

The Effects of Immigration on NHS Waiting Times

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Abstract

This paper analyzes the effects of immigration on waiting times for the National Health Service (NHS) in England. Linking administrative records from Hospital Episode Statistics (2003-2012) with immigration data drawn from the UK Labour Force Survey, we find that immigration reduced waiting times for outpatient referrals and did not have significant effects on waiting times in accident and emergency (A&E) and elective care. These results are explained by the fact that immigration increases natives' internal mobility and that immigrants tend to be healthier than natives who move to different areas. Conversely, we observe higher outpatient waiting times in places to which native internal migrants have moved. Finally, we find evidence that immigration increased waiting times for outpatient referrals in more deprived areas outside of London. The increase in average waiting times in more deprived areas is concentrated in the years immediately following the 2004 EU enlargement and disappears in the medium term (e.g., 3 to 4 years).

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1 Introduction

The impact of immigration on the welfare of host-country residents has long been a contentious topic. In the UK, a majority of the public has been opposed to more immigration since at least the 1960s, and most people perceive the costs of immigration to be greater than the benefits (Blinder, 2012). The EU enlargement of May 1, 2004, exacerbated this debate as citizens of eight new member states (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia), commonly referred to as the A8, were granted immediate unrestricted rights to work in the country. The UK was one of only three EU countries, including Ireland and Sweden, that opened its labor market to A8 citizens immediately upon accession, a decision that led to a substantial immigrant inflow to the UK.

Previous papers have analyzed the effect of immigration in the UK on public finances (Dustmann et al., 2010; Dustmann and Frattini, 2014), labor markets (Dustmann et al., 2013), the housing market (Sá, 2015) and crime (Bell et al., 2013), among others. We know less about the effects of immigration on the National Health Service (NHS). Residents of the UK, including immigrants, have free access to the NHS. This free access has resulted in speculation that immigrants may increase the demand for NHS services disproportionately and that some immigrants move to the UK with the explicit purpose of abusing the health care system. These arguments and the potential health care costs associated with immigration have resulted in the introduction of an NHS surcharge for non-EU citizens applying for a UK visa.

Despite the intense political debate on the impact of immigration on the NHS, research on this topic has been limited by the paucity of data. Using longitudinal data from the British Household Panel Survey, Wadsworth (2013) finds that immigrants generally use hospital and general practice services at the same rate as those born in the UK. Steventon and Bardsley (2011) provide evidence suggesting that the belief that immigrants use more secondary care than British natives may be unfounded. Although these are valuable findings, these studies do not provide information on the impact of immigration on NHS efficiency. Waiting times are an important measure of the quality and productivity of a public health care system (Castelli et al., 2007; Gaynor et al., 2012a; Propper et al., 2008a). This paper aims to provide insights on this impact by examining NHS waiting times.

Waiting times function as a rationing mechanism in the NHS and play a role similar to a price (Lindsay and Feigenbaum, 1984). Research suggests that waiting times are one of the leading factors of patients' dissatisfaction with the NHS (Appleby, 2012; Sitzia and Wood, 1997; Propper, 1995). Postponing treatment delays the associated benefits and can have negative effects on patient health (Siciliani and Iversen, 2012; Cullis et al., 2000). Average waiting times for some NHS services were considerably high during the 2000s, and British politicians have suggested that increased immigration was a key factor contributing to NHS waiting times.

Between 1993 and 2013, the number of foreign-born UK residents more than doubled from 3.8 million to approximately 7.8 million (Rienzo and Vargas-Silva, 2012). This increase in the stock of immigrants is likely to have directly increased the demand for health care services. Immigration also affects the demographic composition and population morbidity rates, two factors that have key repercussions for health care demand. These effects of immigration are likely to vary significantly by location, as there is substantial variation across local areas in both the share of immigrants and NHS capacity.

Using a basic theoretical framework, this paper investigates the effects of immigration on waiting times in the NHS. We consider waiting times in outpatients (referrals), elective care and A&E. We exploit a unique dataset created by merging administrative records and survey data. To the best of our knowledge, no studies have directly examined the impact of immigration on NHS waiting times. The purpose of this paper is to fill this gap in the literature.

Following previous studies on the effects of immigration in the UK (Sá, 2015; Bell et al., 2013), we analyze the correlation between spatial variation in the immigrant inflows and waiting times in England. We use immigration data at the local authority level drawn from the special license access version of the UK Labour Force Survey (LFS), obtained via an agreement with the Office of National Statistics (ONS). To study the effects of immigration on waiting times in the NHS, we merge this information with administrative records drawn from the Hospital Episodes Statistics (HES) provided by the Health and Social Care Information Centre (HSCIC) and extracted at the lower super output area (LSOA) level.

As waiting times are not based on socioeconomic status, they are usually viewed as an equitable rationing mechanism in publicly funded health care systems. However, research provides evidence of marked inequalities in waiting times across socioeconomic status (Cooper et al., 2009;

Laudicella et al., 2012; Propper et al., 2007). We also analyze differences in our results based on the level of deprivation of the LSOA in order to explore differences in the impact of immigration in different areas.

To address the concern that immigration may be endogenous to the demand for health services and correlated with unobserved determinants of NHS waiting times, we used an instrumental variable approach exploiting the fact that historical concentrations of immigrants are a good predictor of current immigrant inflows. By including local-area and year fixed effects and controlling for local time-varying characteristics, we can reasonably assume that past immigrant concentrations are uncorrelated with current unobserved shocks that could be correlated with demand for health care services.

Although the political debate has mostly focused on the possible effects of immigration on A&E, we find no evidence of significant effects on waiting times in A&E and elective care. Furthermore, we find a reduction in waiting times for outpatient care. In particular, we show that an increase in the stock of immigrants equal to 10% of the local initial population leads to a 19% reduction in outpatient waiting times.

To investigate the mechanisms underlying the negative effect of immigration on waiting times, we analyze the effects of immigration on native mobility, average morbidity in the population and health care supply. Consistent with previous studies, our results indicate that immigration increases natives' likelihood of moving to different local authorities. Our analysis also confirms that recent cohorts of immigrants are relatively young and healthy upon arrival ("healthy immigrant effect"), suggesting that the increase in demand may have been less than predicted by the NHS (Sá, 2015; Wadsworth, 2013; Steventon and Bardsley, 2011). These effects on mobility and population composition are likely to explain the observed reduction in waiting times. Meanwhile, we find that the supply of health care is not affected by immigration.

We also find that waiting times increased in areas that native internal migrants moved into and that immigration increased the average waiting time for outpatients living in deprived areas outside of London in the period immediately following the 2004 EU enlargement. Our findings suggest that the short-term increase in outpatient waiting times in deprived areas in response to immigration can be explained by both the lower mobility of incumbent residents in these areas and the higher morbidity observed among immigrants moving into more deprived areas.

This paper is organized as follows. Section 2 presents the theoretical framework. Section 3 provides a discussion of the empirical specification, the identification strategy and the data. Section 4 presents the main results of the paper. Section 5 discusses the potential mechanisms explaining our main findings. We then illustrate the the heterogeneity of the results across England in section 6 and present robustness checks in section 7. Concluding remarks are given in section 8.

2 Theoretical framework

We illustrate the relationship between immigration and waiting times using a basic model of the demand and supply of health care services. Our model builds on [Lindsay and Feigenbaum \(1984\)](#); [Windmeijer et al. \(2005\)](#); [Martin et al. \(2007\)](#); [Siciliani and Iversen \(2012\)](#), and we extend the model to explicitly incorporate the effects of immigration. Unless admitted through A&E, all patients are referred by their GP to access NHS elective care. If patients receive a referral, they join the waiting list for outpatient care. The specialist can decide whether the patient needs elective hospital care, in which case the patient is placed on the waiting list for hospital admission.

Patients can alternatively seek private care or receive no care at all if the waiting time becomes too long. The demand for NHS care will depend on the expected waiting time and on various demand shifters, such the health needs of the population (e.g., morbidity), the proportion of elderly patients, the overall size of the population, and other variables that may affect both the supply and demand of health care services (e.g., the quality of NHS care, the level of competition).

The sign of the effect of immigration on waiting times is ambiguous. An increase in the number of immigrants will affect demand and supply through its effects on demand shifters, patients' and managers' expected waiting time, and the supply of health care personnel. The effect on waiting times will tend to be positive if the increase in the immigrant population is not offset by an increase in the supply. In the short term, managers may be constrained by the annual budget-setting process. Moreover, as managers forecast waiting times depend on the predicted change in population based on previous observations, unexpected immigration inflows may result in excess demand. As such, the supply may not adjust immediately because of differences between predicted and actual inflows or because of budget constraints. By contrast,

the effect could be negative if the supply increases more than the actual demand for health care services. This may occur if immigration leads natives to move to and/or seek care in different areas or in the private sector and if immigrants have a lower incidence of morbidities or, more generally, a lower demand for health care services. If natives with higher incomes are more likely to move (or seek private care) as a response to immigration inflows, one may expect the negative effect of native out-migration on waiting times to be amplified in less deprived areas. One may instead expect larger positive effects of immigration on waiting times in areas where the demand for health care services is less elastic (higher mobility costs) or in areas that attract less healthy immigrants.

Following [Siciliani and Iversen \(2012\)](#), we can describe the demand and supply function in the following way:

$$Y_i^d = \alpha_0 + \alpha_1 w_i + \alpha_2 x_i^d + \alpha_3 z_i + e_i^d \quad (1)$$

$$Y_i^s = \beta_0 + \beta_1 w_i + \beta_2 x_i^s + \beta_3 z_i + e_i^s \quad (2)$$

where Y_i^d and Y_i^s are the demand and supply of health care in area i and w_i is the waiting time. Under the equilibrium assumption $Y_i^d = Y_i^s$, we can write the waiting time as a function of demand and supply shifters:

$$w_i = \gamma_0 + \gamma_1 x_i^d + \gamma_2 x_i^s + \gamma_3 z_i + e_i \quad (3)$$

where

$$\gamma_0 = \frac{\alpha_0 - \beta_0}{\beta_1 - \alpha_1}, \gamma_1 = \frac{\alpha_2}{\beta_1 - \alpha_1}, \gamma_2 = \frac{-\beta_2}{\beta_1 - \alpha_1}, \gamma_3 = \frac{\alpha_3 - \beta_3}{\beta_1 - \alpha_1}.$$

We can adapt this framework to analyze the effects of immigration as an exogenous shock to the demand for health care services. Formally,

$$w_{it} = \lambda_0 + \lambda_1 IMM_{it} + \lambda_2 X_{d,it} + \lambda_3 X_{s,it} + \lambda_4 Z_{it} + \mu_i + \eta_t + e_{it} \quad (4)$$

where w_{it} is the average waiting time in local area i , λ_1 captures the effect of an increase in the number of immigrants living in local area i on waiting times, λ_2 (λ_3) are the parameters associated with a vector of variables controlling for other demand (supply) shifters, λ_4 captures

the effects of variables affecting both the supply and demand for health care services, and μ_i and η_t are the health local area and time fixed effects.

3 Data and Empirical Specification

3.1 Data

Data on waiting times are extracted from the HES database provided by the HSCIC. The HES dataset includes patients treated by the publicly funded NHS in England. The HES database is a record-based system that covers all NHS trusts in England, including acute hospitals, primary care trusts and mental health trusts. We extracted data on waiting times and basic population demographics from the HES at the LSOA level. LSOAs were designed to improve the reporting of small-area statistics and are constructed from groups of output areas. England is divided into 32,483 LSOAs with a minimum population of 1,000 inhabitants and a maximum of 3,000 inhabitants.

