The Effect of Immigration on the Well-Being of Native Populations: Evidence from the United Kingdom

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September 2018

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Abstract

Immigration has long been a controversial topic in the political landscape of the United Kingdom. Public scepticism over the adverse effects of immigration has largely determined the outcome of the recent referendum on the UK's membership in the EU. This is especially the case for certain demographic groups, such as older people who tend to be more opposed to immigration. The aim of this study is to explore the relationship between migrant inflows and the subjective well-being of natives in the United Kingdom. The empirical analysis relies on a combined dataset from the British Household Panel Survey (BHPS) and the UK Household Longitudinal Study (UKHLS) for the entire UK covering the period 2004-2016, while subjective well-being is captured by life satisfaction and general happiness. Using respondents' geographic identifiers allows us to map net migration at the local authority level. Our results suggest that immigration has only a minor effect on the subjective well-being of natives. We also examine how our estimates vary across socio-demographic groups and conclude that there is some degree of heterogeneity in terms of gender, age, marital and job status, although our results are not statistically significant. To account for endogeneity and reverse causality we apply the instrumental variable (IV) approach. The IV results suggest a positive effect of immigration on natives' well-being, however the magnitude of the estimated coefficient appears to be quite small. Furthermore, we perform several additional tests to ensure the robustness of our estimates. Finally, we suggest that labour market and health outcomes may be two possible channels through which migrant inflows affect the subjective well-being of British natives.

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1. Introduction

Immigration has long been as issue of contention in economic and political landscape of the United Kingdom (UK). However, this subject became of central importance following the enlargement of the European Union, when the Central and Eastern European countries Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia joined the union in 2004. The resulting influx, which amounted to about 560,000 immigrants between 2004 and 2006, was the largest immigration wave in the history of Britain (Salt and Millar, 2006). It is widely recognised that public scepticism over the adverse effects of immigration has largely determined the outcome of the recent referendum over the UK's membership in the EU (Alfano et al., 2016; Portes, 2016; Vargas-Silva, 2016). Immigration is commonly seen as a threat to local labour markets, but also to social life and culture of population in receiving countries (Card et al., 2005). Yet numerous studies in this area conclude that immigration has only a minor or no effect on natives' welfare (Card and Altonji, 1991; Dustmann et al., 2005, 2010; Ekberg, 2011; Ottaviano and Peri, 2012). Much of the received literature has examined the effects of immigration on natives' well-being using objectively observable measures, such as labour market outcomes and contribution to public finances. Empirical studies have also examined the impact of immigration on other domestic markets, including housing and financial markets and physical capital (Foad, 2012; Peri, 2012; Gonzalez and Ortega, 2013). This positivistic view was retained by neoclassical economists for decades and permeates economic policy appraisal.

In recent years, however, the traditional economic framework has come under major scrutiny. Numerous studies have pointed out that any treatment defining well-being in monetary terms is not capable of explaining human welfare (Kahneman et al., 1997; Stiglitz et al., 2009; Graham, 2016). Even though economic policy is largely determined by economic outcomes, Diener and Seligman (2004) argue that economic indicators fail to provide a full account of quality of life. More recently, economists have started to consider alternative approaches to evaluate welfare, which allow them to capture the subjective well-being of individuals (Deaton, 2008). Although, this research domain was traditionally the province of psychology, subjective well-being goes beyond the narrow economics viewpoint of utility. It offers a complementary approach to explore the non-market effects of immigration on natives' well-being and evaluate the effectiveness and progress of immigration policies (Bansak et al., 2015; Graham, 2016). In fact, an increasing body of research shows that measures of subjective well-being can be used to monitor societal progress and inform public policy with accuracy

(Dolan and White, 2007; Dolan and Metcalfe, 2012; OECD, 2013a). Given the importance of subjective well-being for policy purposes, it is imperative to obtain reliable estimates on the specific relationship between immigration and natives' well-being and assess the implications of empirical research for immigration policy.

The reasons of investigating the specific relationship between immigration and subjective well-being are various. First, subjective measures of well-being do not require from individuals to act as econometricians and perform complex statistical analyses to determine, for example, the equilibrium of labour markets in receiving countries. Instead, they presume that immigration has an impact on self-reported well-being of natives. Second, there is considerable evidence indicating that subjective well-being leads to objective benefits. More specifically, studies find that higher subjective well-being is associated with better health, higher productivity and income among others (Dolan and White, 2007; De Neve et al., 2013; Diener et al., 2017). Given the importance of happiness, it is crucial to examine whether factors such as immigration affect self-reported well-being.

Nevertheless, studies examine the link between immigration and self-reported well-being have a number of limitations. One potential issue is associated with endogeneity and reverse causality. The fact that immigrants are not evenly distributed across different regions poses a major challenge to researchers. The underlying justification is that immigrants tend to move into regions with large concentration of diaspora and high levels of SWB, which may hinder the causal effect between immigration and well-being. One way to reduce endogeneity stemming from reverse causality is to distinguish between regions with low and high immigration and see whether the estimated effect is driven by these factors. In addition, natives may decide to relocate to less diverse area, where immigrant concentration is lower. If this is the case, a selection bias could possibly arise since the decision to relocate may be positively correlated with immigration flows in the region of residence. To rectify the potential selection bias, we perform separate regressions by distinguishing between individuals who changed area of residence and those who never moved. Another plausible solution to mitigate endogeneity is to assign an instrumental variable for immigration. Yet studies provide disputable evidence on the validity of the instrumental variable approach (Lozano and Steinberger, 2010; Frey and Stutzer, 2012). Furthermore, we employ a detailed geographical panel dataset, which allow us to absorb any individual or region-specific characteristics that may be correlated with immigration and affect the main outcome of interest. A second limitation is that subjective well-being measures are self-assessed on an arbitrary scale, which hinders the comparison of well-being within individuals. In this study, however, we presume that the scale of subjective

well-being measures is consistent between waves, thus limiting the plausible bias related to differential item functioning (DIF) (Kapteyn et al., 2010; Giovanis and Ozdamar, 2018).

To date, there is a dearth of empirical research addressing the relationship between immigration and subjective well-being. To the best of our knowledge, this is the first study examining this specific relationship in the entire UK. Therefore, the objectives of this study are to investigate (1) the effect of immigration on the subjective well-being of British natives, (2) how the immigration effect varies across different groups, (3) whether immigration causes out-migration of natives, (4) whether immigrants settle into regions where subjective well-being is higher, and (5) the channels through which immigration affects natives' well-being.

The importance and contribution of this study lie in the following aspects. First, the United Kingdom is a high immigration country. As of 2017, estimates from the Office for National Statistics show that 9.4 million people or 14.3% of UK's total population were born abroad[2]. Second, this is the first study that investigates the specific relationship between immigration and self-reported well-being of natives for all four countries in the UK. A combined panel dataset from the BHPS and UKHLS enables us to control for individual and regional heterogeneity, while immigration flows are mapped at a highly disaggregated level, which is the local authority district. Third, our empirical approach relies on a robust set of instrumental variables to address potential endogeneity and reverse causality, while additional tests are performed to ensure the robustness of our findings. Finally, we exploit various domain satisfactions to account for the possible mechanisms behind our estimates.

The remaining sections of this study are organised as follows. Section 2 reviews the related literature on the nexus between the well-being of natives and immigration. Section 3 presents the chosen econometric strategy and describes the data used in the analysis. Section 4 reports and discusses the empirical findings. Finally, section 5 presents the concluding remarks and policy implications of the research.

2.   Literature Review

In this section, we review previous research on different valuation methods of welfare and the channels through which immigration affects native population. Much of the existing literature has employed objective metrics to explore the immigration effect on natives' well-being. For

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[2] Source: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/ internationalmigration

a long time, economists relied on the neoclassical labour market model to assess the distributional effects of immigration in host countries. As noted by Dustmann et al. (2005), the possible adverse impact of immigration on local labour markets has been a disputed issue among the public and policy-makers for decades. For this reason, several studies have sought to explore this nexus at both theoretical and empirical level, while the evidence provided appear to be rather conflicting.

