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The effect of immigration on natives' well-being in Europe

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Abstract

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 demonstrates that increasing immigrant population shares have no aggregate effect on natives' wellbeing in 24 European countries over the years 1990-2017. However, the results exhibit heterogeneity. The effects are positive but insignificant in older European Union member states. While in the new states, which joined in the 2000s, the aggregate effects are negative but insignificant (2005-2017). In this group, the evidence is consistent with the view that immigrants may substitute for natives in the labor market; however, when accounting for GDP per capita, the noneconomic effects are positive and significant. The analysis uses Eurobarometer survey data. Sources of bias, especially reverse causality, are addressed by evaluating within-country changes over time and using instrumental variable methods.

Keywords: migration, life satisfaction, happiness, Eurobarometer
JEL codes: I31, J11, O15

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The effect of immigration on natives' well-being in Europe

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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 demonstrates that increasing immigrant population shares have no aggregate effect on natives' well-being in 24 European countries over the years 1990-2017. However, the results exhibit heterogeneity. The effects are positive but insignificant in older European Union member states. While in the new states, which joined in the 2000s, the aggregate effects are negative but insignificant (2005-2017). In this group, the evidence is consistent with the view that immigrants may substitute for natives in the labor market; however, when accounting for GDP per capita, the non-economic effects are positive and significant. The analysis uses Eurobarometer survey data. Sources of bias, especially reverse causality, are addressed by evaluating within-country changes over time and using instrumental variable methods.

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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). The European Migration Network (EMN), part of the European Commission, substantiates Szijjarto's view, citing survey evidence from the Eurobarometer that by late 2017, Europeans considered immigration to be the most important issue. What is more, the majority of Europeans at this time felt negatively about immigrants from outside the EU (European Migration Network, 2018).

The aim of this paper is to test whether immigration affects natives in Europe. Although the present political environment paints a bleak picture, it is possible that immigration has an overall positive impact. Indeed the EMN report conveys a more nuanced description than the Eurobarometer data referenced above, 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[1] 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 single-item measure that captures factors that are otherwise often ignored.[2]

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, reducing social cohesion, increasing congestion, or indirectly reducing provision of public goods. However, the 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 both positive and negative relations in the individual countries:

[1] Excluding refugees, consistent with similar studies.

[2] Consider the case of China as an example. While GDP per capita 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).

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

United States, Germany, and England. 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. However, 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).

In summary, the evidence relating to immigration and subjective well-being suggests labor markets may be important (as in England (Ivlevs and Veliziotis, 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 the authors acknowledge are less-than-ideal (lags of the endogenous variable, or diversity defined at a geographically larger area) (Akay

et al., 2016; Longhi, 2014). 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 on natives' well-being.[4] Second, I estimate the impacts in a broader sample that includes 24 EU countries as they were added over the period 1990-2017.[5] To my knowledge the period 2010-2017 has not yet been included in a similar study, even though this period is somewhat unique.[6] Third, I empirically evaluate several potential channels through which immigration affects life satisfaction. Lastly, I use instrumental variable techniques to eliminate potential sources of bias (especially reverse causality).

II. Data and Methods

A. Data

Individual life satisfaction data are from repeated cross-sectional Eurobarometer surveys (European Commission, 2018). Life satisfaction is measured on a scale from 1 to 4 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

[4] It is more common to evaluate immigrants' life satisfaction in the subjective well-being literature. See for example the *World Happiness Report 2018* (Helliwell et al., 2018).

[5] The largest sample I am aware of that evaluates the impacts of immigration on natives subjective well-being includes 26 European countries, but only over the period 2002-2010 (Betz and Simpson, 2013).

[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).

ways consistent with theory (including for example mortality), relate to objective characteristics including biometrics such as those from functional magnetic resonance imagings (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 discussed in the Appendix A. The top two categories were used in contrast to the extreme

[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.

categories because that more closely approximates the sample median and mean of approximately three.

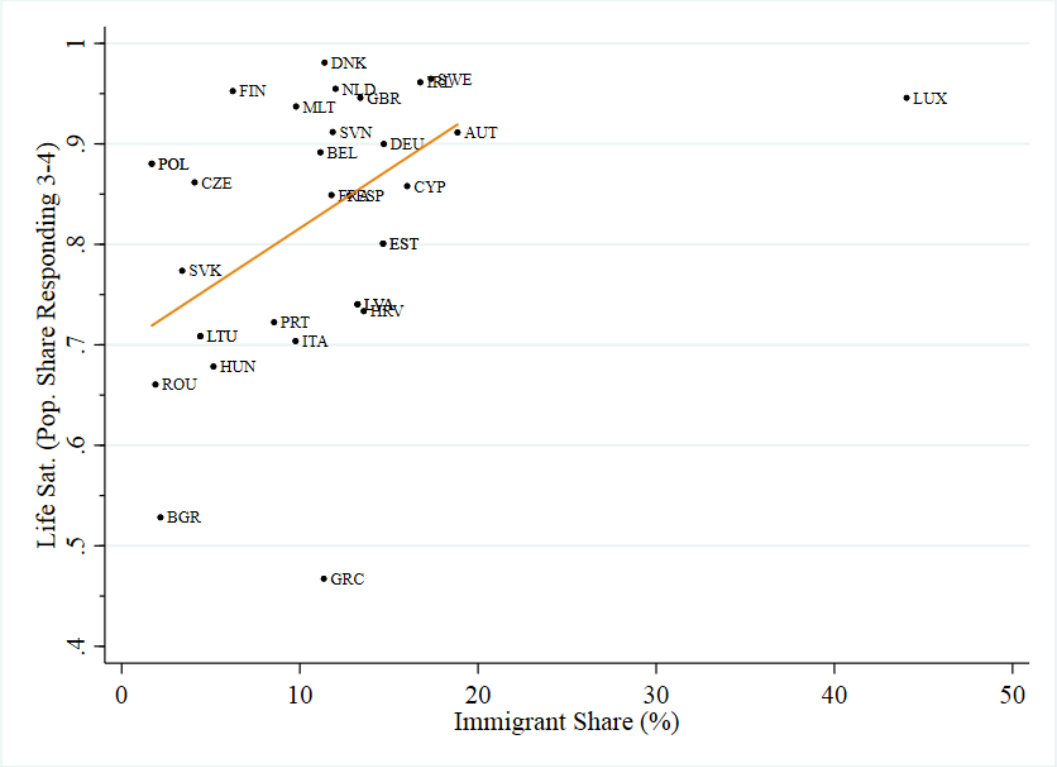
Bilateral immigration stocks, for more than 200 destination countries/territories from more than 200 origin countries/territories, are available every five years from 1990-2015 and 2017 from the United Nations (United Nations Population Division, 2017). For most countries, immigrants are defined as people 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. Four countries use different definitions 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.

