P^{\star}$	0.388	0.386**	0.082	0.311	0.715	0.439**	0.507	0.522*
	(0.400)	(0.167)	(0.525)	(0.248)	(0.488)	(0.192)	(0.646)	(0.285)
higher degree	0.143	0.151***	0.277*	0.327***	0.156	0.151***	0.274**	0.335***
	(0.114)	(0.049)	(0.140)	(0.082)	(0.111)	(0.048)	(0.135)	(0.081)
unempl r	–0.561***	–0.722***	–0.398***	–0.580***	–0.557***	–0.718***	–0.419***	–0.574***
	(0.079)	(0.076)	(0.128)	(0.109)	(0.077)	(0.075)	(0.126)	(0.107)
% home owner	0.219*	0.181***	0.220	0.031	0.228*	0.181***	0.208	0.035
	(0.121)	(0.061)	(0.151)	(0.099)	(0.118)	(0.060)	(0.146)	(0.097)
constant	0.043	–0.056***	0.079*	–0.067***	0.033	–0.057***	0.065	–0.074***
	(0.030)	(0.011)	(0.041)	(0.021)	(0.031)	(0.011)	(0.042)	(0.022)
R^2	0.50	0.50	0.22	0.26	0.49	0.50	0.21	0.26
Wald					59.84	179.85	52.30	158.95
Sargan					0.01	0.12	0.02	0.54
p-value					0.92	0.73	0.89	0.46
N	76	137	70	125	76	137	70	125

Standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. The reported coefficient refers to the network measure $P^{\star}$ as instrumented by the change in the country-specific population stocks between 1980 and 1990 and the distance from the closest port of entry. Models are weighted by the population of each ethnic group in the LAD. The Wald statistic refers to the test for weak identification of the instruments. The Sargan statistic refers to the test for overidentifying restrictions.

Table 4.16: Full OLS and IV estimates, differences - Pakistanis and Bangladeshi

	OLS				IV			
	Males		Females		Males		Females	
	UK-born	F-born	UK-born	F-born	UK-born	F-Born	UK-born	F-Born
$P^{\star}$	–0.666**	–0.359**	–0.196	0.091	–1.270*	–1.179**	1.233	0.240
	(0.289)	(0.174)	(0.426)	(0.162)	(0.699)	(0.458)	(1.551)	(0.373)
higher degree	–0.016	0.026	0.107	0.388***	–0.060	–0.079	0.294	0.414***
	(0.111)	(0.091)	(0.176)	(0.087)	(0.120)	(0.111)	(0.268)	(0.104)
unempl r	–0.517***	–0.715***	–0.431***	–0.201***	–0.521***	–0.749***	–0.485***	–0.202***
	(0.051)	(0.073)	(0.066)	(0.033)	(0.051)	(0.080)	(0.089)	(0.033)
% home owner	–0.139	0.108	–0.004	0.098	–0.123	0.145*	–0.049	0.100
	(0.100)	(0.069)	(0.112)	(0.062)	(0.101)	(0.077)	(0.127)	(0.061)
constant	0.082**	–0.004	0.003	–0.043**	0.129**	0.058	–0.136	–0.055
	(0.031)	(0.023)	(0.052)	(0.020)	(0.059)	(0.040)	(0.154)	(0.035)
R^2	0.62	0.52	0.48	0.44	0.59	0.42	0.37	0.43
Wald					6.71	10.36	2.42	9.26
Sargan					0.05	0.35	0.00	0.77
p-value					0.82	0.56	0.98	0.38
N	72	109	59	90	72	109	59	90

Standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. The reported coefficient refers to the network measure $P^{\star}$ as instrumented by the change in the country-specific population stocks between 1980 and 1990 and the distance from the closest port of entry. Models are weighted by the population of each ethnic group in the LAD. The Wald statistic refers to the test for weak identification of the instruments. The Sargan statistic refers to the test for overidentifying restrictions.

