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The effect of immigration on natives' well-being in the European Union

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ABSTRACT

Immigration is one of the most debated topics in Europe today. Immigrants may affect natives through multiple channels, both economic and non-economic. For this reason, evidence that reflects all of the relevant factors influenced by immigrants is necessary to inform policy. This paper uses life satisfaction, a comprehensive single-item measure, to demonstrate that immigration has no statistically significant effects on natives' overall well-being, in 28 European countries (the EU and UK) over the years 1990–2017 (EU12) and 2005–2017 (new member states). This finding holds for immigrants from the EU, not from the EU, refugees, and regardless of natives' age or level of education. In order to overcome data limitations and endogeneity concerns, the methods range from observing the raw data to instrumental variable regressions. Life satisfaction is aggregated from Eurobarometer surveys. Immigrant stocks are from the United Nations (for every five years and again in 2017).

1. Introduction

"The future of Europe's elections will be all about migration, foreign minister says," according to a relatively recent headline from CNBC news (Turak, 2018). The quoted minister, Peter Szijjarto, is Hungary's foreign affairs trade minister, part of a government that was elected on an anti-immigration platform. This view is not exceptional. Concerns relating to immigration are seen as contributing strongly to the election of Donald Trump in the United States, Britain's vote to exit the European Union (EU), and other populist election outcomes (e.g., Italy). Survey responses substantiate Szijjarto's view, by late 2017 EU natives considered immigration to be the second most important issue facing the EU, nearly matching their concern for terrorism (see Fig. 1).

The aim of this paper is to test whether immigration has an overall positive or negative effect on natives' well-being in the EU.[1] Although the present social and political environment suggests people feel negatively about immigrants, it is possible that immigration has an overall positive impact. A report by the European Migration Network cites the same Eurobarometer evidence referenced above but conveys a much more nuanced picture (European Migration Network, 2018), and numerous papers have demonstrated that there are positive impacts on economic outcomes, e.g., productivity, employment, and entrepreneurial activity (see for example, Aleksynska and Tritah, 2015; Alesina et al., 2016; Jaumotte et al., 2016;

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[1] While the United Kingdom (UK) has officially left the EU, it is treated as part of the EU in this paper because the data used for analysis are for periods prior to the UK's exit.

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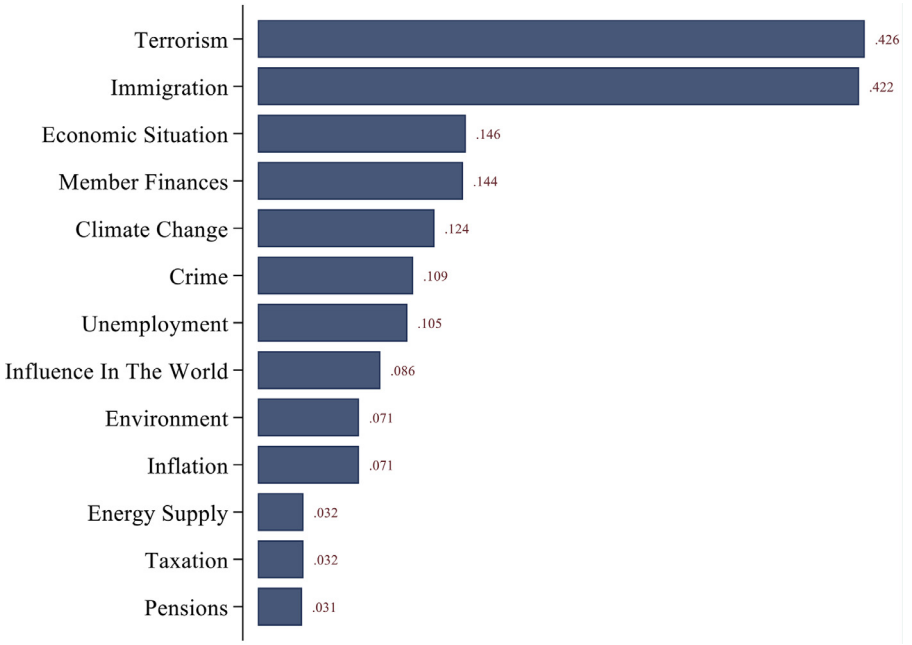

Fig. 1. Survey responses to the question: What do you think are the two most important issues facing the EU at the moment? (Share of Natives - EU28).
Source: Author calculations, Eurobarometer 88.3 QA5, November 2017
Average over 28 country averages.

Ortega and Peri, 2009; Peroni et al., 2016). What is more, many of the channels through which immigrants affect natives are non-economic (e.g., diversity as in Akay et al., 2016), which relatively few studies have examined. If we assume that policymakers are interested in the overall well-being of their constituents, then we need to assess both the economic and non-economic effects of immigration.

To that aim, this paper evaluates the overall impact of immigration on a broadly defined measure of well-being. Specifically, I use survey data from the Eurobarometer regarding individuals' satisfaction with their lives (life satisfaction). Life satisfaction represents one of several measures of subjective well-being (discussed further in Section 3.1 Data). It is a comprehensive single-item measure that captures both economic and non-economic factors that are otherwise often ignored. This is an important advantage. For example, as stated by Di Tella et al. (2003), "Standard economics tends to ignore what appear to be important psychic costs of recessions. (p. 823)" What is more, aggregating outcomes is challenging, in part because weights are necessary. Consider for example, Okun's Misery Index, which places equal weight on the components unemployment and inflation. However, from the life satisfaction literature we know that equal weights are inappropriate in this case, because people suffer more from unemployment than inflation (Di Tella et al., 2001). When individuals assess their life satisfaction, they implicitly determine the weights and factors they deem to be relevant. As a consequence, and because immigration affects individuals through numerous channels, subjective well-being is well suited to assess immigration's overall impact. Subjective well-being measures have some limitations however, which are addressed in Section 3.1. Still, they are considered to contain reliable and valid information (OECD, 2013; Stiglitz et al., 2009).

The past evidence on immigration and subjective well-being has important limitations. First, most of the research has not distinguished between immigrants of different origins (e.g., Betz and Simpson, 2013; Howley et al., 2018; Papageorgiou, 2018). In 2017 $>$ 60 percent of the native population felt positively about immigration from other EU states, but a similar number felt negatively about immigrants from outside the EU (see Fig. 2). While the degree of difference may be surprising, it is consistent with expectations that natives feel differently about immigrants from different places. Consider: immigrants from ethnically similar backgrounds may not be visually distinguishable, affecting perceptions of the number of immigrants; immigrants from more dissimilar backgrounds are more likely to affect concerns over social cohesion and traditional culture; greater cultural and language similarity should make it easier for immigrants to assimilate; and skills may also be distinct, especially for refugees who are escaping hardship, cannot go home, and may not otherwise meet the domestic standards for admission.

Another limitation is that much of the past research was conducted before the recent refugee crisis.[2] In recent years, not only has the composition of immigrant flows changed, but also people's feelings toward immigration. According to natives responding to Eurobarometer surveys, immigration went from the fifth most important issue facing the EU in 2010 to the

[2] The crisis is due in large part to the Syrian civil war (European Migration Network, 2018), which began in 2011 and continues through the end of the study period.

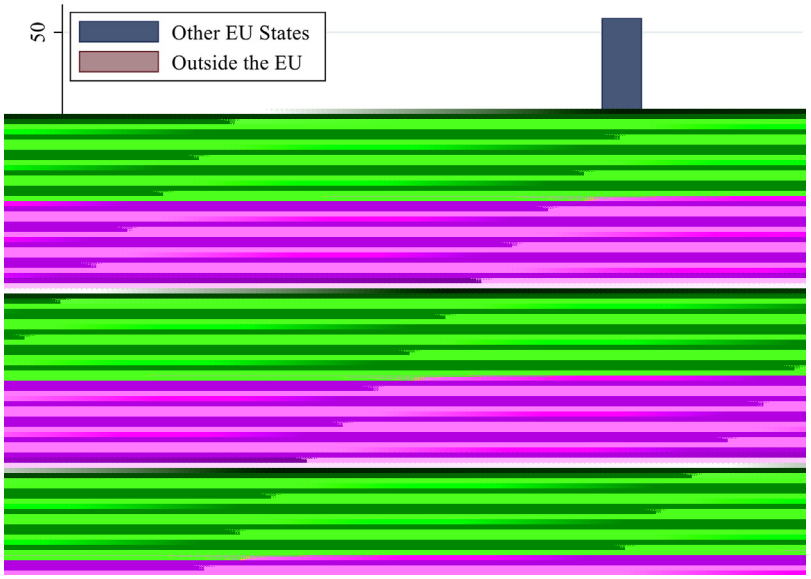

Fig. 2. Feelings toward immigrants from other EU States and Outside the EU
(Share of Natives - EU 28)
"Please tell me whether each of the following statements evokes a positive or negative feeling for you. 1. Immigration of people from other EU Member States. 2. Immigration of people from outside the EU". Average over individuals in all 28 countries.
Source: Author calculations, Eurobarometer 88.3 QB4, November 2017.

second in 2017 (Eurobarometer, 2018). This change alone could have a negative effect if such feelings are reflected in life satisfaction. Indeed, concerns relating to international relations and domestic politics are listed as important for personal well-being, though to a lesser degree than income/work, family, and health, based on open-ended survey conducted in 12 countries (Cantril, 1965). For these reasons, the present analysis distinguishes between immigrants from inside and outside of the EU, separately assesses the effects of refugees, and includes the years of the refugee crisis (up until 2017). Further contribution details are discussed in the next section.