Under a perfectly competitive labour market, the effect of immigrants on labour market outcomes in destination countries depends largely on whether native-born workers and immigrants are substitutes or complements in production process (Dustmann et al., 2016). If immigrants and natives possess perfectly substitutable skills, there will be excess supply of labour, as a consequence of immigration, which raises competition and puts a downward pressure on wages of native-born workers. Supposing that labour supply has some elasticity, immigration may induce voluntary unemployment among those natives who decide to exit the labour market because of the lower wages. If, however, natives and immigrants are complements in labour market, immigration will induce an increase in the demand for labour, which increases wages and employment opportunities for native workers; see Van den Berg and Bodvarsson (2009) and Bansak et al. (2015) for a discussion on the labour market impact. Overall, the neoclassical theory portrays immigration as being detrimental for native workers whose skills are similar to those of immigrants, yet beneficial for those with different skills. Nevertheless, as discussed later in this section, most of the empirical studies tend to find no evidence supporting the standard framework. One reason for this, according to Dustmann et al. (2016), is that the estimates are sensitive to the econometric strategies employed in these studies. In the literature, three main approaches for estimating the effect of immigration on host country labour markets have been developed, namely production function, spatial correlation and skill cell approach.

Early empirical studies exploited the standard input demand framework, by specifying a production function and estimating the degree of substitutability between immigrants and native workers. The rationale for this approach is that a large and negative elasticity of natives' wages with respect to immigrant flows suggests a high degree of substitutability between the two groups of labour, meaning that immigration is devastating for the native population. The study of Grossman (1982) was among the first to employ the production function method to estimate the effect of immigration on the U.S. labour market. The author observes that the wages of the first- and second-generation workers decline by 0.02 and 0.03 percent respectively for 1 percent increase of employed immigrants, hence the immigration effect on natives' wages

is close to zero. Following Grossman (1982), a number of studies that adopted the same estimation technique conclude that immigration exerts only minor effects on labour markets in destination countries (Borjas, 1987; Gang and Rivera-Batiz, 1994; Bauer, 1997; Suen, 2000). The main strength of the production function approach is that it is strongly related to the economic theory which, according to Bansak et al. (2015), is also its largest drawback. Bansak et al. (2015) argue that the method requires a set of assumptions in order to make the estimation possible, thus the specification of an appropriate functional form has important implications for the predicted effects of immigration.

Contrary to the production function approach, other studies employ the spatial correlation approach, which allows researchers to examine the nexus between the immigrant share and the labour market outcomes of natives at regional level. The purpose of the spatial approach is to investigate whether immigration explains wage differences across regions (Borjas, 2014). An early empirical investigation by Card and Altonji (1991) uses the spatial approach to estimate the effect of immigration on wages and employment in 120 U.S. SMSAs. The authors find that 1 percentage point increase in the share of immigrants within an SMSA is associated with 1.2 percent reduction in native wages. As noted by Borjas (2003) existing studies tend to provide mixed and conflicting evidence yet, the consensus finding is that immigration exerts only a small effect on labour market outcomes of native-born workers. This point is also documented in the meta-analysis by Longhi et al. (2005), who conclude that wages across the studies under investigation depress by 0.119 percent for a 1 percentage point increase in the immigrant share in labour force.

However, studies which rely on the spatial approach are usually challenged by two main identification problems. One important issue arises from the non-random allocation of immigrants across local labour markets. Typically, immigrants sort themselves into regions where local labour markets have a strong performance. This is likely to bias the true effect of immigration on wages or employment, as both variables may be correlated with common unobserved labour market characteristics (Borjas, 2003). A further endogeneity issue concerns the response of natives to immigration by moving into areas where there is low concentration of immigrants. In the absence of an exogenous supply shock to the labour market (see Card, 1990 and Hunt, 1992), the estimated relationship between immigrant influx and wages may subject to reverse causality issues. This point has been stressed in several empirical studies with some authors claiming that there is a significant displacement effect due to immigration (Filer, 1992; Borjas et al., 1997; Hatton and Tani, 2005), while others find little effect of immigration on out-migration of natives (Card and DiNardo, 2000; Card, 2001).

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The standard approach to addressing reverse causality and endogeneity issues is to find an instrumental variable (IV) that is correlated with immigration but does not directly influence the outcome of interest. For instance, Dustmann et al. (2005) use historical immigrant concentrations as an instrument for immigration flows. Orrenius and Zavodny (2007) use immigrants who are admitted to the U.S. in a given year as the spouse of a US citizen by occupation group, area, and year, while Kleemans and Magruder (2017) use rainfall shocks at the origin area. Lozano and Steinberger (2010) contend that the IV approach is a useful technique that allows economists to elicit important information regarding immigration. Nevertheless, Frey and Stutzer (2012) argue that it is difficult to apply the IV technique adequately.

Arguing that the spatial approach is prone to a number of empirical shortcomings, Borjas (2003) suggests an alternative method which can be applied at the national level and therefore be robust to possible endogeneity issues. Specifically, the skill cell approach explores the effects on labour market outcomes by segmenting the national labour force into groups based on their educational attainment and work experience. Drawing on four decennial U.S. Censuses (1960-2000), Borjas (2003) finds that a 10 percent increase in immigrant influx during the period 1980-2000 reduces the wages of native workers by 3-4 percent, while the results differ considerably across education groups. Borjas' (2003) findings stand somewhat in contrast to much of the literature discussed earlier, which concludes that the estimated wage effect of immigration hovers around zero. However, challenges to Borjas' (2003) proposition come from Ottaviano and Peri (2012), who refine the original model by allowing for possible complementarities between immigrants and natives within cells. The authors employed an identical dataset to Borjas (2003) covering the same time period 1960-2000, while a second dataset was drawn from the 2006 American Community Survey. Their estimates predict a modest positive effect on natives' wages (+0.6 percent) during the period 1990-2006, yet the impact on wages of existing immigrants appears to be significant (-6.7 percent).

Though there are a multitude of studies that explore the labour market impact of immigration, much attention has been directed to other channels through which immigration affects natives in receiving economies. In what follows, we consider the fiscal effect of immigration in destination countries. In the literature, two main methods for estimating the fiscal impact of immigration have been developed. Studies that rely on the first method, the static accounting, calculate the net fiscal contribution made by immigrants by deducting the value of taxes paid from the value of fiscal transfers made to immigrants at any given year (Preston, 2014). In an early study, Borjas (1994) utilises the static accounting approach to

estimate the fiscal burden on natives imposed by U.S. immigrants in 1990. The findings indicate that immigrants are a net fiscal drain with the estimated loss being equal to $16 billion. Consistent with the findings of Borjas (1994), Wadensjö (2007) suggests that immigrants make a negative contribution to the public finances of Denmark, whilst similar results reported in the OECD (2013) for Germany and France. In the United Kingdom, Dustmann et al. (2010) show that A8 immigrants are net fiscal contributors despite the fact that the country was running a budget deficit during the period under examination (2005-2009). The static accounting approach is attractive because it is relatively simple and requires only a few assumptions. A major limitation of this approach, however, is that it considers existing immigrants only and allows assessments of the net fiscal impact of immigration at a given point in time.

More recent studies have challenged the narrow view of static accounting by adding a dynamic perspective into the model. One strand of literature has adopted the generational accounting method, 'that can be used to assess the fiscal burden current generations are placing on future generations' (Auerbach et al., 1991:55). Auerbach and Oreopoulos (2000) use the generational accounting and find small fiscal effects of immigrants relative to the size of the overall fiscal imbalance in the U.S. They also assert that the relationship is not clear since changes in the composition of immigrant population and projections of the net fiscal burden are likely to influence the outcome of interest. In addition, Mayr (2005) finds that immigrants have a positive effect on fiscal position of the Austrian economy, while Chojnicki (2013) derives similar results for France.

Another set of studies use the net transfer profile projections method, which is based on projections of tax revenues and fiscal transfers made to immigrants in the future (Rowthorn, 2008). Based on the method of net transfer profiles, Lee and Miller's (2000) findings for the U.S. indicate that the overall effect of immigration on public finances is relatively small. In particular, the authors find the NPV of fiscal effects is equal to $99,000, while a policy of admitting only high-education immigrants of young working age would seem propitious for the fiscal position of the country. A more recent study by Ekberg (2011) investigates the future fiscal impact of immigrants in Sweden from 2006 through 2050. The annual net contribution effects, either positive or negative, are less than 1 percent of the GDP for most of the years. Nevertheless, the author argues that these findings are sensitive to new immigrants' labour market integration and changes in the composition of the welfare system. Despite the useful insights of dynamic modelling for policy purposes, the method requires a set of assumptions regarding future government expenditure, tax policies, projection of native and immigrant

populations and other indicators. Such a requirement poses fundamental challenges to dynamic methodologies, which hinder their application (Rowthorn, 2008).