Several additional macro variables are used including a few based on data from the World Development Indicators. A complete listing of additional variables and sources is presented in Appendix B.

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 1 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.

Figure 1. 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

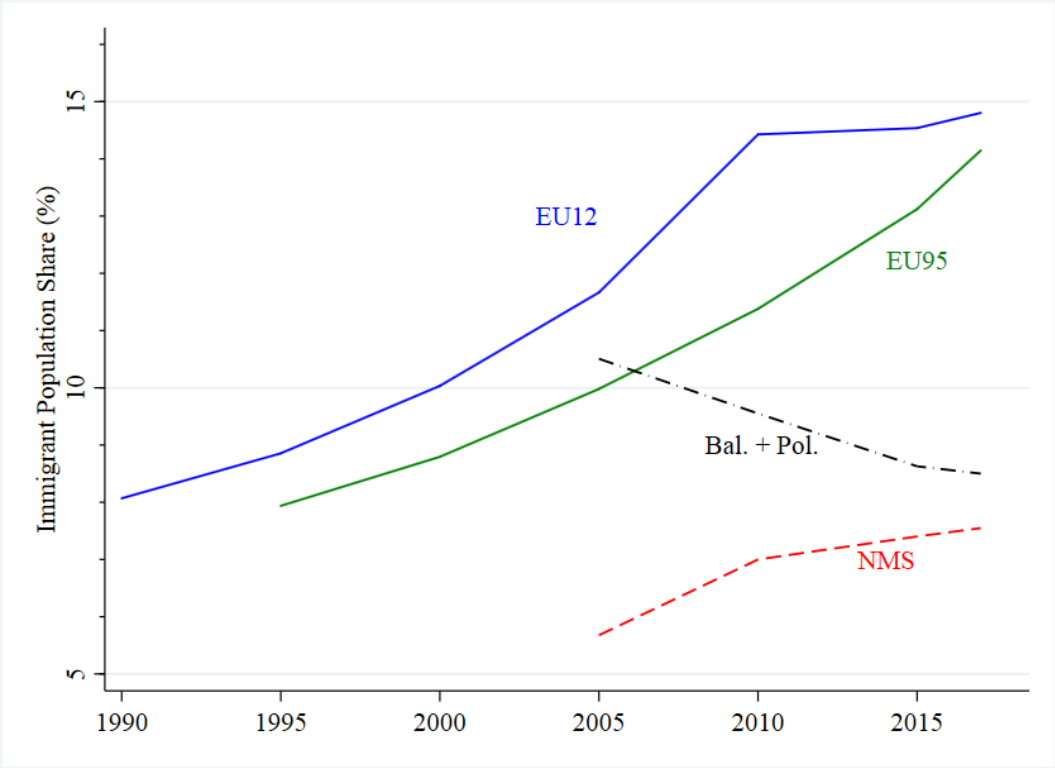
To see the evolution of immigrant stocks over the sample period, four samples are presented: (1) the original EU12[8] countries for which all have life satisfaction and immigration data since 1990, (2) Austria, Sweden, and Finland (labeled EU95), which are observed from 1995; (3) the new EU member states (with four exceptions) (labeled NMS)[9], which have been observed since 2005; and (4) Estonia, Latvia, Lithuania, and Poland, which were separated as the only countries in the EU28 that had declining immigrant shares over the sample period. Figure 2 presents the

[8] EU12: Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, and United Kingdom.

[9] The NMS countries include: Bulgaria, Croatia, Cyprus, Czech Republic, Hungary, Malta, 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.

average immigrant shares for these samples in each year immigrant stocks and life satisfaction are observed.

Figure 2. Change in immigrant population shares 1990-2017



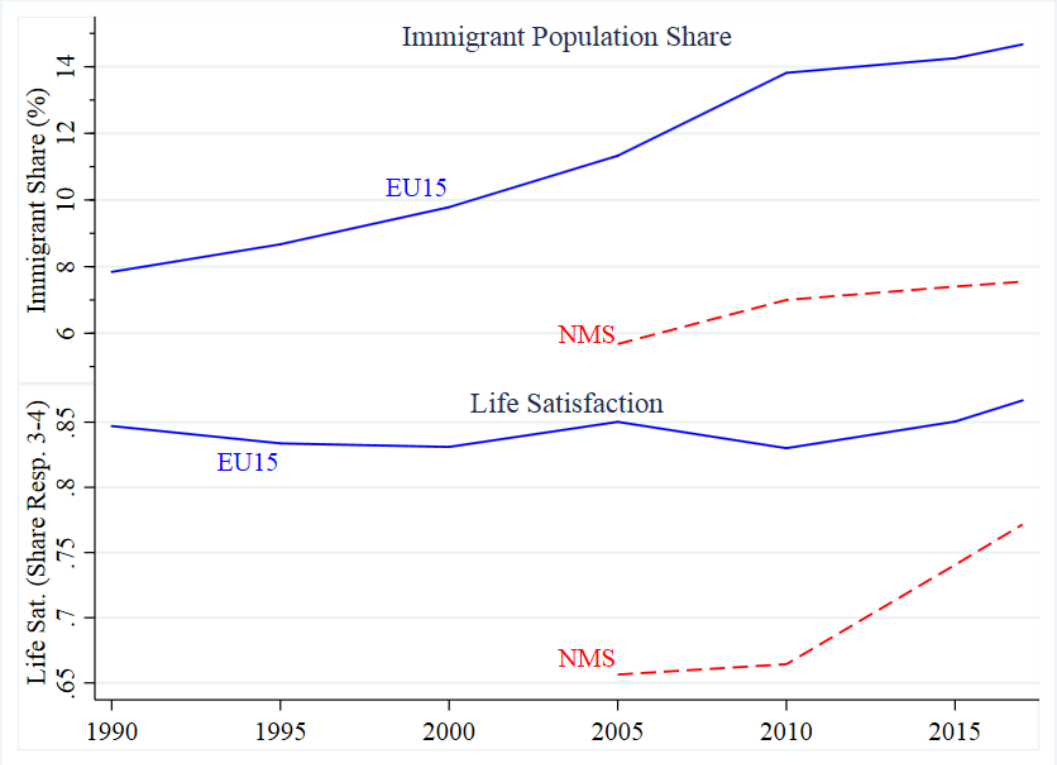
EU12: Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, and United Kingdom; EU95: Austria, Hungary, and Sweden; Bal. + Poland: Estonia, Latvia, Lithuania, and Poland; NMS: Bulgaria, Croatia, Cyprus, Czech Republic, Hungary, Malta, Romania, Slovak Republic, and Slovenia.
Dates of immigration figures are truncated to correspond to when life satisfaction data is also available.
Source: Author calculations based on data from the United Nations Population Division.