Understanding the impacts of immigration on subjective well-being is intrinsically important[3] and important because subjective well-being predicts numerous outcomes (De Neve et al., 2013; Piekałkiewicz, 2017), from income, unemployment, and health (Graham et al., 2004; O'Connor, 2020; Tay et al., 2015) to voting behavior (Ward, 2019). Recently, Arampatzi et al. (2018) found a strong association between feelings of dissatisfaction before Arab Spring and the grievances associated with the Arab Spring protests. In another paper, the authors find individual feelings about one's finances to be more predictive of the United Kingdom's vote to exit the EU than objective income. Financial feelings were also a better predictor than the commonly assumed determinant, age (except for young adults 18–24) (Liberini et al., 2019).

The results, presented in Section 4, demonstrate that immigrant flows[4] do not statistically affect the life satisfaction of natives in the EU over the period 1990–2017. This holds for immigrants from the EU, not from the EU, refugees, and regardless of natives' age or level of education. Further discussion of the data and methods is included in Section 3. Section 5 concludes.

2. Background and contribution

It is unclear both conceptually and based on the past empirical studies whether immigration has an overall positive or negative effect on subjective well-being. The results of most of the previous studies regarding the impacts of immigration on subjective well-being differ and apply solely to individual countries (discussed in detail below). The present paper builds on this literature first by estimating the impacts in a broader sample that includes 28 EU countries as they were added over the period 1990–2017, especially important is the period 2010–2017. Second, I distinguish between immigrants of EU and non-EU origin. Lastly, I improve upon the identification strategies, using two sets of instrumental variables to eliminate potential sources of bias. The results are further supported by additional methods, which also address the small number of

[3] The following set of articles discuss the importance of subjective well-being for policy (Easterlin, 2013; Graham et al., 2018; Helliwell, 2019; Kahneman et al., 2004; Layard, 2005; The Global Happiness Council, 2018).

[4] Immigrants are generally defined as individuals who were born in countries other than where they reside (additional details are included in Section 3.1). Flows are measured as the change in the immigrant population shares over periods of five years, except for the last period, 2015–2017.

countries. Concerning the broader literature, this paper contributes by evaluating the total impacts of immigrant population shares and refugee population shares on natives' life satisfaction.[5]

A key characteristic of the economics of migration literature is that there is little consensus over whether immigration is good or bad. We could expect immigration to have a positive impact on productivity and labor markets (e.g., increasing aggregate demand, replacing workers in response to an aging population, or otherwise improving allocative efficiency), and to simultaneously reduce costs and increase the diversity of goods and services. Negative channels include: crowding out natives in the labor market, endangering traditional culture, reducing social cohesion, increasing congestion, or fears that immigrants contribute less to public finances. Conceptually, it is unclear whether immigration should have an overall positive or negative effect on natives' well-being.

The empirical evidence primarily concerns economic factors, especially relating to labor markets. There are too many studies to reference here; however, to list a few, in the United States the impacts are generally considered to be negative but small (Borjas, 2003, 1994; Card, 2005; Friedberg and Hunt, 1995), while in broader samples, especially those comprised primarily of European countries, the relations are more positive (Aleksynska and Tritah, 2015; Alesina et al., 2016; Jaumotte et al., 2016; Ortega and Peri, 2009). Yet, there is considerable disagreement. A recent study specifically addresses this issue and provides an overview of studies and concise explanation for the disagreement – different estimates are due to different empirical strategies and assumptions (Dustmann et al., 2016).[6] The authors explain that three approaches are typically used to estimate the effects of immigration. The "spatial approach" estimates the total impacts of regional immigration inflows and typically yields more positive estimates. Two skill-based approaches estimate the relative impacts on natives of different skill-groups from inflows of immigrants of different skill-levels: (1) at the national ("national skill-cell approach") or (2) regional levels ("mixture approach"). The two skill-based approaches typically yield more negative estimates. The authors go on to describe the relative merits of each method but in the end advocate the spatial approach (Dustmann et al., 2016). The chief drawback of the spatial approach is that conditional independence is less likely to hold compared to the other approaches; however, that can be overcome using instrumental variables. In part for this reason, I conduct a spatial analysis, estimating the average total impacts of immigration within countries, and use multiple techniques including instrumental variables.

The evidence on migration's impact on subjective well-being focuses primarily on immigrants. See for example the 2018 edition of the *World Happiness Report* (Helliwell et al., 2018) and (Hendriks, 2015; Nikolova and Graham, 2015; Simpson, 2013). Concerning the subjective well-being of natives, the evidence is inconclusive. The one multi-country study that I am aware of covers 26 European countries over the period 2002–2010 and finds positive impacts of immigration flows on natives' life satisfaction, but at the same time, argues that the relation is too small to have a substantial impact (Betz and Simpson, 2013). The remaining studies find positive, negative, and nil relations in the individual countries: United States, Germany, and United Kingdom (U.K.). In particular, for the United States over the period 2005–2010, the relations between immigration and life satisfaction are negative, small, and exhibit heterogeneity, affecting whites more than other racial groups (Kuroki, 2018). In Germany, Akay et al. (2014) find positive impacts of immigrant population shares on the life satisfaction of natives (by regions in Germany over the period 1998–2009). The authors argue that the relation has a meaningful magnitude that is not driven by labor market conditions. In a further paper, Akay et al. (2016) focus instead on ethnic diversity in Germany (1998–2012), finding that it is positively related to natives' life satisfaction, but with a smaller magnitude than the immigrant share. In England, Longhi (2014) also focuses on diversity, but finds that both diversity and greater numbers of non-white residents are negatively related to the life satisfaction of white-English people during the years 2009–2010. Ivlevs and Veliziotis (2018) find more heterogeneous results in England and Wales using inflows from Eastern Europe: negative relations for older, unemployed, and lower-income people, but positive relations for younger, employed, higher-income, and better educated people (2003–2008). More recently, Howley et al. (2018) and Papageorgiou (2018) find no effect of immigration on the subjective well-being of English natives over the period 2009–2015 and the U.K. population from 2004 to 2016, respectively. However, each find negative relations for individuals beyond the age of 70. For the general population, they suggest job satisfaction as a channel through which immigration affects overall subjective well-being, however, in opposite directions – negative (Howley et al., 2018) and positive (Papageorgiou, 2018).

In summary, the evidence relating to immigration and subjective well-being suggests labor markets may be important (as in the U.K. (Howley et al., 2018; Ivlevs and Veliziotis, 2018; Papageorgiou, 2018), but not in Germany (Akay et al., 2014)), but so are other factors, such as immigrant diversity (Akay et al., 2016; Longhi, 2014). Moreover, the relations depend on destination and vary within a country (Akay et al., 2016, 2014; Kuroki, 2018; Longhi, 2014). However, the interpretations from these studies have some limitations. They are based on single countries (other than Betz and Simpson, 2013), from which we cannot generalize, and the identification strategies rely on conditional independence (Akay et al., 2014; Betz and Simpson, 2013; Ivlevs and Veliziotis, 2018; Kuroki, 2018) or instruments that have limitations (Akay et al., 2016; Howley et al., 2018; Longhi, 2014; Papageorgiou, 2018).[7] While the expositions are often fairly convincing (e.g., Akay et al. (2014)

[5] Within the subjective well-being literature, it is more common to evaluate immigrants' life satisfaction, and I am not aware of a study that evaluates refugees' impact on life satisfaction.

[6] The authors also note important extensions to theoretical models, especially to relax assumptions (e.g., fixed product mixes or prices), but focus on the empirical approaches (Dustmann et al., 2016).

[7] Akay et al., (2016), Howley et al. (2018), and Papageorgiou (2018) include lags or historic values of immigration as instruments, which may not meet the exclusion restriction due to the serial correlation in settlement patterns. For a recent critique of instruments using historic values of immigration

uses a battery of additional tests, and Ivlevs and Veliziotis (2018) exploits variation in immigrant flows that is arguably exogenous), more evidence is necessary to understand the impacts of immigration on natives' well-being across the European Union. And this evidence could help us to anticipate natives' responses.

3. Data and methods

3.1. Data

Individual life satisfaction data are from repeated cross-sectional Eurobarometer surveys (Eurobarometer, 2018). Life satisfaction is measured using the responses to the question, "On the whole, are you very satisfied, fairly satisfied, not very satisfied or not at all satisfied with the life you lead?" Responses to such questions have been shown to provide reliable and valid measures of well-being. They predict future behavior in ways consistent with theory (including mortality), relate to objective characteristics including biometrics such as those from functional magnetic resonance imaging (fMRI), relate to other subjective measures (including expert evaluations), and are consistent over time (based on retesting subjects within a short period of time). The present question captures what is referred to as evaluative subjective well-being.[8] For a further discussion of the types of subjective well-being questions and their reliability and validity see (Helliwell and Wang, 2012; Kapteyn et al., 2015; OECD, 2013). And for any readers that are concerned with measurement error in life satisfaction, these concerns are addressed in Appendix A.1.