The HES dataset provides counts and time waited for all patients referred or admitted to a hospital (inpatients, outpatients and A&E). For outpatients and inpatients, we restrict the analysis to first admissions and exclude maternity data. Data on waiting times for outpatients and elective care are available for the entire period under analysis (2003-2012), while in the HES dataset, we have data on A&E only since 2007. Waiting times for outpatients are defined as the number of days that a patient waits from the referral date to the appointment with the specialist; waiting times for elective care are defined as the period between the date of the decision to admit and the date of actual admission. For the A&E department, waiting times are defined as the minutes from a patient's arrival in the A&E room and the decision of transfer, admission or discharge the patient. We calculate the average waiting time for outpatients, elective care and A&E by the LSOA of patients' residence. Note that in England, to access an NHS specialist, individuals must obtain a referral from their GP. Until 2015, although patients had the the right to choose a GP practice, for most people, this choice was limited to a practice near where they lived, as the GP surgeries could refuse to register the patient if he resided outside the practice boundaries.¹ Until

¹Since January 5, 2015, all GP practices in England are free to register new patients who live outside their practice boundary area. See also <http://www.nhs.uk/choiceintheNHS/Yourchoices/GPchoice/Pages/ChoosingaGP.aspx>.

2006, patients had no choice in their hospital when seeking a referral to see a specialist; the GP would decide for the patient. Since January 2006, NHS patients can choose between 5 hospitals. However, the evidence suggests that patients have strong preferences for short distances and that, on average, patients did not travel any farther and were not less likely to choose the closest hospital after the 2006 reform (Gutacker et al., 2015; Gaynor et al., 2012b). As noted by Dixon and Robertson (2011), despite the increased choice and the provision of information on differences in the quality of care between hospitals, patients tend to be loyal to their local providers. For instance, Beckert et al. (2012) show that patients traveled, on average, just over 12 km for a hip operation in 2008-2009.

In addition, we use data at the primary care trust (PCT) level from the HES and HSCIC databases on the supply side, including information on the number of GPs, the number of GP practices, the number of specialists, the ratio of occupied beds in the PCT hospitals, the annual NHS expenditure and the number of doctors with a foreign degree. Using these variables, we can partially account for time-varying changes in the NHS supply at the PCT level. PCTs were largely administrative bodies responsible for commissioning primary, community and secondary health services from providers until 2013. As of October 1, 2006, there were 152 PCTs in England, with an average population of just under 330,000 per trust. After these changes, approximately 70% of PCTs were coterminous with local authorities having social service responsibilities, which facilitated joint planning. PCTs were replaced by clinical commissioning groups on March 31, 2013, as part of the Health and Social Care Act of 2012.

We use information on the immigrant population by local authority and year drawn from the special license of the UK LFS between 2003 and 2012. We define immigration based on country of birth and pool quarters for each year. The LFS is the largest household survey in the UK and consists of a sample of approximately 40,000 households (100,000 individuals) per quarter. Even with its large size, concerns could arise regarding the accuracy with which this survey measures the size of the immigrant stock at smaller geographical levels (even when data are pooled across quarters for a given year). Therefore, as a robustness check, we also use data from NINO registrations of overseas nationals from the Department for Work and Pensions (see Section 7 and the Data Appendix).

The merged sample includes 32,483 LSOAs, 141 local authorities, 150 PCTs, and 16 regions

of residence in England. Each LSOA belongs to a given PCT and a given local authority. In our sample, 127 PCTs (90%) are coterminous with local authorities.

Table 1 presents the summary statistics on waiting times, the immigrant share of the population and a vector of variables affecting the demand and supply of health care services. For the 2003-2012 period, the average waiting time for outpatients was 47 days, while that for inpatients was 70 days. The average waiting time for A&E was 52 minutes.

The native population of the UK has remained relatively stable for the last decade. In contrast, the foreign-born population increased continuously over the same period, with a sharp increase in individuals born in other EU countries. Figure 1 shows the growth in the foreign-born share of the population of England between 2003 and 2012. During that period, the foreign-born share of the working-age population increased from 9% to 13%. The EU expansion induced a sharp increase in the number of recent immigrants—defined as foreign-born people who have been living in the UK for 5 years or less—from 2% to 4% of the population (Rienzo and Vargas-Silva, 2012). Another indicator of the growth in the migrant population is the trend in new immigrant GP registrations. As shown in Figure 2, new immigrant GP registrations as a share of the total population in England increased from 0.9% in 2004 to 1.15% in 2010.

Waiting times decreased for outpatients and elective care between 2003 and 2012 and for A&E between 2007 and 2012, as reported in Figure 3. This outcome is partly the result of NHS policies implemented during this period. The NHS Plan in 2000 shifted the focus from the size of the waiting list to the maximum waiting times experienced by patients. In particular, the government adopted an aggressive policy of targets. The maximum wait for inpatient and day-case treatment was reduced from 18 to 6 months, while the maximum wait for an outpatient appointment was reduced from 6 to 3 months. Targets were coupled with the release of information on waiting times at the hospital level and strong sanctions for poorly performing hospital managers. These changes led to a significant reduction in the percentage of patients waiting at various points of the distribution of waiting times (Propper et al., 2008b). However, as shown in Figure 3, there has been an increase in waiting times for elective care since 2008 (see also Appleby et al. (2014)).²

Finally, we also use data on health status, self-reported disability and health care use from

²For a more detailed analysis of recent trends in NHS waiting times, see also the 2014 Department of Health Report: <https://www.nao.org.uk/wp-content/uploads/2014/01/NHS-waiting-times-for-elective-care-in-England.pdf>.

the Labor Force Survey, Understanding Society and General Household Survey (see the Data Appendix).

3.2 Identification Strategy

To identify the effect of immigration on NHS waiting times, we exploit variation over time in the share of immigrants living in a local authority between 2003 and 2012. In our baseline specification, we estimate the following model:

$$w_{it} = \alpha + \beta S_{it} + X'_{it}\gamma + Z'_{pt}\lambda + \mu_p + \eta_t + \epsilon_{it}, \quad (5)$$

where w_{it} is the average waiting time (for outpatients, elective care, or A&E) in LSOA i belonging to the PCT p at time t ; S_{it} is the share of immigrants in local authority l at time t ; X'_{it} is a vector of time-varying LSOA characteristics (index of deprivation and rural indicator); Z'_{pt} is a vector of time-varying characteristics at the PCT level, and μ_p and η_t are PCT and year fixed effects, respectively; and ϵ_{it} captures the residual variation in waiting times.³ To capture time-invariant characteristics that may be correlated with both waiting times and immigration inflows we control for PCT fixed effects. PCTs are the health administrative areas responsible for commissioning primary, community, and secondary health services from providers. The capacity of the nearest hospital is likely to determine the average waiting time in a given LSOA. LSOAs served by the same hospitals would therefore share common determinants of waiting times. Thus, we include nearest NHS trust fixed effects instead of PCT fixed effects as a robustness check.

The use of geographical variation in the share of immigrants (often called an “area approach”) has been criticized by scholars (e.g., [Borjas et al., 1996](#); [Borjas, 2003](#)) for two main reasons. First, natives may respond to the impact of immigration on a local area by moving to other areas. This is important in our study because healthier natives may be more likely to migrate. Following [Borjas et al. \(1996\)](#), we test the robustness of our results to a change in the geographical unit using a higher level of aggregation. Furthermore, we analyze the effects of immigration on native internal mobility and examine whether waiting times were affected by native internal

³As immigration information is available only at the local authority level, we cannot control for LSOA fixed effects in the regression.

inflows across local authorities.

The second critique of the area approach is that immigrants might endogenously cluster in areas with better economic conditions. To address the concern of a local unobserved shock affecting both native and immigrant labor demand, we adopt an instrumental variable approach. Following Altonji and Card (1991), Card (2001), Bell et al. (2013) and Sá (2015), we use an instrumental variable based on a “shift share” of national levels of immigration into local authorities to impute the supply-driven increase in immigrants in each local authority.

In practice, we exploit the fact that immigrants tend to locate in areas that have higher densities of immigrants from their own country of origin, and we distribute the annual national inflow of immigrants from a given source country across the local authorities using the distribution of immigrants from a given country of origin in the 1991 UK Census. Using the distribution of immigrants in 1991, we reduce the risk of endogeneity because annual immigration inflows across local authorities might be driven by time-varying characteristics of the local authority that are associated with health outcomes.

Specifically, let us define F_{ct} as the total population of immigrants from country c residing in England in year t and $s_{cl,1991}$ as the share of that population residing in local authority l in year 1991. We then construct \hat{F}_{clt} , the imputed population from country c in local authority l in year t , as follows:

$$\hat{F}_{clt} = s_{cl,1991} * \Delta F_{c,t} + F_{cl,1991} \quad (6)$$

and the imputed total share of immigrants as follows:

$$\hat{S}_{lt} = \sum_c \hat{F}_{clt} / P_{l,1991} \quad (7)$$

where $P_{l,1991}$ is the total population in local authority l as of 1991. Thus, the predicted number of new immigrants from a given country c in year t who choose to locate in local authority l is obtained by redistributing the national inflow of immigrants from country c based on the distribution of immigrants from country c across local authorities as of 1991. Summing data for all countries of origin, we obtain a measure of the predicted total immigrant inflow in local authority l in year t . The variation of \hat{S}_{lt} is driven only by changes in the imputed foreign

population (the denominator is held fixed at its 1991 value) and is used as an instrument for the actual share of immigrants in local authority l at time t (S_{lt}).

One potential threat to the validity of this approach is that the instrument cannot credibly address the resulting endogeneity problem if the local economic shocks that attracted immigrants persist over time. However, this problem is substantially mitigated by including PCT fixed effects and by controlling for time-varying characteristics at the LSOA and PCT levels; thus, we can reasonably assume that past immigrant concentrations are not correlated with current unobserved local shocks that might be correlated with health. Under the assumption that the imputed inflow of immigrants is orthogonal to the local specific shocks and trends in labor market conditions after controlling for PCT and year fixed effects and time-varying characteristics of LSOAs and PCTs, the exclusion restriction holds.

4 Results

4.1 *Waiting Times for Outpatients*

Table 2 presents the main results on the effects of immigration on waiting times for outpatients. In column 1, we report the OLS estimate controlling for year and PCT fixed effects. The coefficient is negative and statistically significant. An increase in the stock of immigrants equal to 10% of the initial local authority's population decreases the average waiting time for outpatients by approximately 3 days (6% relative to the mean of the dependent variable). The coefficient becomes non-significant when we include LSOA and PCT time-varying characteristics (column 2). Including the LSOA population (column 3) does not substantially change the results, suggesting that the negative association between immigration and waiting times is not correlated with changes in the LSOA size.⁴

To account for the endogeneity of the immigrant distribution across local authorities, we then estimate a 2SLS regression using the typical shift-share instrumental variable approach explained above. In the first-stage regression, the F-statistic (17.11) is above the weak instrument threshold. Column 4 presents the second-stage estimates including only year and PCT fixed

⁴Note that including the local authority population rather than the LSOA population yields results that are substantially identical (coef. -0.933, std. err. 0.460)

effects. The coefficient diminishes by approximately 30% when including LSOA and PCT time-varying characteristics (column 5) but is still negative and significant, suggesting that an increase in the stock of immigrants equal to 10% of the initial local authority's population would reduce the average waiting time for outpatients by approximately 9 days (19% relative to the mean of the dependent variable). Propper (1995) estimated that patients would be willing to pay GBP 80 (in 1991 prices)–roughly GBP 150 in 2013 prices–for a reduction of one month in waiting times. If disutility from the waiting list were linear, one could estimate that a 10-day reduction in waiting time would be equivalent to GBP 37.5 in 2013 prices.

Again, including population size (column 6) does not change the results. Overall, these results suggest that immigration was associated with a reduction in the average waiting time for outpatients.

