Subjective health status and immigration: Evidence across Europe

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Subjective health status and immigration: Evidence across Europe ☆

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Abstract

Background: Subjective health status and migration are critical issues in healthcare policy and strategic decision making. There are many health challenges to resolve and at the same time, migration has reached to historic highs, leading to different views among immigrants and natives, policy makers and habitants.

Objective: Our research focuses on the subjective health status reported by European habitants, on its differentiation with respect to participants origin, and on whether various demographic, macroeconomic and other factors, such as the foreigners' presence in a country, affect it.

Setting and participants: Using survey data of 227,200 respondents from 22 countries and over the period 2002-2016, and employing logit estimation techniques, we analysed the effect of demographic, macroeconomic and other factors in shaping respondents' subjective health status.

Results: Our results demonstrate the important role of all demographic factors in shaping respondents' subjective health status. Immigrants report a higher subjective health status, while macroeconomic conditions and foreign presence in a country do play an important role. A country healthcare provision state and health expenditures can moderate the negative effect of foreigners' presence and thus the reported health status of natives.

Conclusions: The factors influencing subjective health status are complex and interdependent. However, government policies should increase social cohesion, since, the latter is not only related to health care outcomes but also can be a tool for disseminating social inequalities.

Keywords: Immigration, Europe, ESS, Subjective health status

JEL: C25, F22, I10, J61, O52

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1. Introduction

It is commonly believed that migration has reached unprecedented levels over the past few years, as migrants travel even over increasingly long distances due to manifold reasons; international and domestic inequalities, the persistent demand for high- and low-skilled migrant labor in the segmented labor markets of wealthy countries, oppression, violent conflict in developing societies and even basic needs for nutrition and shelter, to name some. According to Eurostat (2019), more than 22.3 million non-EU citizens live in the EU region (representing the 4.4% of the total EU population). In addition, more than 17.6 million EU citizens don't live in their country of origin. For instance, the total annual asylum applications in the EU Member States and European Free Trade Association countries have increased by 183% from 2008 to 2017 -from 257,445 to 727,805 applications (Migration Policy Institute, 2019). Although the numbers are sharply down from their 2015-2016 peak, tens of thousands of people are still trying to reach Europe and observers believe it is only a matter of time before the number of arrivals picks up significantly once more. Thus, migration remains under the radar as for its consequences to the destination country's security, social cohesion, welfare benefits and health of the host populations.

The highest attainable standard of health and its enjoyment is one of the fundamental rights of every human being without distinction of race (WHO, 1946). The overall "biological" health status in industrialized countries, where people are relatively healthy by default (Kotzian, 2009), is rather high. Much or even most of this achievement may be due to improved overall living conditions which prevent the occurrence of illnesses (Cutler et al., 2006), but also due to health systems' performance in avoiding the mortality which is amenable to medical intervention (Nolte and McKee, 2003). The literature has focused largely on investigating the difference between the immigrants' and natives' health, though the results are far from conclusive.

A voluminous set of studies provides evidence on the health of migrant populations in comparison with the host communities, using self-assessed measures such as self-reported health status and/or more objective health variables (i.e. chronic illness or disability, injury, hospital stay duration). There is a large body of evidence reporting that upon arrival, immigrants have significantly less disease specific mortality and lower rates of chronic disease than their native counterparts (McDonald and Kennedy, 2004; Newbold and Filice, 2006; Newbold, 2009), whilst a large vein of the literature documents worse health status among immigrants (Wiking et al., 2004; Smedley et al., 2009; Nielsen and Krasnik, 2010; Missinne and Bracke, 2012; Hadjar and Backes, 2013; Blom et al., 2016). The "healthy immigrant effect" describes a phenomenon whereby first-generation immigrants enjoy better health compared with

the ethnic majority groups, although it seems to fade over time (Alang et al., 2015). Researchers in order to identify the scope of this relationship have involved in their models potential mediating variables such as demographic and socioeconomic, among others.

In our days, the complex issue of migration has been brought once again to front lines. The dramatic economic recession that began in 2008 in conjunction with the massive influx of immigrants constituted unambiguously a divisive issue that raised concerns among public, politicians and policy makers as for their impact on healthcare utilization, fairness within the public healthcare system, but especially on the individuals' state of health. The absence of EU-level coordinated mechanisms led many member countries to autonomous responses, resulting to mixed feelings among the general public. Nevertheless, it is difficult for immigration policies to succeed if they do not take into consideration two main points: first, the importance of health as a fundamental prerequisite for development; and second, the fact that immigration conditions may affect the vulnerability to ill-health (Davies et al., 2009).

Our work studies the effects of migration on health. In this vein, we carefully merge individual survey and aggregate data to determine how immigration affects the health of both immigrants and natives over time, as well as which are the factors that mediate this relationship. Subjective general health that has been related to morbidity, mortality (Idler and Angel 1990; Ferraro and Su 2000, DeSalvo et al., 2006) or use of medical care (McCallum et al., 1994), is selected as the dependent variable. Although a self- assessed measure, the majority of researchers rely on it to analyze overall individual health in populations.