The Eurobarometer is a valuable source for evaluating changes in natives' well-being over time in Europe. Life satisfaction was first asked in 1973 in seven countries and in 2017 included more than the 28 EU countries. In each year, multiple surveys are conducted that ask about life satisfaction. The responses from individuals excluding immigrants were used to construct annual observations of natives' life satisfaction in each country. Analysis including or even focusing on immigrants would be interesting, but it is not possible using the Eurobarometer while also maintaining the long time series. Prior to 1994 the target population included natives only, and in 1994 the target population expanded to include people born in any EU member state but still excluded immigrants from non-EU countries (Schmitt et al., 2009, p. 56). Similarly, analysis at the subnational level is not possible using the Eurobarometer or any survey with similar country and time coverage.[9]

The life satisfaction variable is aggregated as the weighted proportion of natives reporting one of the two top response categories, "very satisfied" or "fairly satisfied". A proportion is used in order to maintain an ordinal treatment of life satisfaction, as discussed in Appendix A.1, and the top two categories are used because that more closely approximates the sample median and mean.[10] In any case, results are qualitatively similar when using the mean score of life satisfaction, as presented in Appendix A.2. It was aggregated for three reasons, including the lack of consistent individual variables over time (e.g., income), which are discussed in Appendix A.2.

Bilateral immigration stocks for more than 200 destination/origin countries/territories are available every five years from 1990 to 2015 and 2017 from the United Nations (United Nations Population Division, 2017). This series was selected over other sources because of its coverage and because it includes bilateral stocks, which are necessary for the analysis. Immigrants are defined as people residing in a country other than where they were born, for most countries, however, other definitions are also used (usually based on citizenship). Immigrant stocks also exclude refugees. Refugee data are from the UN Refugee Agency and discussed in Section 4.4. Four countries use different definitions of immigrant stocks in the study sample, but this does not present a significant problem for the analysis because it relies on within-country comparisons over time using consistent within country definitions, and a robustness test is conducted excluding these countries.

3.2. Data descriptives and diagnostics

To provide an initial sense of the figures, the life satisfaction of natives is plotted against immigrant shares for each of the 28 EU countries across all years. Fig. 3 displays the data and linear relationship. There is one distinct outlier in terms of immigrant shares. Luxembourg's share is at or more than 30 percent, while most EU countries have populations that are at most 20% immigrants. Life satisfaction has nearly a 70-point range across countries. Two countries report much lower life satisfaction, Bulgaria and Romania, particularly the Bulgarian population in 2005, of which less than 30% reported life satisfaction in the top two categories. On the other hand, 98% of the Danish population reported in the top two categories in 2017. The simple cross-sectional relationship between immigrant shares and life satisfaction is positive, based on the sample excluding Luxembourg. Further summary statistics by country are presented in Appendix B, Table 8.

Are the changes in immigrant shares over time related to changes in natives' well-being? To see the evolution of immigrant share and life satisfaction over the sample period, the trends for two samples are presented in Fig. 4. The samples

see (Jaeger et al., 2018). Longhi (2014) uses both lags of the endogenous variable and the endogenous variable defined at a geographically larger area, introducing correlation across units in the same geographic area, which is not addressed.

[8] Note evaluative subjective well-being questions encompass more than the respondent's present emotional state. In contrast, affective, experiential, or hedonic measures of subjective well-being are distinct, more momentary measures that are more often used outside economics.

[9] For example, the European Values Study also began early, in the 1980s, but only has five waves of which countries participated intermittently, and the European Social Survey includes subnational indicators, but only for four waves in the early 2000s.

[10] The median response is "fairly satisfied." The mean response is similar; it would take the value of approximately three, corresponding to "fairly satisfied" if the responses took values from 1 to 4 with greater satisfaction taking greater values.

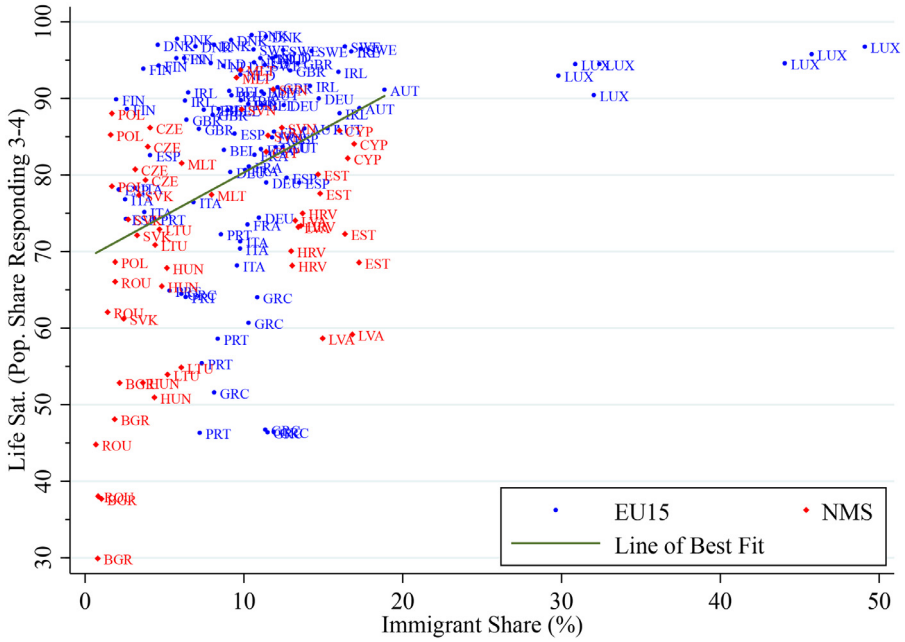

Fig. 3. Cross-sectional relationship between natives' life satisfaction and immigrant share. 28 European Union countries. 1990–2017
In "Pop. Share Responding 3-4", 3-4 represents the top two of four response categories, fairly or very satisfied. Luxembourg is excluded from the line of best fit.
Source: Author calculations. Eurobarometer; and United Nations Population Division.

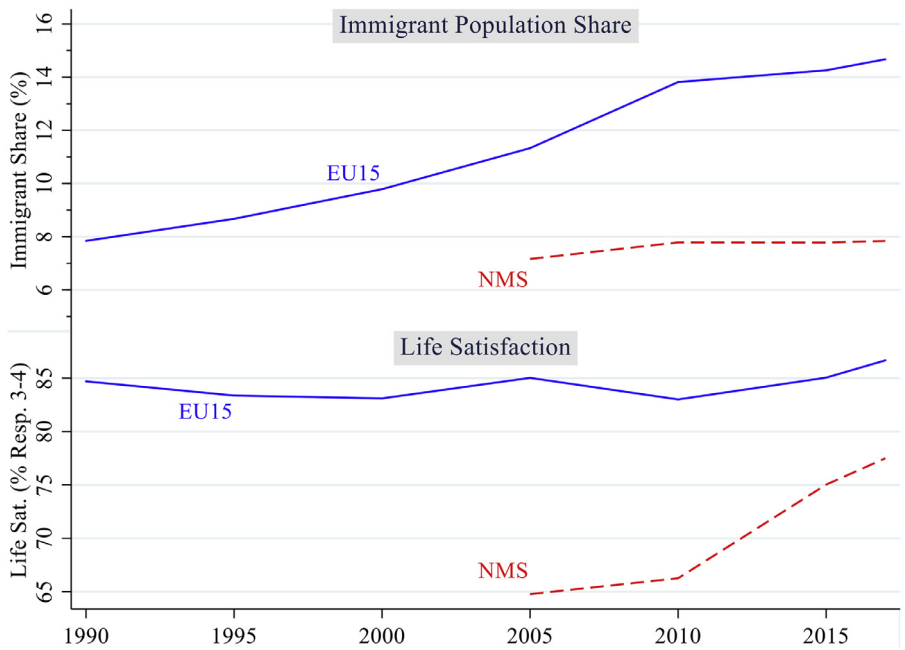

Fig. 4. Change in immigrant shares and natives' life satisfaction over time
In "Pop. Share Responding 3-4", 3-4 represents the top two of four response categories, fairly or very satisfied. EU15 Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and United Kingdom. NMS: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovak Republic, and Slovenia. Dates of immigration figures are truncated to correspond to when life satisfaction data is also available.
Source: Author calculations. Eurobarometer; and United Nations Population Division.

include (1) the original EU15[11] countries for which all have life satisfaction and immigration data since 1990 or 1995 (Austria, Sweden, and Finland), and (2) the new EU member states (labeled NMS),[12] which have been observed since 2005.

Observing the trends in Fig. 4, average immigrant shares appears to be unrelated to average life satisfaction in both the EU15 and NMS. Immigrant shares generally increase over the period. While life satisfaction also finished the period higher, much of the increase occurred from 2010 to 2017, a period which experienced slower growth in immigrant shares.

Visually inspecting the immigrant-share trend for the EU15 suggests that it may not be stationary and could follow a unit root.[13] For this reason, I conducted unit root testing to determine whether any relations estimated in levels could be stable and not spurious (Engle and Granger, 1987). The results, which are discussed in Appendix C, suggest the possibility of a unit root. For this reason the specifications will be estimated in first differences to impose stationarity. Nevertheless, the main results are qualitatively similar if the specifications are run in levels.