In Figure 2, The EU12 and EU95 groups have similar increasing trends in immigrant shares until 2010, while the more recently added EU member states differ substantially, especially the Baltic states and Poland. For this reason, and because of time coverage, the EU12 group and EU95 group are pooled for analysis to comprise the EU15 group and the group of Baltic states

and Poland are dropped.[10] As such, the samples are comprised solely of countries with increasing immigrant shares; meaning the results should not be generalized especially in cases of decreasing immigrant shares because the effects may not be symmetric.

Are the changes in immigrant shares over time related to changes in natives' well-being? Observing the trends in Figure 3, the answer appears to be no in both the EU15 and NMS. Immigrant shares generally increase over the period, especially from 2005 – 2010. While life satisfaction also finished the period higher, much of the increase occurred from 2010 – 2017, a period which experienced slower growth in immigrant shares.

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



See figure 2 for country group definitions. EU15 includes EU12 and EU95.
Source: Author calculations. Eurobarometer; and United Nations Population Division.

[10] Note that increasing shares could result from declining populations and do not necessarily imply increasing immigrant totals. For example Croatia experienced both a total and immigrant population decline from 2005 – 2017 and their immigrant share increased. Countries that experienced declining total populations over the sample period include: Bulgaria, Croatia, Hungary, Romania, and the Baltic States (Estonia, Latvia, and Lithuania) plus Poland.

Visually inspecting the immigrant-share trend for the EU15 suggests that it may not be stationary and could follow a unit root[11]. 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 the Appendix, suggest the possibility of a unit root. For this reason the specifications will be estimated in first differences to impose stationarity.

C. Methods

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

$$H_{ct} = \gamma Immigsh_{ct} + \boldsymbol{X}_{ct}\boldsymbol{\beta}' + \alpha_c + \lambda_t + \varepsilon_{ct} \quad (1)$$

Aggregate life satisfaction of natives (H_{ct}) for country c in time t depends on the immigrant share ($Immigsh_{ct}$), a vector of time-varying factors ($\boldsymbol{X}_{ct}$), common time shocks (λ_t), and time-invariant characteristics (α_c) (fixed effects). 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.

$$\Delta H_{ct} = \gamma \Delta Immigsh_{ct} + \Delta\boldsymbol{X}_{ct}\boldsymbol{\beta}' + \lambda_t + \Delta\varepsilon_{ct} \quad (2)$$

[11] Process with an autoregressive coefficient of one.

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. The set of controls included in $\boldsymbol{X}_{ct}$ varies as discussed in detail below.

Two stage least squares (2SLS) is 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, the change in immigrant share (flow) is predicted in the first stage by an excluded instrument that depends solely on fixed characteristics and the time-varying characteristics of sending countries. In this way, the predicted immigrant flow is exogenous to time-varying characteristics of the destination country.

Constructed immigrant flows is used as the instrument.[12] To construct immigrant flows, bilateral immigrant stocks from origin country o residing in destination country c in year t are predicted ($\widehat{Immigsh_{oct}}$) using a gravity model (described below); the predictions are summed ($\overline{\widehat{Immigsh_{ct}}} = \sum_{o \neq c} \widehat{Immigsh_{oct}}$) to construct immigrant stocks; and then first differences are applied to obtain flows for each destination country ($\Delta\overline{\widehat{Immigsh_{ct}}}$). Bilateral immigrant stocks are predicted using the specification: $\ln(Immigsh_{oct}) = \alpha_{oc} + \lambda_{ot} + \mu_{oct}$.[13] The model includes origin-destination-pair fixed effects (α_{oc}). They include all fixed characteristics shared between origin and destination countries that influence emigration decisions, including among others all of the gravity-type determinants such as: common borders, distance between countries,

[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.

[13] Log-transformations are commonly used in the literature (e.g., Jaumotte et al., 2016) considering shares can only take non-negative values. To accommodate zero immigrant stocks, the natural log is taken of ($Immigsh_{oct} + 1$).

and shared history. Year by origin-country dummies (λ_{ot}) capture the net effect of all time-varying characteristics affecting emigration from the various origin countries, so-called "push factors". Log-transformed immigrant shares are used in contrast to flows in order to avoid violating the exclusion restriction. Because the origin-destination-pair fixed effects include information about the destination country, they need to be accounted for in the second stage regressions, which is accomplished by differencing them out when obtaining immigrant flows. In the regression of bilateral stocks, 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 0.58.

The analysis is performed separately for two subsamples in addition to the full sample of 24 EU countries (EU28 less the Baltic states and Poland as mentioned above). The subsamples include (1) the EU15 countries and (2) the NMS countries, which joined the EU in the 2000s (excluding the four mentioned above).

Two sets of independent variables are used. First, standard controls, such as year effects and others variables that improve the precision of 2SLS results. Second, mediating variables that capture a portion of the immigration-life satisfaction relationship. Immigration has been shown to affect a whole range of outcomes, most notably GDP pc, meaning that controlling for it would shut down one of the channels through which immigration affects life satisfaction. For this reason, mediating variables are excluded from the initial regressions to capture the overall effect of immigration on life satisfaction.[14] The set of mediating variables is determined empirically in Section III B from the following overall set of independent variables: labor market variables (the

[14] Such mediating variables are referred to as bad controls in Angrist and Pischke (2009).

natural log of real GDP pc, unemployment rate, working-age (15-64) labor force participation rate), population characteristics (natural log of total population, the female share of total population, and the working-age (15-64) population share), cross-country relations (trade as a percent of GDP, the KOF globalization index (de jure), and net inflow of remittances per capita), and additional societal characteristics (urbanization rate, Gini coefficient, average years of school, and crime (measured as homicides per 100,000 people)). The variables were chosen as the likely outcomes that immigration determines, which in turn could affect life satisfaction (i.e., plausible channels).