Our paper adds to the literature in two distinct ways: First, we provide a comprehensive analysis of the micro-level characteristics that may constitute determinants of health studies. To test our hypothesis, we use data from eight waves of the European Social Survey (ESS), combining the commonly used individual characteristics along with others less explored, such as public and private health expenditures, life expectancy at birth, and healthcare provision state. Our work aims to unearth the impact, if any, of these indicators on individuals' subjective health. Secondly, we enrich the micro- with macro-level data assuming their predictive power on the migration-health nexus and trying to analyze the differences they may impose to the individuals' perceptions. We consider a range of macroeconomic variables to proxy the economic performance of a country as well as its ethnic diversity.

Our aim is to examine the impact of the above-named factors on the self-assessed health status in a number of European countries. The main interest lies on the set of immigration and health provision variables, as, to our knowledge, there is scant

empirical evidence on the way they affect the individuals' perceived general health. Our hypothesis is that host populations report generally worse health status compared to migrants and the phenomenon is more evident in countries which receive large numbers of immigrants and simultaneously score low in the health provision components.

The remainder of the paper proceeds as follows. Section 2 discusses the data and introduces the estimation technique for modelling individuals' subjective health. Section 3 presents the results. Section 4 discusses the findings and Sections 5 concludes.

2. Methods

This section discusses the data and presents the selection of the estimation strategy.

2.1 Data description and analysis

This empirical analysis relies on data obtained from the ESS, a large-scale biennial study of attitudes and values. Our individual-level data consist of 227,624 respondents, covering 22 countries for eight rounds/waves (2002-2016). The respondents answered several questions and we use the question "How is your health in general?" (measured on a five-point scale) in order to construct our dependent variable. Raw data were adjusted using post-stratification and population size weights, provided by the ESS to control for qualitative characteristics of the interviewees in each wave within a country and for different country sizes. According to ESS (2014), post-stratification weights are a more sophisticated weighting strategy that uses auxiliary information to reduce the sampling error and potential non-response bias. As Table 1, below, shows, regarding data availability, eleven countries in the dataset are represented in all ESS waves, while rest of the countries only for some waves (three to seven).

Table 1. Number of Observations (obs) by Country and Wave

Country (Code)	*European Social Survey (ESS)Waves*							
	2002	2004	2006	2008	2010	2012	2014	2016
Austria (AUT)	1,455	1,272	1,473	-	-	-	1,344	1,505
Belgium (BEL)	1,428	1,366	1,558	1,558	1,453	1,695	1,609	1,664
Czech Republic (CZE)	919	1,908	-	1,434	1,687	1,325	1,478	1,721
Denmark (DNK)	1,281	1,286	1,323	1,388	1,352	1,406	1,324	-
Estonia (EST)	-	-	-	1,352	1,514	1,963	-	1,956
Finland (FIN)	1,784	1,844	1,721	2,013	1,716	2,057	1,940	1,821
France (FRA)	-	1,505	1,738	1,863	1,575	1,779	1,790	1,882
Germany (DEU)	2,309	2,154	2,150	2,274	2,388	2,511	2,697	2,531
Greece (GRC)	1,813	1,599	-	1,234	1,859	-	-	-
Hungary (HUN)	-	1,299	-	1,136	1,211	1,413	1,206	1,017
Ireland (IRL)	-	1,765	1,223	1,545	1,727	1,924	1,886	2,038
Italy (ITA)	636	-	-	-	-	560	-	1,493
Netherlands (NLD)	2,030	1,626	1,666	1,566	1,477	1,563	1,714	1,483

Norway (NOR)	1,941	1,705	1,682	1,479	1,453	1,552	1,368	1,459
Poland (POL)	1,767	1,402	1,382	1,300	1,313	1,480	1,194	1,269
Portugal (PRT)	1,047	1,190	1,186	989	-	1,013	1,061	1,126
Slovakia (SVK)	-	871	1,015	-	1,227	1,245	-	-
Slovenia (SVN)	1,200	1,062	1,154	1,016	1,065	930	985	1,114
Spain (ESP)	1,022	1,030	1,126	1,622	1,461	1,571	1,515	1,506
Sweden (SWE)	1,860	1,802	1,775	1,722	1,391	1,664	1,631	1,435
Switzerland (CHE)	1,579	1,678	1,438	1,378	1,232	1,235	1,296	1,244
United Kingdom (GBR)	1,763	1,382	1,843	1,993	1,842	1,725	1,845	1,604
Total	25,834	29,746	25,453	28,862	28,943	30,611	27,883	29,868

A wide range of socioeconomic characteristics, the Demographic set of variables, such as Gender, Age, Education, Marital Status, Income, Domicile, Unemployed, Length of Stay and Origin were gathered from ESS. More specifically, Gender takes the value of 0 for male and 1 for female; Age consists of six intervals and takes the value of 1 for <25 years old, 2 for 25–34, 3 for 35–44, 4 for 45–54, 5 for 55–64 and 6 for >65years old; Education takes the value of 1 for less that primary education, 2 for primary, 3 for secondary and 4 for tertiary education; Marital Status is a categorical variable and takes the value of 1 for married, 0 otherwise; Income level is grouped in three classes and takes the value of 1 for low, 2 for medium, and 3 for high income class; Domicile indicates the location of residency and is 1 for village or countryside and 2 for big city, suburbs or town; Unemployed represents the employment status and is 1 for unemployed, 0 otherwise; Length of stay is a constructed variable that represents the number of years that both foreigners and natives live in the country; Origin is a constructed variable and takes the value of 1 for natives, 2 for natives with an immigrant parent (Par_Imm) and 3 for those who were not born in country (foreigners).

