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

By KELSEY J. O'CONNOR*

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Immigration is one of the most debated topics in Europe today, yet little is known about the overall effect of its multiple impacts. The analysis suggests natives need not worry. Increasing immigrant population shares have no statistically significant effects on natives' well-being in 28 European Union countries over the years 1990-2017 (EU12) and 2005-2017 (new member states) using macro data aggregated from Eurobarometer surveys. Immigration does not statistically affect natives' well-being across all scenarios, such as: when observing the raw data or accounting for reverse causality and omitted variables using instrumental variable methods; accounting for whether or not immigrants are from the EU; and for population subgroups, notably the poorly educated and elderly. Refugees also do not statistically affect the well-being of natives. Any negative relations that are observed are not statistically significant and exhibit small magnitudes.

Keywords: migration, refugees, life satisfaction, happiness, Eurobarometer

JEL codes: I31, J11, O15

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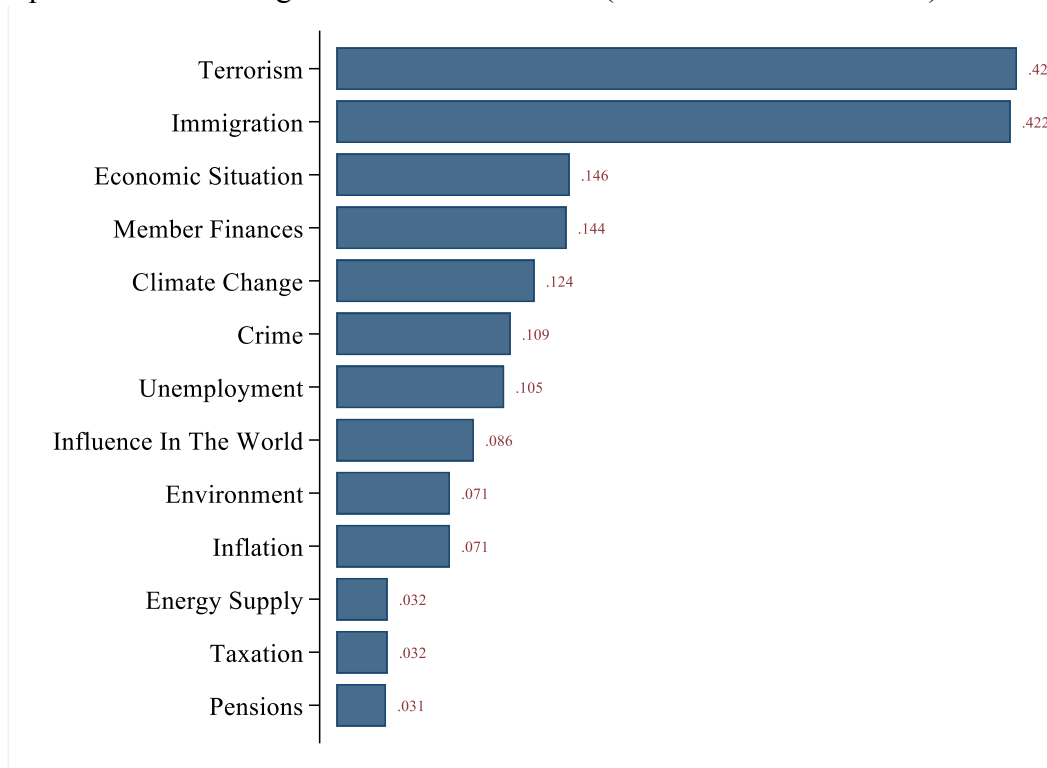
I. Introduction

Immigration is seen as one the most important issues facing Europeans today. “The future of Europe’s elections will be all about migration, foreign minister says” – a 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 Figure 1). What is more, the majority of Europeans at this time felt negatively about immigrants from outside the EU (a point I return to below).

The aim of this paper is to test whether immigration affects the well-being of natives in Europe. Although the present political environment paints a bleak picture, it is possible that immigration has an overall positive impact. Indeed 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; Ortega and Peri, 2009; Peroni et al., 2016). However, many of the channels through which immigrants affect natives could be non-economic (e.g., diversity as in Akay et al., 2016), which relatively few studies have examined. To account for all of the channels, we need to consider the evidence on overall well-being. This paper evaluates the aggregate impact of immigration including both economic and non-economic factors through the use of 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 is well suited as a comprehensive single-item measure that captures economic and non-economic factors that are otherwise often ignored.¹ Moreover, decisions are subjective. We need subjective data to anticipate behavior.²

¹ Life satisfaction reflects factors such as: material conditions, family/social relationships, health, and community, among others (Cantril, 1965; Cummins, 1996). Consider the case of China as an example. While GDP per capita