3.3. Methods

To estimate the impact of immigration on the well-being of natives, the following data generating process is assumed (Eq. (1)).

$$LS_{ct} = \gamma Immigsh_{ct} + \alpha_c + \lambda_t + \varepsilon_{ct} \tag{1}$$

Aggregate life satisfaction of natives (LS_{ct}) for country $c$in time t depends on the immigrant share ($Immigsh_{ct}$), common time shocks (λ_t), and time-invariant characteristics (α_c)(fixed effects). For purposes of estimation, Eq. (1) is reparameterized in first differences as Eq. (2) to account for the fixed effects and to impose stationarity as discussed above.

$$\Delta LS_{ct} = \gamma \Delta Immigsh_{ct} + \lambda_t + \Delta\varepsilon_{ct} \tag{2}$$

Where: $\Delta LS_{ct} = LS_{ct} - LS_{ct-1}$. Corresponding with the immigration data, the differences are for a period of five years, except for the final period 2017, which has a difference of two years.

Control variables were intentionally left out in order to capture the full impacts of immigration. Immigration has been shown to affect a large range of outcomes, meaning that controlling for them would shut down channels through which immigration affects life satisfaction. For example, if immigration affects GDP per capita and GDP per capita is related to life satisfaction, then controlling for GDP per capita captures part of the impacts of immigration on life satisfaction. In other words GDP per capita represents a "mediator" (cf. Baron and Kenny, 1986) or "bad control" (cf. Angrist and Pischke, 2009). Other variables such as unemployment or attitudes towards immigrants are also likely to be bad controls for the same reasons. Fixed elements, such as shared language, are captured by first differencing. Moreover, instrumental variable methods are implemented, which precludes the need for controls to obtain consistent estimates.

Instrumental variable (IV) methods are implemented to address endogeneity in the immigrant share. Endogeneity could arise from multiple sources. Emigrants may choose to move to countries with greater life satisfaction, or the choice to emigrate to a particular destination and the life satisfaction there could be jointly determined by omitted time-varying factors. To address these issues, two stage least squares (2SLS) is implemented, predicting the change in immigrant share (net flow) in the first stage using two different sets of excluded instruments. Two sets are used because the first (as discussed below) is more intuitive, but the second is necessary to include additional excluded instruments, which are necessary for secondary analysis and to assess their validity (discussed further in Section 4).

The first set of instruments is comprised of constructed immigrant flows,[14] which depend solely on the time-varying characteristics of sending countries. In this way, the instruments are constructed to be exogenous to time-varying characteristics of the destination country.[15] To construct the instruments: (1) bilateral immigrant flows from origin country o residing in destination country c in year t are predicted based on the specification: $\Delta Immigsh_{oct} = \delta_{ot} + \mu_{oct}$. As such, predicted flows depend solely on origin-country-by-time dummies ($\Delta\widehat{Immigsh}_{oct} = \widehat{\delta_{ot}}$), which capture the net effect of all time-varying characteristics affecting emigration from origin countries, so called "push factors," such as poor economic conditions or conflict. (2) Predicted flows are then summed over origin countries to construct the instrument ($\overline{\Delta Immigsh_{ct}} = \sum_{o \neq c} \Delta\widehat{Immigsh}_{oct} = \sum_{o \neq c} \widehat{\delta_{ot}}$). In words, the instrument for a particular country is equal to the sum of estimated push factors of all other countries in a particular year. Given there are 233 origin countries/regions, the push factors for any one country contribute only a small proportion to the instrument, meaning any relation between push factors and characteristics of the destination country is mechanically very small. Altogether, in the regression of bilateral flows there are 6524 destination-origin country pairs (28 EU countries and 233 sending origin countries/territories), which based on

[11] EU15: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and United Kingdom.

[12] The NMS countries include: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovak Republic, and Slovenia. Although Bulgaria, Croatia, and Romania joined the EU in 2007 and 2013, the Eurobarometer also began coverage of them in 2004.

[13] Process with an autoregressive coefficient of one.

[14] Similar instruments were constructed and applied in (Aleksynska and Tritah, 2015; Alesina et al., 2016; Jaumotte et al., 2016; Ortega and Peri, 2009) to evaluate immigration's effects on several productivity measures, especially GDP pc.

[15] Although it is possible for correlation between the time-varying characteristics of destination and origin countries, as described below, any such correlation poses minimal threat to the instrument's exogeneity because the instrument is constructed from the information of 232 origin countries/regions.

Table 1
Benchmark Regression Results. ΔLife Satisfaction (p.p.) on ΔImmigrant Shares (p.p.).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sample	Full	Full	Full	EU15	EU15	EU15	NMS	NMS	NMS
Method	OLS	Const.	Lewbel	OLS	Const.	Lewbel	OLS	Const.	Lewbel
Δ Immigrant Share	0.002	1.664	0.005	0.214	1.499	0.300	0.013	−0.444	−0.289
	[0.996]	[0.633]	[0.981]	[0.595]	[0.614]	[0.362]	[0.974]	[0.899]	[0.441]
Constant	2.008	1.59	2.008	1.532	0.996	1.496	2.456	2.484	2.475
Observations	126	126	126	87	87	87	39	39	39
# of Countries	28	28	28	15	15	15	13	13	13
R Sq.	0.204	−0.065	0.204	0.198	−0.074	0.196	0.240	0.234	0.237
Kleibergen-Paap F Stat.		3.539	118.811		3.005	491.660		1.855	669.006
Hansen J p-value			0.753			0.478			0.699
Mean Life Sat.	80.640	80.640	80.640	84.098	84.098	84.098	72.925	72.925	72.925
Mean Δ Life Sat.	1.366	1.366	1.366	0.078	0.078	0.078	4.240	4.240	4.240
Mean Immig. Share	10.861	10.861	10.861	12.232	12.232	12.232	7.802	7.802	7.802
Mean Δ Immig. Share	0.859	0.859	0.859	1.143	1.143	1.143	0.226	0.226	0.226

Wild Cluster Bootstrapped p-values are reported in brackets. All regressions include year effects.
Source: Author Calculations; Eurobarometer; and United Nations Population Division.

seven observations over the years 1990–2017 amounts to a total of 45,668 observations. This process results in constructed immigrant flows which are correlated with actual immigrant flows at 29% in the main sample.

The second set of instruments is also constructed, this time using the internal structure of the data according to the Lewbel (2012) method. While the approach has been used numerous times now (as documented in Lewbel (2012) and more recently by (Arampatzi et al., 2018; Le Moglie et al., 2015; O'Connor and Graham, 2019; Sarracino and Fumarco, 2018)), it is not very intuitive. For a complete description see Baum et al. (2013) and Lewbel (2012). In brief, the instruments (Z_{ct}) are generated as follows: (1) run a regression of immigrant shares on $\lambda_t$from Eq. (2) and store the residuals ($\widehat{\Delta\varepsilon_{ct}}$), (2) then de-mean λ_t(over the full sample) and multiply them by the stored residuals ($Z_{ct} = (\lambda_t - \bar{\lambda}) * \widehat{\Delta\varepsilon_{ct}}$). By construction, the covariance between $\lambda_t$and $\widehat{\Delta\varepsilon_{ct}}$is zero, and on average the covariance between $Z_{ct}$and $\widehat{\Delta\varepsilon_{ct}}$will be zero, but with heteroskedasticity, Z_{ct}will take meaningful values. The method relies on two conditions in addition to the standard IV ones. First, heteroskedasticity, which can be tested using the standard Breusch-Pagan test. Second, the product of the residual from the first step and the second stage residual of life satisfaction must be unrelated to the time dummies used in the regression. Although the second condition is untestable, I use the typical IV diagnostics to assess whether the instruments are relevant (first stage F-stat) and valid (overidentification test). The STATA user written command ivreg2h can be used to generate the instruments and perform the IV analysis (Baum and Schaffer, 2012).

Because the sample includes a small number of countries, statistical significance is assessed using Wild Cluster Bootstrap methods. Clustering standard errors at the country level is necessary because the errors within a country are not likely to be independent. Bootstrap methods are necessary because the number of countries is small, meaning the number of clusters is also small. Previous work has demonstrated that a small number of clusters leads to greatly over rejecting the null hypothesis, in some cases at more than double the critical value (Bertrand et al., 2004). To address this problem Wild Cluster Bootstrap methods are used (using Webb weights (Webb, 2014) and 999 replications). The limitation is that only p-values from the bootstrap distribution can be obtained.[16] For this reason, the bootstrapped p-values for immigrant shares are reported in the tables. For a further explanation of Wild Cluster Bootstrap methods see (Cameron and Miller, 2015); when using instrumental variables, see (Davidson and Mackinnon, 2010); and for implementation using STATA, see (Roodman et al., 2018).

4. Results

4.1. Benchmark results

The benchmark results suggest there is no statistically significant effect of increasing immigrant shares over periods of five years[17] on the life satisfaction of natives. Fig. 5, illustrates the raw changes in life satisfaction and immigrant shares. It is clear that there is no relation between the two. This figure has the advantage of being free from any modeling assumptions, yet as mentioned there is good reason to expect immigration to be endogenously determined. Emigrants typically move to countries with positive relative wages (e.g., as in Ortega and Peri, 2009) and income is positively associated with life satisfaction at a point in time. The regression analysis is necessary to address reverse causality and omitted variables.