In recent years, economists have started to deviate from the narrow viewpoint of the neoclassical model and adopt broader concepts of well-being to proxy individual utility (Helliwell and Barrington-Leigh, 2010). The standard economic theory defines well-being in pecuniary terms based on the conception that individuals are consistently rational and maximise their utility, given the constraints they face. Despite its prominence, however, behavioural economists and psychologists have challenged the mainstream approach. As Stiglitz et al. (2009:41) explicitly state, 'quality of life is a broader concept than economic production and living standards. It includes a full range of factors that influences what we value in living, reaching beyond its material side'. Following the seminal study of Easterlin (1974), a well-established literature has been developed to address the various dimensions of well-being (Blanchflower and Oswald, 2004a; Ferrer-i-Carbonell and Gowdy, 2007; Dolan et al., 2008).

Although much of the literature on the impact of immigration on natives has employed objective measures of well-being, such as wages and employment outcomes, there is a dearth of empirical research specifically on the relationship between immigration and subjective well-being. An early investigation of this nexus comes from Betz and Simpson (2013) who utilised cross-sectional data for 26 European countries. The authors find a positive association between immigration flows lagged by one year and the well-being of natives over the period 2002-2010, while the immigration impact becomes insignificant in the longer-term. Instead of mapping migration flows on country-level, Longhi (2014) also uses cross-sectional data at a highly disaggregated level to examine the impact of diversity in terms of country of birth, ethnicity and religion on self-reported well-being of natives in the United Kingdom. The author observes a negative correlation between white British population living in diverse regions and life satisfaction, whereas diversity has no effect on the well-being of non-white British and foreign-born population. Nevertheless, studies rely on cross-sectional data are likely to be biased, since their estimates are may suffer from potential endogeneity of immigration and reverse causality (Borjas, 1999).

Akay et al. (2014) address the immigration impact on the welfare of natives using panel data drawn from German Socio-Economic Panel (GSOEP). The authors map immigration flows at a disaggregated level of 96 regions over the period 1998-2009. The findings suggest that immigration has a positive effect on the well-being of German natives, while the effect is stronger for areas with intermediate assimilation of immigrants. Furthermore, the authors

account for potential endogeneity coming from sorting and reverse causality. They conclude that immigration induces no out-migration of natives, while immigrants sorting to regions with higher well-being levels does not affect the causal interpretation of the predicted relationship. Consistent with these results, the study of Akay et al. (2017) offers a complementary analysis to the previous study by looking at the effect of ethnic diversity on native well-being in Germany. Using identical empirical strategy to Akay et al. (2014), the authors suggest that ethnic diversity is associated with an increase in the well-being of natives, while their analysis shows that the effect is larger for immigrants whose culture is similar to Germany's.

In a similar vein with the studies of Akay et al. (2014, 2017), two more studies exploit a panel data structure and focus on the United Kingdom. Ivlevs and Veliziotis (2018) merge data from the British Household Panel Survey (BHPS) with data obtained from the Worker Registration Scheme (WRS) to examine the nexus between immigrant flows from A8 countries and self-reported well-being of the UK natives. The time span used covered a period from 2004 to 2011, while the analysis is performed at the local authority district level. Contrary to the previous literature, the results show a negative association between immigrant inflows and subjective well-being of certain groups, particularly for elderly, unemployed and those with lower income. However, migration appears to induce a positive change in life satisfaction of younger people and those who receive better education and earn relatively higher income. The authors suggest that these findings could also explain attitudes towards immigration across socio-demographic groups in the light of the recent referendum. Following a similar research design, Howley et al. (2018) draw on 15 waves (2000-2015) of the BHPS and its successor, the UK Household Longitudinal Study (UKHLS) and observe no significant effects of foreign-born population on natives in the UK. The evidence stands somewhat in contrast to the studies of Akay et al. (2014, 2017) for Germany, whilst being consistent with the findings of Ivlevs and Veliziotis (2018) for the UK. The present study adopts similar methodology to Akay et al. (2014, 2017). Our study contributes to the scarce literature by using a detailed micro-level longitudinal dataset and mapping net migration at the local authority level. In contrast to the studies of Longhi (2014); Howley et al. (2018); and Ivlevs and Veliziotis (2018), which also focus on the UK, our study is the first to explore the nexus between immigration and natives' well-being for all four countries in the UK. We also employ a robust set of instrumental variables to address potential endogeneity and reverse causality. Moreover, additional robustness checks are applied, such as heterogeneity analysis by subgroups, while we exploit different domain satisfactions to account for the potential mechanisms behind our estimates.

3. Data and Methods

3.1. Conceptual framework

In this section, we present the conceptual framework for the relationship between immigration and the utility of natives. In economic discourse, the standard approach to address the effects of immigration on the utility of natives is through labour market outcomes. If we assume that the utility of natives is a function of wages in local labour markets, then people who reside in areas with high concentration of immigrants are more likely to experience a decrease in their utility (see section 2 for details on the labour market impact). Utility, as it was conceptualised in the neoclassical framework, is more akin to decision utility. According to Dolan and Kahneman (2008) decision utility refers to desire for an outcome which is revealed through people's market choices. However, income only is not sufficient to predict human well-being. Instead, recent research has emphasised on the importance of experienced utility (Kahneman et al., 1997). This concept of utility, which was originally introduced by Bentham (1789), refers to the property of any object or action to increase or lower utility. More specifically, experienced utility, as described in Kahneman et al. (1997), emphasises on current evaluation of past outcomes. If valuation of non-market goods is involved, as in the case of immigration, subjective well-being data may reflect the implications of one's choices in terms of the utility they experienced. In other words, non-market valuation is independent of people's choices; what matters only is the statistical association between one's subjective well-being and the number of immigrants enter the country.

Another way to conceive the effects of immigration is to examine the broader non-monetary aspects through which immigrants affect the well-being of natives. A growing body of literature has explored the immigration impact on health outcomes. Studies consistently find that immigrants arrive in destination countries tend to be healthier than natives, which reduces the probability of accessing health care services and thus increase their prices (Goldman et al., 2006; Giuntella and Mazzonna, 2015; Giuntella et al., 2018). In a similar vein, other studies focus on channels through which immigration affects the provision of education and educational attainment of natives (Brunello and Rocco, 2013; Ransom and Winters, 2016; Hunt, 2017). One possible justification may be that immigrant students tend to have limited language proficiency, which could affect the quality of teaching. In particular, teachers may be required to adjust the pace of instruction to the needs of foreign students, which may have implications for the performance of the entire classroom. Although this is not an exhaustive

list of the various aspects through which immigration affects natives' utility, it could be argued that immigration is a complex phenomenon and any treatment within the domain of labour markets is too narrow to capture its broad effects on human well-being.

3.2. Fixed effects

In this section, we present the empirical strategy adopted in the analysis. In order to achieve the research objectives, our default specification comprises of two equations corresponding to the two different measures of well-being, life satisfaction and general happiness. The first model for individual i, in region r, at time t is expressed as follows:

$$LS_{i,r,t} = \beta_0 + \beta_1 I_{r,t} + \beta_2 \log(y)_{i,r,t} + \beta_3 z_{i,r,t} + a_i + \delta_r + \theta_t + \delta_r T + \varepsilon_{i,r,t} \tag{1}$$

$LS_{i,r,t}$ stands for life satisfaction, $I_{r,t}$ denotes the net migration rate in region r and in time t, while $\log(y)_{i,r,t}$ is the logarithm of the household income. The matrix z includes several socioeconomic and demographic factors discussed in section 3.4 below. Set a_i denotes individual fixed-effects, δ_r denotes the local authority district (LAD) fixed effects, θ_t represents a time-vector for the day, the month and the year the interview was conducted, while $\delta_r T$ encapsulates a set of region-specific time trends, which control for unobserved time-varying attributes and allow us to eliminate the effect of exogenous factors on changes in the main outcomes of interest. Finally, $\varepsilon_{i,r,t}$ is the error term which is assumed to be *iid*. Additionally, we use clustered robust standard errors at the individual level to rectify the potential problem of heteroscedasticity or serial correlation (Ferrer-i-Carbonell and Ramos, 2014; Howley et al., 2018).