The analyses are performed first excluding controls and mediators to form the benchmark analysis. Then the set of independent variables are tested as outcomes of immigration in each subsample. Next, the additional controls are added to the benchmark analysis, and then the variables affected by immigration are added to reveal channels through immigration affects life satisfaction. Following that, sensitivity tests are run to test the robustness of the results to different samples, and last, the relations are tested for heterogeneity by education and age.

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.[15] For this reason, the bootstrapped p-values for immigrant shares are reported in the tables along with the country-clustered standard errors. 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

Before presenting the detailed results, a brief summary is warranted. The impact of increasing immigrant-shares on natives' life satisfaction is nil, in both the EU15 and NMS; however, this conclusion relies on the relatively new and strict assessment of statistical significance (Wild Cluster Bootstrap). Based on the magnitudes, the benchmark analysis (Section A) suggests the growth in immigrant shares from 1990-2017 is positively associated with the life satisfaction of natives in EU15 countries, but negatively associated in the NMS countries from 2005-2017. This difference is in part due to time period. Sensitivity analysis reveals that the relationship is smaller in the EU15 when considering the more recent period.

What is more important than period, is the role of mediators (Section B). Based on 2SLS estimates, increasing immigrant shares is positively associated with GDP pc in the EU15, but negatively associated in the NMS. Indeed controlling for this negative channel in the NMS reveals the only statistically significant effects of immigration. Increasing immigrant shares have net positive effects on natives in NMS countries when GDP pc is controlled. Excluding countries with potentially problematic data strengthens this relation (Section C).

[15] 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.

A. Benchmark Results

The initial evidence, which suggests there are no statistically significant effects of increasing immigrant shares on the life satisfaction of natives, is presented in Table 1. The estimates are 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 two regressions corresponding to samples and estimation method (2SLS and ordinary least squares (OLS) for comparison). The second and third panels present the results from the first stage and a reduced form analysis using constructed immigrant shares as the independent variable. Recall that clustered standard errors are presented in the body of the table, while the bootstrap p-value should be used to assess the statistical significance of the effects of increases in immigrant shares on changes in life satisfaction.

As mentioned, the results are insignificant according to the Wild Bootstrap p-values; the lowest is nearly 0.3. With that caution, it is still relevant to assess the economic significance of the magnitudes. In the NMS the 2SLS relationship is negative and larger than the positive relation in the EU15. In each group, the magnitudes are meaningful relative to the average period change in life satisfaction. Applying the coefficients (EU15 0.008; NMS: -0.026) to the average change in immigrant shares (EU15 1.143; NMS: 0.624) results in changes of 0.009 percentage points per period in the EU15 and -0.016 per period in the NMS. Relative to the average change per period (EU15: 0.001; NMS: 0.038), the effect is quite large in the EU15 and meaningful in the NMS. However, the magnitudes are small relative to average levels (EU15: 0.841; NMS: 0.725), at approximately 1.1 percent and -2.2 percent in the EU15 and NMS, respectively.

Table 1 Benchmark Regression Results. Change in natives' life satisfaction on changes in immigrant shares (%), first stages, and reduced form.

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Full	Full	EU15	EU15	NMS	NMS
Model	OLS	2SLS	OLS	2SLS	OLS	2SLS
Dependent Variable: Δ Life Satisfaction						
Δ Immigrant Share	0.002	0.002	0.002	0.008	0.006	-0.026
	(0.002)	(0.004)	(0.002)	(0.003)	(0.008)	(0.016)
Constant	0.021	0.021	0.015	0.013	0.030	0.035
	(0.007)	(0.007)	(0.010)	(0.009)	(0.008)	(0.008)
R Sq.	0.190	0.190	0.198	0.149	0.185	-0.071
Kleibergen-Paap F Stat.		14.595		13.708		4.970
Immig. Bootstrap p	0.536	0.771	0.595	0.352	0.498	0.228
Obseravations	114	114	87	87	27	27
Countries	24	24	15	15	9	9
Mean Δ Life Sat.	0.010	0.010	0.001	0.001	0.038	0.038
Mean Life Sat.	0.814	0.814	0.841	0.841	0.725	0.725
Mean Δ Immig. Share	1.020	1.020	1.143	1.143	0.624	0.624
Mean Immig. Share	11.068	11.068	12.232	12.232	7.317	7.317
First Stage - Dependent Variable: Δ Migrant Share						
Δ Cons. Immigrant Share		0.633		0.635		1.097
		(0.166)		(0.172)		(0.492)
Constant		0.116		0.197		-0.143
		(0.180)		(0.261)		(0.246)
R Sq.		0.367		0.362		0.384
Reduced Form - Dependent Variable: Δ Life Satisfaction						
Δ Cons. Immigrant Share		0.001		0.005		-0.029
		(0.003)		(0.002)		(0.012)
Constant		0.021		0.015		0.039
		(0.007)		(0.010)		(0.008)
R Sq.		0.188		0.215		0.220

Immig. Bootstrap p is the probability the coefficient on Δ Immigrant Shares takes the value 0, based on Wild Cluster Bootstrap methods. Standard errors in parentheses have limitations as discussed in Section II C Methods. All regressions include year effects.
Source: Author Calculations; data sources detailed in data section.

One might attribute the lack of statistical significance to weak instruments, but this concern is alleviated for the EU15 when considering the size of the Kleibergen-Paap rk statistic (Kleibergen and Paap, 2006); however, for the NMS, the instrument is indeed likely to be weak in the present analysis, because the 4.97 falls below the often-cited Stock and Yogo standards (Stock and

Yogo, 2002). This issue is addressed in the sensitivity analysis, which upon excluding countries that have either declining total populations or define immigrants differently, yields stronger first stage estimates, but the effect of increasing immigrant shares remains statistically insignificant. Note too that the by cluster-robust standard errors, the effects are often significant.

B. Sensitivity to Mediating and Control Variables

The impact of immigration on natives' well-being operates through multiple channels in theory. To provide further evidence, several additional variables were considered as either controls or mediators.

Potential Mediators.—Potential mediators can be tested by repeating the 2SLS regressions from the benchmark analysis using destination-country outcomes that represent plausible mediators. If immigration shares are related to an outcome variable, then that variable is considered to be a potential mediator. The independent variables considered are listed in the data section.