Table 1 presents the estimates from regressions of the change in life satisfaction on the change in immigrant shares with no other controls except for year dummies. The column headings indicate that there are three sets of three regressions

[16] Standard errors cannot be estimated using this method because it includes asymptotic refinement (sample estimates approach the population values at a faster rate), which can only be performed on statistics that do not depend on unknown parameters.

[17] Two years, in the last period from 2015 to 2017.

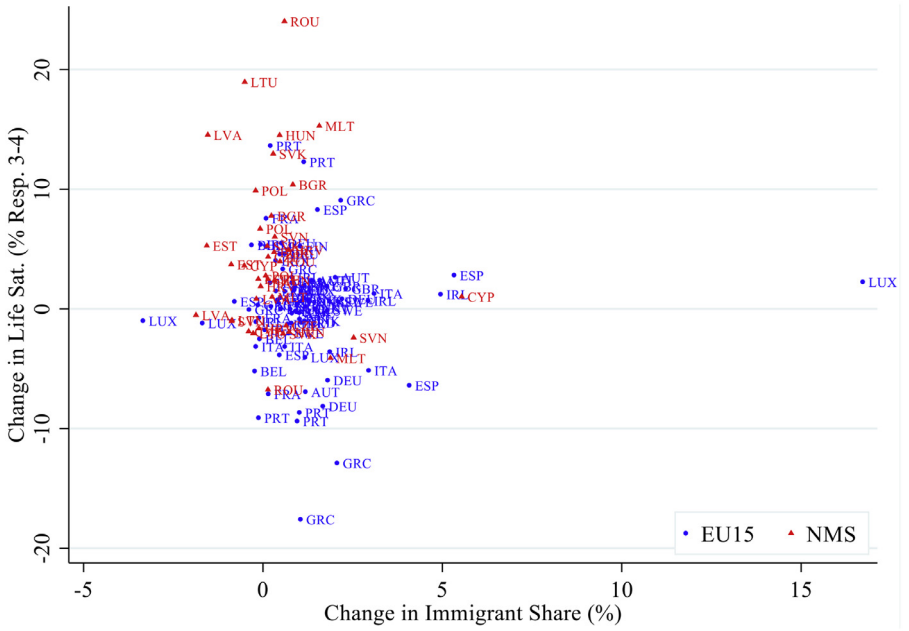

Fig. 5. Changes in life satisfaction and immigrant share.
In "Pop. Share Responding 3-4", 3-4 represents the top two of four response categories, fairly or very satisfied.
Source: Author calculations. Eurobarometer; and United Nations Population Division.

corresponding to samples and estimation method: ordinary least squares (OLS); Const., using constructed immigrant shares as the excluded instrument; and Lewbel, which uses constructed immigrant shares and the Lewbel-generated instruments.

Immigration does not have a statistically significant effect on the life satisfaction of natives regardless of method, in the full sample, EU15, and NMS (the p-values are all quite high). What about the magnitudes? Perhaps the relations are economically meaningful but imprecisely estimated due to the relatively small sample size or bootstrapping procedure. That is not the case. The largest negative magnitude, from column 8, is quite small – applying the coefficient to the average change in immigrant shares in the NMS results in a change of −0.10 percentage points per period ($-0.447 \times 0.23 = -0.10$), which is about −0.02 of the average period change in life satisfaction ($-0.02 = -0.10/4.24$) and quite small relative to mean life satisfaction (72.93). In the EU15, the magnitude is larger and positive: applying the coefficients from columns 4 and 5 (for comparison) to the average change in immigrant share per period (1.14) results in average changes of 0.24 and 1.65 percentage points per period respectively – each magnitude is larger than the average period change in life satisfaction (0.08).

One might attribute the lack of statistical significance to weak instruments. Although constructed immigrant shares is considered weak when used as the sole excluded instrument (Const. regressions), that is not the case in the Lewbel regressions – the first stage F-stat (Kleibergen-Paap F or rk from Kleibergen and Paap, 2006) greatly exceeds the often-cited Stock and Yogo standards (Stock and Yogo, 2002). The instruments are also likely to meet the other condition, i.e., to be valid. The Hansen J statistic is far from significant, failing to reject the null that the instruments are jointly valid, and recall that the Lewbel regressions include both constructed immigrant shares as well as the generated instruments.

4.2. Heterogeneous impacts by education and age

The benchmark (full population) analysis could obscure heterogeneous effects by population subgroup; indeed there is good reason to think so. Increasing immigrant shares increases the supply of labor for lower skilled jobs in particular,[18] which in theory would reduce the wage and cost of production. Ceteris paribus, this shift in the labor supply would negatively affect natives competing for the same jobs, but positively affect consumers through reduced prices. Also, beyond labor markets there is reason to suspect heterogeneous relations. Age in particular has been found to moderate the relationship. Four papers find the life satisfaction of younger natives to be more positively associated with immigration than in older groups, with age 50 (Akay et al., 2014; Kuroki, 2018) and 70 (Howley et al., 2018; Papageorgiou, 2018) representing a threshold beyond which the relationship is more negative.

To test for heterogeneity by skill and age, I reran the benchmark analysis using reconstructed life satisfaction based on the native populations aggregated separately by education (high or low) as a proxy for skill and age (<35, 35–50, >50). As

[18] Immigrants are more likely to be overqualified and concentrated in low-skilled occupations (OECD, 2018, ch. 2).

Table 2
Subpopulation Regression Results. ΔLife Satisfaction (p.p.), aggregated at the country level as indicated by panel heading, on ΔImmigrant Shares (p.p.).

	Full Sample		EU15		New Member States	
	OLS	Lewbel	OLS	Lewbel	OLS	Lewbel
Δ LS High Educ.						
Δ Immigrant Share	0.082	0.045	0.280	0.295	0.062	−0.395
	[0.726]	[0.850]	[0.348]	[0.370]	[0.875]	[0.201]
R Sq.	0.110	0.110	0.164	0.164	0.090	0.082
Δ LS Low Educ.						
Δ Immigrant Share	−0.057	−0.014	0.186	0.303	−0.117	−0.340
	[0.853]	[0.958]	[0.613]	[0.329]	[0.786]	[0.452]
R Sq.	0.206	0.206	0.193	0.191	0.245	0.243
Δ LS Age<35						
Δ Immigrant Share	0.093	0.068	0.241	0.276	0.185	−0.066
	[0.795]	[0.846]	[0.621]	[0.548]	[0.675]	[0.866]
R Sq.	0.185	0.185	0.203	0.203	0.230	0.228
Δ LS Age 35–50						
Δ Immigrant Share	−0.084	−0.013	0.294	0.407	−0.725	−0.973
	[0.843]	[0.967]	[0.526]	[0.324]	[0.325]	[0.157]
R Sq.	0.196	0.195	0.182	0.180	0.244	0.243
Δ LS Age>50						
Δ Immigrant Share	−0.080	−0.007	0.118	0.285	0.003	−0.231
	[0.742]	[0.969]	[0.698]	[0.307]	[0.991]	[0.652]
R Sq.	0.199	0.198	0.157	0.153	0.278	0.277
Observations	126	126	87	87	39	39
# of Countries	28	28	15	15	13	13
Kleibergen-Paap F Stat.		118.811		491.660		669.006
Min. Hansen J p-value		0.561		0.534		0.793

For LS High Educ, LS Low Educ., LS Age<35, LS Age35–50, and LS Age >50 life satisfaction is defined as proportion of people in that population group that reported "very satisfied" or "fairly satisfied." All regressions include year effects. Although separate second stage regressions, the first stage regressions are the same, which is why the Kleibergen-Paap F Stat. is the same. For parsimony, only the minimum Hansen J p-values were presented.
Wild Cluster Bootstrapped p-values are reported in brackets.
Source: Author Calculations; Eurobarometer; and United Nations Population Division.

an example, life satisfaction for people with high education is aggregated as the proportion of people with high education that reported "very satisfied" or "fairly satisfied" in a particular country-year. Someone with high education finished school at any age greater than 19. Age of completion is used as the only consistent variable in the Eurobarometer data pertaining to education. Likewise 19 is used to maintain the greatest number of surveys possible and consistency over time.

The results are presented in Table 2. The bootstrapped p-values reveal that the relations are again statistically insignificant, across each group and model. The Const. regressions were excluded because the F-stats are again low. By education, the lower educated group generally has more negative relations with immigration, which is broadly consistent with previous findings – consistent in Germany and England (Akay et al., 2014; Ivlevs and Veliziotis, 2018) but not the United States (Kuroki, 2018). By age group, there is more heterogeneity. The youngest may experience the most positive relation, which is generally consistent with past findings (Akay et al., 2014; Kuroki, 2018). However, what is perhaps most notable is the substantially greater magnitude for the 35–50 year olds in the NMS. It is possible that there is significant heterogeneity within the group that is reducing estimation precision.

4.3. Immigrant diversity

Perhaps immigration from non-EU states negatively affects the life satisfaction of natives. As mentioned in the Introduction, in 2017 Europeans feel negatively toward immigrants from non-EU member states (see Fig. 2).

A greater number of immigrants from non-EU member states is also likely to increase the diversity of immigrant populations overall. Greater diversity may reduce social cohesion and could directly and indirectly affect natives through the provision of public goods – natives may fear immigrants will contribute less to public finances and both natives and immigrants may prefer to contribute less in ethnically or culturally diverse settings. Positive outcomes are also likely, including increasing the diversity of goods and services offered and bringing new skills to the labor force. Natives may also simply have preferences for or against diversity.