The second model investigates the nexus between general happiness and immigration flows. This is defined as:

$$GH_{i,r,t} = \beta_0 + \beta_1 I_{r,t} + \beta_2 \log(y)_{i,r,t} + \beta_3 z_{i,r,t} + a_i + \delta_r + \theta_t + \delta_r T + \varepsilon_{i,r,t} \tag{2}$$

$GH_{i,r,t}$ denotes general happiness, while all the elements on the right-hand side of equation (2) remain the same as in (1). The use of fixed effects in our analysis is crucial, as it allows us to control for unobserved factors such as gender, race and culture that vary across LADs, but are constant over time. If a pooled OLS specification is used instead, our estimates could be biased,

because the error term may be correlated with the regressors included in the model (Gujarati and Porter, 2009). For instance, individuals in specific areas may over-report their subjective well-being generating a positive bias in the cross-region estimates of the effect of immigrants and other factors on subjective well-being (White et al., 2013).

Although measures of subjective well-being are collected on ordinal scale, the empirical literature suggests that linear specification yields similar results to ordered latent response models, whereas the latter does not account for individual unobserved characteristics (Ferrer-i-Carbonell and Frijters, 2004). Hence, a fixed effect estimator would be preferred. Fixed effects estimators have been widely employed in the literature of subjective well-being, allowing researchers to focus entirely on changes in well-being within individuals rather than between (Boyce, 2010). Ferrer-i-Carbonell and Frijters (2004) find that time-invariant fixed effects change the results substantially and their omission could potentially bias the estimates. Although our econometric approach enables us to account for individual and LAD heterogeneity, hence limiting considerably the scope of omitted variable bias, causality issues may arise. In fact, there may exist unobservable traits, which may be correlated with immigration and affect natives' well-being. Therefore, in the following sections we take account of these issues, focusing on endogeneity coming from selection bias and reverse causality. First, we examine whether natives respond to immigration by relocating to areas with low immigrant inflows. Second, we investigate whether immigrants are attracted into areas where the well-being of natives is high. Finally, we perform further tests to examine the robustness of our estimates.

3.3. Endogeneity and robustness checks

As we discussed in the preceding section, our panel structure allows us to control for unobservable heterogeneity at LAD level. Furthermore, controlling for region-specific time trends we account for unobservable time-varying LAD characteristics that may be correlated with both immigration and subjective well-being. Notwithstanding the above, we examine whether our estimates are affected by possible endogeneity and causality issues. One important source of endogeneity is that natives may respond to immigration by relocating into more homogeneous areas. This is likely to induce a selection bias, which will only be materialised if the decision to relocate is positively correlated with diversity in the region of residence. If we assume that the sample of movers experiences lower well-being due to immigration, then the

sample of stayers (i.e. those who did not relocate in response to immigration) will report higher levels of subjective well-being. In this case, our estimates will be biased upwards. Another source of endogeneity is that immigrants tend to settle in regions where the well-being of natives is higher. This self-selection of immigrants is likely to affect the causal interpretation of our estimates substantially, thus biasing our results. This bias could, first, be due to the fact that regional time-invariant characteristics are not taken into account. Our econometric specification allows to account for unobservable time-varying LAD characteristics that may be associated with both immigration and subjective well-being. Second, our econometric strategy omits to address the influence of exogenous factors that may impact subjective well-being indirectly through immigration.

In order to mitigate endogeneity due to selection bias and causality, our study implements the Two-State Least Squares (2SLS) method instrumenting for the main endogenous variable, which is net migration. In particular, we use two factors as instrumental variable for net migration rate. The first is the lagged values of share of non-British population. This is derived by dividing the total non-British population by the total population in each local authority district lagged by one year. The second variable is the percentage of live births to non-UK born mothers. The justification relies on the earlier literature and the role of diasporas, as people tend to settle to regions with large presence of diaspora and given also common socio-cultural characteristics and norms (Card and DiNardo, 2000; Dustmann et al., 2005; Beine et al., 2011; Giuntella et al., 2018). In particular, diasporas-networks attract high number of new migrants with certain skill and education composition and geographical concentration. Furthermore, another underlying justification of using these variables as instruments rely on the family reunification, which remains one of the major reasons to enter Europe (Kofman, 2000; Barbiano di Belgiojoso and Terzera, 2018).

To further investigate the robustness of our estimates, we perform the following additional tests. As we discussed earlier, natives are likely to respond to immigration by moving into areas where the number of immigrants is lower, which could potentially bias our estimates. To reduce the possibility of a selection bias, we derive two versions of our baseline specification by distinguishing between individuals who moved between LADs and those who never relocated. It is also important to split between movers and stayers, as both groups may experience different opportunities in terms of employment and education. In addition, we explore whether our benchmark results differ between areas with low and high immigrant concentrations. One important reason for distinguishing between low and high immigration areas is to examine

whether our estimates are driven by regions with high intensity of immigration. If this is true, causality issues may arise due to this self-selection.

After having examined the robustness of our estimates to various confounding factors, we focus on the possible channels behind our results. In particular, we examine how different elements of subjective well-being could be affected by immigration. To achieve this, we exploit four components of life satisfaction obtained from our longitudinal dataset, namely job, income, health and amount of leisure and substitute the dependent variable in our default specification with each of the four domains. We should note that this is not an exhaustive list of domain satisfactions; the aim is to explore only those that are the most relevant to immigration. One potential mechanism is the perceived influence on local labour markets (Akay et al., 2014; Howley et al., 2018). Despite the ample empirical evidence indicating that the labour market impact of immigrants is very small, outcomes such as wages or employment opportunities remain a key channel through which immigration affects native populations. To test this hypothesis, we use job satisfaction and satisfaction with income as dependent variables. Another aspect of life satisfaction is related to health status. In public discourse, increasing immigration is likely to have consequences for the natives' health outcomes. There are various channels through which immigration may influence health satisfaction. One possibility is that immigrants put a pressure on health services by increasing the cost of healthcare, thereby reducing natives' health satisfaction. Nevertheless, empirical evidence finds no evidence supporting this claim (Goldman et al., 2006; Wadsworth, 2013). In fact, immigrants are healthier than native populations, while it does appear that much of the costs of health care is covered by government revenues for which immigrants are net contributors (Lee and Miller, 2000; Mayr, 2005). Empirical evidence also suggests that immigrants have a comparative advantage in physically demanding occupations, which increase the risk of work-related accidents and thus lead to lower health satisfaction (Giuntella and Mazzonna, 2015; Ravesteijn et al., 2018). Lastly, we consider the association between immigration and the leisure aspect. The argument is that the impact of immigration on leisure time of natives is not necessarily quantifiable, instead it may be associated with the quality of leisure. It appears that immigrants tend to engage with leisure activities that are related to their original culture (Iwasaki et al., 2009). We propound that these cultural ties of immigrants could potentially influence leisure satisfaction of natives through religious activities or the supply of ethnic products in certain regions (Green and Elliott, 2010; Akay et al., 2014).

3.4. Data

Our empirical analysis draws on a combined dataset from two panel surveys in the United Kingdom, the British Household Panel Survey (BHPS) and its successor, the UK Household Longitudinal Study (UKHLS). Both surveys have been widely used in the SWB literature (Ferrer-i-Carbonell and Gowdy, 2007; Oswald and Powdthavee, 2008; Longhi, 2014; Giovanis, 2018). The BHPS is an annual longitudinal survey started in 1991 with a national representative sample of 5,000 households living in the UK. The main sample has been extended over the years by including an additional sub-sample of 1,500 households in each of Wales and Scotland in 1999 and a new sample of 2,000 households for Northern Ireland in 2001. The BHPS stopped in 2009, when the UKHLS was launched. The UKHLS is an ongoing survey and comprises of a sample of 40,000 households, which renders the survey the largest longitudinal study of its kind. Both the BHPS and the UKHLS collect micro-data at the individual and household level which relates to health, socio-economic status and social life. Importantly for our analysis, there are similarities between the two surveys, such as same design features, questions and sample members which enables us to exploit information from 25 waves in total, covering the period 1991-2016 (Fumagalli et al., 2017). Since the year 2004 is the earliest year in which we can obtain immigration statistics at the local authority level, our analysis focuses on the period 2004 to 2016.