The data comprises of three more sets of variables. The Macroeconomic set consists of three variables obtained from the World Development Indicators. More specifically: public health expenditures as % of GDP, private health expenditures as % of GDP and Life expectancy at birth. In order to proxy a country's economic welfare, we also apply our analysis regarding different levels (above and under median values) of countries' GDP per capita and unemployment rate.

The Health Provision set consists of a constructed variable. The number of physicians per 100,000 habitants, the number of nurses per 100,000 habitants and the number of beds per 100,000 habitants (obtained from Eurostat) were used in order to categorize each one of the participating countries as a moderate healthcare provider, good or a very good one (values 1,2 and 3, respectively). The constructed variable takes the value of 1 if the country is below sample median in all aforementioned variables, 2 if the country is above sample median in one or two of the three aforementioned scores

and 3 otherwise.

Finally, the Immigration set of variables includes variables from OECD International Migration database (2019). Foreign Stock represents the percentage of foreigners living in country and Foreign Inflows represents the percentage of new foreigners with respect to total population.

Table 2 below presents the summary statistics of all variables.

Table 2. Summary statistics

Individual-level Variables	***Foreigners n=19,943 Mean (St. Dev.)***	***Par_Imm n=15,483 Mean (St. Dev.)***	***Natives n=191,774 Mean (St. Dev.)***	***Min***	***Max***
Subjective Health	3.860 (0.923)	3.835 (0.906)	3.805 (0.905)	1	5
Gender	0.529 (0.499)	0.520 (0.499)	0.520 (0.499)	0	1
Age	3.594 (1.524)	3.478 (1.657)	3.883 (1.647)	1	6
Education	3.228 (0.659)	3.207 (0.572)	3.130 (0.632)	1	4
Marital Status	0.252 (0.434)	0.206 (0.404)	0.266 (0.442)	0	1
Income	1.759 (0.733)	1.864 (0.739)	1.835 (0.732)	1	3
Domicile	1.754 (0.430)	1.703 (0.456)	1.602 (0.489)	1	2
Unemployed	0.086 (0.086)	0.064 (0.245)	0.049 (0.216)	0	1
Length of stay	34.120 (20.306)	44.851 (17.662)	49.404 (18.067)	0	93
Country-level Variables	***Mean***	***Median***	***St. Dev.***	***Min***	***Max***
Public health expenditures (%GDP)	6.990	6.990	1.389	4.242	10.025
Private health expenditures (%GDP)	2.215	2.250	0.724	0.647	4.561
Life expectancy at birth	79.581	79.990	2.235	72.649	83.490
Physicians (per 100.000 habitants)	330.857	332.120	62.197	177.920	512.960
Nurses (per 100.000 habitants)	943.870	903.100	339.348	322.120	1,795.310
Beds (per 100.000 habitants)	524.501	499.370	177.443	233.870	887.300
Foreign Inflows (% pop)	0.673	0.610	0.466	0.042	2.165
Foreign Stock (% pop)	6.832	5.830	4.728	0.016	23.777

As Table 2 shows, the participants perceive their state of health as rather good, with foreigners to report a slightly better subjective health compared to natives and to those born in country and having at least one immigrant parent; Half of our sample participants are male, while the majority of them are above the age of 45 years old. Respondents, on average, are well educated and live in big cities. In addition, the majority are employed and they belong to the medium income class, with small differences documented among them. With respect to macroeconomic variables,

countries spend almost 7% of their GDP for public health expenditures, while the private ones hardly exceed 2%. Moreover, respondents live about 80 years. With respect to health provision factors, 330 physicians, 943 nurses and 524 clinical beds correspond, on average, to 100,000 habitants. Finally, foreigner stock and inflows exceed 6.5% and 0.6% of total population, on average, respectively.

Figure 1, below, visualizes[1] how subjective health status alters across countries in response to presence of foreigners.

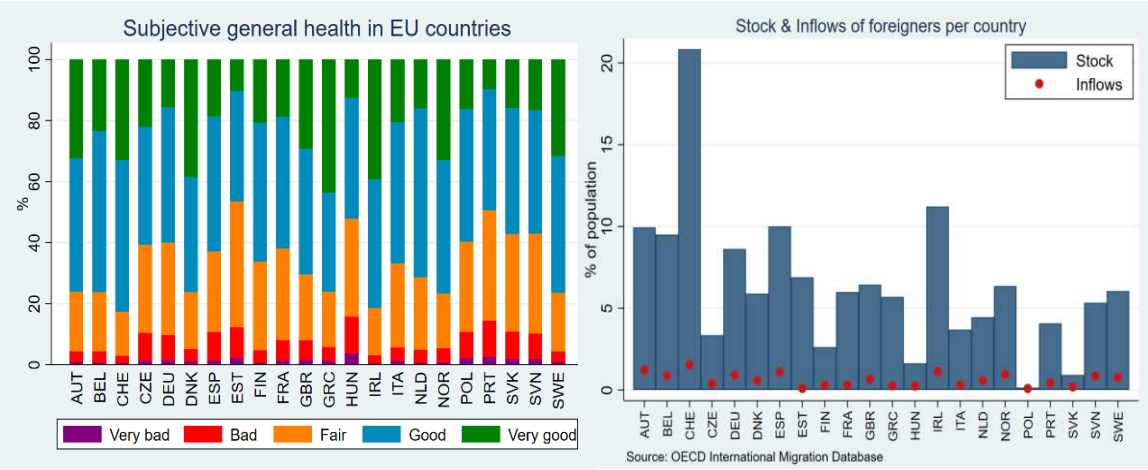

Figure 1 (consisting of Figure 1a and Figure 1b; left and right panel, respectively). Subjective health status and foreign presence across countries

According to Figure 1a, the average subjective health status is good or very good in the majority of the countries. High percentages of bad and very bad subjective health status are documented in Hungary, Portugal and Estonia. On the other hand, according to Figure 1b, Switzerland is the country which receives the highest percentage of foreigners, where at the same time the highest percentage of stock foreigners exists, whilst Ireland is at the second place.