As a robustness check in Table A.1, we replicate the analysis using nearest NHS trust fixed effects instead of PCT fixed effects. The coefficient of our preferred estimate (column 5) is smaller–but not statistically different–than the one reported in Table A.1, suggesting that an increase in the stock of immigrants equal to 10% of the initial local authority's population would reduce the average waiting time for outpatients by approximately 6 days (13% relative to the mean of the dependent variable).

4.2 *Waiting Times in Elective Care*

In Table 3, we examine the effects of immigration on waiting times for elective care. The OLS estimate reported in column 2, which includes LSOA time-varying characteristics, year and PCT fixed effects, suggests that immigration is negatively associated with waiting time for elective care. An increase of 10 percentage points in the immigration share is associated with a 5-day reduction in the average waiting time for elective care (a 7% reduction relative to the average waiting time for elective care observed in the sample). However, the 2SLS estimate presented in column 4 is positive and non-significant, and the point estimate suggests a relatively small effect (+2% relative to the mean).

4.3 *Waiting Times in A&E*

Table 4 illustrates the effects of immigration on waiting times for A&E. Unfortunately, at the LSOA level, we have information only for the years 2007-2012. There is no evidence that immigrants have an effect on A&E waiting times. The OLS estimates are negative and non-significant. The 2SLS estimate (column 4) is positive but is estimated imprecisely. The point estimates are small (waiting times are reported in minutes). However, these results should be interpreted with caution because the analysis does not include the 2003-2006 period, in which immigration from A8 countries to the UK surged.

5 Potential Mechanisms

The model presented above suggests that immigration may reduce waiting times by two main channels. Immigration may increase native internal mobility (see [Sá \(2015\)](#)). If immigration leads natives to move to different local authorities, the population size in the local authority may not change, and the health care demand may not increase. Moreover, natives may also seek care in the private sector, thus decreasing the pressure on local authorities where immigration is surging. At the same time, recent immigrant cohorts are relatively young and healthy upon arrival because of the “healthy immigrant effect” ([Kennedy et al., 2014](#)), suggesting that these immigrants may demand less care than what the NHS predicted ([Wadsworth, 2013](#); [Steventon and Bardsley, 2011](#)). If immigrants are healthier and/or less likely to seek care, then waiting times may decrease even if the supply did not adjust.

To understand the possible mechanisms behind the negative effect of immigration on waiting times, we examine how immigration affected internal mobility and morbidity rates with respect to local authorities in England.

5.1 *Native mobility*

[Hatton and Tani \(2005\)](#) and [Sá \(2015\)](#) analyze the displacement effects of immigration in the UK. [Hatton and Tani \(2005\)](#) find that for every 10 immigrants arriving in a region, 3.5 natives leave and move to other regions. Using the UK LFS and focusing on the working-age population,

Sá (2015) finds even larger effects, suggesting a 1-to-1 immigrant-native displacement. In Table 5, we replicate the same analysis of Sá (2015) focusing on the population 15 years of age and older.⁵ As we are interested in the effects of immigration on the NHS, it is important for us to consider the effects on the elderly, who represent an important share of the demand for health care services.

Exploiting LFS information on residence in the previous year, we analyze the response of the native population to immigration in our examination of in-migration and out-migration rates. Following Sá (2015), we classify natives as having moved out of local authority l if they lived in local authority i in the previous year ($t - 1$) and currently, in year t , live in a different local authority. We then define the out-migration rate as the number of natives who moved out of local authority l divided by the native population of local authority l in year t . Similarly, we classify natives as having moved into local authority l if they live there in year t and were living in a different local authority in the previous year. We compute the in-migration rate as the ratio of the the number of natives who moved into local authority l to the native population of l in year $t - 1$. The out-migration rate is simply the difference between the out-migration and in-migration rates.

To examine the effect of immigration on native out-migration, in-migration and net out-migration rates, we estimate the following equation:

$$mobility_{lt} = \beta \Delta FBl_t / Pop_{lt-1} + \phi_t + \rho_l + \epsilon_{lt} \quad (8)$$

The dependent variables are the native out-migration, in-migration or net out-migration rate. The coefficient β captures the change in mobility rates generated by an immigration increase equal to 1% of the local authority population. As the mobility of natives is affected by many factors that may also be correlated with the immigrant inflow in a local area, we adopt the instrument based on historical settlement patterns of immigrants to address the endogeneity concern.

Overall, our results are in the same direction as those obtained by Sá (2015) and, if anything, suggest an even larger displacement of natives. An increase in the stock of immigrants equal to

⁵Information on the local authority of residence in the year before the interview is available in the LFS since 2004.

1% of the local initial population increases the native out-migration rate by 16 percentage points and the native in-mobility rate by 6.2 percentage points. As a result, native net out-migration rate increases by 9.7 percentage points.⁶ These results confirm that immigration leads natives to move to different areas. This also explains why we find no differences in the effect of immigration on waiting times when we include population size as a control variable.

Native out-migration in response to immigration may increase demand for health care services in the local areas to which natives move. As shown in Table 6 (column 1), an increase of 1 percentage point in the native population relative to the resident population in the previous year increases the average waiting time for outpatients by approximately 6 days (13% more relative to the mean of the dependent variable). The coefficient diminishes when we include LSOA time-varying characteristics (column 2) and does not change substantially when we control for population size. The effect of native out-migration on waiting times for elective care and A&E is insignificant (not reported).

5.2 *Immigration and Health*

As returns on migration are higher for healthier individuals, immigrants are likely to self-select migration based on health, along with other dimensions (e.g., education, Palloni and Morenoff (2001); Jasso et al. (2004); Giuntella (2013)). Kennedy et al. (2014) show that this is particularly true for less educated immigrants, who have much better health outcomes than the average native person with low education.

The LFS contains questions on whether individuals had a health problem lasting more than 12 months, whether they reported any disability⁷, and whether they had days off work because they were sick or injured in the reference week. Unsurprisingly, we find a positive and significant correlation between the incidence of individuals reporting health problems and disability and waiting times across Englands local authorities. For instance, an increase of 10 percentage points in the share of individuals reporting health problems is associated with a 9.3% increase in average waiting times for outpatients (results are available upon request). By changing the de-

⁶Consistent with these results, our findings indicate that an increase in the share of immigrants living in a local authority has no significant effects on the local authority population size.

⁷We include both individuals who have a long-term disability that substantially limits their day-to-day activities and those who have a long-term disability that affects the kind or amount of work that they can do.

mographic composition of the population living in a local area, immigration may affect the share of individuals reporting health problems and disability and thus affect waiting times. To investigate this potential mechanism, in Table 7, we analyze immigrant-native differences in health using individual data from the LFS (2003-2012).

Panel A shows that foreign-born individuals are significantly less likely to report any health problem. In particular, the raw difference reported in column 1 shows that immigrants in England are 8 percentage points less likely (than their UK-born counterparts) to report a health problem lasting more than a year. This is equivalent to a 25% difference with respect to the mean of the dependent variable in the sample (32%). The difference becomes smaller when we account for age, education, gender and year fixed effects, indicating a difference of 4.6 percentage points equivalent to 15% of the mean (column 2). The coefficient remains stable when we include local authority fixed effects (column 3). In Panel B, we illustrate the difference in the likelihood of reporting any disability. On average, immigrants are 4.4 percentage points less likely to report any disability (column 1). The coefficient reduces to 2.8 percentage points when we account for sociodemographic characteristics, year fixed effects (column 2), and local authority fixed effects (column 3), revealing a 12% difference with respect to the incidence of disability in the sample (22%). Immigrants are also less likely to take time off because of health problems. The conditional difference reported in column 3 of Panel C shows that foreign-born individuals are 17% less likely to be absent from work because of health problems than their UK-born counterparts. In Table 8, we restrict the native sample to individuals who resided in a different local authority in the previous year. The results show that immigrants tend to be healthier than native internal migrants. Consistent with previous literature on the healthy immigrant effect, the advantage is larger among recent cohorts of immigrants (columns 3-6).

These results are also confirmed when we use data from the Understanding Society survey (2009-2014). As shown in Table 9, the Understanding Society data suggest that immigrants are less likely to report having a poor health status, any health limitation, or any disability. This is particularly true for immigrants who arrived in England after 2000. The health immigrant advantage still remains when we control for sociodemographic characteristics such as gender, age, education, marital status, occupational category, region of residence, rural status, and year fixed effects. Given these findings, it is unsurprising that immigrants are less likely to use health

care services than natives.

Using the same Understanding Society sample, we also illustrate differences between immigrants and natives in their health care use (see Table 10). Consistent with previous findings by Wadsworth (2013) and Steventon and Bardsley (2011), we find that recent immigrants are significantly less likely than natives to have consulted a GP and to have received treatment as outpatients or inpatients. Again, the results hold when we control for sociodemographic characteristics.⁸

As shown in Panel C in Table 10, immigrants are overall more likely to use GP services. This result is driven by earlier cohorts of immigrants. Recent cohorts are, by contrast, less likely than natives to use GP services (column 3-6).⁹ We obtain similar results using the General Household Survey (2002-2006). See Table A.2 in the appendix for further details.

5.3 Immigration and the Supply of Health Care

Thus far, we have focused on the effects of immigration on the demand for care and waiting times. However, immigration may also induce a rightward shift in supply, as many doctors and nurses come to the UK from overseas, increasing the supply of health care personnel. In this section, we analyze how immigration affects the supply of health care services by focusing on the number of GPs, the number of GPs who graduated abroad, specialists, GP practices, the ratio of occupied hospital beds to the population, and average NHS expenditure.

The results presented in Table 11 reveal no evidence of a significant association between immigration and the health care supply across England. As the NHS supply may not adjust immediately to immigration, we also replicate the same estimates using a model with long differences (between years t and $t-3$) and confirm the lack of any significant effect on the supply side at the local level.¹⁰ Consistent with these results, using data on individual occupations from the LFS 2003-2012, we find no evidence of a significant relationship between immigration and

⁸Dustmann and Frattini (2014) estimate that immigrants from the European Economic Area (EEA), particularly immigrants from countries that joined the EU in 2004, made a positive fiscal contribution. Our results suggest that their estimates may be downward biased because they estimate the proportion of health services expenditure attributable to each group based on the groups age structure, yet we show that immigrants are healthier than natives in their same age group even after controlling for socioeconomic status and education.

⁹Note that information on doctor and hospital services is available only in the 4th wave of the Understanding Society survey.

¹⁰The results are available upon request.

the proportion of health care professionals and nurses in the population. Furthermore, when including the number of GPs, health care professionals and nurses in our main regression on waiting times, we find that the coefficient is not substantially affected.¹¹

While the NHS is strongly dependent on foreign-trained doctors and foreign health care professionals, the lack of a significant association between immigration and the supply of health care may have several explanations. First, the large majority of immigrants do not work in the NHS, and this could affect the correlation between the share of immigrants and the staff size across local authorities. Indeed, using LFS data (2003-2012), only 7% of the working-age immigrant population works in professional health care occupations, including medical doctors, dentists, pharmacists, nurses and midwives. Second, the vast majority of foreign-born health care professionals are concentrated in a few areas (e.g., London, Oxford), as local authorities with the highest provision of doctors and nurses are those with major cities/urban centers along with medical schools and teaching hospitals (Yar et al., 2006; Shutes, 2011). Third, many new immigrants working in the NHS could be substituting for natives or other immigrants and may not necessarily increase the supply of NHS staff. It is also important to note that an increase in the number of GPs or practitioners may not necessarily reduce waiting times (Silvester et al., 2004; Devlin et al., 2002). Previous studies analyzing the association between waiting lists and supply measures such as the number of consultants, the number of beds and hospital expenditure have found no clear pattern (Cullis et al., 2000). Finally, there is evidence that while NHS increased the number of qualified doctors and nurses during the 2002-2012 period, the productivity of consultants specialists decreased over this period (Bohmer and Imison, 2013).