Based on the recent literature on subjective well-being, a distinction is commonly made between two dimensions of subjective well-being, namely life evaluation and measures of affect. The former refers to the cognitive evaluation of the respondent's life as a whole, whilst the latter captures individuals' emotional state in their daily lives (Diener, 2006; Kahneman and Krueger, 2006). In addition to the measures of life evaluation and affect, another important measure of well-being is eudaimonia, which refers to the extent individuals have a virtuous or meaningful life (Rojas, 2017). There is now a sufficient body of evidence suggesting that the correlation between eudemonic well-being and other dimensions of well-being is smaller compared to the correlation between life evaluations and affect (Diener et al., 2010; Clark and Senik, 2011; Huppert and So, 2013). Therefore, our study focuses on life evaluation and affect, which correspond to the two dependent variables employed in the analysis, while the net migration rate is the main independent variable. The most common measurement of life evaluation refers to the "life as a whole", whereas measures of affect are captured by asking respondents whether they are happy (OECD, 2013a). Both the BHPS and the UKHLS include several indicators of subjective well-being, however only two questions refer to the overall life

satisfaction and general happiness. Specifically, life satisfaction is measured on a scale from 1 to 7, with answers ranging from completely dissatisfied to completely satisfied. The second measure, general happiness, answers to the question *"Have you recently been feeling reasonably happy, all things considered?"*, allowing responses on a 4-point scale from more so than usual to much less than usual. It is important to be cautious about the interpretation of general happiness as negative coefficients correspond to positive outcomes due to inverse scaling. In addition, the fact that subjective well-being metrics are self-assessed on an arbitrary scale renders utility comparison among individuals problematic. As such, we presume that the scale of different metrics remains identical between waves, thus limiting the plausible bias related to DIF (Kapteyn et al., 2010; Giovanis and Ozdamar, 2018).

Our analysis includes various economic and socio-demographic factors that have been well-documented in the received literature, such as household income, age, marital status, household size, job status, house tenure and health status (Akay et al., 2014, 2017; Longhi, 2014; Howley et al., 2018; Ivlevs and Veliziotis, 2018). The rationale for employing these factors as potential drivers of subjective well-being lies in the following aspects. Older people are more likely to oppose to immigration compared to young people. Perceptions that immigrants abuse local health services and threaten national identity may have an indirect effect on the well-being of older population. Similarly, opposition to immigration becomes more common for people who are unemployed or earn relatively low income and therefore report lower levels of subjective well-being. This group of people is more concerned with labour market opportunities and the perceived pressure immigrants put on wages in certain regions. Instead, those earning higher income from employment are more likely to gain satisfaction from other aspects of life such as owing a house or affording high quality education and healthcare. Housing tenure is an important driver, as those owning a house could live in areas where immigrant concentration is small. Furthermore, homeowners are more likely to create social bonds with their neighbours, thus increasing their well-being through social life. Marital status and household size may be associated with stronger family ties and enhanced financial support within the household, therefore leading to higher well-being. Finally, evidence consistently suggests that being healthy, both physically and mentally, has a positive influence of many aspects of life, which ultimately lead to higher level of subjective well-being.

In addition, a special license access on geographical identifiers of the BHPS/UKHLS allows us to map immigration at the local authority level, which is a rather detailed geographic area

(NUTS3)[3]. We also control for the day and the month the interview was conducted, the wave of the survey and a region-specific time trend to account for unobservable time-varying LAD characteristics that may be correlated with both immigration and subjective well-being. Using the local authority codes, the next step is to merge our panel dataset with immigration data obtained from the Office for National Statistics (ONS). Specifically, we use long-term international migration statistics and mid-population estimates at local authority level to generate the independent variable of interest, the rate of net migration per 1000 inhabitants. Given the data availability for immigration flows, however, we are not able to distinguish between immigrant inflows from the EU and the rest of the world. This is likely to undermine the actual effect of EU immigration, which is currently one of the most important issues in the political and economic landscape of the UK (Portes, 2016). Despite this drawback, the longitudinal structure of our data along with the fact that we map net migration at the LAD level allow us to gain a thorough understanding of the role of immigration on the self-reported well-being of British natives and provide insights for the formation of immigration policy in the UK.

In Table 1 we present the descriptive statistics of the variables employed in the analysis. We divide the sample between areas with low and high immigration density based on the median value of the share of non-British population. As we can see, there is no substantial variation in the well-being of natives between areas with low and high immigration. This result is consistent for both SWB measures we employ. In terms of the labour market effect, it is evident that household income across low and high immigration LADs is almost identical, whereas the proportion of the sample being unemployed is slightly larger in high immigration regions. Furthermore, no major differences appear in demographic characteristics, yet we can observe that the proportion of the sample who own a house is somewhat higher in low immigration regions. Overall, the summary statistics in Table 1 does not indicate any substantial variation on the self-reported well-being across regions of low and high immigrant concentration. This is also the case for the other control variables under consideration. Notwithstanding the above, our analytical approach outlined in the preceding section allows us to examine in greater depth how immigrants influence the self-reported well-being of British natives and offer valuable insights to immigration policy.

(Insert Table 1)

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[3] In the United Kingdom there are 391 local authority districts.

Table 2 reports the correlation coefficients for all variables employed in our analysis. The correlation between life satisfaction and happiness appears to be statistically significant. The fact that the two measures have correlation significantly less than 1 indicates that life satisfaction and general happiness are not synonymous, as described by Veenhoven (1991), and capture different aspects (OECD, 2013a). The correlation between life satisfaction, happiness and net migration is negative and not statistically significant for happiness at the 1 percent level. Nonetheless, no meaningful conclusions can be drawn from this association. As we mentioned above, the non-random allocation of immigrants across LADs can bias the true effect of immigration if endogeneity is not fully considered. Furthermore, household income is positively correlated with both life satisfaction and general happiness. According to Inglehart (2010), economic indicators may have a higher impact in life satisfaction than happiness. This relationship has been documented in the seminal study of Easterlin (1974), who finds that higher income improves individuals' well-being. Nonetheless, he argues that after a certain level, additional income does not raise subjective well-being. Graham et al. (2004) find a reverse causality between income and happiness which could explain, to some extent, the positive association found by Easterlin (1974). Other studies, such as Ferrer-i-Carbonell (2004) suggest that the estimated income effect of happiness declines when controlling for unobservable individual characteristics. The relationship between income and well-being, however, may be sensitive to the functional form and econometric specification used, which may have a substantial influence in the predicted outcome.

Age is positively correlated with both life satisfaction and happiness. This stands in contrast with previous studies, such as Ferrer-i-Carbonell and Gowdy (2007) who find a negative association between the two variables. The majority of studies, however, suggest a U-shaped relationship between age and SWB. Younger and older people report higher SWB, while the lowest well-being is observed in middle age, between 32 and 50 years (Blanchflower and Oswald, 2004b, 2008; Dolan et al., 2008). We also observe a negative association between age and net migration, which it was expected for the reasons we discussed earlier. In addition, the above-mentioned relationship may explain the negative attitudes of older people towards immigration. In terms of marital status, we find a negative and statistically significant association between being married and SWB. Generally speaking, marriage is positively related to well-being (Diener et al., 2000; Kim and McKenry, 2002; Vanassche et al., 2013). The rationale is that marriage satisfies basic human needs, which ultimately lead to higher well-

being. Others studies provide evidence that widowhood or divorce result in lower levels of well-being (Helliwell, 2003; Sun et al., 2016).