Figure 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

In theory, we could expect immigration to have a positive impact on productivity and labor markets (e.g., by increasing aggregate demand, replacing workers in response to an aging population, or improving allocative efficiency), and to both reduce costs and increase the diversity of goods and services. But negative channels are also envisioned, for example by: crowding out natives' in the labor market, endangering traditional culture, reducing social cohesion, increasing congestion, or indirectly reducing provision of public goods. However, the

grew fourfold over the period 1990-2010, life satisfaction exhibited a U-shape pattern ending near the 1990 value (Easterlin et al., 2012), which clearly illustrates that more than growth influenced life in China during this period. Support for life satisfaction as part of a broader class of subjective well-being measures is growing. See for example (OECD, 2013; Stiglitz et al., 2009).

² See for example a recent paper that predicts the United Kingdom's vote to exit the EU (Liberini et al., 2019). The authors find individual feelings about one's finances to be more predictive of pro-Brexit feelings than objective income. Financial feelings were also a better predictor than the commonly assumed determinant, age (except for young adults 18-24). It should be noted, however, that life satisfaction was not predictive (Liberini et al., 2019). In any case, subjective well-being is important per se, and indirectly as a predictor of economic behavior. For a summary of past papers that use subjective well-being to predict objective outcomes, see (De Neve et al., 2013).

evidence primarily concerns economic factors, especially relating to labor markets, and the impacts depend on the destination country. In the United States the impacts are generally considered to be negative but small (Borjas, 2003, 1994; Card, 2005; Friedberg and Hunt, 1995). 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).

The evidence on overall well-being is also inconclusive. The one multi-country study that I am aware of 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).³ 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, Constant, and Giulietti (2014) find positive impacts of immigrant population shares on the life satisfaction of natives (by regions in Germany over the period 1989-2009). 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: 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 2004-2016, 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,

³ Betz and Simpson (2013) cover 26 European countries over the period 2002-2010.

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 other than being based on single countries. The identification strategies typically rely on conditional independence (Akay et al., 2014; Betz and Simpson, 2013; Ivlevs and Veliziotis, 2018; Kuroki, 2018) or instruments that are less-than-ideal (Akay et al., 2016; Howley et al., 2018; Longhi, 2014; Papageorgiou, 2018)⁴. While the expositions are often fairly convincing (e.g., Akay, Constant, and Giulietti (2014) uses a battery of additional tests, and Ivlevs and Veliziotis (2018) exploits variation in immigrant flows that is arguably exogenous) there is significant room to contribute.

The present paper contributes first by evaluating the impacts of immigrant population shares and refugee population shares on natives' well-being.⁵ Second, I estimate the impacts in a broader sample that includes 28 EU countries as they were added over the period 1990-2017. To my knowledge similar analysis for the period 2010-2017 has only been conducted for the U.K. (Howley et al., 2018; Papageorgiou, 2018), even though this period is somewhat unique.⁶ Lastly, I use instrumental variable techniques to eliminate potential sources of bias (especially reverse causality).

⁴ 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. Longhi (2014) uses the endogenous variable defined at a geographically larger area, introducing correlation across units in the same geographic area, which is not addressed.

⁵ The evaluation of immigrant shares is a contribution broadly defined. As documented, there are similar studies, but relative to the immigration literature, very few that use subjective well-being, and within the subjective well-being literature, it is more common to evaluate immigrants' life satisfaction. See for example the *World Happiness Report 2018* (Helliwell et al., 2018). Concerning refugees, I am not aware of a study that evaluates refugees' impact on life satisfaction.

⁶ Unique, as illustrated by the large increase in importance placed on immigration over this period. Immigration went from the fourth most important issue facing the EU in 2010 to the first in 2017, based on Eurobarometer surveys (European Migration Network, 2018, p. 4).

II. Data and Methods

A. Data

Individual life satisfaction data are from repeated cross-sectional Eurobarometer surveys (European Commission, 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 for example 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.⁷ 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.

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 continues today for more than the present 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).

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”. It was aggregated for three reasons, including the lack of consistent variables over time (e.g., income), which are

⁷ 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 in psychology.

discussed in Appendix A. The top two categories were used in contrast to the extreme categories because that more closely approximates the sample median and mean.⁸

Bilateral immigration stocks, for more than 200 destination countries/territories from more than 200 origin countries/territories, are available every five years from 1990-2015 and 2017 from the United Nations (United Nations Population Division, 2017). For most countries, immigrants are defined as people residing in a country other than where they were born; however, other definitions are also used (usually based on citizenship). Immigrant stocks also exclude refugees. Refugee data are discussed in Section 3 D. 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.