6 The Heterogeneous Impact of Immigration Across Local Authorities

The extent of immigrant health selectivity is likely to differ among local authorities in England. Figure 4 shows that both natives and immigrants in more deprived areas are more likely

¹¹Immigrants represent a large and growing share of care workers in the UK who provide home care services for elderly natives (Shutes, 2011). While home care workers are unlikely to have any direct effect on waiting times, they may affect population access to NHS health care services by increasing early diagnosis and patient mobility. To verify whether our main result is partially explained by the increase in home care workers induced by immigration, we include the share of foreign-born home care workers as a control when analyzing the effect of immigration on waiting times. The coefficient is only marginally higher—and not statistically different—than that found in our baseline specification. The results are available upon request.

to report health problems lasting more than 12 months and disabilities. Unsurprisingly, Table 12 shows that individuals living in areas with an Index of Multiple Deprivation (IMD) above the median are, on average, less healthy than those living in less deprived areas.¹² In particular, immigrants in deprived areas tend to be less favorably selected (see columns 5 and 6).

There is evidence that migrants moving to less deprived areas are healthier than migrants who move to more deprived locations, thus increasing health inequalities across areas (Norman et al., 2005). This suggests that the effects of immigration on waiting times may be very different in deprived areas, particularly as these are areas where the supply tends to be more inelastic, where the population faces higher mobility costs, and where waiting times tend to be longer (Laudicella et al., 2012).

In Table 13, we explore this further by estimating the impact of immigration on outpatient waiting times based on the level of deprivation of the area.¹³ The results show that the negative effect on waiting times for outpatients is driven by less deprived areas. Columns 1-5 report the estimates of the main effect for LSOAs in the different quintiles of the IMD distribution. The table shows that the negative effect is largest (in absolute value) in the LSOAs in the less deprived areas (Q1) and lowest in the more deprived areas (Q5), with the coefficient decreasing monotonically along the IMD distribution.¹⁴

We also investigate whether there are any specific short-term effects of immigration in deprived areas and whether the results are affected by the inclusion of London, the region that has the largest concentration of immigrants and the largest health care supply in England. We find that the results are affected by the exclusion of London and the focus on more deprived areas of England before 2008. In particular, columns 4-5 of Table 14 show that immigration had a heterogeneous impact across England and that, at least in the first years following the 2004 EU enlargement, immigration increased the average waiting time in deprived areas outside of London. Column 4 shows that in the first three years after the 2004 EU enlargement, an increase of 10 percentage points in the share of immigrants living in a local authority increased waiting times by approximately 14 days (a 25% increase relative to the mean of the dependent variable) when

¹²Note that we exclude the health domain from the computation of the IMD score.

¹³We replicate Table 14 for waiting times in elective care and A&E but find no evidence of significant effects even when restricting the analysis to deprived areas outside of London.

¹⁴Note that in Table 13, we include region fixed effects rather than PCT fixed effects, as the smaller sample size of each quintile does not allow us to have sufficient identification power when using PCT fixed effects.

we restrict the analysis to local authorities with an IMD above the median. The effect becomes even larger (20 days, + 38% of the mean of the dependent variable) when limit the sample to the 4 highest deciles of the IMD. With the estimates of [Propper \(1995\)](#) on the cost of waiting time, an average increase of 20 days in waiting time would be equivalent to GBP 100 (in 2013 prices) per patient.

As shown in [Figure 4](#) and [Table 12](#), deprived areas attract immigrants with worse health status. One of the factors contributing to the higher morbidity of immigrants moving into more deprived areas may be the greater presence of non-economic immigrants. Previous studies have shown that refugees and asylum seekers have worse health than economic migrants ([Chiswick et al. \(2008\)](#)). In the UK, most asylum seekers are assigned to local areas by the UK government based on space and logistical considerations. However, as noted by [Bell et al. \(2013\)](#), asylum seekers are disproportionately sent to deprived areas. Using data from the Home Office Immigration Statistics confirms this result in [Figure 5](#).

In [Table A.3](#), we show that a larger number of asylum seekers in a local authority is associated with higher waiting times. Columns 1 and 2 report OLS estimates including PCT and year fixed effects (column 2). Columns 3 and 4 repeat this analysis for asylum seekers in dispersal accommodation. The coefficient is positive but becomes non-significant when we include year fixed effects. The sign of this relationship between the share of asylum seekers and the average waiting time for outpatients is confirmed when using asylum seekers in dispersal accommodation to instrument for the total number of asylum seekers in an area (column 5), as in ([Bell et al., 2013](#)). Again, the coefficient is not precisely estimated when we include year fixed effects (column 6), and the estimated effect is relatively small: one standard deviation in the share of asylum seekers is associated with an approximately 1% increase in waiting times relative to the mean of the dependent variable. However, these results suggest that the larger presence of asylum seekers in deprived areas may contribute to the increase in waiting times shown in [Table 14](#).

7 Robustness Checks

7.1 Using Data from National Insurance Numbers (NINOs) as an Alternative Measure of Immigration

Using the LFS to compute the stock of immigrants living in a local authority is subject to measurement error because in some local authorities, the share of immigrants in the LFS sample is low. Measurement error can result in substantial attenuation bias. Although using an instrumental variable based on census data and national-level inflows substantially mitigates this concern, as underlined by [Sá \(2015\)](#), we further check the robustness of our results using data from NINO registrations to overseas nationals from the Department for Work and Pensions.

Overseas nationals seeking to work, claim benefits or claim tax credits in the UK need a NINO. Thus, NINOs registrations of foreign nationals constitute an alternative source of information on immigrant inflows across local authorities. The main advantage of using NINOs data is that they are based on administrative records and provide a good measure of employment-driven migration ([Lucchino et al., 2012](#)). However, NINOs provide information only for the point and time of registration. Immigrants may change residence over time or leave the UK and return without having to re-register for a new NINO. We compute the stock of immigrants living in different local authorities using the 2001 Census data as a base for the initial stock of immigrants by the local authority and the NINOs data (available since 2002) to compute the evolution of the stock of immigrants by local authorities in the period under study (2003-2012). In [Table 15](#), we replicate the main results presented in [Tables 2-4](#) and find very similar results, thus confirming the negative effect on waiting times for outpatients and the non-significant effects on waiting times for elective care and A&E.

7.2 Regional Analysis

In this section, we test the robustness of our results to a change in the geographical unit using a higher level of aggregation. Consistent with previous analyses by [Borjas \(2006\)](#) and [Sá \(2015\)](#), we find no evidence that immigration has a negative effect on waiting times when waiting times are aggregated at the regional level (see [Table 16](#)). While point estimates are not precise and the standard errors are very large because the sample is much smaller, the point estimate is much

smaller than that presented in Table 2.

A likely explanation of this result is that intra-region native mobility is causing diffusion of the effects of immigration within a region (see Tables 5). Immigration may decrease waiting times at the local level, but the outflow of natives in response to immigration may increase waiting times in other local areas (see Table 6).

8 Conclusion

Immigrants' free access to the NHS and the perceived associated health care costs have generated much debate in the UK and have even resulted in the introduction of a fee for non-EU citizens to access NHS services. While previous papers have analyzed the effect of immigration to the UK on welfare use and documented differences in health care use between foreign-born individuals and natives, we know less about the effects of immigration on NHS waiting times, which is one of the most pressing issues for the NHS system.

This article contributes to the previous literature by estimating the effects of immigration on NHS waiting times in England. We find that immigration has reduced waiting times for outpatient referrals. An increase of 10 percentage points in the share of migrants living in a local authority would reduce waiting times by 9 days on average. We find no evidence that immigration affects waiting times in A&E and in elective care. This result is likely to be driven by two key factors. First, migrants tend to be young and healthy upon arrival (healthy immigrant effect) and are likely to have a smaller impact on the demand for NHS services. Second, the arrival of immigrants increases the likelihood of natives moving and accessing health services in a different local authority. Thus, the effects of immigration on the demand for health care services are dispersed throughout the country (via internal migration).

We also observe a positive impact of immigration on outpatient waiting times in the years immediately following the 2004 EU enlargement in the more deprived areas outside of London. This effect is partly explained by the fact that less healthy immigrants tend to move into more deprived areas, thereby increasing the demand for NHS services in those areas. Another driving factor is the lower mobility of natives in deprived areas, particularly among those with health problems.

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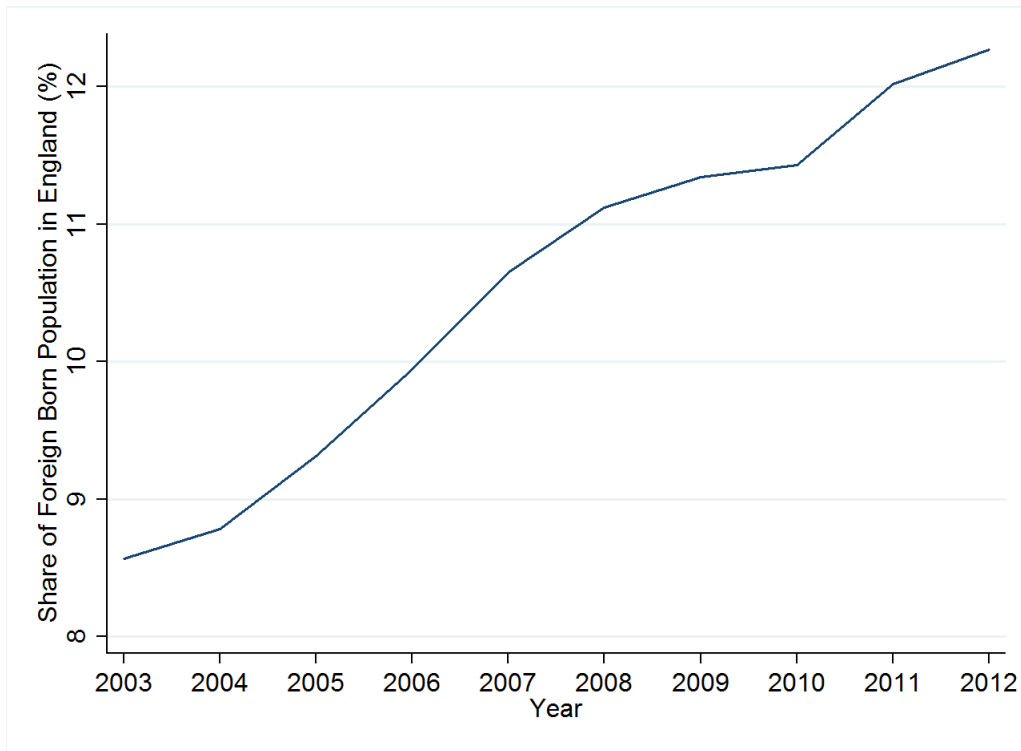
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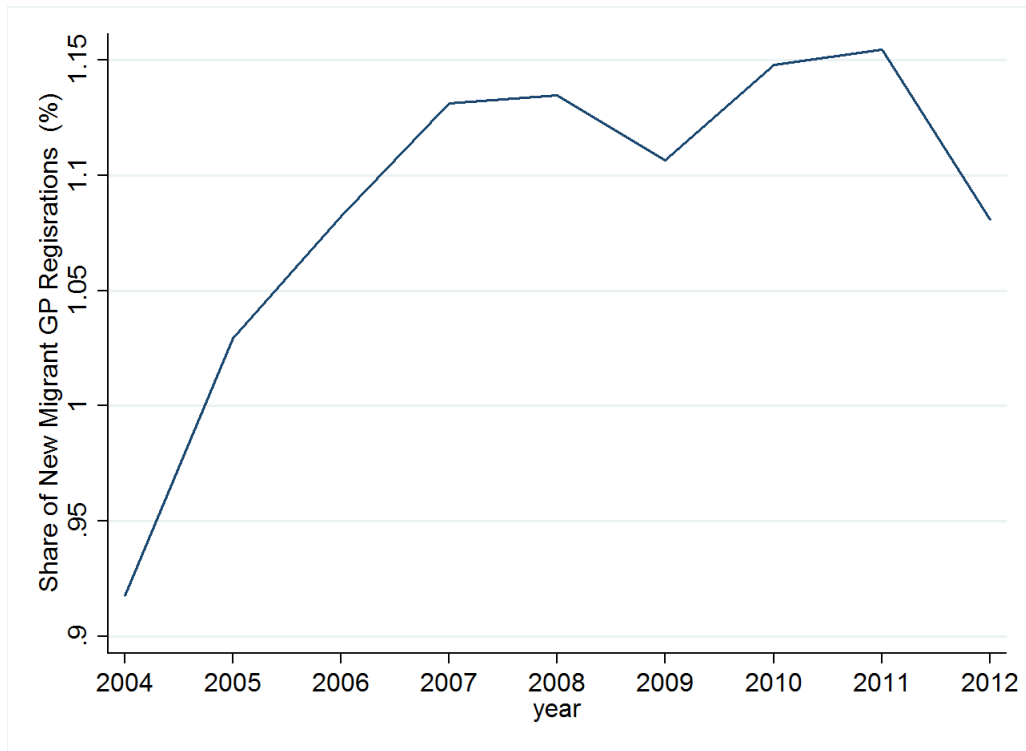
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Figure 1: Foreign-born share of the population in England