As it was expected, being unemployed is negatively correlated with life satisfaction. Empirical studies consistently find that unemployment is associated with lower life satisfaction (Winkelmann and Winkelmann, 1998; Blanchflower and Oswald, 2004b; Green, 2011). Despite the income costs of being unemployed, these studies show that psychological costs due to loss of self-esteem or social status have a larger impact on well-being. Furthermore, the correlation between happiness and health status is positive, which is in keeping with previous literature (Bukenya et al., 2003; Diener and Chan, 2011). Regarding household size, the correlation coefficients suggest a negative relationship with SWB. This effect is somewhat stronger for happiness than life satisfaction and statistically significant at any level. Such a relationship may be associated with income distribution within the household (Zereyesus et al., 2016). Finally, the negative relationship between being a tenant and life satisfaction suggests that those who rent a house may report lower life satisfaction than owners (Zumbro, 2014).

(Insert Table 2)

4. Empirical Results and Discussion

4.1. Baseline estimates

Table 3 presents the fixed effect regressions using models (1) and (2). In the first two columns we report the estimated results without the quadratic net migration term, while in columns (3) and (4), squared net migration is inserted into the model. On average, higher net migration is associated with a negligible effect on the well-being of British natives. Linear net migration yields a negative coefficient in both models and is statistically insignificant at any conventional level. Specifically, a unit increase (1,000 people) in net migration rate reduces natives' life satisfaction by -0.00075, while happiness increases by 0.000486 units. As we mentioned above, the negative coefficient in general happiness indicates a positive association. We argue that these estimates are mirrored in earlier studies focused on the UK context, such as those provided by Howley et al. (2018). Contrary to our study, Ivlevs and Veliziotis (2018) find a negative nexus between inward migration from A8 countries and subjective well-being in the UK, yet their estimates vary substantially across socio-demographic groups. Heterogeneity analysis is also a focal point in our study, which is examined in the following section.

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Furthermore, we examine the non-linear relationship between net migration and SWB, by including a square term of the former into the model. While not statistically significant, there does appear to be some well-being gain, where an increase in square net migration is associated with a 0.0000222 units increase in life satisfaction and a 0.0000845 units reduction in general happiness. To provide an idea of how large these effects are, we compare the estimated coefficients of health status, which is a key driver of subjective well-being, with the results obtained for net migration. Based on our estimates, individuals who report that their health status is poor will experience a -0.817 reduction in their life satisfaction. This is in line with earlier studies, which suggest poor health status is devastating for people's well-being (Bukenya et al., 2003; Diener and Chan, 2011). Household income appears to be statistically significant for both measures of well-being. The relationship between income and SWB has a positive sign, which implies that people earning higher income are likely to live in areas where subjective well-being is higher. Furthermore, age and its quadratic term appear with the expected signs, yet they are not statically significant for life satisfaction. The quadratic effect confirms the U-shaped relationship found by other researchers (Blanchflower and Oswald, 2008). Regarding marital status, we find that being married is associated with lower life satisfaction and happiness, even though the latter is insignificant. While marriage is generally associated with higher life satisfaction, Dolan et al. (2008) argue that objective circumstances concerning, for example, the stability of the relationship need to be accounted for. In addition, being divorced or widowed reduces life satisfaction by -0.127 and -0.239 units respectively. In the case of general happiness, being married and divorced are statistically insignificant, except for being widowed, which is significant at 10 percent level and positively associated with happiness, implying that happiness deteriorates. Our results also indicate that unemployment has a negative effect on both life satisfaction and happiness, whereas those being inactive see an decrease in their happiness level by 0.0183 units (Winkelmann and Winkelmann, 1998; Green, 2011). This can be attributed to the fact that the inactive group is mainly comprised of retired individuals, who tend to report lower levels of well-being (Mein et al., 2003; Latif, 2011). As far as the housing tenure is concerned, being a tenant, as opposed to be an owner, increases life satisfaction by 0.0575 units and is statistically significant at 5 percent level. Finally, household size is insignificant for both life satisfaction and happiness.

(Insert Table 3)

4.2. Heterogeneity analysis

In this section we investigate whether our estimates vary across groups. To achieve this, we estimate separate models based on different socio-demographic features. More specifically, we consider four characteristics, namely gender, age, marital status and employment. All models are estimated using the benchmark specification we employed in the previous section. Tables 4 and 5 report the estimated relationships. For illustration purposes, the tables present only the estimated coefficient for the main independent variable, which is net migration.

As shown in Tables 4 and 5, the estimated coefficients are not statistically significant at any conventional level, except from 'Age>70'. Despite that, there is some degree of heterogeneity in the nexus between inward migration and self-reported well-being of natives. In terms of gender, we observe that immigration has a negative impact on life satisfaction of males, while the effect is positive for females. These findings are in line with previous studies suggesting that women tend to report higher life satisfaction than men (Alesina et al., 2004; Blanchflower and Oswald, 2004b). In contrast to life satisfaction, we find that women are less happy than men as a result of immigration. We argue that these inconsistencies may arise due to the fact that SWB measures capture different concepts. As it was expected, we find a positive association between immigration and employment. The argument is that those in employment are less likely to face labour market competition, which explains the positive association with immigration. However, the same does not hold for those being unemployed. These results may be attributable to perceptions that immigrants put a downward pressure on wages and increase local labour market competition. As we discussed previously, there is sufficient evidence indicating that the labour market impact of immigration is negligible (Card and Altonji, 1991; Suen, 2000; Longhi et al., 2005; Ottaviano and Peri, 2012). In addition, we find a negative association between net migration and SWB of those being inactive. Since the group of inactive individuals is mainly comprised of retired people (approximately 80 percent), we contend that this negative association reflects the negative attitudes of elderly people towards immigration. As we can see, life satisfaction of older people (Age>70) is statistically significant at 5 percent level and negative associated with higher levels of immigration (β= -0.00681). As we argued before, older people are more likely to oppose to immigration as they may believe that immigrants will reduce the quality of local health services or threaten the local economy and culture (Akay et al., 2017; Ivlevs and Veliziotis, 2018).

Even though the groups of 'Age 35-70' and 'Age>70' are not statistically significant, the age follows a U-shaped pattern similar to what most studies find (Blanchflower and Oswald,

2004b; Akay et al., 2014, 2017). Finally, we examine marital status. We find the effect on life satisfaction to be stronger and negative for married people, which is consistent with our baseline results. We argue that the positive impact of marriage, that most studies find, on life satisfaction could be a function of other objective situations that do not directly influence one's well-being (Dolan et al., 2008). Overall, there appears to be substantial heterogeneity across different subgroups. Even though our estimates yield coefficients that are statistically insignificant, we consistently find only minor effects of immigration on different groups of people.

(Insert Tables 4 & 5)

4.3. Two-Stage Least Squares (2SLS)

In this section, we account for endogeneity due to selection bias and reverse causality. To do so, we apply the IV approach using 2SLS method and instrumenting net migration with the variables outlined in section 3. These include the lagged values of the share of non-British population and the percentage of live births to non-UK born mothers. The results of the IV analysis are summarised in Table 6. Looking first at the relationship between net migration and life satisfaction, the IV regression yields a positive coefficient of 0.00643, as opposed to the negative coefficient of -0.000751 found in our baseline fixed effects model. In addition, the coefficient for net migration remains statistically insignificant. Although positive, the size of the coefficient is still quite small compared to that of other well-being drivers such as health status or being unemployed (see Table 3). A higher coefficient in the IV estimation indicates that our benchmark fixed effects model may exhibit some downward bias. Our estimates are compatible with those obtained by Howley et al. (2018), who argue that fixed effects estimates are prone to measurement error. As such, studies rely on spatial analysis are more likely to underestimate the true effect of immigration on self-reported well-being (Aydemir and Borjas, 2011). Finally, we consider the nexus between net migration and happiness. As shown in Table 6, the causal effect of net migration on general happiness is still negative indicating a positive effect, but somewhat higher than the baseline fixed effects model (-0.000486 compared to -0.00115). This result confirms the claim that our initial specification underestimates the relationship between inward migration and subjective well-being. Furthermore, we assess the relevance of our instrumental variables using the F-statistic in the first-stage regression, where

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we reject the null hypothesis of a weak instrument for both measures of SWB. We also accept the null hypothesis of no endogeneity based on the Hansen statistic. Table 6 below does not present the coefficients of the remaining variables, since the patterns observed are identical to those reported in Table 3.