To assess the impact of immigration diversity generally and from non-EU members, I reran the benchmark analysis with an additional immigration variable. First, the immigrant population share is broken into two variables – one for immigrants from the EU and the second for those from outside the EU. Second, the original overall immigrant share is used along with a common measure of ethnic diversity (Akay et al., 2016; Longhi, 2014), in particular fractionalization based on the Herfindahl-Hirshman index of diversity, Div_{ct}, which is calculated for country c at time t based on the stock of immigrants

Table 3
Diversity regression results. ΔLife Satisfaction (p.p.) on Δ Immigrant Shares (p.p.) EU and non-EU (NEU), or ΔImmigrant Diversity.

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Full	Full	EU15	EU15	NMS	NMS
Method	OLS	Lewbel	OLS	Lewbel	OLS	Lewbel
Panel A						
Δ EU Immigrant Share	0.048	0.053	0.270	0.297	−1.425	−1.565
	[0.932]	[0.887]	[0.623]	[0.515]	[0.160]	[0.209]
Δ NEU Immigrant Share	−0.126	−0.024	−0.019	0.178	0.742	0.455
	[0.726]	[0.967]	[0.969]	[0.682]	[0.117]	[0.307]
Constant	2.027	2.009	1.593	1.532	2.481	2.494
R Sq.	0.204	0.204	0.200	0.198	0.275	0.273
Kleibergen-Paap F Stat.		91.278		102.718		435.837
Hansen J p-value		0.887				0.743
Panel B						
Δ Immigrant Share	0.000	−0.025	0.220	0.259	−0.204	−0.582
	[0.999]	[0.918]	[0.576]	[0.443]	[0.590]	[0.198]
Δ Immigrant Diversity	−0.941	−1.105	5.550	5.694	−75.793	−85.443
	[0.941]	[0.938]	[0.435]	[0.416]	[0.707]	[0.670]
Constant	2.009	2.016	1.528	1.512	2.537	2.569
R Sq.	0.204	0.204	0.200	0.200	0.283	0.279
Kleibergen-Paap F Stat.		76.979		358.893		363.246
Hansen J p-value		0.941				0.819
Observations	126	126	87	87	39	39
# of Countries	28	28	15	15	13	13

Wild Cluster Bootstrapped p-values are reported in brackets.
Source: Author Calculations; Eurobarometer; and United Nations Population Division.

Im_{oct} from origin country o: $Div_{ct} = 1 - \sum_o (\frac{Im_{oct}}{Im_{ct}})^2$. Div_{ct} ranges between 0 and 1 and takes greater values as the number of groups increases or size of groups equalize. In each case only the OLS and Lewbel models are used because the Const. model only included one excluded instrument.

Table 3 presents the results. Again the immigrant shares do not statistically significantly affect natives' life satisfaction. Presented in Panel A, immigrants from non-EU countries (NEU) may be more negatively associated with life satisfaction in the EU15, but in the NMS, non-EU immigrants are more positively associated with life satisfaction. Presented in Panel B, immigrant diversity is also not statistically related to natives' life satisfaction. In this case, diversity appears to have a rather large negative relation in the NMS states, but the relation is still statistically insignificant, which suggests the relation is likely due to outliers.

4.4. Refugees

What do European natives think about refugees? They have increased in number and received a lot of public attention in recent years. From 2010 to 2017 the total number of refugees in the EU28 increased from 1.8 to 3.5 million. Is the (negative) attention on refugees warranted? This number is not unheard of. In 1995 there were approximately 3.4 million refugees in the same countries. What is more, in 2017 refugees represented a small proportion of immigrants, 5.2%, and an even smaller proportion of the total population, 0.6%. Refugee data are from the UN Refugee Agency population statistics including refugees and asylum seekers (UN Refugee Agency, 2018).

To assess the impact of refugees on natives, the benchmark analysis was replicated using an additional variable for refugee shares. As in the diversity analysis, only the OLS and Lewbel models were used due to the need for an additional instrument.

Table 4 presents the results. Like immigrants, refugee shares do not have a statistically significant impact on the life satisfaction of natives. The magnitudes are generally larger for refugees than for immigrants, but flows for refugees are much smaller than for immigrants, meaning any impact is still small. The findings represent an important contribution. Refugees have been relatively understudied in the literature. To my knowledge no paper has assessed their influence on natives' life satisfaction.

4.5. Non-economic effects of immigration

So far the analysis has not made a distinction between the economic and non-economic effects of immigration. Indeed, the nil net effect may be due to them offsetting each other. Although natives list immigration as a concern and feel negatively toward immigrants from outside the EU (cf., Figs. 1 and 2), perhaps these feelings reflect non-economic issues and natives' receive offsetting economic gains (e.g., through positive effects on GDP).

Table 4
Refugee and immigrant regression results. ΔLife Satisfaction (p.p.) on ΔImmigrant Shares (p.p.) and ΔRefugee Shares (p.p.).

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Full	Full	EU15	EU15	NMS	NMS
Method	OLS	Lewbel	OLS	Lewbel	OLS	Lewbel
Δ Immigrant Share	−0.011	−0.046	0.162	0.203	−0.031	−0.278
	[0.971]	[0.845]	[0.619]	[0.449]	[0.931]	[0.506]
Δ Refugee Share	0.285	0.933	0.916	1.659	−1.926	−4.697
	[0.776]	[0.649]	[0.306]	[0.358]	[0.881]	[0.247]
Constant	2.000	1.982	1.508	1.454	2.518	2.618
Observations	126	126	87	87	39	39
# of Countries	28	28	15	15	13	13
R Sq.	0.204	0.202	0.206	0.199	0.246	0.233
Kleibergen-Paap F Stat.		156.819		343.893		43.876
Hansen J p-value		0.700				0.715
Mean Life Sat.	80.640	80.640	84.098	84.098	72.925	72.925
Mean Δ Life Sat.	1.366	1.366	0.078	0.078	4.240	4.240
Mean Immig. Share	10.861	10.861	12.232	12.232	7.802	7.802
Mean Δ Immig. Share	0.859	0.859	1.143	1.143	0.226	0.226
Mean Refugee. Share	0.517	0.517	0.624	0.624	0.280	0.280
Mean Δ Refugee. Share	0.046	0.046	0.047	0.047	0.044	0.044

Wild Cluster Bootstrapped p-values are reported in brackets.
Source: Author Calculations; Eurobarometer; United Nations Population Division; and UN Refugee Agency.

Table 5
Non-economic effects of immigration. ΔLife Satisfaction (p.p.) on ΔImmigrant Shares (p.p.) and Δln(Real GDP per capita).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sample	Full	Full	Full	EU15	EU15	EU15	NMS	NMS	NMS
Method	OLS	Const.	Lewbel	OLS	Const.	Lewbel	OLS	Const.	Lewbel
Δ Immigrant Share	0.099	2.265	0.176	0.153	1.503	0.226	0.550	9.335	0.338
	[0.712]	[0.420]	[0.438]	[0.679]	[0.657]	[0.427]	[0.219]	[0.382]	[0.659]
Δ ln(Real GDP pc)	34.843	38.600	34.978	18.917	14.369	18.671	47.469	72.708	46.859
	[0.000]	[0.001]	[0.000]	[0.056]	[0.112]	[0.047]	[0.006]	[0.163]	[0.009]
Constant	0.094	−0.656	0.067	0.909	0.502	0.887	−1.246	−3.743	−1.186
Observations	126	126	126	87	87	87	39	39	39
R Sq.	0.393	−0.061	0.392	0.253	−0.043	0.253	0.510	−1.836	0.508
Kleibergen-Paap F Stat.		3.350	100.582		3.057	1225.770		0.952	516.688
Hansen J p-value			0.227			0.551			0.476

Wild Cluster Bootstrapped p-values are reported in brackets. All regressions include year effects.
Source: Author Calculations; Eurobarometer; United Nations Population Division; and World Development Indicators.

To assess whether there are non-economic effects of immigration on natives' life satisfaction, changes in the natural log of real GDP per capita is added as a control variable to the benchmark analysis. Including GDP per capita as a control changes the interpretation of the coefficient on immigrant shares. As discussed, GDP per capita represents one of the channels through which immigration could affect natives. Controlling it shuts down this channel, leaving uncontrolled what might be interpreted as the non-economic (i.e., non GDP per capita) effects of immigration. Data for GDP per capita are from the World Development Indicators.

Table 5 presents the results. The non-GDP effects of immigration on natives' life satisfaction are positive and larger than those controlled by GDP, but statistically insignificant. Relative to the benchmark analysis, nearly all of the coefficients on immigration increased in size, and in columns 8 and 9, they even reversed directions. However, the immigration relations are all still statistically insignificant. Also, the first stage F-stats remain low in the Const. regressions, especially column 8, which could account for the large magnitude.

On the other hand, GDP per capita is generally statistically significant (at five percent) and positively associated with natives' life satisfaction. GDP per capita is expected to be positively related to life satisfaction in the short run.[19] Confirming this result lends credibility to the model. If it were substantially underpowered, then it would not correctly reject the relation between GDP per capita and life satisfaction as zero.

[19] For a discussion on the effects of GDP on life satisfaction, distinguishing between short and long run, see (Bartolini and Sarracino, 2014; De Neve et al., 2018; Easterlin, 2017).