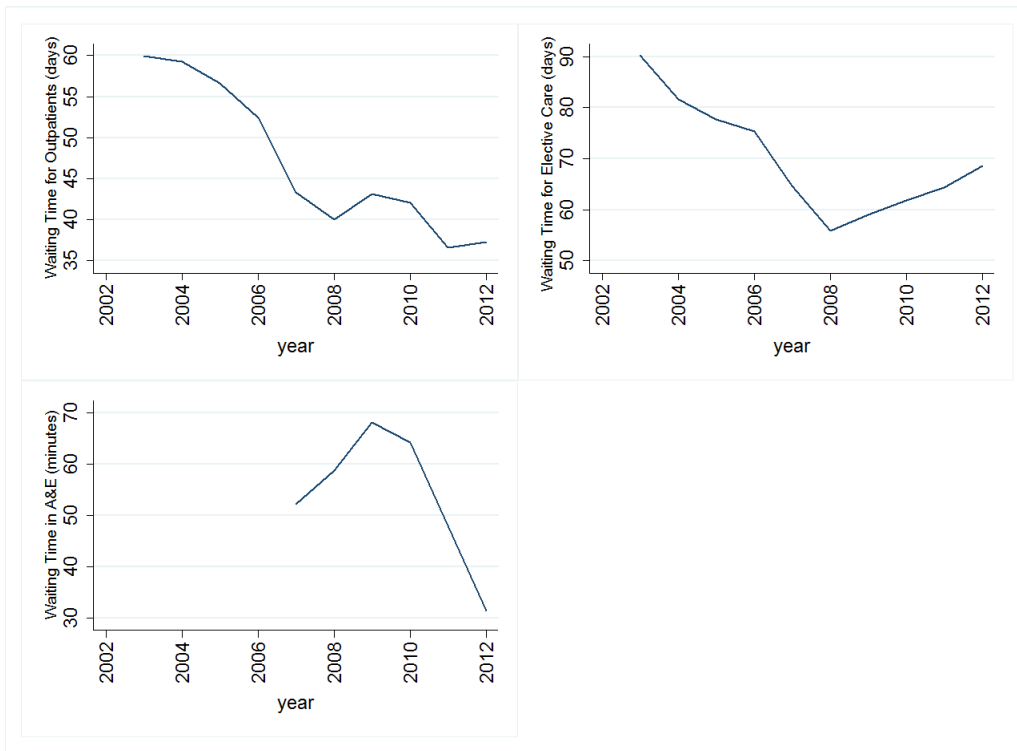
Notes - Data are drawn from the UK Labor Force Survey (2003-2012).

Figure 2: New migrant GP registrations as a share of total population in England



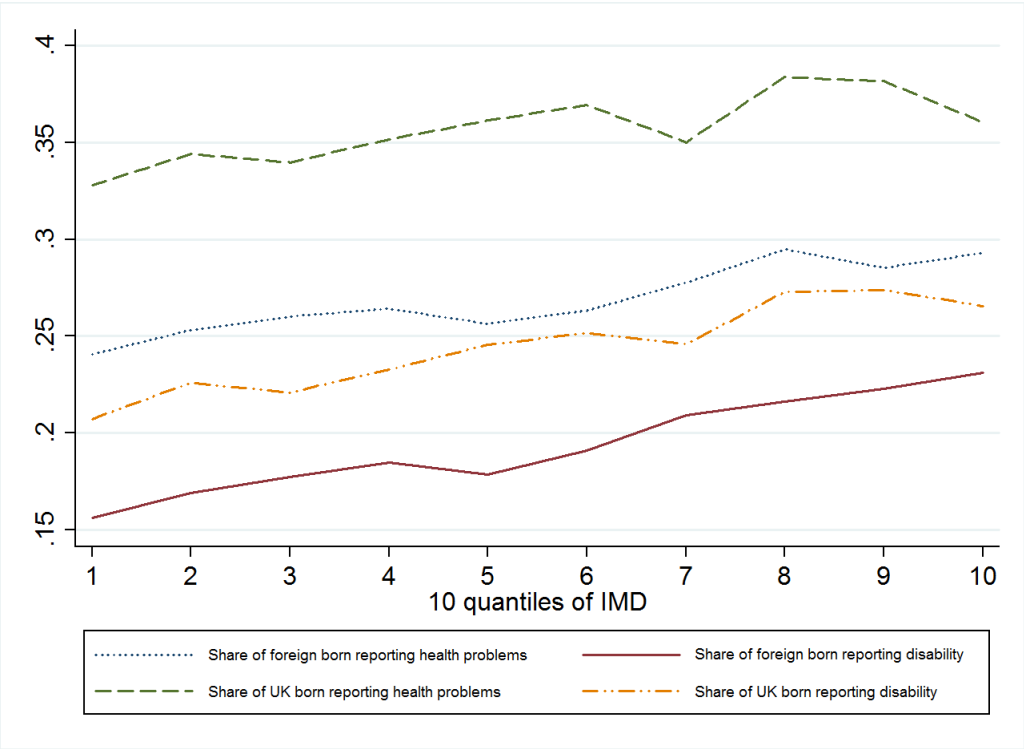
Notes - Source: Patient Register Data Service (2004-2012).

Figure 3: Waiting Times in the NHS (2003-2012)



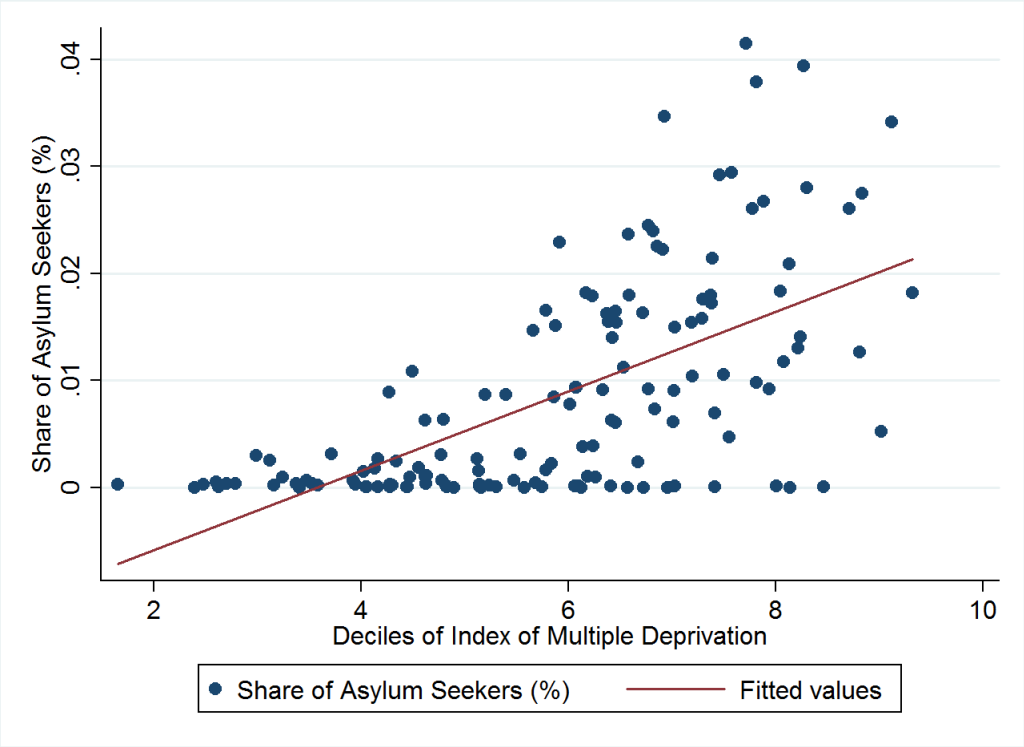
Notes - Data on average waiting times for outpatient services are drawn from the Hospital Episodes Statistics.

Figure 4: Health by migrant status and Index of Multiple Deprivation (IMD) in England (2003-2012)



Notes - Data are drawn from the UK Labor Force Survey.

Figure 5: Share of asylum seekers in the population by Index of Multiple Deprivation (IMD) in England (2003-2012)



Notes - Data are drawn from the UK Home Office (2003-2012).

Table 1: Summary Statistics, 2003-2012

| | Mean | Std |
|--|---------|---------|
| <i>Waiting times (LSOA-level, Source: NHS, HES)</i> | | |
| Waiting time for Outpatients (Days) | 47.06 | (16.61) |
| Waiting time for Elective (Days) | 69.82 | (39.51) |
| Waiting time for A&E (minutes) | 51.98 | (64.56) |
| <i>LSOA characteristics</i> | | |
| Log total population | 7.35 | (0.15) |
| Share of Women over 60 | 0.12 | (0.05) |
| Share of Men over 65 | 0.07 | (0.03) |
| Share of Women | 0.51 | (0.03) |
| Rural Index (1-8) | 5.30 | (0.86) |
| IMD score | 21.54 | (15.61) |
| <i>Supply Characteristics (PCT-level, Source: NHS, ONS)</i> | | |
| GPs per 1k pop | 0.94 | (0.17) |
| Specialists per 1k pop | 0.16 | (0.03) |
| Ratio of occupied hospital beds to population | 0.82 | (0.19) |
| NHS expenditure per capita , (000s) | 1.11 | (0.59) |
| <i>Incidence of Disease ((PCT-level, per 1000, , Source: HES, ONS)</i> | | |
| Stroke | 16.61 | (3.88) |
| Coronary disease | 37.28 | (8.57) |
| Hypertension | 138.25 | (18.60) |
| Diabetes | 39.14 | (7.11) |
| Pulmonary Disease | 15.19 | (4.80) |
| Epilepsy | 6.32 | (1.04) |
| Hypothyroidism | 26.60 | (6.20) |
| Cancer | 9.43 | (4.17) |
| Mental Health | 7.00 | (2.13) |
| Ventricular Disfunction | 5.30 | (0.86) |
| <i>Immigration(LA-level, Source: LFS)</i> | | |
| Share of Immigrants (LFS) | 11.75 | (10.99) |
| Observation | 287,092 | 287,092 |

Notes - Data are drawn from the Hospital Episodes Statistics, the UK Labor Force Survey, and the UK ONS.