(Insert Table 6)

4.4. Further tests

In this section, we perform additional tests to ensure the robustness of our results. First, we divide our sample between individuals who moved between LADs and those who never relocated over the period 2004-2016. Subsequently, we investigate whether our results are driven by regions with high immigrant concentration. To achieve this, we distinguish between areas with low and high immigration density. We define high immigration regions those where the share of non-British population is above 10 percent. Similarly, low immigration regions are those where the share of non-British population is below 10 percent. The results of both tests are reported in Table 7.

While the estimated coefficients are not statistically significant, we can still derive some interesting patterns. First, we observe that net migration reduces life satisfaction and increases happiness of internal migrants by -0.0163 and -0.0179 units respectively. One would expect this outcome if the decision to relocate is associated with the increasing level of immigration in the previous area of residence. In contrast, life satisfaction for stayers seems to increase with immigration. Similar results obtained by Akay et al. (2014) who examine the proportion of non-movers and find a positive association of well-being with immigration. Another interesting finding arises from the distinction between low and high immigration regions. While someone would expect regions where immigration density is lower to be more satisfied, our estimates suggest otherwise. Individuals who live in less diverse area are likely to experience life satisfaction loss, yet the coefficient is slightly lower compared to that reported in high immigration density regions. This leads us to the conclusion that our estimates are not driven by regional differences in immigrant concentration, thus ensuring the robustness of our results.

(Insert Table 7)

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4.5. Channels behind our results

In this section, we focus on the mechanisms behind our results. As we discussed above, we consider four life domain satisfactions as potential channels through which immigration influences well-being. The estimated regressions are presented in Table 8. Based on the results, we contend that job satisfaction and satisfaction with health are the most affected domains. The association between net migration and job satisfaction is positive and statistically significant at 5 percent level. This suggests that labour markets may be a channel though which immigration affects well-being. In our case, the positive coefficient may confirm this strand of literature arguing that immigration exerts only minor effects on local labour markets (Card and Altonji, 1991; Longhi et al., 2005). Regarding satisfaction with health, the regression coefficient appears to be positive. This result stands in contrast to the belief that immigrants abuse local health services and reduce the quality of healthcare (Giuntella et al., 2018). Previous research has shown that immigrants tend to be healthier and younger and thus, use less medical services (Goldman et al., 2006; Chiswick et al., 2008; Giuntella and Mazzonna, 2015). Another plausible justification is that immigrants, and particularly those coming from the EU, tend to be better educated than natives (Dustmann et al., 2013). This reflects the fact that immigrants are more likely to engage with professional occupations, which minimises the risk of work-related accidents and likelihood to use medical care.

(Insert Table 8)

5. Conclusions

In this study, we examine the direct impact of immigration on the subjective well-being of British natives. To the best of our knowledge, this is the first study to address this specific relationship using a set of panel data for the entire UK. Utilising two different measures of subjective well-being, namely life satisfaction and general happiness, we can investigate the underlying relationship beyond the narrow viewpoint of labour market outcomes and public finances and rely on more comprehensive measures of welfare to understand the broader effects of immigration. Our study employs a long-run panel dataset obtained from the BHLS and the UKHLS and data on net migration at local authority level over the period 2004-2016. Our estimates reveal several important results. In contrast to much of the empirical evidence on the nexus between immigration and natives' wellbeing, our findings suggest that immigration has

no significant impact on the well-being of natives in the UK. The estimated coefficient is higher and positive when the quadratic term of net migration enters the model. The results also suggest that there is no clear advantage of using life satisfaction over general happiness, as the difference between the two coefficients is quite small.

Another interesting finding arises from the heterogeneity analysis. Even though most of the coefficients are statistically insignificant, there appears to be some degree of heterogeneity in terms of gender, age, employment and marital status. In general, our estimates are robust to different specifications and additional tests. As a final point, we explore the mechanisms behind our results. We conclude that domain satisfactions related to labour market and health outcomes are two possible channels through which immigration affects natives' well-being. It is evident that the complex and multifaceted nature of migration affects several aspects of life. Our study is the first to provide a comprehensive analysis on the influence of immigration on human well-being using a large sample covering the four countries in the UK. This allows us to elicit important information and gain an understanding of the extent to which immigration affects different groups of people and the potential avenues behind these effects.

In this regard, we contend that our study has several policy implications. It is noticeable that the immigration effect extends beyond the pecuniary dimension of labour markets. Hence, it is important for policy-makers to emphasise on the broader effects of immigration, such as the impact on provision of health services and education or fertility. Furthermore, the observed differentials across different groups of people could possibly explain people's attitudes towards immigration. These attitudes may have largely determined the outcome of the recent referendum over the UK's membership in the EU. We argue that our findings may contribute to immigration policy in the post-Brexit period.

Further research may focus on the following areas. First, future empirical studies may explore the drivers behind the international differences in subjective well-being as a result of immigration. In contrast to our study, other research studies have shown that immigration exerts a positive effect on well-being of natives, while other find a substantial differentiation across different groups. Therefore, it is important to understand the source of heterogeneity in empirical research. Another potential area concerns immigration attitudes and the effects for immigration policies. Our evidence suggests that certain cohorts may be more affected by immigration compared to others. Therefore, we contend that future studies may explore whether subjective well-being affects attitudes towards immigration. Our final proposition is associated with the mechanisms that underlie the immigration impact. Even though this aspect has been addressed in earlier studies, further research is required to establish the various

channels through which changes in immigration flows affect the people's well-being in destination countries.

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Table 1. Descriptive statistics

	Low Immigration Density		High Immigration Density		Total Sample	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Life Satisfaction	5.202	1.444	5.102	1.474	5.177	1.452
General Happiness	2.042	0.555	2.038	0.582	2.040	0.566
Net Migration	1.091	1.843	7.358	7.194	3.891	5.900
Log of Household Income	7.877	0.747	7.933	0.800	7.921	0.773
Age	48.802	18.665	45.388	18.240	47.279	18.545
Single	(Reference)		(Reference)		(Reference)	
Married	0.181	0.385	0.149	0.356	0.160	0.367
Divorced	0.236	0.425	0.329	0.470	0.284	0.450
Widowed	0.044	0.206	0.028	0.165	0.036	0.187
Employed	(Reference)		(Reference)		(Reference)	
Unemployed	0.041	0.198	0.060	0.237	0.048	0.215
Inactive	0.414	0.492	0.391	0.488	0.405	0.490
Excellent	(Reference)		(Reference)		(Reference)	
Very good	0.370	0.482	0.351	0.477	0.363	0.481
Good	0.261	0.439	0.279	0.448	0.267	0.442
Fair	0.130	0.336	0.133	0.340	0.130	0.336
Poor	0.056	0.230	0.058	0.234	0.055	0.229
Owner	(Reference)		(Reference)		(Reference)	
Tenant	0.246	0.431	0.340	0.474	0.292	0.454
Household Size	2.754	1.315	3.013	1.603	2.902	1.494

Source: Author's calculations based on data from the BHPS and UKHLS (2004-2016). The data for net migration was obtained from the ONS. The distinction between low and high immigrant density is based on the median value of the share of non-British population (0.052).

Table 2. Correlation matrix

	Life Satisfaction	General Happiness	Net Migration	Log of Household Income	Age	Marital Status	Job Status	Health Status	Household Size
General Happiness	-0.359***								
	(0.0000)								
Net Migration	-0.049***	-0.005**							
	(0.0000)	(0.0278)							
Log of Household Income	0.094***	-0.063***	0.015***						
	(0.0000)	(0.0000)	(0.0000)						
Age	0.046***	0.059***	-0.104***	-0.248***					
	(0.0000)	(0.0000)	(0.0000)	(0.0000)					
Married (Ref: Single)	-0.085***	-0.010***	0.071***	-0.121***	-0.48***				
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)				
Unemployed (Ref: Employed)	-0.068***	0.070***	0.046***	-0.248***	-0.012***	0.158***			
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)			
Health Status	-0.298***	0.228***	0.016***	-0.207***	0.264***	-0.063***	0.215***		
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)		
Household Size	-0.007***	-0.029***	0.118***	0.388***	-0.453***	-0.042***	0.041***	-0.124***	
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	
Tenant (Ref: Owner)	-0.103***	0.013***	0.142***	-0.108***	-0.332***	0.254***	0.055***	0.018***	0.047***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)

Source: Author's calculations based on data from the BHPS and UKHLS (2004-2016). The data for net migration was obtained from the ONS.

p-values within brackets, ***,** indicate significance at 1% and 5% level respectively.