2.2 Model and Estimation strategy

The likelihood of an individual reporting very good health state can be described by an ordered logit model defined as follows:

$$\text{Prob}(Y = c|X_i) = F(X_i\beta),$$

where the endogenous variable Y describes the individuals' perception about its state of health and is an integer ranging from 1 (Very Bad) to 5 (Very Good); *F* is the standard logistic cumulative distribution function; and x is a set of covariates detailed below.

Our dependent variable, individuals' subjective general health is an ordinal one,

[1] Supplementary exploratory data visualizations are provided in the link: https://public.tableau.com/profile/dimitrios.karamanis#!/vizhome/SubjectiveGeneralHealthinEUCountries/LineGraph

which means that although we can categorize the values, the distance between the classes is not observed. Interviewees refer that their health is bad, fair, good or very good, if their latent concern exceeds a threshold c1, a higher c2, a much higher c3 or an even higher c4 respectively, whereas state of health is considered very bad if respondent's latent concern is below threshold c1. The vector parameter β and c= (c1, c2, c3, c4) can then be chosen such as to maximize the likelihood of observing the sample on hand. Assuming a standard logistic distribution function for the error term ε, we employ an ordered logit model and estimate it using maximum likelihood estimation (MLE) techniques. Assuming that time trends are not the same across countries, we have included country- and time-fixed effects in order to capture all country- and time-invariant common features, simultaneously. Then, the estimated set of regression coefficients (b), predict the probability of the outcome of interest.

The model is specified as:

$$X_i\beta = \beta_0 + \beta_1 Demographic_i + \beta_2 Macroeconomic_i + \beta_3 HealthProvision_i + \beta_4 Immigration_i + \varepsilon_i,\ \varepsilon_i \sim Logistic\ (0, 1)$$

The vector x includes Demographic, Macroeconomic, Health Provision and Immigration variables and ε_i is the error term. More analytically, the set of Demographic (*Set D*) contains characteristics that were requested and recorded from the participants, such as gender, age, education, marital status, income, domicile, unemployment, and origin of the respondent. The aforementioned factors have been broadly used in the health field as mediating in the health-migration nexus and the evidence corroborates their importance and predictive power. Arguably, one would expect that aged, low income and low educated migrants would refer worse health state, compared to their native counterparts. Salinero-Fort et al. (2012) showed that statistically significant differences appeared between the Latin American-born and the Spanish-born in terms of age, gender, educational level, occupational status and monthly income. Moreover, Lanari et al. (2015) confirmed the health disadvantage of Eastern European immigrants aged 50+ living in Western Europe, and the more steeply deterioration of their health, as well.

The set Macroeconomic (*Set M*) contains variables that could describe a country's economic performance and at the same time affect the way populations perceive their state of health. A handful of studies have attempted to unveil the relationship between main macroeconomic indicators and health-related variables, such as GDP per capita (Ljunge, 2016), long-term unemployment (Gordo, 2006), and health expenditures per capita (Reinhardt et al., 2002) with respect to individuals' subjective general health (Olsen and Dahl, 2007). We controlled for three country-level factors, namely, public and private health expenditures as percentage of GDP, and life expectancy. Public

health expenditures play an important role for the patient satisfaction, simply because health services are perceived to be provided free of charge by the state. Kringos et al. (2013) showed that strong primary care is combined with better health state, fewer health disparities and lower rates of unnecessary hospitalization, but also with higher health expenditures. At the other end of the spectrum, private health expenditures appear reasonably to be negatively correlated with subjective general health, since citizens have to pay out of their pockets to receive (better) private healthcare, at economic downturns or when public healthcare fails, although they contribute to public health expenses through taxation. Moreover, what is worth mentioning is the evidence arising from the work of Blom et al. (2016), which focused on the relationship between health and healthcare expenditure. The latter appeared to reduce socioeconomic differences in health, but at the same time induced health differences between recent migrants and natives. With reference to life expectancy, Ljunge (2016) used it as an instrument to test the robustness of its results and it indicated that the estimate on health remained positive and significant; outcome which stimulates interest on exploring its effect on populations' subjective general health.

When it comes to Health Provision (*Set P*), a dummy variable is constructed from three others, namely number of physicians, nurses and hospital beds per 100,000 habitants. The inclusion of such indicators in health models is prominent in the literature. Kotzian (2009) pointed out that a relatively low level of doctors per capita translates to a relative shortage of medical staff and this might lower the satisfaction in the sense that there are not enough personnel to deliver beyond-health outputs.