Table 2: Immigration and Waiting Times (days) in the NHS (Outpatients), 2003-2012

| | (1) | (2) | (3) | (4) | (5) | (6) |
|-----------------------------------|---------|---------|---------|----------|----------|----------|
| | OLS | OLS | OLS | 2SLS | 2SLS | 2SLS |
| Share of Immigrants | -0.324* | -0.163 | -0.164 | -1.575** | -0.933** | -0.935** |
| | (0.178) | (0.158) | (0.158) | (0.701) | (0.461) | (0.461) |
| Year f.e. | YES | YES | YES | YES | YES | YES |
| PCT f.e. | YES | YES | YES | YES | YES | YES |
| LSOA time-varying characteristics | NO | YES | YES | NO | YES | YES |
| LSOA population | NO | NO | YES | NO | NO | YES |
| Observations | 287,092 | 287,092 | 287,092 | 287,092 | 287,092 | 287,092 |
| Mean of Dep. Var. | 47.07 | 47.12 | 47.12 | 47.07 | 47.12 | 47.12 |
| Std.Err. of Dep. Var. | 16.61 | 16.65 | 16.65 | 16.61 | 16.65 | 16.65 |
| IV F-stat | | | | 17.11 | 16.07 | 16.05 |

Notes - The dependent variable is the average waiting time for outpatient services (in days). Data on average waiting times for outpatient services are drawn from the Hospital Episodes Statistics. Data on immigrant distribution across Local Authorities are drawn from the UK Labor Force Survey. Time-varying LSOA characteristics include an Index of Deprivation (we use dummies for each decile of the index) and an indicator for rural status, the share of women, and the share of over 65 in the LSOA population. PCT time-varying characteristics include ratio of occupied hospital beds to population, number of GPs per capita, number of GP practice per capita, number of health consultants per capita, health expenditure per capita, incidence of most common diseases. Columns 3 and 6 include LSOA size. Standard errors are clustered at the Local Authority level.

Table 3: Immigration and Waiting Times (days) in the NHS (Elective Care - Inpatients), 2003-2012

| | (1) | (2) | (3) | (4) | (5) | (6) |
|-----------------------------------|-------------------|--------------------|--------------------|------------------|------------------|------------------|
| | OLS | OLS | OLS | 2SLS | 2SLS | 2SLS |
| Share of Immigrants | -0.103 (0.317) | -0.477* (0.261) | -0.475* (0.262) | 0.204 (0.597) | 0.203 (0.596) | 0.208 (0.597) |
| Year f.e. | YES | YES | YES | YES | YES | YES |
| PCT f.e. | YES | YES | YES | YES | YES | YES |
| LSOA time-varying characteristics | NO | YES | YES | NO | YES | YES |
| LSOA population | NO | NO | YES | NO | NO | YES |
| Observations | 287,092 | 287,092 | 287,092 | 287,092 | 287,092 | 287,092 |
| Mean of Dep. Var. | 69.83 | 69.88 | 69.88 | 69.83 | 69.88 | 69.88 |
| Std.Err. of Dep. Var. | 39.52 | 39.36 | 39.36 | 39.52 | 39.36 | 39.36 |

Notes - The dependent variable is the average waiting time for inpatients (in days). Data on average waiting times for elective care are drawn from the Hospital Episodes Statistics. Data on immigrant distribution across Local Authorities are drawn from the UK Labor Force Survey. Time-varying LSOA characteristics include an Index of Deprivation (we use dummies for each decile of the index) and an indicator for rural status, the share of women, and the share of over 65 in the LSOA population. PCT time-varying characteristics include ratio of occupied hospital beds to population, number of GPs per capita, number of GP practice per capita, number of health consultants per capita, health expenditure per capita, incidence of most common diseases Columns 3 and 6 include LSOA size. Standard errors are clustered at the Local Authority level.

Table 4: Immigration and Waiting Times (minutes) in the NHS (A&E), 2007-2012

| | (1) | (2) | (3) | (4) | (5) | (6) |
|-----------------------------------|-------------------|-------------------|-------------------|------------------|------------------|------------------|
| | OLS | OLS | OLS | 2SLS | 2SLS | 2SLS |
| Share of Immigrants | -0.780 (1.151) | -0.522 (0.978) | -0.522 (0.978) | 1.772 (1.295) | 1.203 (1.147) | 1.203 (1.147) |
| Year f.e. | YES | YES | YES | YES | YES | YES |
| PCT f.e. | YES | YES | YES | YES | YES | YES |
| LSOA time-varying characteristics | NO | YES | YES | NO | YES | YES |
| LSOA population | NO | NO | YES | NO | NO | YES |
| Observations | 145,028 | 145,028 | 145,028 | 145,028 | 145,028 | 145,028 |
| Mean of Dep. Var. | 55.26 | 55.30 | 55.30 | 55.26 | 55.30 | 55.30 |
| Std.Err. of Dep. Var. | 65.56 | 65.53 | 65.53 | 65.56 | 65.53 | 65.53 |

Notes - The dependent variable is the average waiting time in A&E (in minutes). Data on average waiting times for A&E are drawn from the Hospital Episodes Statistics. Data on immigrant distribution across Local Authorities are drawn from the UK Labor Force Survey. Time-varying LSOA characteristics include an Index of Deprivation (we use dummies for each decile of the index) and an indicator for rural status, the share of women, and the share of over 65 in the LSOA population. PCT time-varying characteristics include ratio of occupied hospital beds to population, number of GPs per capita, number of GP practice per capita, number of health consultants per capita, health expenditure per capita, incidence of most common diseases. Columns 3 and 6 include LSOA size. Standard errors are clustered at the Local Authority level.

Table 5: Immigrant Inflows and Native Internal Mobility (LFS, 2004-2012)

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---------------------------|---------------------|---------------------|---------------------|---------------------|------------------------|------------------------|
| | OLS | 2SLS | OLS | 2SLS | OLS | 2SLS |
| Dependent Variable: | Out-migration rate | Out-migration rate | In-migration rate | In-migration rate | Net out-migration rate | Net out-migration rate |
| $\Delta FBit / Pop_{i-1}$ | 0.119*** (0.014) | 0.159*** (0.027) | 0.053*** (0.016) | 0.062*** (0.019) | 0.066*** (0.022) | 0.097*** (0.033) |
| Observations | 1,269 | 1,269 | 1,269 | 1,269 | 1,269 | 1,269 |
| Mean of Dep. Var. | 0.033 | 0.033 | 0.030 | 0.030 | 0.003 | 0.003 |
| Std.Err. of Dep. Var. | 0.056 | 0.056 | 0.042 | 0.042 | 0.048 | 0.048 |
| IV-Fstat | | 25.36 | | 25.36 | | 25.36 |

Notes - Data are drawn from the UK Labor Force Survey. Information on past year residence is available only since 2004. All the regressions include year and local authority fixed effects and the standard errors are clustered at the Local Authority level.

Table 6: Native Internal Mobility and Waiting Times for Outpatients (days), 2004-2012

| Dependent Variable: | (1) 2SLS Waiting Time | (2) 2SLS Waiting Time | (3) 2SLS Waiting Time |
|-----------------------------------|-----------------------------|-----------------------------|-----------------------------|
| Natives | 5.689*** (1.716) | 3.219*** (1.138) | 3.227*** (1.138) |
| Year f.e. | YES | YES | YES |
| PCT f.e. | YES | YES | YES |
| LSOA time-varying characteristics | NO | YES | YES |
| LSOA population | NO | NO | YES |
| First-Stage F | 11.14 | 7.00 | 7.01 |
| Observations | 258,458 | 258,458 | 258,458 |
| Mean of Dep. Var. | 45.71 | 45.71 | 45.71 |
| Std.Err. of Dep. Var. | 15.64 | 15.64 | 15.64 |
| IV-Fstat | 12.52 | 11.91 | 11.91 |

Notes - The dependent variable is the average waiting time for outpatient services (in days). Data on average waiting times for outpatient services are drawn from the Hospital Episodes Statistics. Data on immigrant distribution across Local Authorities are drawn from the UK Labor Force Survey. Information on past year residence is available only since 2004. Time-varying LSOA characteristics include an Index of Deprivation (we use dummies for each decile of the index) and an indicator for rural status, the share of women, and the share of over 65 in the LSOA population. PCT time-varying characteristics include ratio of occupied hospital beds to population, number of GPs per capita, number of GP practice per capita, number of health consultants per capita, health expenditure per capita, incidence of most common diseases. Column 3 includes LSOA size. Standard errors are clustered at the Local Authority level.

Table 7: Immigrant-Native Differences in Health, (LFS, 2004-2012)

| Panel A: Any health issue | | | |
|--|----------------------|----------------------|----------------------|
| Foreign born | -0.075*** (0.001) | -0.046*** (0.001) | -0.049*** (0.001) |
| Observations | 1,596,154 | 1,551,640 | 1,551,640 |
| Mean of Dep.Var. Std.Err. | 0.317 (0.465) | 0.319 (0.466) | 0.319 (0.466) |
| Panel B: Any disability | | | |
| Foreign born | -0.039*** (0.001) | -0.024*** (0.001) | -0.029*** (0.001) |
| Observations | 1,583,195 | 1,538,633 | 1,538,633 |
| Mean of Dep.Var. Std.Err. | 0.220 (0.414) | 0.222 (0.416) | 0.223 (0.416) |
| Panel C: Absent at work due to illness or injury | | | |
| Foreign born | -0.003*** (0.001) | -0.002*** (0.001) | -0.004*** (0.000) |
| Observations | 983,229 | 938,668 | 938,668 |
| Mean of Dep.Var. Std.Err. | 0.023 (0.152) | 0.023 (0.151) | 0.023 (0.151) |
| Socio-demographic characteristics | NO | YES | YES |
| Year f.e. | NO | YES | YES |
| Local authority f.e. | NO | NO | YES |

Notes - Sociodemographic characteristics include gender, dummies for age, education, occupation (1-digit). Robust standard errors are reported in parentheses.

Table 8: Immigrant-Native Internal Migrants Differences in Health, (LFS, 2004-2012)

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Panel A: Any health issue | | | | | | |
| Foreign born | | | | | | |
| Foreign born arrived after 2000 | -0.038*** (0.005) | -0.051*** (0.004) | | | | |
| Foreign born arrived after 2004 | | | -0.106*** (0.005) | -0.072*** (0.003) | -0.131*** (0.005) | -0.084*** (0.003) |
| Observations | 166,078 | 162,869 | 96,854 | 95,655 | 62,649 | 62,401 |
| Mean of Dep. Var. | 0.185 | 0.186 | 0.121 | 0.122 | 0.105 | 0.105 |
| Std.Err. of Dep. Var. | 0.388 | 0.389 | 0.327 | 0.327 | 0.307 | 0.307 |
| Panel B: Any disability | | | | | | |
| Foreign born | | | | | | |
| Foreign born arrived after 2000 | -0.026*** (0.004) | -0.039*** (0.003) | | | | |
| Foreign born arrived after 2004 | | | -0.080*** (0.004) | -0.057*** (0.003) | -0.101*** (0.004) | -0.069*** (0.003) |
| Observations | 165,192 | 161,979 | 95,816 | 94,615 | 61,634 | 61,385 |
| Mean of Dep. Var. | 0.138 | 0.139 | 0.0850 | 0.0854 | 0.0711 | 0.0711 |
| Std.Err. of Dep. Var. | 0.344 | 0.346 | 0.279 | 0.279 | 0.257 | 0.257 |
| Panel C: Absent at work due to illness or injury | | | | | | |
| Foreign born | | | | | | |
| Foreign born arrived after 2000 | -0.001 (0.002) | -0.004* (0.002) | | | | |
| Foreign born arrived after 2004 | | | -0.004 (0.002) | -0.006*** (0.002) | -0.006** (0.002) | -0.006*** (0.002) |
| Observations | 109,582 | 106,369 | 63,004 | 61,803 | 39,494 | 39,245 |
| Mean of Dep. Var. | 0.0216 | 0.0214 | 0.0200 | 0.0200 | 0.0186 | 0.0185 |
| Std.Err. of Dep. Var. | 0.145 | 0.145 | 0.140 | 0.140 | 0.135 | 0.135 |
| Sociodemographic characteristics | NO | YES | NO | YES | NO | YES |
| Year f.e. | NO | YES | NO | YES | NO | YES |
| Local authority f.e. | NO | YES | NO | YES | NO | YES |

Notes - We restrict the sample of natives to individuals who were living in a different local authority in the previous year. Standard errors (in parentheses) are clustered at the local authority level. Regressions include year and local authority fixed effects. Sociodemographic characteristics include gender, dummies for age, education occupation (1-digit).