Table 2 presents the results. The top panel includes variables for which data are available for the entire sample, while the bottom includes variables with reduced availability. In the EU15, immigrant shares impact several variables (using clustered standard errors)[16] – positively affecting GDP pc, total population, trade, and the Gini Coefficient, and negatively affecting the female population ratio, and net remittance inflows. Immigrants have no impact on the unemployment rate in the EU15. The relations for total population, remittances, and trade are perhaps the most intuitive, assuming it is easier for immigrants to maintain more contact with their networks than for natives to establish connections. However, it was not expected to find no

[16] As mentioned bootstrapped standard errors are appropriate for assessing the impact of immigrant shares on life satisfaction, but for the present purpose, it is important to simply understand whether two variables are related to each other in the present empirical framework. If they are related, their inclusion in the second stage results will affect the immigration-life satisfaction relation.

impact on the working-age population and a negative impact on the female-population ratio. 74.3 percent of immigrants in the OECD are of working-age (25-64) in 2010-11 and 51.4 percent are women (Arslan et al., 2014 pp 18, 26); however, the average female-share has dropped below 50 percent in more recent years (OECD, 2018, p. 46). These demographic characteristics should be assessed further in future research. Concerning the Gini coefficient, it is not too surprising that income inequality increases within a country when new members join the population with different capital, both physical and human. Lastly, finding no impact of immigration on crime is in itself an important result.

Table 2 Coefficient directions from 2SLS regressions on Δ Immigrant Share

Dep. Variable	EU15	NMS	Dep. Variable	EU15	NMS
Δ ln(Real GDP pc)	+	-	Δ Unemploy. Rate	ns	+
Δ ln(Population)	+	+	Δ Labor Force Part. % (15-64)	ns	ns
Δ Female Pop.	-	ns	Δ Pop. 15-64[a]	ns	+
Δ Trade (% of GDP)	+	ns	Δ Urbanization	ns	ns
Reduced Samples					
Δ Gini	+	ns	Δ Years of School	ns	na
Sample size	82	24	Sample size	57	9
Δ Global. Index de jure	ns	-	Δ Net Remit In pc	-	ns
Sample size	72	18	Sample size	67	18
Δ Homicides per 100K	ns	ns			
Sample size	53	17			

a. Slightly reduced sample in NMS of 26 observations.
ns: not significant. na: not available. All regressions include year effects. Each reported coefficient direction is statistically significant at 10% or better using clustered standard errors.
Source: Author Calculations; data sources detailed in data section.

The relations for the NMS countries differ notably from the EU15 relations. Most importantly, increasing immigrant shares decreases GDP pc and increases the unemployment rate in the NMS countries during the period 2005-2017. It is likely that immigrants arrive and do not immediately

find a job, increasing the unemployment rate, and decreasing GDP pc indirectly by increasing the population. Or if to emigrate they must first have a job, they serve as substitutes that compete with natives. This interpretation is consistent with the other results that immigration increases total population and the working age population share in the NMS countries. In contrast, immigrants in the EU15 are less likely to be substitutes. They do not increase the working age population share or the unemployment rate, and GDP pc increases, suggesting a more complementary role.

Relations when including mediators and controls.—To assess the impact of controls and mediators, the benchmark analysis is repeated first including the additional control variables (in both stages), and then, also the variables that represent potential mediators. In brief the results are: in the NMS, one statistically significant immigration-life satisfaction relation emerges, while in the EU15, the magnitudes exhibit remarkable consistency but are insignificant.

Table 3 presents the detailed results for the EU15 countries. Columns 1 and 2 include additional controls. The coefficient on immigrant share is the same as in the benchmark analysis, suggesting the 2SLS results are indeed robust. In particular the labor market of destination countries, as proxied by the unemployment and labor force participation rates, do not determine the constructed immigrant shares.[17]

[17] The urbanization rate was dropped because the sample size is fairly small and the conventional t-stat is less than one. Then separate regressions were run for each of the following: years of school, homicides, net remittances, and the globalization index, but they were omitted for brevity because each yielded coefficients with t-stats less than one and because the regression were not comparable due to reduced samples.

Table 3 EU15 Sensitivity analysis. 2SLS estimates of the moderated impacts of immigrant shares on natives' life satisfaction

	(1)	(2)	(3)	(4)
Δ Immigrant Share	0.008	0.008	0.009	0.009
	(0.003)	(0.003)	(0.003)	(0.003)
Δ Unemploy. Rate	-0.005	-0.005	-0.004	-0.005
	(0.002)	(0.002)	(0.003)	(0.001)
Δ Pop. 15-64	-0.004	-0.004	-0.005	-0.005
	(0.003)	(0.003)	(0.004)	(0.003)
Δ Labor Force Part. % (15-64)	-0.003	-0.003	-0.002	
	(0.002)	(0.002)	(0.002)	
Δ Urbanization	0.000			
	(0.002)			
Δ ln(Population)			-0.453	-0.519
			(0.283)	(0.245)
Δ Trade (% of GDP)			0.001	0.001
			(0.000)	(0.000)
Δ ln(Real GDP pc)			0.096	
			(0.142)	
Δ Female Pop.			0.003	
			(0.041)	
Δ Gini			0.000	
			(0.005)	
Constant	0.002	0.002	-0.005	0.004
	(0.007)	(0.007)	(0.005)	(0.007)
Obseravations	87	87	82	87
R Sq.	0.235	0.234	0.272	0.268
Kleibergen-Paap F Stat.	10.694	11.222	9.187	10.361
Immig. Bootstrap p	0.421	0.376	0.234	0.249

Dependent variable Δ life satisfaction. Analysis covers 1995-2017, dropping 1990 when forming the first differences. Immig. Bootstrap p is the probability the coefficient on Δ Immigrant Shares takes the value 0, based on Wild Cluster Bootstrap methods. Standard errors in parentheses have limitations as discussed in Section II C Methods. All regressions include year effects.
Source: Author Calculations; data sources detailed in data section.

Column 3, Table 3, includes all of the potential mediators from the previous section. As a result, the magnitude increases, but only slightly, and the relations remain insignificant. The regression in column 4 is based on sequentially dropping variables with the lowest t-statistic until all of them are above one. The results are remarkably stable, though this should not be too surprising given that including trade and total population affects the immigration-life satisfaction

relation in offsetting ways. That is because immigration has positive effects on total population and trade (Table 2), which are negatively and positively related to life satisfaction. Separately accounting for these channels would increase the net immigration-life satisfaction relation in the case of total population, and decrease it in the case of trade. But as can be seen, the net effect of accounting for both positive and negative mediators does not affect the relation much in the present case. Note that the mediators are endogenous variables and their coefficients should not be interpreted as unbiased.