The set Immigration (*Set I*) includes two main variables relevant to the cultural diversity and ethnicity of the population in the receiving country. The inflows of foreigners in a country and the stock of foreigners as a percentage of the country's total population may affect individuals' opinion about their state of health, as well. We also include an interaction term between the two variables, assuming that inflows of foreigners in countries with already high stock of immigrants will have a moderate impact on individual's subjective health. It is also documented in the literature that historical concentrations of immigrants are a good proxy if someone wants to predict the current immigrant inflows (Giuntella and Mazzonna, 2015).

3. Results

Table 3, below, presents estimates of odds ratios for each one of the variable sets and for the fully-fledged model. One can read the odds ratios as follows: if the odd ratio, a, is bigger than 1 ($a > 1$), then the probability of a citizen reporting a very good health status, that is $Y = 5$, increases by $(a–1) * 100\%$, whereas the probability decreases by

(1–a) * 100%, if the odd ratio is smaller than one (a < 1).

Table 3. Logit estimates (odds ratios) for subjective health status

Variables	***Set (D)***	***Set (M)***	***Set (P)***	***Baseline (X)***
Gender	**0.864***** (0.035)	**0.864***** (0.035)	**0.864***** (0.035)	**0.864***** (0.035)
Age	**0.789***** (0.024)	**0.789***** (0.023)	**0.789***** (0.023)	**0.790***** (0.023)
Education	**1.411***** (0.030)	**1.412***** (0.030)	**1.412***** (0.030)	**1.413***** (0.031)
Marital Status	**1.071*** (0.044)	**1.074*** (0.044)	**1.072*** (0.045)	**1.074*** (0.045)
Income	**1.382***** (0.032)	**1.379***** (0.031)	**1.379***** (0.032)	**1.379***** (0.032)
Domicile	0.951 (0.30	0.951 (0.30)	0.951 (0.30)	0.950 (0.30)
Unemployed	**0.844***** (0.021)	**0.843***** (0.021)	**0.843***** (0.022)	**0.842***** (0.021)
Length of stay	**0.985***** (0.001)	**0.985***** (0.002)	**0.985***** (0.002)	**0.985***** (0.002)
Par_Imm	**0.864***** (0.022)	**0.865***** (0.022)	**0.865***** (0.022)	**0.865***** (0.022)
Foreigners	**0.855***** (0.039)	**0.854***** (0.039)	**0.854***** (0.039)	**0.853***** (0.039)
Public health expenditures		**0.935**** (0.028)	**0.933**** (0.029)	**0.937**** (0.030)
Private health expenditures		**0.896*** (0.054)	**0.900*** (0.056)	**0.897*** (0.056)
Life expectancy		**1.089*** (0.048)	**1.097*** (0.052)	1.065 (0.049)
Provision			1.036 (0.037)	1.036 (0.037)
Foreign Inflows				**0.777***** (0.060)
Foreign Stock				**0.977*** (0.012)
Foreign Inflows * Stock				**1.020**** (0.008)
-LogLikelihood	252,227	252,197	252,195	252,175
Observations	227,200	227,200	227,200	227,200

Note: Heteroscedasticity-robust standard errors in parentheses.
All estimates control for country fixed-effects and year fixed-effects.
***, **, * indicate significance at 1, 5 and 10%, respectively.

Column (1) presents estimates of the model, where only the demographic factors (D) are included. Next, columns (2) and (3) show estimates of the model, where the macroeconomic (M) and health provision (P) factors are incorporated into the initial specification. Finally, column (4) presents estimates, where the full set of covariates (X) are included.

As Table 3 shows, among the demographic factors presented in column (1), all of them explain the deviations between individuals' perception with respect to their health status. More specifically, gender (being a woman) has a negative and statistically significant role in all specifications. For instance, when being a woman, the probability of an individual to report a good subjective health status decreases by 13.6% [=(0.864–1) * 100%]. The exact negative effect is also documented for all specifications. The same holds for the age effect across all specifications. We find that as individuals grow older, the likelihood of reporting very good health status decreases by 21.1%.

However, the opposite holds with respect to the educational and income level of participants. In particular, when an individual is well educated and belongs to higher income classes, then his/her probability of reporting very good health status increases by 41.1% and 38.2%, respectively. The positive significance of the aforementioned factors remains across all specifications. Also, a positive association is documented for the marital status effect (the probability of reporting very good health status increases by 7.1% for those who are married).

A statistical negative significance is also documented with respect to employment effect. For instance, when a citizen is unemployed, the probability of reporting very good health status decreases by 15.6%. Where the individual resides (domicile) also plays a negative role in his/her perceptions of health status. Finally, the participants' origin seems to have a negative effect. When natives are used as reference, the probability of reporting very good health status decreases for those who are born in the country but at least one of their parents are immigrants and for the foreigners by 13.6% and 14.5%, respectively.

When the macroeconomic factors are incorporated into the initial specification in column (2), one can see that when the public and the private health expenditures increase, the probability of an individual reporting very good health status decreases by 6.5% and 10.4%, respectively. In addition, the higher the life expectancy gets, the probability of reporting very good health status increases by 8.9%. In column (3), the health provision factor is the only new input into our initial specification. Although there is no statistical significance, a positive effect is documented. In particular, the higher the healthcare provision of a country is, the probability of an individual reporting very good health status increases by 3.6%.