Table 9: Immigrant Health Advantage, (Understanding Society, 2009-2014)

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|--------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Panel A: Poor health, waves 1-4 | | | | | | |
| Foreign born | | -0.047*** (0.007) | | | | |
| Foreign born came after 2000 | | | -0.134*** (0.007) | -0.134*** (0.007) | | |
| Foreign born came after 2004 | | | | | -0.144*** (0.008) | -0.144*** (0.008) |
| Observations | 67,584 | 67,584 | 62,711 | 62,711 | 61,565 | 61,565 |
| Sociodemographic Controls | NO | YES | NO | YES | NO | YES |
| Mean of Dep. Var. | 0.193 | 0.193 | 0.190 | 0.190 | 0.192 | 0.192 |
| Std.Err. of Dep. Var. | 0.394 | 0.394 | 0.393 | 0.393 | 0.394 | 0.394 |
| Panel B: Disability, waves 1-4 | | | | | | |
| Foreign born | | -0.127*** (0.009) | | | | |
| Foreign born came after 2000 | | | -0.256*** (0.010) | -0.256*** (0.010) | | |
| Foreign born came after 2004 | | | | | -0.276*** (0.011) | -0.276*** (0.011) |
| Observations | 67,649 | 67,649 | 62,770 | 62,770 | 61,623 | 61,623 |
| Sociodemographic Controls | NO | YES | NO | YES | NO | YES |
| Mean of Dep. Var. | 0.359 | 0.359 | 0.360 | 0.360 | 0.365 | 0.365 |
| Std.Err. of Dep. Var. | 0.480 | 0.480 | 0.480 | 0.480 | 0.481 | 0.481 |
| Panel C: Any health limitation, waves 1-4 | | | | | | |
| Foreign born | | -0.018*** (0.005) | | | | |
| Foreign born came after 2000 | | | -0.066*** (0.005) | -0.066*** (0.005) | | |
| Foreign born came after 2004 | | | | | -0.074*** (0.006) | -0.074*** (0.006) |
| Observations | 67,672 | 67,672 | 62,791 | 62,791 | 61,643 | 61,643 |
| Sociodemographic characteristics | NO | YES | NO | YES | NO | YES |
| Mean of Dep. Var. | 0.114 | 0.114 | 0.112 | 0.112 | 0.113 | 0.113 |
| Std.Err. of Dep. Var. | 0.318 | 0.318 | 0.316 | 0.316 | 0.317 | 0.317 |

Notes - Data are drawn from waves 1-4 of the Understanding Society. Sociodemographic characteristics include controls for gender, dummies for age, education occupation (1-digit), employment status, income, region, an index of rural status, and year fixed effects. Robust standard errors are reported in parentheses.

Table 10: Immigrant-Native Differences in Health Care Use, (Understanding Society, 2009-2014)

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--|--------|-------------------|----------------------|----------------------|----------------------|----------------------|
| Panel A: Inpatient days, waves 1-4 | | | | | | |
| Foreign born | | -0.001 (0.002) | | | | |
| Foreign born came after 2000 | | | -0.010*** (0.003) | -0.010*** (0.003) | | |
| Foreign born came after 2004 | | | | | -0.013*** (0.003) | -0.013*** (0.003) |
| Observations | 67,672 | 67,672 | 62,791 | 62,791 | 61,643 | 61,643 |
| Sociodemographic Controls | NO | YES | NO | YES | NO | YES |
| Mean of Dep. Var. | 0.0196 | 0.0196 | 0.0190 | 0.0190 | 0.0191 | 0.0191 |
| Std.Err. of Dep. Var. | 0.160 | 0.160 | 0.157 | 0.157 | 0.158 | 0.158 |
| Panel B: Hospital services use, wave 4 | | | | | | |
| Foreign born | | -0.002 (0.015) | | | | |
| Foreign born came after 2000 | | | -0.037** (0.018) | -0.037** (0.018) | | |
| Foreign born came after 2004 | | | | | -0.051** (0.020) | -0.051** (0.020) |
| Observations | 4,551 | 4,551 | 3,178 | 3,178 | 2,816 | 2,816 |
| Sociodemographic Controls | NO | YES | NO | YES | NO | YES |
| Mean of Dep. Var. | 0.483 | 0.483 | 0.459 | 0.459 | 0.457 | 0.457 |
| Std.Err. of Dep. Var. | 0.500 | 0.500 | 0.498 | 0.498 | 0.498 | 0.498 |
| Panel C: Doctor services use, wave 4 | | | | | | |
| Foreign born | | 0.020* (0.011) | | | | |
| Foreign born came after 2000 | | | -0.020 (0.014) | -0.020 (0.014) | | |
| Foreign born came after 2004 | | | | | -0.026 (0.016) | -0.026 (0.016) |
| Observations | 4,551 | 4,551 | 3,178 | 3,178 | 2,816 | 2,816 |
| Sociodemographic characteristics | NO | YES | NO | YES | NO | YES |
| Mean of Dep. Var. | 0.846 | 0.846 | 0.821 | 0.821 | 0.821 | 0.821 |
| Std.Err. of Dep. Var. | 0.361 | 0.361 | 0.383 | 0.383 | 0.384 | 0.384 |

Notes - Data for Panel A are drawn from waves 1-4 of the Understanding Society. Data for Panel B and c are drawn from wave 4 of the Understanding Society. Sociodemographic characteristics include controls for gender, dummies for age, education occupation (1-digit), employment status, income, region, an index of rural status and year fixed effects. Robust standard errors are reported in parentheses.

Table 11: Immigration and NHS Supply, 2003-2012

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|-----------------------|--------------------------------|-----------------------------------|-----------------------------------|--------------------|----------------------------------|------------------|---------------------------|---------------------|------------------------------------|----------------------------------|
| Dependent Variable: | 2SLS Overall expenditure | 2SLS Expenditure per capita | 2SLS Ratio of occupied beds | 2SLS # Practice | 2SLS # Practice per capita | 2SLS # GP | 2SLS #GP per capita | 2SLS #consultant | 2SLS # consultant per capita | 2SLS # GP graduated abroad |
| Share of Immigrants | -0.004 (0.011) | -0.006 (0.007) | 0.000 (0.003) | 0.368 (0.321) | -0.000 (0.000) | 1.818 (2.426) | -0.003 (0.003) | 0.711 (3.816) | 0.007 (0.012) | -0.054 (0.257) |
| Observations | 1,290 | 1,290 | 1,290 | 1,290 | 1,290 | 1,290 | 1,290 | 1,290 | 1,290 | 1,290 |
| Mean of Dep. Var. | 12.68 | 1.226 | 0.814 | 57.52 | 0.170 | 340.1 | 0.953 | 253.4 | 0.827 | 48.20 |
| Std.Err. of Dep. Var. | 0.646 | 0.546 | 0.218 | 25.71 | 0.0408 | 206.0 | 0.217 | 206.1 | 0.706 | 25.98 |
| IV-Fstat | 11.83 | 11.83 | 11.83 | 11.83 | 11.83 | 11.83 | 11.83 | 11.83 | 11.83 | 17.82 |

Notes - Data on per capita expenditure, share of occupied beds, practices, consultants and GPs are drawn from the Hospital Episodes Statistics and are at the PCT level. Data on immigrant distribution across Local Authorities are drawn from the UK Labor Force Survey. All estimates include PCT and year fixed effects. Standard errors are clustered at the Local Authority level.

Table 12: Health Across Less and More Deprived Areas in England, (LFS, 2003-2012)

| Dependent variable: | (1) | (2) | (3) | (4) | (5) | (6) |
|----------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|--------------------|
| | Any health issue | Any health issue | Any health issue | Any health issue | Any health issue | Any health issue |
| | All | All | UK-born | UK-born | Foreign-born | Foreign-born |
| Highly deprived areas | 0.016*** (0.001) | 0.010*** (0.002) | 0.021*** (0.001) | 0.011*** (0.002) | 0.023*** (0.002) | 0.015** (0.006) |
| Sociodemographic characteristics | YES | YES | YES | YES | YES | YES |
| Year F.E. | YES | YES | YES | YES | YES | YES |
| Local authority F.E. | YES | YES | YES | YES | YES | YES |
| Mean of Dep. Var. | 0.302 | 0.319 | 0.326 | 0.329 | 0.242 | 0.244 |
| Std.Err. | (0.459) | (0.466) | (0.469) | (0.470) | (0.429) | (0.429) |
| Observations | 1,596,291 | 1,551,777 | 1,392,313 | 1,351,754 | 203,841 | 199,886 |

Notes - All estimates include year and local authority fixed effects. Sociodemographic characteristics include gender, age (dummies), education (dummies), occupation (1-digit, dummies). Standard errors in parentheses are clustered at the local authority level. Robust standard errors are reported in parentheses.

Table 13: Immigration and Waiting Times (in days) for Outpatients by Index of Multiple Deprivation (IMD) quintiles, 2003-2012

| | (1) | (2) | (3) | (4) | (5) |
|-----------------------|-------------------|----------------------|----------------------|----------------------|-------------------|
| | 2SLS | 2SLS | 2SLS | 2SLS | 2SLS |
| | Q1 | Q2 | Q3 | Q4 | Q5 |
| Share of Immigrants | -0.893 (0.543) | -0.730*** (0.234) | -0.669*** (0.213) | -0.549*** (0.201) | -0.277 (0.193) |
| Region f.e | YES | YES | YES | YES | YES |
| Year f.e. | YES | YES | YES | YES | YES |
| Observations | 57,491 | 57,513 | 57,632 | 57,352 | 57,104 |
| R-squared | 0.319 | 0.344 | 0.374 | 0.428 | 0.475 |
| Mean of Dep. Var. | 45.69 | 46.24 | 47.29 | 48.19 | 48.22 |
| Std.Err. of Dep. Var. | 15.17 | 16.40 | 16.75 | 17.33 | 17.34 |
| IV-Fstat | 9.44 | 14.29 | 13.39 | 33.07 | 72.14 |

Notes - Data on average waiting times for outpatient services are drawn from the Hospital Episodes Statistics. Data on immigrant distribution across Local Authorities are drawn from the UK Labor Force Survey. Time-varying LSOA characteristics include an Index of Deprivation (we use dummies for each decile of the index) and an indicator for rural status, the share of women, and the share of over 65 in the LSOA population. PCT time-varying characteristics include hospital beds' availability, number of GPs per capita, number of GP practice per capita, number of health consultants per capita, health expenditure per capita, incidence of most common diseases. Columns 3 and 6 include LSOA size. Standard errors are clustered at the Local Authority level.