Table 4 presents the results from the corresponding analysis for the NMS sample. The impact of immigration on life satisfaction when GDP pc is controlled emerges as statistically significant (at ten percent) and positive in column 4. This reversal, from a negative to a positive impact clearly illustrates the importance of mediators in the NMS, in particular GDP pc. Once this negative channel through which immigration affects natives is accounted for, the remaining impact is positive.

Concerning the other results in Table 4, the structure is similar to Table 3. Column 1 adds all of the control variables that do not reduce the sample size to less than 26 (working-age-population share reduces the sample by 1). Here the result is quite similar to that of the benchmark analysis (but with a higher F stat), again supporting the 2SLS specification. In column 2, the mediators are added and urbanization was dropped due to a low t-stat. When the mediators are added, the net impact of increasing immigration is estimated to be positive but not significant. Column 3 presents the regression after sequentially dropping variables with a t-stat of less than one. In the small sample context, dropping insignificant controls has a substantial impact on the estimation power, and immigration becomes more significant (the p-value goes

from 0.519 to 0.180).[18] Column 4 uses GDP pc alone to assess its importance especially in the small sample context. The magnitude of immigration in column 4 is greater than in column 3 as should be expected because column 3 includes the working age population share, which accounts for a positive channel through which immigration affects life satisfaction in the NMS.

Table 4 NMS Sensitivity analysis. 2SLS estimates of the moderated impacts of immigrant shares on natives' life satisfaction.

	(1)	(2)	(3)	(4)
Δ Immigrant Share	-0.025	0.020	0.014	0.028
	(0.014)	(0.022)	(0.010)	(0.015)
Δ Trade (% of GDP)	-0.001	-0.001	-0.001	
	(0.000)	(0.000)	(0.000)	
Δ Female Pop.	0.074	-0.038		
	(0.056)	(0.062)		
Δ Labor Force Part. % (15-64)	0.010	-0.002		
	(0.011)	(0.007)		
Δ Urbanization	0.006			
	(0.013)			
Δ ln(Real GDP pc)		0.529	0.558	0.582
		(0.132)	(0.070)	(0.086)
Δ Pop. 15-64		0.023	0.018	
		(0.014)	(0.007)	
Δ ln(Population)		-0.262		
		(0.451)		
Δ Unemploy. Rate		-0.001		
		(0.004)		
Constant	0.035	0.009	0.007	-0.015
	(0.009)	(0.016)	(0.007)	(0.010)
Obseravations	26	26	26	26
R Sq.	0.207	0.535	0.541	0.408
Kleibergen-Paap F Stat.	14.884	4.914	5.489	4.336
Immig. Bootstrap p	0.197	0.519	0.180	0.070

Dependent variable Δ life satisfaction. Analysis covers 2010-2017, dropping 2005 when forming the first differences. Immig. Bootstrap p is the probability the coefficient on Δ Immigrant Shares takes the value 0, based on Wild Cluster Bootstrap methods. Standard errors in parentheses have limitations as discussed in Section II C Methods. All regressions include year effects.
Source: Author Calculations; data sources detailed in data section.

[18] Regressions with insubstantial controls that were also based on reduced samples were omitted for brevity. An important exception is crime, which significantly and negatively reduced life satisfaction. Nonetheless the regressions were omitted because of the reduced sample size of 17 observations.

Note that the instrument is fairly weak in columns 2-4, but this concern is alleviated by the sensitivity analysis presented in the following section.

C. Sensitivity to Sample Composition

The different conclusions for the NMS and EU15 depend on samples that differ not only in terms of countries but also time period. The results in each sample may also be affected by the inclusion of countries that skew the results. For these reasons, four subsamples were considered for further analysis to test the sensitivity of the effects of immigration on natives' life satisfaction to sample composition. In particular, the benchmark regression and benchmark with mediators regressions are rerun in each subsample. In subsamples based on the EU15 sample, the mediators regression corresponds with that of Table 3 column 4; for the NMS sample, the corresponding regressions are from Table 4 columns 3 and 4.

The subsamples include the EU15 countries restricted to match the NMS period (2005-2017 or 2010-2017 in first differences), and both the EU15 and NMS samples excluding the following three groups of potentially problematic countries. First, the four countries that define immigrant stocks differently: Belgium, Croatia, Czech Republic, and Hungary. Stocks in Belgium and the Czech Republic are defined based on foreign citizenship, not place of birth. Stocks in Croatia and Hungary include refugees. It is not clear how citizenship might affect the results, but including refugees could greatly increase flows during the recent years. Second Hungary and the newest members of the EU (Bulgaria, Croatia, and Romania) all experienced declining total populations during the sample period. In these countries an increasing immigrant population share does not necessarily mean more immigrants but could result from stable immigrant stocks and a declining total population; in which case, the mechanisms should operate differently.

Results from each subsample reveal important variations in the immigration-life satisfaction relation. Results from the first subsample, presented in Table 5 columns 1 and 2, suggest that the character of immigration changed during the period 2005-2017. The positive (insignificant) net relationship in the EU15 declines by more than half when mediators are accounted for. That suggests that the negative effect of immigration in the NMS may also depend on the period. Excluding Belgium did not have a meaningful impact on the relations and for this reason the regression was omitted for brevity.

Table 5 Sensitivity analysis. 2SLS estimates of the impacts of immigrant shares on natives' life satisfaction in different subsamples