In the final column, where the estimation of the fully-fledged specification is presented, all the aforementioned factors pertain their statistical significance and their sign. The new input here is the presence of foreigners in the host country. In this case, the probability of individuals reporting very good health status decreases when the foreigners' inflows and their stock increase. Nevertheless, the negative impact of

foreigners' presence may alter once we control the arrival of new foreigners (inflows) in a country, where the stock percentage of foreigners is already high. The sign and the statistical significance of the interaction term captures exactly that. What we observe is that in countries with high percentages of stock foreign population, the negative effect of foreign inflows is moderated.

Next, for a more in-depth analysis, in Table 4, we re-estimate our baseline model, but this time participants and countries are classified using dummy variables. In doing so, we use two variables of interest, namely origin and foreign presence. Finally, countries are classified as below or above the median sample with respect to GDP per capita.

Table 4. Logit estimates (odds ratios) of subjective health status for several classifications

Variables	***Baseline***	***Origin***			***Foreign Presence***			***Welfare***	
	(X)	***Foreigners***	***Par_Imm***	***Natives***	***Low***	***Medium***	***High***	***Low***	***High***
Gender	**0.864*** **	**0.836*** **	0.922	**0.864*** **	**0.823*** **	**0.878** **	**0.886*** **	**0.847*** **	**0.898*** **
	(0.035)	(0.054)	(0.051)	(0.038)	(0.048)	(0.052)	(0.037)	(0.051)	(0.015)
Age	**0.790*** **	**0.712*** **	0.952	**0.926*** **	**0.776*** **	**0.828*** **	**0.806*** **	**0.776*** **	**0.824*** **
	(0.023)	(0.020)	(0.109)	(0.027)	(0.027)	(0.027)	(0.017)	(0.033)	(0.019)
Education	**1.413*** **	**1.309*** **	**1.372*** **	**1.418*** **	**1.387*** **	**1.432*** **	**1.403*** **	**1.369*** **	**1.441*** **
	(0.031)	(0.040)	(0.024)	(0.036)	(0.066)	(0.047)	(0.017)	(0.028)	(0.029)
Marital Status	**1.074***	1.047	0.967	1.071	**1.107** **	**1.109*** **	1.028	**1.097** **	1.034
	(0.045)	(0.062)	(0.093)	(0.046)	(0.048)	(0.033)	(0.070)	(0.042)	(0.038)
Income	**1.379*** **	**1.337*** **	**1.427*** **	**1.363*** **	**1.380*** **	**1.380*** **	**1.408*** **	**1.375*** **	**1.408*** **
	(0.032)	(0.036)	(0.047)	(0.038)	(0.055)	(0.062)	(0.027)	(0.045)	(0.027)
Domicile	0.950	**0.875** **	1.020	0.954	0.992	0.930	0.935	0.939	0.978
	(0.30)	(0.051)	(0.036)	(0.031)	(0.027)	(0.046)	(0.044)	(0.044)	(0.023)
Unemployed	**0.842*** **	**0.851*** **	0.940	**0.821*** **	**0.883*** **	**0.835*** **	**0.826*** **	**0.864*** **	**0.733*** **
	(0.021)	(0.050)	(0.067)	(0.036)	(0.025)	(0.022)	(0.050)	(0.017)	(0.020)
Length of stay	**0.985*** **	**0.993*** **	**0.973*** **	**0.970*** **	**0.975*** **	**0.985*** **	**0.988*** **	**0.983*** **	**0.988*** **
	(0.002)	(0.002)	(0.012)	(0.003)	(0.005)	(0.001)	(0.001)	(0.003)	(0.001)
Par_Imm	**0.865*** **				**0.812*** **	**0.902** **	**0.905*** **	**0.848*** **	**0.919*** **
	(0.022)				(0.023)	(0.046)	(0.025)	(0.028)	(0.023)
Foreigners	**0.853*** **				**0.831** **	**0.838*** **	**0.923***	**0.834***	**0.876*** **
	(0.039)				(0.066)	(0.050)	(0.039)	(0.050)	(0.039)
Public health	**0.937** **	1.090	1.043	**0.919** **	**0.914** **	**0.930***	0.981	**0.903** **	0.953
	(0.030)	(0.086)	(0.059)	(0.025)	(0.034)	(0.034)	(0.027)	(0.043)	(0.035)
Private health	**0.897***	1.029	0.992	**0.879** **	**0.873** **	0.938	0.856	**0.748*** **	0.908
	(0.056)	(0.139)	(0.131)	(0.048)	(0.052)	(0.125)	(0.099)	(0.061)	(0.064)
Life expectancy	1.065	**1.179***	1.028	1.030	1.039	**1.029***	0.911	**1.125** **	0.931
	(0.049)	(0.117)	(0.085)	(0.053)	(0.042)	(0.083)	(0.067)	(0.053)	(0.090)
Provision	1.036	0.993	0.989	1.047	**1.185*** **	**0.871*** **	**0.783***	**1.086** **	1.017
	(0.037)	(0.041)	(0.048)	(0.037)	(0.096)	(0.038)	(0.100)	(0.042)	(0.051)
Foreign Inflows	**0.777*** **	1.056	0.915	**0.728*** **				**0.684*** **	**0.753*** **
	(0.060)	(0.074)	(0.182)	(0.069)				(0.074)	(0.058)
Foreign Stock	**0.977***	1.005	0.983	**0.974***				**0.971** **	0.988
	(0.012)	(0.018)	(0.026)	(0.015)				(0.014)	(0.027)
Interaction	**1.020** **	1.006	1.000	**1.025** **				**1.031*** **	**1.011***
	(0.008)	(0.006)	(0.010)	(0.010)				(0.011)	(0.006)
-LogLikelihood	252,175	24,009	19,197	208,592	78,283	59,848	113,410	169,508	82,301

Observations	227,200	19,943	15,483	191,774	88,084	51,258	87,858	113,697	113,503

Note: Heteroscedasticity-robust standard errors in parentheses.
All estimates control for country fixed-effects and year fixed-effects.
***, **, * indicate significance at 1, 5 and 10%, respectively.