B. Data Descriptives and Diagnostics

To provide an initial sense of the current figures, the life satisfaction of natives is plotted against immigrant shares for each of the 28 EU countries in 2017. Figure 2 displays the data and linear relationship. There is one distinct outlier in terms of immigrant shares. Luxembourg's share is more than 40 percent, while most EU countries have populations that are at most 20 percent immigrants. Two countries report much lower life satisfaction, Bulgaria and Greece, particularly the Greece population, of which less than 50 percent reports life satisfaction in the top two categories. The simple cross-sectional relationship between immigrant shares and life satisfaction is positive in 2017.

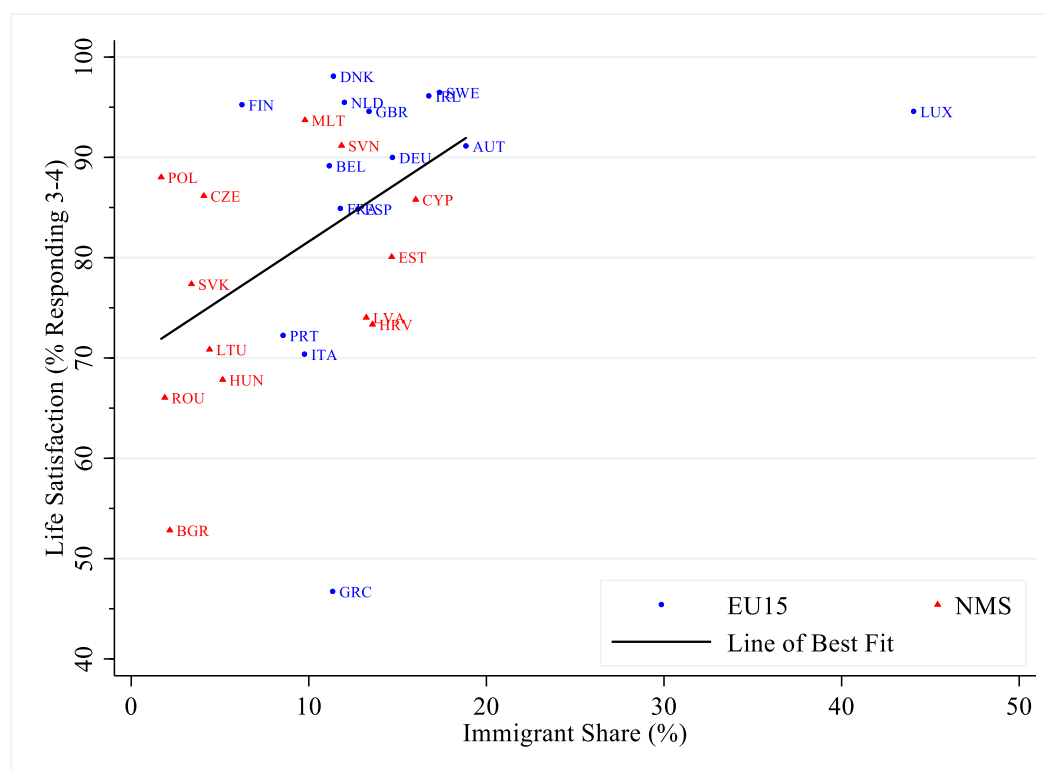
Are the changes in immigrant shares over time related to changes in natives' well-being? To see the evolution of immigrant share and life satisfaction over the sample period, two samples are presented: (1) the original EU15⁹ countries for which all have life satisfaction and

⁸ 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 1-4 with greater satisfaction taking greater values.

⁹ EU15: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and United Kingdom.

immigration data since 1990 or 1995 (Austria, Sweden, and Finland), and (2) the new EU member states (labeled NMS)¹⁰, which have been observed since 2005.

Figure 2. Cross-sectional relationship between natives' life satisfaction and immigrant share. 28 European Union countries. Year 2017