Table 6
Subsample Regression Results. ΔLife Satisfaction (p.p.) on ΔImmigrant Shares (p.p.).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Sample	EU15 2010–2017		EU15 Excl. Lux.		NMS Excl. Bal&P		NMS Excl. Decl.		NMS Excl. Lim.	
Model	OLS	Lewbel	OLS	Lewbel	OLS	Lewbel	OLS	Lewbel	OLS	Lewbel
Δ Immigrant Share	0.301	0.263	−0.171	0.356	0.557	0.037	−0.382	−0.542	0.030	−0.246
	[0.484]	[0.442]	[0.619]	[0.799]	[0.498]	[0.965]	[0.349]	[0.202]	[0.932]	[0.545]
Constant	1.496	1.511	1.918	1.619	3.012	3.089	2.489	2.486	2.870	2.883
Observations	45	45	81	81	27	27	27	27	30	30
# of Countries	15	15	14	14	9	9	9	9	10	10
R Sq.	0.179	0.179	0.218	0.207	0.185	0.178	0.134	0.132	0.197	0.195
Kleibergen-Paap F Stat.		225.533		31.422		2108.027		6639.055		750.042
Hansen J p-value		0.475		0.271		0.097		0.732		0.667
Mean Life Sat.	84.908	84.908	83.334	83.334	72.546	72.546	79.134	79.134	73.074	73.074
Mean Δ Life Sat.	0.548	0.548	0.063	0.063	3.835	3.835	3.740	3.740	4.658	4.658
Mean Immig. Share	14.249	14.249	10.247	10.247	7.317	7.317	8.907	8.907	7.928	7.928
Mean Δ Immig. Share	1.114	1.114	1.052	1.052	0.624	0.624	0.155	0.155	0.195	0.195

Excl. Lux. represents excluding Luxembourg; Bal&P: Estonia, Latvia, Lithuania, and Poland; Decl.: Bulgaria, Croatia, and Romania; and Lim.: Czech Republic, Croatia, and Hungary.
Wild Cluster Bootstrapped p-values are reported in brackets. All regressions include year effects.
Source: Author Calculations; Eurobarometer; and United Nations Population Division.

4.6. Robustness: sensitivity to sample definition

The main results show that immigrant population shares are not statistically significantly related to the life satisfaction of natives, whether they are immigrants from EU or non-EU countries or refugees. This is true in the EU15 and NMS, in the raw data, OLS, and two different 2SLS models. However, one might argue that country-sample selection masks important underlying relations. This section deals with this concern to once more demonstrate immigration does not negatively affect the life satisfaction of natives.

There are countries that exhibit notable differences from the main sample that could reduce estimation precision of the effects of immigration on natives' life satisfaction. The relation may also be affected by time period. In order to test the sensitivity to sample composition three EU15 subsamples and three NMS samples were used in further analysis. In particular the benchmark analysis was rerun on the following subsamples: (1) EU15 excluding the period 1990–2005; (2) EU15 excluding Luxembourg, which is a clear outlier in terms of both immigrant population shares and flows (see Figs. 3 and 5); (3) EU15 excluding Belgium because it defines immigrants differently, as those without citizenship instead of by place of birth; (4) NMS excluding the countries that experienced declining immigrant population shares (Estonia, Latvia, Lithuania, and Poland, see Appendix B for details); (5) NMS excluding the countries that experienced declining total populations (Bulgaria, Croatia, and Romania), among whom increasing immigrant population shares could result from a declining total population instead of greater immigrant stocks; and (6) NMS excluding the countries that define immigrant stocks differently (Czech Republic uses citizenship, not place of birth, and Croatia and Hungary include refugees).

Table 6 presents the results. As before immigrant population shares are not statistically significant, in any of the subsamples. Only the OLS and Lewbel results were presented for brevity (Const. results available upon request).

There are some differences from those obtained in the main samples. In Table 6 column 3, the OLS result based on the sample excluding Luxembourg is negative. Contrasting with the positive benchmark results (0.214 in Table 1 column 4) suggests there is a strong positive relation between immigration and life satisfaction in the raw data in Luxembourg, but this relation is likely due to reverse causality or omitted variables because the contrast is no longer present in the 2SLS results (contrast 0.300 from Table 1 column 6 with Table 6 column 4). The relations based on excluding Belgium were nearly the same as the benchmark and excluded for brevity. Across the NMS subsamples, there is more heterogeneity. Excluding the countries with declining immigrant shares (Table 6 column 6) yields a positive relation (cf., −0.289, Table 1 column 9)[20]; excluding countries with declining populations (Table 6 columns 7 and 8) increases the negative relation (more negative) (Table 1 columns 7, 0.013, and 9, −0.289), but excluding the countries with different immigrant definitions does not change the relations much (Table 6 columns 9 and 10). Still, in all cases the impact of immigration is statistically insignificant.

5. Conclusion

Do immigrants have lasting effects on natives' subjective well-being? The evidence indicates the answer is no. Changes in immigrant stocks did not have a positive or negative effect on natives' life satisfaction in 28 European Union countries (including the United Kingdom), over the nearly 30-year period 1990–2017. There is no effect in the EU15 or new member states (NMS) (that joined in the 2000s), nor does immigration affect subgroups defined by education or age (e.g., the poorly

[20] Note the Hansen J test rejects the validity of the instruments at ten percent, but the underlying lack of precision in the estimates obscures any impact this may have had.

educated and elderly). Refugee status nor immigrant origin matters – there are no effects from refugees nor immigrants from the EU or outside the EU.

The nil relations do not depend on modeling assumptions nor are they merely the result of low statistical power. Fig. 5 plots the raw changes in life satisfaction against the raw changes in immigrant shares and clearly illustrates there is no relation between the two. Three regression models with varying assumptions are also used, ordinary least squares and two-stage least squares with two sets of excluded instruments. The regression analyses face a limitation in terms of statistical power. In any study that relies on variation at the country level, the number of clusters is equal to the number of countries, because observations within a country are not likely to be independent. It is in part due to this limitation that both Fig. 5 and the magnitudes of the estimated relations are important. Each suggests there is no meaningful relation between immigration and life satisfaction. Any negative relations that are observed, are statistically insignificant and exhibit small magnitudes (e.g., approximately 2 percent of the average change in life satisfaction over a sample period, cf. Table 1 column 8). Moreover, I tackle this issue more rigorously using Wild Cluster Bootstrap methods, which reduces the influence of outliers and improves consistency. Further reassurance that the models are not statistically underpowered comes from the finding that GDP per capita is positive and statistically significantly related to life satisfaction as expected.

The results are important as few studies have evaluated the impact of immigration and refugees on natives using a broad measure of well-being. Although the impacts are certainly multifaceted, affecting both economic and non-economic outcomes, most studies have focused only on a particular outcome such as wages. Within the subjective well-being literature, most studies have focused on the subjective well-being of immigrants. This study advances on the few similar studies by covering both a larger sample of 28 European countries and a longer period (1990–2017 for the EU12), assessing the effects of different groups of immigrants and refugees, and by using a better identification strategy (instrumental variables, using both constructed immigrant shares and Lewbel (2012) generated instruments).

Since 1990, increasing immigrant population shares have had no significant effect on the life satisfaction of native populations in the European Union. While EU natives believe immigration is an important issue (cf. Fig. 1), other issues have a greater influence on how satisfied they report being with their lives (e.g., the economic situation).

Declaration of Competing Interest

None.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jebo.2020.10.006.

Appendix A. Measurement of subjective well-being

A.1. Measurement

Economists have traditionally been concerned with using subjective measures of well-being. Although this has changed somewhat in recent years, criticisms still exist. The primary concern is whether it is possible to make interpersonal comparisons of subjective well-being. People of different personalities or gender may report differently (see for example Bertrand and Mullainathan (2001) and Montgomery (2017)), and unknown characteristics of the reporting function make it impossible to compare different groups (Bond and Lang, 2019). Some take issue with the cardinal treatment of the ordinal responses. There are numerous responses to these criticisms.

Perhaps the most authoritative view comes from a commission of 25 social scientists, including six Nobel Laureates in economics, which concluded that subjective well-being measures contain "meaningful and reliable" information (Stiglitz et al., 2009, p. 16). Moreover, there is a simple approach to address concern regarding interpersonal comparisons, which is to instead focus on *intra*personal comparisons (e.g., using fixed effects). Fixed effects address the measurement issues raised in (Bertrand and Mullainathan, 2001) to the extent measurement error is fixed (e.g., caused by a fixed personality trait). Individual fixed effects have also been shown to address the issues raised in (Bond and Lang, 2019) (Kaiser and

Table 7
Robustness Regression Results. ΔLife Satisfaction (mean on scale from 1 to 4) on ΔImmigrant Shares (p.p.).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sample	Full	Full	Full	EU15	EU15	EU15	NMS	NMS	NMS
Method	OLS	Lewbel	Lewbel	OLS	Lewbel	Lewbel	OLS	Lewbel	Lewbel
Δ Immigrant Share	−0.005	0.020	−0.007	−0.002	0.015	−0.003	−0.007	0.012	−0.010
	[0.131]	[0.714]	[0.133]	[0.560]	[0.800]	[0.459]	[0.408]	[0.865]	[0.191]
Constant	0.038	0.031	0.038	0.034	0.027	0.035	0.040	0.039	0.041
Observations	126	126	126	87	87	87	39	39	39
# of Countries	28	28	28	15	15	15	13	13	13
R Sq.	0.290	0.134	0.289	0.310	0.205	0.309	0.264	0.233	0.263
Kleibergen-Paap F Stat.		3.539	118.811		3.005	491.660		1.855	669.006
Hansen J p-value			0.648			0.333			0.652
Mean Life Sat.	3.026	3.026	3.026	3.109	3.109	3.109	2.842	2.842	2.842
Mean Δ Life Sat.	0.026	0.026	0.026	0.007	0.007	0.007	0.070	0.070	0.070
Mean Immig. Share	10.861	10.861	10.861	12.232	12.232	12.232	7.802	7.802	7.802
Mean Δ Immig. Share	0.859	0.859	0.859	1.143	1.143	1.143	0.226	0.226	0.226

Wild Cluster Bootstrapped p-values are reported in brackets. All regressions include year effects.
Source: Author Calculations; Eurobarometer; and United Nations Population Division.