Table 14: Immigration and Waiting Times (days) for Outpatients, by Index of Multiple Deprivation (IMD)

| | (1) 2SLS Overall 2003-2012 | (2) 2SLS Overall 2003-2007 | (3) 2SLS Outside London 2003-2007 | (4) 2SLS Outside London 2003-2007 More Deprived Areas (6-10) | (5) 2SLS Outside London 2003-2007 More Deprived Areas(7-10) |
|--------------------------------------|-------------------------------------|-------------------------------------|--|--|--|
| Share of Immigrants | -0.935** (0.461) | -0.818*** (0.317) | 0.479 (0.350) | 1.499* (0.788) | 2.085* (1.143) |
| Year f.e. | YES | YES | YES | YES | YES |
| PCT f.e. | YES | YES | YES | YES | YES |
| LSOA time-varying characteristics | YES YES | YES YES | YES YES | YES YES | YES YES |
| LSOA population | YES | YES | YES | YES | YES |
| Observations | 287,092 | 144,476 | 122,067 | 57,146 | 44,964 |
| Mean of Dep. Var. | 47.12 | 54.26 | 51.49 | 52.03 | 52.01 |
| Std.Err. of Dep. Var. | 16.65 | 17.27 | 15.40 | 16.04 | 16.27 |
| IV-Fstat | 16.05 | 28.72 | 54.54 | 20.60 | 14.09 |

Notes - The dependent variable is the average waiting time for outpatient services (in days). Data on average waiting times for outpatient services are drawn from the Hospital Episodes Statistics. Data on immigrant distribution across Local Authorities are drawn from the UK Labor Force Survey. LSOA characteristics include: an Index of Deprivation, ratio of occupied hospital beds to population, density of GP practices, number of specialists and GPs, Rural Index, share of women, share of over 65, LSOA incidence of most common diseases and LSOA size. Standard errors are clustered at the Local Authority level.

Table 15: Immigration and Waiting Times, NINOs Data, 2003-2012

| | (1) | (2) | (3) |
|--------------------------------------|-----------------------------|-------------------------------|---------------------|
| | 2SLS | 2SLS | 2SLS |
| Dependent Variable: | Waiting Time Outpatients | Waiting Time Elective Care | Waiting Time A&E |
| Share of Immigrants | -1.191** (0.560) | 0.137 (0.738) | 1.172 (1.198) |
| Observations | 287,092 | 287,092 | 145,028 |
| LSOA time-varying characteristics | YES | YES | YES |
| Year f.e. | YES | YES | YES |
| PCT f.e. | YES | YES | YES |
| Mean of Dep. Var. | 47.12 | 69.88 | 55.30 |
| Std.Err. of Dep. Var. | 16.65 | 39.36 | 65.53 |

Notes - Data on average waiting times for outpatient services are drawn from the Hospital Episodes Statistics. Data on immigrant distribution across Local Authorities are drawn from the Statistics on National Insurance Number (UK Department for Work and Pensions). Time-varying LSOA characteristics include an Index of Deprivation (we use dummies for each decile of the index) and an indicator for rural status, the share of women, and the share of over 65 in the LSOA population. PCT time-varying characteristics include ratio of occupied hospital beds to population, number of GPs per capita, number of GP practice per capita, number of health consultants per capita, health expenditure per capita, incidence of most common diseases. Columns 3 and 6 include LSOA size. Standard errors are clustered at the Local Authority level.

Table 16: Immigration and Outpatients Waiting Times, Regional Analysis, 2003-2012

| | (1) 2SLS | (2) 2SLS |
|---------------------------------------|-------------------|-------------------|
| Share of Immigrants | -0.194 (0.188) | -0.316 (0.251) |
| Year f.e. | YES | YES |
| Regional time-varying characteristics | YES | YES |
| Regional Population | NO | YES |
| Observations | 160 | 160 |
| Mean of Dep. Var. | 45.42 | 45.42 |
| Std.Err. of Dep. Var. | 10.69 | 10.69 |
| IV-Fstat | 396.1 | 324.6 |

Notes - The dependent variable is the average waiting time for outpatient services (in days). Data on average waiting times for outpatient services are drawn from the Hospital Episodes Statistics. Data on immigrant distribution across Local Authorities are drawn from the UK Labor Force Survey. Standard errors are clustered at the regional level.

Appendix A

Table A.1: Immigration and Waiting Times (days) in the NHS (Outpatients), Nearest NHS Trust fixed-effects, 2003-2012

| | (1) | (2) | (3) | (4) | (5) | (6) |
|-----------------------------------|-------------------|-------------------|-------------------|----------------------|----------------------|----------------------|
| | OLS | OLS | OLS | 2SLS | 2SLS | 2SLS |
| Share of Immigrants | -0.081 (0.056) | -0.113 (0.088) | -0.114 (0.088) | -0.295*** (0.088) | -0.595*** (0.183) | -0.596*** (0.184) |
| Year f.e. | YES | YES | YES | YES | YES | YES |
| Nearest NHS Trust f.e. | YES | YES | YES | YES | YES | YES |
| LSOA time-varying characteristics | NO | YES | YES | NO | YES | YES |
| LSOA population | NO | NO | YES | NO | NO | YES |
| Observations | 287,092 | 287,092 | 287,092 | 287,092 | 287,092 | 287,092 |
| Mean of Dep. Var. | 47.07 | 47.12 | 47.12 | 47.07 | 47.12 | 47.12 |
| Std.Err. of Dep. Var. | 16.61 | 16.65 | 16.65 | 16.61 | 16.65 | 16.65 |

Notes - The dependent variable is the average waiting time for outpatient services (in days). Data on average waiting times for outpatient services are drawn from the Hospital Episodes Statistics. Data on immigrant distribution across Local Authorities are drawn from the UK Labor Force Survey. Time-varying LSOA characteristics include an Index of Deprivation (we use dummies for each decile of the index) and an indicator for rural status, the share of women, and the share of over 65 in the LSOA population. PCT time-varying characteristics include ratio of occupied hospital beds to population, number of GPs per capita, number of GP practice per capita, number of health consultants per capita, health expenditure per capita, incidence of most common diseases. Columns 3 and 6 include LSOA size. Standard errors are clustered at the Local Authority level.

Table A.2: Immigrant-Native Differences in Health Care Use, (General Household Survey, 2000-2006)

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
| Panel A: Consulted doctor last 2 wks (exc.hosp) | | | | | | |
| Foreign born | 0.007* | 0.007* | | | | |
| | (0.004) | (0.004) | | | | |
| Foreign born came after 2000 | | | -0.049*** | -0.028*** | | |
| | | | (0.007) | (0.007) | | |
| Foreign born came after 2004 | | | | | -0.069*** | -0.048*** |
| | | | | | (0.012) | (0.012) |
| Observations | 137,273 | 137,273 | 128,494 | 128,494 | 127,121 | 127,121 |
| Sociodemographic Controls | NO | YES | NO | YES | NO | YES |
| Mean of Dep. Var. | 0.153 | 0.153 | 0.152 | 0.152 | 0.152 | 0.152 |
| Std.Err. of Dep. Var. | 0.360 | 0.360 | 0.359 | 0.359 | 0.359 | 0.359 |
| Panel B: NHS GP consultations last 2 wks | | | | | | |
| Foreign born | 0.004 | 0.006 | | | | |
| | (0.005) | (0.005) | | | | |
| Foreign born came after 2000 | | | -0.067*** | -0.044*** | | |
| | | | (0.009) | (0.009) | | |
| Foreign born came after 2004 | | | | | -0.086*** | -0.065*** |
| | | | | | (0.013) | (0.014) |
| Observations | 137,273 | 137,273 | 128,494 | 128,494 | 127,121 | 127,121 |
| Sociodemographic Controls | NO | YES | NO | YES | NO | YES |
| Mean of Dep. Var. | 0.168 | 0.168 | 0.167 | 0.167 | 0.167 | 0.167 |
| Std.Err. of Dep. Var. | 0.470 | 0.470 | 0.468 | 0.468 | 0.469 | 0.469 |
| Panel C: NHS GP consultations last year | | | | | | |
| Foreign born | 0.103 | 0.168 | | | | |
| | (0.124) | (0.128) | | | | |
| Foreign born came after 2000 | | | -1.744*** | -1.140*** | | |
| | | | (0.225) | (0.230) | | |
| Foreign born came after 2004 | | | | | -2.228*** | -1.682*** |
| | | | | | (0.350) | (0.356) |
| Observations | 137,275 | 137,275 | 128,497 | 128,497 | 127,122 | 127,122 |
| Sociodemographic Controls | NO | YES | NO | YES | NO | YES |
| Mean of Dep. Var. | 4.366 | 4.366 | 4.332 | 4.332 | 4.349 | 4.349 |
| Std.Err. of Dep. Var. | 12.22 | 12.22 | 12.18 | 12.18 | 12.20 | 12.20 |
| Panel D: Hospital Outpatient Attend - last 3 months | | | | | | |
| Foreign born | -0.015*** | -0.010*** | | | | |
| | (0.003) | (0.004) | | | | |
| Foreign born came after 2000 | | | -0.050*** | -0.019*** | | |
| | | | (0.007) | (0.007) | | |
| Foreign born came after 2004 | | | | | -0.063*** | -0.033*** |
| | | | | | (0.012) | (0.012) |
| Observations | 137,287 | 137,287 | 128,506 | 128,506 | 127,132 | 127,132 |
| Sociodemographic characteristics | NO | YES | NO | YES | NO | YES |
| Mean of Dep. Var. | 0.144 | 0.144 | 0.145 | 0.145 | 0.145 | 0.145 |
| Std.Err. of Dep. Var. | 0.351 | 0.351 | 0.352 | 0.352 | 0.352 | 0.352 |

Notes - Data are drawn from the General Household Survey (GHS, 2000-2006). Sociodemographic characteristics include controls for gender, dummies for age, education, income, region and an index of rural status and an indicator for missing information on income.

Table A.3: Asylum Seekers and Waiting Times for Outpatients, 2003-2012

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|----------------------|----------------------|-----------------------|-------------------|-----------------------|-------------------|
| | OLS | OLS | OLS | OLS | 2SLS | 2SLS |
| Share of Asylum Seekers in a Local Authority | 80.421*** (9.077) | 24.499*** (7.397) | | | 68.646*** (12.180) | 3.985 (13.322) |
| Share of Asylum Seekers in Dispersal Accommodation | | | 76.776*** (13.963) | 3.733 (12.548) | | |
| PCT f.e. | YES | YES | YES | YES | YES | YES |
| Year f.e. | NO | YES | NO | YES | NO | YES |
| Observations | 293,382 | 293,382 | 293,382 | 293,382 | 293,382 | 293,382 |
| IV F-stat | | | | | 1529 | 627.2 |

Notes - The dependent variable is the average waiting time for outpatient services (in days). Data on average waiting times for outpatient services are drawn from the Hospital Episodes Statistics. Data on asylum seekers are drawn from Home Office, Immigration Statistics (2003-2012). Standard errors (in parentheses) are clustered at the local authority level.

Appendix B

Data Sources:

UK Labour Force Survey (LFS, 2003-2012): the LFS is a quarterly survey of employment and labour markets in the UK. We use the special license version of the survey which includes local authority level information. Source: Office for National Statistics.

National Insurance Number (NINO) registration of overseas nationals (2002-2012): NINOs are used to record contributions and taxes of individuals. The NINO is also necessary for most benefit claims. Source: Department for Work and Pensions.

Asylum seeker statistics (2003-2012): this reports the number of asylum seekers in each local authority receiving Government support (Section 95). It includes asylum seekers in dispersal and non-dispersal accommodation. Source: Home Office.

Hospital Episode Statistics (HES, 2003-2012): it is a records-based system that covers all NHS trusts in England, including acute hospitals, primary care trusts and mental health trusts. Source: Health and Social Care Information Centre.

Understanding Society (US, 2009-2014): it is the largest panel survey in the world, supporting social and economic research. Its sample size is 40,000 households from around the UK. Source: Understanding Society project.

General Household Survey (GHS, 2002-2006): it is a multi-purpose continuous survey carried out by the collecting information on a range of topics from people living in private households in Great Britain. Source: Office for National Statistics.