Table 4.17: Full OLS and IV estimates, differences - Whites

	OLS				IV			
	Males		Females		Males		Females	
	UK-born	F-born	UK-born	F-born	UK-born	F-Born	UK-born	F-Born
$P^\star$	0.140*	0.554***	0.176**	0.787***	–0.017	0.349*	0.141	0.677***
	(0.079)	(0.163)	(0.073)	(0.173)	(0.095)	(0.186)	(0.087)	(0.203)
higher degree	0.125***	0.039	0.151***	0.072	0.092**	0.044	0.146***	0.066
	(0.044)	(0.047)	(0.048)	(0.053)	(0.045)	(0.047)	(0.048)	(0.052)
unempl r	–0.392***	–0.708***	–0.268***	–0.564***	–0.398***	–0.664***	–0.262***	–0.554***
	(0.072)	(0.092)	(0.098)	(0.088)	(0.072)	(0.091)	(0.097)	(0.088)
% home owner	0.230***	0.289***	0.193***	0.171***	0.238***	0.305***	0.196***	0.179***
	(0.041)	(0.045)	(0.039)	(0.053)	(0.041)	(0.047)	(0.039)	(0.053)
constant	–0.013***	0.008	0.018***	0.043***	–0.015***	0.005	0.018***	0.041***
	(0.004)	(0.011)	(0.003)	(0.013)	(0.004)	(0.011)	(0.003)	(0.012)
R^2	0.32	0.45	0.21	0.32	0.30	0.44	0.20	0.32
Wald					237.91	207.81	263.13	219.69
Sargan					4.68	0.78	0.87	4.38
p-value					0.03	0.38	0.35	0.04
N	233	178	233	188	233	178	233	188

Standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. The reported coefficient refers to the network measure $P^\star$ as instrumented by the change in the country-specific population stocks between 1980 and 1990 and the distance from the closest port of entry. Models are weighted by the population of each ethnic group in the LAD. The Wald statistic refers to the test for weak identification of the instruments. The Sargan statistic refers to the test for overidentifying restrictions.

Conclusion

The essays contained in this thesis have investigated unsolved research questions about the relationships of migration and the labour markets.
The results from the first Chapter show that minimum wage is an important asset for low wage earners. The mechanisms through which immigrants choose to move to the country have been outlined by the means of a model that encapsulates the effects of the minimum wage in terms of wage and employment change. In general, these effects move in opposite direction, and hence the overall impact of the policy is ambiguous. In the period under analysis, however, the USA minimum wage did not hinder employment opportunities but, if anything, increased them. Hence, immigrants found it convenient to exploit the gains generated by the policy. One implication of these results is that markets are not perfectly competitive and hence there is room for policies such as the minimum wage without harming employment. In implementing this institution, however, the results of the analysis suggest that policy makers should take into account that low-wage immigrants react to small changes in the expected wages and they are thus likely to immigrate. In general, the results of the analysis corroborate the findings that international flows are particularly responsive to welfare magnets (Borjas, 1999). Due to the increase in the number of States setting a wage higher than the federal, an interesting extension of this study could be the analysis of state-based policy. Another important question would be to test the predictions of the model in the context of countries with different labour market structures, such as France, where the minimum wage is relatively high.
The analysis from the second Chapter reveals that flows of recent immigrants to England and Wales are complementary to the movements of UK-born individuals, while they "displace" earlier cohort of immigrants. These results corroborate and update previous findings about the negligible impact of migration in the UK labour market (Dustmann et al., 2005) and are a corollary to the imperfect substitutability in production between immigrants and natives (Manacorda et al., 2008). One of the most interesting discovery of this research is that the magni-

tude of displacement is very heterogeneous across skill groups, country of birth and local labour markets. For example, low-skilled earlier immigrants suffer the highest penalties in terms of displacement, and this could be ascribed to the fact that they are more likely to have skills similar to recent immigrants. Moreover, the impact of displacement is larger within than across regions. The results of this research contrast with previous findings of displacement Hatton and Tani (2005). The Chapter has documented that this divergence is attributable to the fact that Hatton and Tani (2005) considered flows aggregated at regional level and without skill breakdown. One interesting extension of this work is to analyse more in details the dynamics of displacement for earlier immigrants. Ideally, one would need detailed data by country of birth, which could be used to understand if patterns of displacement have changed after the enlargement of the European Union.

The empirical analysis contained in the third Chapter has shown that living in an enclave is not detrimental to the probability of being employed. Perhaps the most striking result, however, is that the impact varies substantially across ethnic groups, gender and country of birth, which might suggest that the level of cultural assimilation of these group is different. This work could be extended along several dimensions, all of which require more detailed data than those available. First of all, an analysis of outcomes such as wages will help addressing the question if living in an enclave is detrimental in other aspects of the economic performance of individuals. Second, information about year of arrival of immigrants and on the parental country of birth of individuals will improve the understanding of the role played by the enclave in the labour market assimilation of its members.

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