Columns (2)-(4) re-estimate the baseline model classifying the participants according to our first variable of interest, namely origin. The dummy variable here is introduced in order to see if different groups of participants respond differently with respect to their subjective health status. Column (2) takes into account the foreigners who were not born in country, Column (3) takes into account those who were born in country but at least one of their parents is immigrant, and Column (4) accounts for natives. Although the number of observations differs across specifications, the estimates still carry the right sign and the statistical significance pertains in most cases. Among the demographic factors, a negative effect is documented with respect to gender, age and unemployment for all groups, while a positive effect is documented with respect to education and income. Public and private health expenditures, as well as the percentage of foreign inflows, play a negative role and are statistically significant only for the group of natives.

In addition, the baseline model classifying countries according to our second variable of interest, namely foreign presence, is re-estimated in Columns (5)-(7). The dummy variable introduced here captures the presence of foreigners in a country, taking into account both inflows and stock; in this way, a country is classified as "low-", "medium-" and "high-foreign presence" if the country is below sample median in both aforementioned variables, above sample median in only one of the two scores, and above sample median in both of them, respectively. It is obvious that the negative unemployment effect as well as the positive education and income effects are enhanced in countries with high foreign presence. When it comes to origin, it is remarkable that the negative effect for foreigners and for those with immigrant parents (compared to natives), is moderated in countries with high-foreign presence. With respect to public and private health expenditures, their negative effect is higher and statistically significant only in countries with low foreign presence, where the healthcare provision state plays a positive role.

In order to capture the economic welfare differences across countries, GDP per capita is introduced as a dummy variable in columns (8)-(9). In doing so, countries are classified as "high-income" and "low-income" if the country's GDP per capita is above or below sample median (38,901.05$, constant 2011 PPP), respectively. The origin effect is more negative for low-income countries and the same holds for public and private health expenditures. In addition, healthcare provision has a statistically

significant positive effect only for low-income countries. With respect to foreign inflows, the negative effect is documented for both groups of countries, but for participants from low-income countries the probability of reporting very good health status is significantly lower than the one for participants from high-income countries.

Overall, independently of participants' origin and independently of a country's foreign presence and economic welfare, we find that the same sets of variables associate in shaping individuals' opinion about their health status.

Robustness

We have performed a battery of sensitivity analysis to sharpen the robustness of our results. We split our sample in two sub-periods 2002-2008 and 2010-2016 to test whether financial crisis had an impact on subjective health status. Results did not alter significantly, although the expected negative effects were documented.

Further, in all specifications the number of asylum seekers and the foreign inflows from non-European countries were used interchangeably with our Immigration Set of variables. Results mildly varied without, however, showing any significant change.

Finally, we also classified countries as above or below the sample median with respect to the unemployment rate, the GINI coefficient and GDP growth rate in order to capture further inequalities and growth prospects, respectively. Results barely modified.

Overall, results do not change in any significant way across different specifications and sub-samples.

4. Discussion

The self-reported measures of health status offer a number of potential advantages. In particular, self-assessed indicators are very easy to implement and are widely collected in almost all countries. Vaillant and Wolff (2012) explored the reliability of self-reported health, using data collected in Albania in 2002–2004 and revealed respondent consistency, from both a subjective and an objective viewpoint, confirming its predictability. The predominant approach of the issue in the literature includes mainly sociodemographic factors (i.e., gender, age, education, occupational status, income, race). To our knowledge, these variables are used merely as key factors in models exploring inequities and inequalities in the healthcare sector, by mapping probabilities of visiting a doctor or a hospital (Solé-Auró et al., 2012; Devillanova and Frattini, 2016).

One strand of the literature shows that immigrants and minority groups in later life tend to have poorer health than the majority population (Nielsen and Krasnick, 2010). Several studies have demonstrated the poorer health status of Eastern Europeans

compared with Westerners (Lanari and Bussini 2012; Weziak-Bialowolska, 2014). The relative importance of the heterogeneity of immigrants in explaining health differentials according to country of origin was also highlighted for France by Vaillant and Wolff (2010), while Ronellenfitsch and Razum (2004) demonstrated that the perceived health status of immigrants was worse than that of native-born in case of Germany. Although we did not take into account the country of origin in our study, the results are not aligned with the aforementioned, since immigrants participating to our sample report slightly better health status than the rest.

Survey-based research on health indicates that several factors may influence the health of the immigrant population, such as those related to the country of origin and cultural backgrounds or other factors in the receiving country (i.e. social class inequalities, with associated behavioral risk factors, limited access to healthcare systems and barriers to health coverage, discrimination). Moreover, studies such as that of Giuntella et al. (2018) fill the gap in the literature by analyzing the heterogeneity of immigrant-native differences in health by reason for immigration (employment, family, study reasons, asylum seekers). The inclusion of the economic and multicultural profile of a country allows us to obtain more insights and discuss the relevant theories.