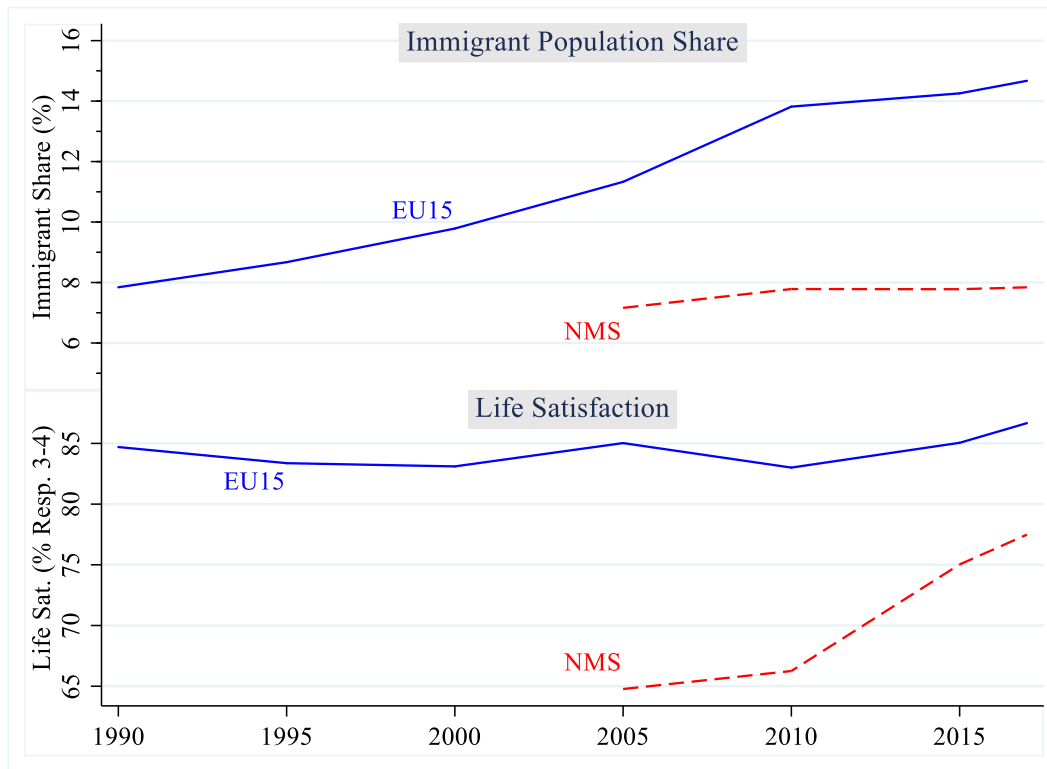
Luxembourg is excluded from the line of best fit.

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

Observing the trends in Figure 3, 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.

¹⁰ 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.

Figure 3. Change in immigrant shares and natives' life satisfaction over time



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.

Visually inspecting the immigrant-share trend for the EU15 suggests that it may not be stationary and could follow a unit root¹¹. 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 B, suggest the possibility of a unit root. For this reason the specifications will be estimated in first differences to impose stationarity.

¹¹ Process with an autoregressive coefficient of one.

C. Methods

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

$$(1) \quad H_{ct} = \gamma Immigsh_{ct} + \alpha_c + \lambda_t + \varepsilon_{ct}$$

Aggregate life satisfaction of natives (H_{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).

Notice the absence of control variables. Controls were intentionally left out in order to capture the full impacts of immigration. Immigration has been shown to affect a whole range of outcomes, meaning that controlling for them would shut down channels through which immigration affects life satisfaction. For example, if immigration affects host country GDP per capita, then because GDP per capita is related to life satisfaction in the short run, controlling for it would attenuate any immigration-life satisfaction relation. In other words GDP per capita represents a “bad control” (cf. Angrist and Pischke, 2009). Moreover, instrumental variable methods are implemented as discussed below, which precludes the need for controls to obtain consistent estimates.

For purposes of estimation, equation (1) is reparameterized in first differences as equation (2) to account for the fixed effects and to impose stationarity as discussed above.

$$(2) \quad \Delta H_{ct} = \gamma \Delta Immigsh_{ct} + \lambda_t + \Delta \varepsilon_{ct}$$

Where: $\Delta H_{ct} = H_{ct} - H_{ct-1}$. 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.

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 (flow) in the first stage using two different sets of excluded instruments.

The first set is comprised of constructed immigrant flows,¹² which depends solely on the time-varying characteristics of sending countries. In this way, the predicted immigrant flow is exogenous to time-varying characteristics of the destination country. To construct immigrant flows, the bilateral immigrant flows from origin country o residing in destination country c in year t are predicted ($\Delta \widehat{Immigsh}_{oct}$) using the model described below, and the predictions are summed ($\overline{\Delta Immigsh}_{ct} = \sum_{o \neq c} \Delta \widehat{Immigsh}_{oct}$) over origin countries to construct the instrument. Bilateral immigrant flows are predicted using the specification: $\Delta Immigsh_{oct} = \delta_{ot} + \mu_{oct}$. Origin-country dummies (δ_{ot}) capture the net effect of all time-varying characteristics affecting emigration from the various origin countries, so-called “push factors,” such as poor economic conditions or conflict. In the regression of bilateral flows, there are 6,524 destination-origin country pairs (28 EU countries and 233 sending origin countries/territories), which based on seven observations over the years 1990-2017 amounts to a total of 45,668 observations. The correlation between the constructed immigrant flows and actual immigrant flows is 0.36 in the main sample.