Table 3. Fixed effects for Life Satisfaction and General Happiness

	(1) DV: Life satisfaction	(2) DV: General happiness	(3) DV: Life satisfaction	(4) DV: General happiness
Net migration	-0.000751 (0.00229)	-0.000486 (0.00114)	-0.00116 (0.00324)	-0.00204 (0.00160)
Net migration square			0.0000222 (0.000132)	0.0000845 (0.0000629)
Log of household income	0.0404*** (0.00734)	-0.00916*** (0.00339)	0.0404*** (0.00734)	-0.00918*** (0.00339)
Age	-0.00688 (0.0172)	0.0139* (0.00786)	-0.00689 (0.0172)	0.0137* (0.00786)
Age square	0.0000652 (0.0000674)	-0.0000825*** (0.0000285)	0.0000653 (0.0000674)	-0.0000823 (0.0000285)
Marital status (reference: single)				
Marital status (married)	-0.0705** (0.0308)	0.0175 (0.0149)	-0.0705** (0.0308)	0.0175 (0.0149)
Marital status (divorced)	-0.127*** (0.0287)	0.0166 (0.0138)	-0.127*** (0.0287)	0.0168 (0.0138)
Marital status (widowed)	-0.239*** (0.0495)	0.0627* (0.0320)	-0.239*** (0.0495)	0.0625* (0.0320)
Job status (reference: employed)				
Job status (unemployed)	-0.218*** (0.0219)	0.122*** (0.0103)	-0.218*** (0.0219)	0.122*** (0.0103)
Job status (inactive)	0.0145 (0.0149)	0.0183*** (0.00689)	0.0144 (0.0149)	0.0179*** (0.00689)
Health status (reference: excellent)				
Health status (very good)	-0.100*** (0.00994)	0.0493*** (0.00445)	-0.100*** (0.00994)	0.0492*** (0.00445)
Health status (good)	-0.232*** (0.0125)	0.106*** (0.00557)	-0.232*** (0.0125)	0.106*** (0.00556)
Health status (fair)	-0.461*** (0.0170)	0.215*** (0.00770)	-0.461*** (0.0170)	0.215*** (0.00770)
Health status (poor)	-0.817*** (0.0277)	0.392*** (0.0129)	-0.817*** (0.0277)	0.392*** (0.0129)
Household size	0.00498 (0.00717)	0.00332 (0.00357)	0.00498 (0.00717)	0.00327 (0.00357)
Housing tenure (reference: owner)				
Housing tenure (tenant)	0.0575** (0.0237)	-0.0101 (0.0121)	0.0575** (0.0237)	-0.0101 (0.0121)
Constant	5.426*** (0.684)	1.629*** (0.318)	5.428*** (0.684)	1.617*** (0.318)
Local authority fixed effects	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes

Time fixed effects	Yes	Yes	Yes	Yes
Number of observations	216,617	218,006	216,617	218,006
Number of persons	74,710	75,018	74,710	75,018
R-squared	0.026	0.022	0.026	0.022

Source: Author's calculations based on data from the BHPS and UKHLS (2004-2016).
Robust standard errors in parentheses, clustered standard errors at the individual level, ***,** and * indicate significance at 1%, 5% and 10% respectively.

Table 4. Heterogeneity across groups – Life satisfaction

	Gender		Employment		
	Male	Female	Employed	Unemployed	Inactive
Net migration	-0.0042055 (0.0034)	0.0012907 (0.0030)	0.002167 (0.0029)	-0.0035968 (0.0191)	-0.0039534 (0.0042)
R-squared	0.0139	0.0176	0.0070	0.0012	0.0074
Number of observations	96,274	120,349	120,835	10,457	85,332
Number of persons	33,925	40,812	44,906	7,413	35,478
	Marital status		Age		
	Married	Not married	Age<35	Age 35-70	Age>70
Net migration	-0.00453 (0.0061)	0.0001508 (0.0025)	-0.00383 (0.0039)	0.00354 (0.0031)	-0.00681** (0.0085)
R-squared	0.0056	0.0194	0.0146	0.0107	0.0041
Number of observations	35,500	181,124	66,332	125,113	25,172
Number of persons	13,153	64,353	27,754	41,956	9,370

Source: Author's calculations based on data from the BHPS and UKHLS (2004-2016).
Robust standard errors in parentheses, clustered standard errors at the individual level, ***,** and * indicate significance at 1%, 5% and 10% respectively. All models are estimated using all variables reported in Table, except from age and age-square.

Table 5. Heterogeneity across groups – General Happiness

	Gender		Employment		
	Male	Female	Employed	Unemployed	Inactive
Net migration	0.000752 (0.0016)	-0.00147 (0.00154)	0.000686 (0.00150)	-0.00293 (0.0093)	-0.00167 (0.0019)
R-squared	0.0075	0.0117	0.0041	0.0010	0.0048
Number of observations	96,839	121,174	121,256	10,560	86,197
Number of persons	34,066	40,980	45,007	7,468	35,721
	Marital status		Age		
	Married	Not married	Age<35	Age 35-70	Age>70
Net migration	0.00216 (0.0029)	-0.00127 (0.0012)	0.000554* (0.0021)	-0.00184 (0.0014)	0.000281 (0.0029)
R-squared	0.0034	0.0115	0.0079	0.0076	0.0017
Number of observations	35,848	182,165	66,603	125,820	25,583
Number of persons	13,221	64,623	27,847	42,125	9,458

Source: Author's calculations based on data from the BHPS and UKHLS (2004-2016).
Robust standard errors in parentheses, clustered standard errors at the individual level, ***,** and * indicate significance at 1%, 5% and 10% respectively. All models are estimated using all variables reported in Table, except from age and age-square.

Table 6. Two-Stage Least Squares fixed effects for Life Satisfaction and General Happiness

	(1) DV: Life satisfaction	(2) DV: General happiness
Net migration	0.00643 (0.0157)	-0.00115 (0.0070)
Hansen statistic for endogeneity	3.707 [0.1567]	3.985 [0.1364]
Weak instrument test	322.83 [0.0000]	326.11 [0.0000]
R-squared	0.0186	0.0134
Number of observations	147,186	148,160

Source: Author's calculations based on data from the BHPS and UKHLS (2004-2016). For instrumental variables we rely on migration data obtained from the ONS.

Robust standard errors in parentheses, p-values within square brackets, ***,** and * indicate significance at 1%, 5% and 10% respectively

Table 7. Additional tests

	Life Satisfaction			
	Non-movers	Movers	Low immigrant density	High immigrant density
Net migration	0.00177 (0.0038)	-0.0163 (0.0208)	-0.0012 (0.0051)	-0.0031 (0.0035)
R-squared	0.0016	0.0017	0.0035	0.0098
Number of observations	49,419	44,831	105,746	110,871
Number of persons	17,862	43,876	45,041	71,028
	General Happiness			
	Non-movers	Movers	Low immigrant density	High immigrant density
Net migration	-0.00074 (0.0023)	-0.0179 (0.0138)	-0.000061 (0.0024)	0.0013 (0.0017)
R-squared	0.0005	0.0002	0.0028	0.0068
Number of observations	49,715	45,479	106,102	111,904
Number of persons	17,897	44,522	45,139	71,667

Source: Author's calculations based on data from the BHPS and UKHLS (2004-2016).
Robust standard errors in parentheses, clustered standard errors at the individual level, ***,** and * indicate significance at 1%, 5% and 10% respectively.

Table 8. Life domain satisfactions

	(1) DV: Job satisfaction	(2) DV: Satisfaction with income	(3) DV: Satisfaction with health	(4) DV: Satisfaction with amount of leisure
Net migration	0.00265** (0.0011)	0.00223 (0.0026)	0.0096** (0.0041)	0.0057 (0.0044)
R-squared	0.6957	0.0510	0.0667	0.0087
Number of observations	246,180	216,503	52,030	51,845
Number of persons	81,796	74,642	15,930	15,925

Source: Author's calculations based on data from the BHPS and UKHLS (2004-2016).
Robust standard errors in parentheses, clustered standard errors at the individual level, ***,** and * indicate significance at 1%, 5% and 10% respectively.