	(1) EU15	(2) EU15	(3) NMS	(4) NMS	(5) NMS	(6) NMS	(7) NMS	(8) NMS
	2010 - 2017		Excl. Mismatching			Excl. Declining Pop.		
Δ Immigrant Share	0.005	0.003	-0.021	0.033	0.020	-0.018	0.024	0.012
	(0.002)	(0.001)	(0.010)	(0.014)	(0.010)	(0.012)	(0.004)	(0.007)
Δ Trade (% of GDP)		0.001			-0.000			-0.001
		(0.000)			(0.000)			(0.000)
Δ Pop. 15-64		0.005			0.025			0.011
		(0.007)			(0.013)			(0.006)
Δ ln(Population)		-0.545						
		(0.299)						
Δ Unemploy. Rate		-0.005						
		(0.001)						
Δ ln(Real GDP pc)				0.729	0.713		0.605	0.550
				(0.142)	(0.109)		(0.140)	(0.069)
Constant	0.014	0.012	0.044	-0.023	0.009	0.038	-0.005	0.020
Adj. R Sq.	0.111	0.246	-0.289	0.267	0.301	-0.46	0.199	0.431
	(0.009)	(0.012)	(0.007)	(0.021)	(0.018)	(0.009)	(0.015)	(0.015)
Obseravations	45	45	18	18	17	15	15	14
Countries	15	15	6	6	6	5	5	5
R Sq.	0.171	0.366	-0.061	0.440	0.563	-0.147	0.428	0.693
Kleibergen-Paap F Stat.	21.337	32.578	133.284	19.996	15.670	43.911	38.171	22.758
Immig. Bootstrap p	0.339	0.256	0.268	0.074	0.054	0.381	0.042	0.347
Mean Δ Life Sat.	0.005	0.005	0.043	0.043	0.045	0.026	0.026	0.026
Mean Δ Immig. Share	1.114	1.114	0.770	0.770	0.800	0.814	0.814	0.814

Dependent variable Δ life satisfaction. Immig. Bootstrap p is the probability the coefficient on Δ Immigrant Shares takes the value 0, based on Wild Cluster Bootstrap methods. Standard errors in parentheses have limitations as discussed in Section II C Methods. All regressions include year effects.
Source: Author Calculations; data sources detailed in data section.

The most important result from the NMS subsamples (columns 3-8) is the increase in the first stage F-stat., which shows that the instruments are no longer weak. And yet, the relations are broadly consistent with the preceding. The unmediated impact of increasing immigration is negatively associated with the life satisfaction of natives, but insignificant. When including GDP pc the relation switches and reveals a positive net effect that is statistically significant in columns 4, 5, and 7 (at five percent in column 7).

D. Heterogeneous Impacts by Education and Age

The positive impact of immigration on GDP pc in the EU15 and negative impacts on GDP pc and unemployment in the NMS suggest immigrants play different roles in the labor markets of these country groups. If indeed immigrants serve as substitutes in the labor markets of the NMS, we should expect this channel to have greater effects on natives that compete with immigrants. Assuming immigrants compete more with lower skilled people[19] and using education as a proxy for skill[20], I expect people with a low level of education to be affected more negatively in the NMS countries. Indeed, better-educated people experienced more positive well-being relations with immigration in Germany and England (Akay et al., 2014; Ivlevs and Veliziotis, 2018), but not the United States (Kuroki, 2018).

Beyond labor markets, there is reason to suspect heterogeneous relations. Age in particular has been found to moderate the relationship. Three papers find that younger people have a more positive immigration-life satisfaction relation, with age 50 in particular representing a threshold beyond which the relationship is more negative (Akay et al., 2016, 2014; Kuroki, 2018).

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

[20] 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).

To test for heterogeneity, the benchmark analysis was rerun using reconstructed life satisfaction based on the native populations aggregated separately by education (high or low) and age (<35, 35-50, >50). Specifically life satisfaction for people with high education, as an example, 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 6. The first thing to note is that the bootstrapped p-values reveal that the relations are again statistically insignificant, except in the NMS when GDP pc is the only additional control (columns 2 and 5). Yet, concerning magnitudes there are several notable differences.

In the EU15, the results are somewhat unexpected. Those with less education have a positive relationship between immigrant shares and life satisfaction that is twice the size of better-educated individuals (0.008 compared to 0.004), and the young are less positively affected by immigration. For the young (less than 35 years old), the magnitude is smaller (0.006) and the coefficient is insignificant using clustered standard errors, while for the other age groups, the relations would be significant. The patterns are similar when adding the controls; the magnitudes increase in size, but do not provide much further insight.

Table 6 Heterogeneity Analysis 2SLS estimates of the impacts of immigrant shares on natives' life satisfaction in different population groups

	(1)	(2)	(3)	(4)	(5)
Group	High	Low	Age < 35	35 - 50	Age > 50
EU15 - No added controls					
Δ Immigrant Share	0.004	0.008	0.006	0.009	0.007
	(0.001)	(0.003)	(0.004)	(0.003)	(0.003)
Kleibergen-Paap F Stat.	13.708	13.708	13.708	13.708	13.708
Immig. Bootstrap p	0.215	0.341	0.360	0.319	0.324
EU15 - Added controls					
Δ Immigrant Share	0.004	0.010	0.008	0.011	0.008
	(0.002)	(0.003)	(0.004)	(0.003)	(0.003)
Kleibergen-Paap F Stat.	10.361	10.361	10.361	10.361	10.361
Immig. Bootstrap p	0.200	0.235	0.277	0.225	0.256
Mean Life Sat.	0.886	0.816	0.872	0.838	0.821
Mean Δ Life Sat.	0.003	-0.001	0.000	0.001	0.004
Mean Immig. Share	12.232	12.232	12.232	12.232	12.232
Mean Δ Immig. Share	1.143	1.143	1.143	1.143	1.143

	(1)	(2)	(3)	(4)	(5)
Group	High	Low	Age < 35	35 - 50	Age > 50
NMS - No added controls					
Δ Immigrant Share	-0.028	-0.029	-0.035	-0.041	-0.021
	(0.020)	(0.014)	(0.022)	(0.019)	(0.015)
Kleibergen-Paap F Stat.	5.065	5.065	5.065	5.065	5.065
Immig. Bootstrap p	0.303	0.147	0.270	0.158	0.207
NMS - Added control: Δ ln(Real GDP pc)					
Δ Immigrant Share	0.021	0.028	0.023	0.014	0.031
	(0.014)	(0.016)	(0.015)	(0.017)	(0.015)
Kleibergen-Paap F Stat.	4.336	4.336	4.336	4.336	4.336
Immig. Bootstrap p	0.140	0.085	0.143	0.453	0.049
NMS - Added controls					
Δ Immigrant Share	0.000	0.016	0.016	0.003	0.013
	(0.011)	(0.011)	(0.011)	(0.013)	(0.010)
Kleibergen-Paap F Stat.	5.489	5.489	5.489	5.489	5.489
Immig. Bootstrap p	0.977	0.158	0.175	0.817	0.240
Mean Life Sat.	0.811	0.674	0.794	0.725	0.669
Mean Δ Life Sat.	0.033	0.044	0.028	0.048	0.045
Mean Immig. Share	7.222	7.222	7.222	7.222	7.222
Mean Δ Immig. Share	0.638	0.638	0.638	0.638	0.638

Added controls include, EU15: Δ Trade (% of GDP), Δ Pop. 15-64, Δ ln(Population), and Δ Unemployment Rate; NMS: Δ Trade (% of GDP), Δ Pop. 15-64, and Δ ln(Real GDP pc). Immig. Bootstrap p is the probability the coefficient on Δ Immigrant Shares takes the value 0, based on Wild Cluster Bootstrap methods. Standard errors in parentheses have limitations as discussed in Section II C Methods. All regressions include year effects. Source: Author Calculations; data sources detailed in data section.