The second set of instruments is generated using the Lewbel (2012) method. The instruments are generated as follows: (1) run a regression of immigrant shares on λ_t from equation 2 and store the residuals, (2) then de-mean λ_t (over the full sample) and multiply them by the stored residuals. The method relies on two key conditions. First, heteroskedasticity, which can be tested using the standard Breusch-Pagan test. The second condition is untestable and relies on an assumption analogous to the IV assumptions. In the present case the second condition is, the residual from the first step above multiplied by the second stage residual of life satisfaction must be unrelated to the time dummies used in the regression. In the present analysis, the typical IV diagnostics will be used to assess whether the instruments are weak (first stage F-stat) and if they are excludable (overidentification test). The STATA user written command `ivreg2h` can be used to generate the instruments and perform the IV analysis (Baum and Schaffer, 2012). To understand the approach further, see Baum et al. (2013) and Lewbel (2012). It has been used numerous times now; Lewbel (2012) documents papers as early as 2007, and more recently by

¹² 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.

(Denny and Oppedisano, 2013; Le Moglie et al., 2015; Kesavayuth and Zikos, 2017; Sarracino and Fumarco, 2018).

Statistical significance is assessed using Wild Cluster Bootstrap methods. Clustering standard errors at the country level is necessary because the error terms 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.¹³ 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).

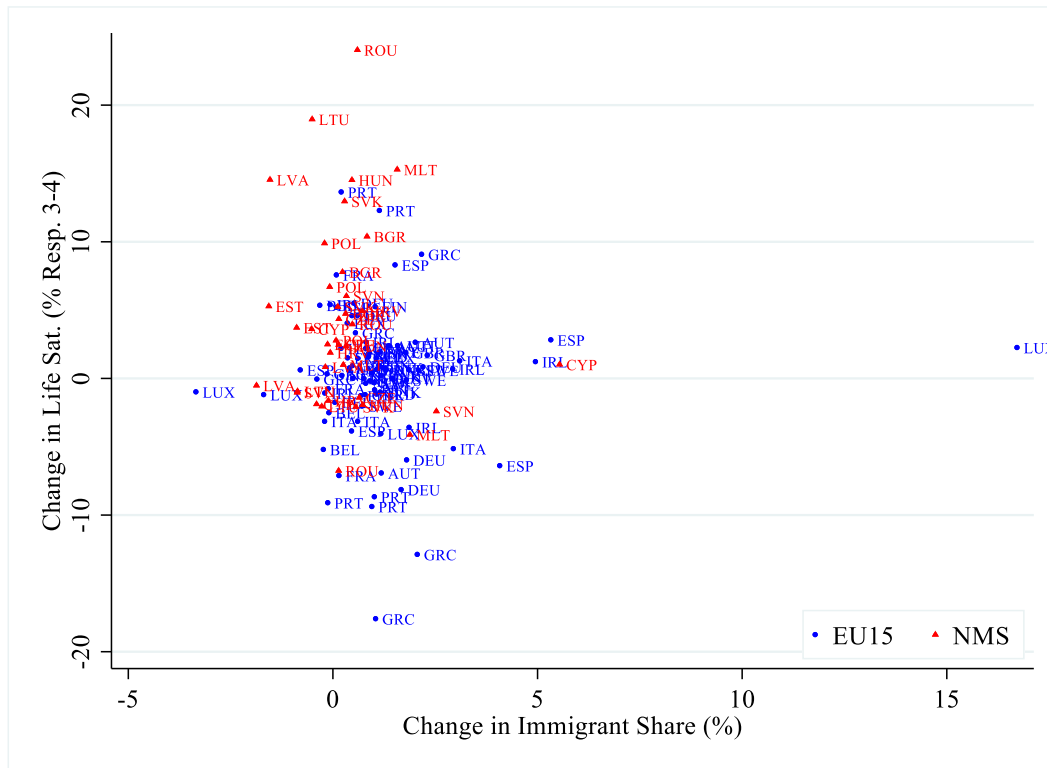
III. Results

A. Benchmark Results

The benchmark results suggest there is no statistically significant effect of increasing immigrant shares on the life satisfaction of natives. Figure 4, 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. To address reverse causality and omitted variables we turn to the regression analysis. Note too that the changes exhibit a significant amount of variance – a point which is addressed in sensitivity analysis (Section 3 F).

¹³ 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.