Vendrik, 2019).[21] A limitation of fixed effects analysis is that it cannot be implemented using the typical ordinal models (ordered probit or ordered logit). However the results from ordinal compared to cardinal models do not qualitatively differ (Ferrer-i-Carbonell and Frijters, 2004). Moreover, a welfare economist has argued that ordinal responses should be treated cardinally (Ng 1997).

For the present analysis, I address the measurement concerns in life satisfaction when aggregating it at the country level. Aggregation is necessary, as discussed below, but also has benefits. Aggregating life satisfaction averages over individual idiosyncrasies (including measurement error) in reports of well-being. Although systemic influences (e.g., cultural) still exist at the country level (Brulé and Veenhoven, 2016), these are addressed in the same way as with individuals. I assess how within-country changes in life satisfaction over time are related to immigration changes at the national level. To the extent that measurement error is caused by culture or other slow-changing factors (e.g., institutions), first differences remove their influence. As discussed in Section 3, the analysis is performed in first differences.

Aggregation using population shares, in particular, addresses measurement issues. See Sechel (2019) for an argument to use population shares as a method to aggregate subjective well-being and overcome the measurement issues discussed above. In brief, unlike treating life satisfaction cardinally, using population shares does not assume the differences between response categories are the same. Also, the share has a simple interpretation. In the present case, aggregate life satisfaction was calculated as the population share that responded "very satisfied" or "fairly satisfied." The remaining of the population responded "not very satisfied" or "not at all satisfied". An increase in this share means there was an increase in the number of people that are more satisfied with their lives than not.

Moreover, while cultural influences are apparent, the same factors are likely to matter in each country. In open-ended survey conducted in 12 countries, Cantril (1965) finds individuals list the same concerns affecting their life evaluations. Consequently the degree to which countries report different factors matter may vary, but the relations should generally be present and in the same direction across countries (albeit heterogeneously).

A.2. Aggregation

Life satisfaction was aggregated for three reasons. First, aggregation facilitates the use of first differences. First differences are important to address measurement issues and the time-series properties of immigration and life satisfaction. Life satisfaction often follows a dynamic process (Bottan and Truglia, 2011), which cannot be observed using repeated cross-sectional data unless aggregated. Indeed, aggregate life satisfaction likely contains a unit root and so does immigration (see Appendix C), which necessitates using first differences. The alternative, country fixed effects is insufficient when a process is dynamic (Ashenfelter, 1978) and behaves worse in longer panels. Second, the typical variables used in micro regressions of life satisfaction are not always available or available with consistent wording or scales in the Eurobarometer. The most notable missing variable is income. Life satisfaction is an important exception. Only occasionally were different scales used and in these cases the survey was not used. Third, the relationship of interest is at the country level. It is more intuitive to use regressions that have a small number of observations than to report the units of variation (clusters). Similarly it is easy to see how samples differ based on country coverage and time period.

As discussed in Section 3.1, life satisfaction was aggregated as the proportion reporting one of the two top response categories, "very satisfied" or "fairly satisfied." Proportions were based on weighted population data using post-stratification weights from Eurobarometer. Although a population share is preferred, the mean life satisfaction value was also used for robustness, coding the responses from 1 to 4, with greater life satisfaction taking greater values.

[21] For another response to (Bond and Lang, 2019), see (Chen et al., 2019).

Presented in Table 7, the results using mean life satisfaction are qualitatively consistent with the benchmark results (Table 1). The relations are all statistically insignificant. Their directions change with the specification and are often inconsistent with the benchmark directions, which further supports their insignificance. Also, the magnitudes are not very large. For example, in column 3, the impact from an average change in the immigrant share is −0.006 (= −0.007×0.859) life satisfaction points, which is less than one quarter of the average period change in life satisfaction (0.026), and quite small relative to sample mean of life satisfaction (3.026).

Appendix B. Summary Statistics

Table 8
Summary Statistics: Life Satisfaction and Immigrant share by country.

Country	Life Satisfaction (% resp. 3 or 4)			Immigrant Share (% of total pop.) EU	EU	EU	Not-EU	Not-EU	Not-EU
	1990	2005	2017	1990	2005	2017	1990	2005	2017
European Union 15 (Including the United Kingdom)									
Austria		86.07	91.14	1.87	4.62	8.02	8.46	9.19	10.83
Belgium	90.98	88.63	89.16	5.38	5.54	7.10	3.69	2.87	4.06
Denmark	96.99	96.99	98.09	0.84	2.32	3.84	3.74	5.81	7.55
Finland		93.88	95.26	0.15	1.24	2.61	1.12	2.42	3.62
France	80.65	82.62	84.91	3.77	3.16	3.53	6.30	7.50	8.24
Germany	88.52	79.03	89.99	1.79	3.84	6.47	5.68	7.56	8.24
Greece	64.47	64.02	46.73	0.99	1.84	3.02	5.07	9.00	8.33
Ireland	90.78	91.64	96.13	5.53	9.91	12.39	0.95	4.25	4.37
Italy	76.83	76.45	70.38	0.56	0.88	3.11	1.96	5.95	6.64
Luxembourg	92.98	94.49	94.58	23.82	28.26	39.31	5.98	4.12	4.74
Netherlands	94.62	94.70	95.48	1.80	2.13	3.43	6.10	8.51	8.57
Portugal	74.27	55.40	72.25	0.99	1.61	1.98	3.38	5.73	6.57
Spain	78.11	85.41	84.86	0.84	2.02	4.29	1.27	7.39	8.48
Sweden		96.31	96.48	1.18	4.53	5.27	8.04	7.94	12.09
United Kingdom	87.21	89.75	94.59	1.92	3.07	5.07	4.46	6.74	8.32
Mean (EU15)		**85.03**	**86.67**	**3.43**	**5.00**	**7.30**	**4.41**	**6.33**	**7.38**
New Member States									
Bulgaria		29.91	52.83		0.17	0.82		0.62	1.35
Croatia		68.16	73.36		1.19	1.67		11.85	11.92
Cyprus		83.02	85.80		4.53	7.45		6.87	8.57
Czech Republic		80.73	86.17		1.47	1.33		1.69	2.76
Estonia		68.56	80.08		0.81	0.89		16.45	13.77
Hungary		52.86	67.84		0.77	3.22		2.87	1.94
Latvia		59.16	74.04		1.64	1.42		15.19	11.82
Lithuania		54.85	70.86		0.60	0.56		5.46	3.85
Malta		81.53	93.72		2.85	4.75		3.23	5.04
Poland		68.63	88.03		0.65	0.67		1.24	1.02
Romania		44.78	66.06		0.14	0.76		0.54	1.14
Slovak Republic		61.22	77.37		1.88	2.83		0.55	0.56
Slovenia		88.57	91.18		1.18	3.31		8.68	8.54
Mean (NMS)		**64.77**	**77.49**		**1.37**	**2.28**		**5.79**	**5.56**
Grand Mean (EU15 & NMS)		**75.62**	**82.41**		**3.32**	**4.97**		**6.08**	**6.53**

Notes: Immigrant shares are disaggregated by immigrant origin, either from the EU or not from EU. The total share is the addition of the two in a particular year.
Source: Author Calculations; Eurobarometer; and United Nations Population Division.

Appendix C. Unit root testing

The results from tests on the EU15 sample (with a minimum of six observations per country), suggest that both life satisfaction and the immigrant share may exhibit a unit root. For both variables the autocorrelation coefficient in the pooled sample is nearly one and the Augmented Dickey Fuller (ADF) test fails to reject a unit root (on means across countries by year). Using panel tests the results are similar but slightly more complex. Depending on the test used, there is evidence to suggest life satisfaction or the immigrant share is non-stationary even when including a lag or deterministic trend. A summary of the test results are presented in Table 9.

Table 9
Unit Root Test Results for Life Satisfaction and Immigrant Share.

	Life Satisfaction	Immigrant Share
Fisher-type tests (Ho: all panels contain unit roots)		
a trend and one lag	reject	reject
a trend and zero lags	reject	fail to reject
no trend or lags	fail to reject	fail to reject
Hadri Lagrange Multiplier (Ho: all panels are stationary)		
trend	reject (10%)	fail to reject
no trend	reject	reject

Source: Author Calculations; Eurobarometer; and United Nations Population Division.

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