As the number of people moving across countries increases, the subject rises concern about the economic and cultural features of the destination country that may attract migrants, and consequently affect the minorities' as well as the indigenous populations' opinion about their state of health. Following the Second World War, many immigrants due to belonging to ethnic and religious minorities or living in areas of political crisis, chose to leave their country of origin; thus, influenced the size and structure of international flows. The stock of foreign-born residents rises among the EU countries, with the UK to report one of the largest in the Organization for Economic Co-operation and Development countries (Arslan et al., 2015). It has been concerned that immigration was, for instance, a fundamental factor that drove the UK to the vote for the 'Brexit' from the European Union in June 2016 (Hobolt, 2016).

The impact of immigration on the demand for health services would largely depend on the health status and health trajectories of immigrants. However, while there is a large literature on the relationship between ethnicity and health outcomes (Devillanova and Frattini, 2016; Gelatt, 2016) there is little information on the role of immigration status and even less information on the role of reason for immigration to the country. In addition, according to so-called 'healthy migrant effect', healthier people are physically and financially more likely to migrate (Kennedy et al., 2006; Malmusi et al., 2010), whereas according to the so-called 'salmon bias effect', migrants might return to their country of origin in times of illness, retirement or unemployment

(Wallace and Kulu, 2014).

In the public debate, in addition to the economic burden and cultural threat that immigration poses, deterioration of host populations' health and restricted access to the healthcare system, are also anti-immigrant arguments, which may intensify hostile feelings and urge governments to implement strict policies. According to Guintella et al. (2016), there is a general concern that immigration may negatively affect access to public services, such as healthcare. Although different patterns of self-reported health status are observed depending on several demographic characteristics, the results have to be taken into account when developing policies addressed to immigrant and host populations.

The implications of the findings are undoubtedly important for the increasingly multicultural societies we live in and especially during the economic upheavals. Migration may be faced as a phenomenon exacerbating risk behaviors and health vulnerabilities, but simultaneously as a vehicle of beneficial for the destination country factors. More immigrant-inclusive policies immune to broader socioeconomic conditions, could smooth out the differences between the host populations and minority parts, hampering discrimination in people's health care experiences and promoting human rights and equity issues, which could spill over to the social realm.

Although the self-reported measures of health status have potential advantages, at the same time, they face critical limitations as well. Even though we try to capture health inequalities, different populations may use different threshold levels when being asked to assess their health. The so-called reporting heterogeneity problem investigated in Lindeboom and Van Doorslaer (2004) may be apparent here, though we have used several demographic and socio-economic characteristics. A last issue concerns the reliability of the responses given (Solé-Auró et al., 2012).

Migration databases have also their limitations with several inherent problems. For example, across countries there is a range of different national sources or even definitions and methods of collection. Unfortunately, there are no other sources at EU level as the data are all products of the national migration systems. For example, in case of asylum seekers data, there is no systematic way of ensuring that an individual's application is unique among different reporting countries (Singleton**,** 2016).

Future research is needed in order to shed more light in the foreigners' presence and establish a clear causal relationship between immigration and health. Healthcare austerity policies may affect healthcare usage, such as the access, but direct effects on the general health of the population are not reported systematically (Lopez-Valcarcel and Barber, 2017). The underlying mechanisms linking healthcare systems to ethnic health inequalities have been studied by Blom et al. (2016), where the policies

suggested, apart from a reduction of socioeconomic inequalities in heath, may also diminish ethnic disparities. The main problem to overcome is the documentation of foreigners and whether they are eligible to health reforms. Finally, future research must take into account the bilateral relations between country of origin and host country for the migrants, as well as the reason for migration.

5. Conclusions

The landscape of the European countries' populations has changed and will change even more due to large international migration flows over the past decades. In addition, there are still many challenges to resolve with respect to healthcare policy and decision making. Therefore, subjective health status and migration are critical issues that lead to different views among immigrants and natives, policy makers and habitants. The question of how a habitant's origin and the foreigners' presence in a country can affect the respondent's perception with respect to his/her subjective health status has become as relevant as ever with implications for both present and potential immigrants as well as for policymakers.

This paper studied the relationship between subjective health status and immigration across Europe. The factors influencing subjective health status are complex and interdependent. We found that Europeans in general report a good subjective health status and immigrants a slightly higher in relation to natives. Although the demographic characteristics of each respondent are the ones that play the most significant role in shaping its subjective health status, the macroeconomic conditions of a country, alongside with the corresponding foreigners' presence, can affect individuals' perceptions. For instance, foreigners and those with immigrant parents seem to have a worst health status compared to natives when all factors are taken into account. Finally, foreign presence and economic welfare do play an important role, since the negative origin effect is moderated in high foreign presence countries and the negative foreign inflows effect is higher in low-welfare countries, respectively.

Priority setting for respondents and resource allocation and policies of governments are topics that have been studied thoroughly, but still there are wide disparities between countries. Understanding the factors that influence subjective health status in a country is particularly important, as it provides critical information to develop targeted and tailored interventions for relevant population segments, and further suggests appropriate strategies. The implication of our results is straightforward.

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