Figure 4. Changes in life satisfaction and immigrant share



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

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 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. In the NMS, applying the coefficient to the average change in immigrant shares results in a change of -0.10 percentage points per period ($-0.44 \times 0.23 = -0.10$), which is about -0.02 of the average period change in life satisfaction (4.24) and does not register 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 per period results in an average period changes of 0.24 and 1.65 percentage points per period respectively – each magnitude is larger than the average period change in life satisfaction (0.78), however small relative to the mean (84.10).

Table 1 Benchmark Regression Results. Δ Life Satisfaction (p.p.) on Δ Immigrant Shares (p.p.)

Sample Method	(1) Full OLS	(2) Full Const.	(3) Full Lewbel	(4) EU15 OLS	(5) EU15 Const.	(6) EU15 Lewbel	(7) NMS OLS	(8) NMS Const.	(9) NMS Lewbel
Δ Immigrant Share	0.002 [0.996]	1.664 [0.633]	0.005 [0.981]	0.214 [0.595]	1.499 [0.614]	0.300 [0.362]	0.013 [0.974]	-0.444 [0.899]	-0.289 [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.

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)¹⁴. 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.

¹⁴ Although there is no single Stock and Yogo F-stat., scholars commonly use 10 as a threshold, below which instruments are considered to be weak.

B. Heterogeneous Impacts by Response Category, Education, and Age

Assessing whether immigration is bad may not be possible with a well-being metric. If immigration is bad, then the appropriate measure may be ill-being. Conceptually, well-being and ill-being are not simply the opposite of each other, and empirically we know that the opposite of positive affect is not negative affect (Kapteyn et al., 2015). The Eurobarometer does not have a measure of ill-being (e.g., depression). To assess the possibility that immigration increases ill-being, I reran the benchmark analysis using a proxy, life satisfaction aggregated as the population share reporting the bottom answer of four: “not at all satisfied with the life you lead.”

The benchmark (full population) analysis could obscure heterogeneous effects by population subgroup; indeed there is good reason to think so. Consider, increasing immigrant shares increases the supply of labor for lower skilled jobs in particular¹⁵, 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 that younger natives have a more positive immigration-life satisfaction relation, with ages 50 (Akay et al., 2016, 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 skill¹⁶ and age (<35, 35-50, >50). As 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.

¹⁵ Immigrants are more likely to be overqualified and concentrated in low-skilled occupations (OECD, 2018, ch. 2).

¹⁶ Borjas (2003) finds a negative impact of immigration on the wages of competing low-skilled natives, but education was not sufficient as a proxy for skill. He needed education and experience to identify the impacts. In future drafts, I will use potential experience *a la* (Mincer, 1974).

The results are presented in Table 2. The bootstrapped p-values reveal that the relations are again statistically insignificant, across each group, model, and aggregation of life satisfaction. The Const. regressions were excluded because the F-stats are again low. Concerning directions, the immigration-ill being relation is negative, which is consistent with the benchmark direction except for the NMS. This distinction between well and ill-being for the NMS is interesting and should be followed-up upon in future research. Concerning education groups, the lower educated group generally has more negative relations with immigration, generally 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., 2016, 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. Additional follow up is warranted here as well.

Table 2. Subgroup Regression Results. Δ Life Satisfaction (p.p.), aggregated as indicated by panel heading, on Δ Immigrant Shares (p.p.)

	Full Sample		EU15		New Member States	
	OLS	Lewbel	OLS	Lewbel	OLS	Lewbel
Δ LSat.=1						
Δ Immigrant Share	-0.061	-0.050	-0.102	-0.097	-0.251	-0.143
	[0.576]	[0.612]	[0.454]	[0.420]	[0.415]	[0.653]
R Sq.	0.156	0.156	0.139	0.139	0.226	0.225
Δ LS High Educ.						
Δ Immigrant Share	0.082	0.045	0.28	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