In the NMS, people with lower education experienced a slightly more negative effect (-0.029 compared to -0.028) that is more precisely estimated (significant using clustered errors). Middle-aged people are also more strongly affected. The eldest have the smallest negative relation (-0.021). When adding controls the effects become positive; the pattern across age groups is similar; however, the effects of immigration now become more positive for people with low education compared to better-educated people. When GDP pc alone was added, two significant effects emerge. Immigration has positive and significant net effects for the low education group (0.085 p-value) and 50-plus age group (0.049 p-value).

In summary, the net effects of immigration are greater for people with low education; this is true in the EU15 generally, but in the NMS depends on the inclusion of GDP pc. By age, the immigration-life satisfaction relation differs for the two country groups, resembling a hill-shape pattern in the EU15 (with people in middle ages more positively affected), and a U-shape in the NMS. This latter result is reminiscent of the often-found U-shape pattern in life satisfaction over the life cycle.[21]

IV. Conclusion

Should natives worry about immigration? The evidence suggests the answer, no. Any negative effects on overall well-being are not statistically significant and the magnitudes are small. Over the 27-year period from 1990-2017, immigration did not have a positive or negative effect on natives' life satisfaction in 24 European Union countries, but in recent years, the relation may have changed for the worse, which is the case in the subsample referred to as the NMS (countries that joined the EU in the 2000s excluding the Baltic states and Poland). In this sample, increasing

[21] See for example work from the present author that also uses Eurobarometer data and a recent broader review (Morgan and O'Connor, 2017; Rauch, 2018).

immigration over the period 2005-2017 may have negatively influenced natives' life satisfaction, but caution should be exercised before drawing any conclusions. The evidence is based on a small sample and while the relationship is statistically significant by conventional standards (at ten percent), it loses significance when applying more up-to-date assessments of significance. Also, the magnitude is fairly small relative to the mean level of life satisfaction. An increase in immigrant share, equal to the mean increase over five years, would cause approximately a 2.2 percentage point reduction in the proportion of people reporting one of the top two life satisfaction categories (of four) in the NMS.

The different findings for the NMS countries and the full sample occur due to differences between NMS sample and the EU15 sample, because the latter comprises more than 75 percent of the full sample and the effect of immigration in this sample is positive though not statistically significant. Contrasting the findings for each subgroup, the differences can be attributed to time period and the role of mediators, particularly relating to labor markets. The evidence for the NMS is consistent with the view that immigrants are substitutes with natives, where increasing immigration increases the unemployment rate and decreases GDP pc, thereby decreasing life satisfaction (insignificantly). In contrast, in the EU15 immigrants do not appear to be substitutes; there, immigration positively affected GDP pc and has no effect on the unemployment rate. If anything the relation is positive in the EU15, and with a remarkably stable magnitude when including different sets of variables. However, as mentioned, the effects change over time. When evaluated over the period following 2005 to correspond with the NMS sample, the positive (insignificant) magnitude in the EU15 is greatly reduced. This change suggests the period following 2005 experienced either a change in the character of immigration or the conditions in destination countries, which could contribute to the negative relation found in the NMS.

This and similar studies 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. To tackle the small number of clusters problem, I use Wild Cluster Bootstrap methods, and in doing so, only one substantive relation emerges as statistically significant. In contrast, when using clustered standard errors (as in the most similar papers), increasing immigration is statistically significant in the majority of regressions. In either case, statistically insignificant relations are still revealing. For example, by either significance standard, increasing immigrant population shares do increase the homicide rate.

The statistically significant relation reveals a positive net effect of increasing immigration on natives' life satisfaction in the NMS (2005-2017), but only once the negative channel operating through GDP pc is controlled. The effect has a magnitude that is large relative to the average change in life satisfaction per period but small relative to the mean level of life satisfaction. The relation is robust to two sensitivity tests and is driven by two population groups: people that completed education by the age of 19, and those more than 50 years old.

The results are important as few studies have evaluated the impact of immigration 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 24 European countries and a longer period (1990-2017 for the EU12), and by using a better identification strategy (instrumental variables, using constructed immigrant shares) to estimate the effects of immigration on natives' life satisfaction.

Europe as a whole could foreseeably benefit from increasing immigration if the experience of the EU15 could be recreated in the NMS. For example, if the effect of immigration on GDP pc were positive in the NMS, as it is in the EU15, then the effect of immigration in the NMS would be positive.

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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), the 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), and in any case, the present analysis focuses on changes in life satisfaction over time.

Aggregation:—Aggregate life satisfaction was for three reasons. First, 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 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), when we know the responses are in fact ordinal. 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. Additional Variable Information

Table 7 Variable Sources

Variable	Source
Female Pop. Share	World Development Indicators
Gini	The Standardized World Income Inequality Database
Globalization Index (de jure)	KOF Swiss Economic Institute
Homicide Rate (per 100,000)	World Development Indicators
Labor Force Partcip. Rate (15-64)	World Development Indicators
Net Remittance Inflows	World Bank, Migration and Remittances Data
Pop. Share aged 15-64	World Development Indicators
Population	World Development Indicators
Real GDP pc	World Development Indicators
Trade (% of GDP)	World Development Indicators
Unemployment Rate	World Development Indicators
Urbanization	World Development Indicators
Years of School	Barro and Lee Education Attainment

2017 values for the unemployment rate and Gini coefficient were imputed. In the case of the unemployment rate, the nationally reported unemployment rate was used because it had greater coverage in the years before 2017, but in 2017, it was predicted using an ILO estimate of unemployment, several additional macro variables (e.g., GDP and inflation) that were available for 2017, and year effects. The imputation model fit was better than .99. For the Gini coefficient, the base data are from the Standardized World Income Inequality Database, and the 2017 value

was predicted using the lagged Gini, other macro variables (e.g., ILO unemployment rate and GDP), and year effects. The model fit was also better than .99.

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 8.

Table 8 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