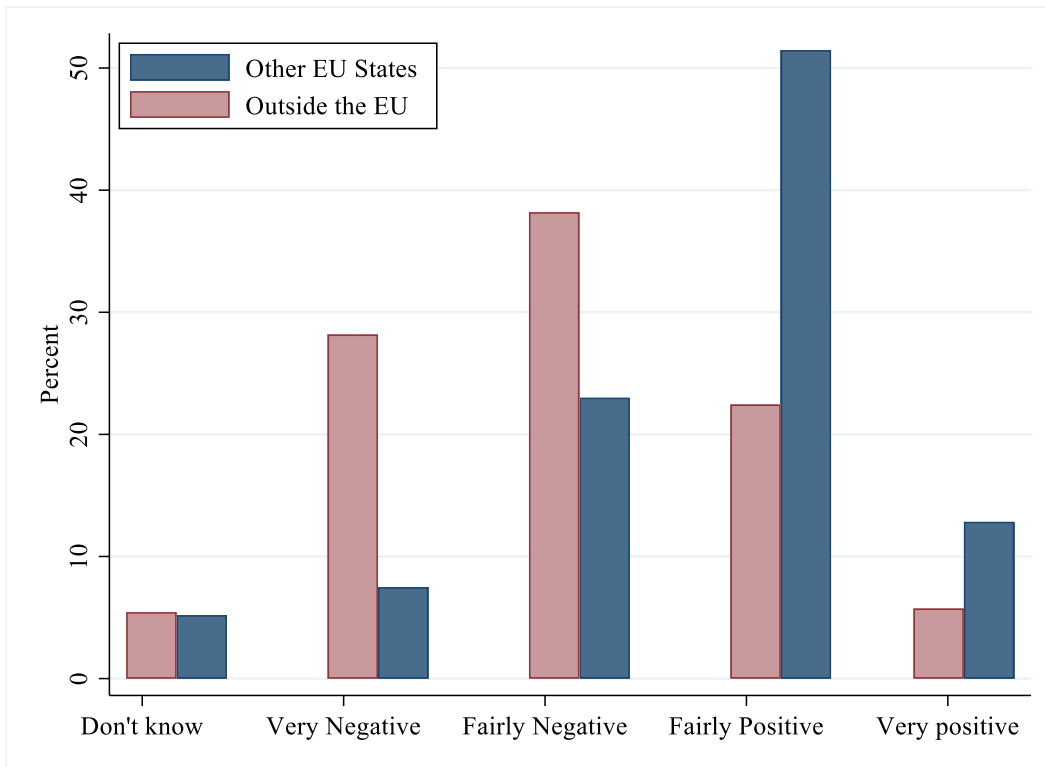
LSat.=1 is the % of people reporting “not at all satisfied with the life you lead.” For LS High Educ, LS Low Educ., LS Age<35, LS Age35-50, and LS Age >50 life satisfaction is defined as proportion of people in that population group that reported “very satisfied” or “fairly satisfied.” All regressions 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.

C. Immigrant Diversity

Perhaps immigration from non-EU states negatively affects the life satisfaction of natives. As mentioned in the Introduction, in 2017 Europeans feel more negatively toward immigrants from non-EU member states. This feeling is illustrated in Figure 5. More than 60 percent of the native population feels positively about immigration from other EU states, but a similar number feels negatively about immigrants from outside the EU. One explanation among many for this difference may be that some individuals include refugees in their minds as non-EU immigrants. Refugees are discussed in the next section.

Figure 5. 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

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, which could directly and indirectly affect natives through the provision of public goods. Positive

outcomes are also likely. Greater diversity should affect the diversity of goods and services offered and bring 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 member, 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 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. 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. 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.

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

D. 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 percent, and an even smaller proportion of the total population, 0.6 percent. 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.

Table 4. Refugee and immigrant regression results. Δ Life Satisfaction (p.p.) on Δ Immigrant Shares (p.p.) and Δ Refugee 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.

E. Non-Economic Effects of Immigration

One of the contributions (broadly defined) of this paper is to assess both the economic and non-economic effects of immigration through the use of life satisfaction as the outcome variable. So far the analysis has not made a distinction between the economic and non-economic effects, yet it is plausible that one offsets the other. Consider, although natives list immigration as a concern and feel negatively toward immigrants from outside the EU (cf., Figures 1 and 4), perhaps these feelings reflect non-economic issues and natives' receive offsetting economic gains (e.g., through positive effects on GDP).

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. Consequently, 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-economic effects of immigration on natives' life satisfaction are positive but statistically insignificant. The results suggest that the non-economic effects are more positively associated with life satisfaction than those controlled by GDP. 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 and not too much emphasis should be placed on them. Note too that 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 related to life satisfaction in the short run.¹⁷ Confirming this result lends credibility to the model. If it were

¹⁷ 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).

substantially underpowered, then it would not correctly reject the relation between GDP per capita and life satisfaction as zero.

Table 5. Non-economic effects of immigration. Δ Life Satisfaction (p.p.) on Δ Immigrant Shares (p.p.) and $\Delta \ln(\text{Real GDP per capita})$

Sample Method	(1) Full OLS	(2) Full Const.	(3) Full Lewbel	(4) EU15 OLS	(5) EU15 Const.	(6) EU15 Lewbel	(7) NMS OLS	(8) NMS Const.	(9) NMS Lewbel
Δ Immigrant Share	0.099 [0.712]	2.265 [0.420]	0.176 [0.438]	0.153 [0.679]	1.503 [0.657]	0.226 [0.427]	0.550 [0.219]	9.335 [0.382]	0.338 [0.659]
$\Delta \ln(\text{Real GDP pc})$	34.843 [0.000]	38.600 [0.001]	34.978 [0.000]	18.917 [0.056]	14.369 [0.112]	18.671 [0.047]	47.469 [0.006]	72.708 [0.163]	46.859 [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.

F. 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 considered for 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 Figures 1 and 4); (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); (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).

Table 6. Subsample Regression Results. Δ Life Satisfaction (p.p.) on Δ Immigrant Shares (p.p.)

Sample Model	(1) EU15 2010-2017 OLS	(2) Lewbel	(3) EU15 Excl. Lux. OLS	(4) Lewbel	(5) NMS Excl. Bal&P OLS	(6) Lewbel	(7) NMS Excl. Decl. OLS	(8) Lewbel	(9) NMS Excl. Lim. OLS	(10) Lewbel
Δ Immigrant Share	0.301 [0.484]	0.263 [0.442]	-0.171 [0.619]	0.356 [0.799]	0.557 [0.498]	0.037 [0.965]	-0.382 [0.349]	-0.542 [0.202]	0.030 [0.932]	-0.246 [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.

There are some relationship 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 (cf., 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 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., Table 1 column 9)¹⁸; excluding countries with declining populations (Table 6 columns 7 and 8) increases the negative relation (more negative) (Table 1 columns 7 and 9), but excluding the countries with different immigrant definitions does not change the relations much (Table 6 columns 9 and 10).

V. Conclusion

Should natives worry about immigration? The evidence suggests they should not. Over nearly 30 years (1990-2017), immigrant populations shares did not have a positive or negative effect on natives' life satisfaction in 28 European Union countries. And 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). This conclusion holds in the EU15 and new member states (NMS) that joined in the 2000s, and among different population groups, notably the poorly educated or elderly. What is more, immigrants do not affect the life satisfaction of natives whether or not they are from EU member states and neither do refugees.

The nil relation between immigration and life satisfaction apparently does not depend on modeling assumptions. Figure 4 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 tackle reverse causality and omitted variables – 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 over time within a country are not likely to be independent. It is in part due to this limitation that Figure 4 is important and also the magnitudes of the estimated relations. Each suggests there is no meaningful relation between immigration and life satisfaction. However, to more rigorously tackle the small number of clusters problem, I use Wild Cluster Bootstrap methods, which reduces the influence of outliers and improves consistency. Some further reassurance the models

¹⁸ 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.

are not statistically underpowered comes from the finding that GDP per capita is positive and statistically significant 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 refugees, and by using a better identification strategy (instrumental variables, using both constructed immigrant shares and Lewbel (2012) generated instruments).

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Appendix

A. Measurement of Subjective Well-Being

Measurement:—Although measurement error in subjective questions may exist in certain contexts (e.g., Bertrand and Mullainathan, 2001; Montgomery, 2017), responses are considered to contain valuable information (Stiglitz et al., 2009). Of particular concern is using life satisfaction to make interpersonal comparisons of utility. This issue is mitigated when using aggregate data that averages over individual idiosyncrasies to the extent that they are random. While systemic influences (e.g., cultural) still exist at the country level (Brulé and Veenhoven, 2016) people in vastly disparate countries list the same concerns affecting their live evaluations (Cantril, 1965). The latter finding means that while countries may report different degrees to which life circumstances matter, the same circumstances are likely to matter in each country – the relations should be present and in the same direction across countries albeit heterogeneous. In any case, the present analysis focuses on changes in life satisfaction over time, which mitigates reporting bias, such as that caused by culture, to the extent it is fixed or slow to change.

Aggregation:—Life satisfaction was aggregated for three reasons. First, it often follows a dynamic process (Bottan and Truglia, 2011), which cannot be observed using repeated cross-sectional data unless aggregated. Indeed, aggregate life satisfaction and the immigrant share likely contain unit roots (representing unstable dynamic processes), which necessitates using first differences. The typical 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.

A proportion was used instead of the mean because the mean incorrectly treats the differences between response categories the same (as if cardinal). It is true that estimates obtained from either treatment (cardinal or ordinal) do not differ significantly (Ferrer-i-Carbonell and Frijters,

2004), but potential biases increase with smaller scales (Kapteyn et al., 2015). The proportion was based on weighted population data using post-stratification weights from Eurobarometer.

B. 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 7.

Table 7 Unit Root Test Results for Life Satisfaction and Immigrant Share

	<u>Life Satisfaction</u>	<u>Immigrant Share</u>
<u>Fisher-type tests (Ho: all panels contain unit roots)</u>		
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
<u>Hadri Lagrange Multiplier (Ho: all panels are stationary)</u>		
trend	reject (10%)	fail to reject
no trend	reject	reject