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Health care utilization of refugees

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Abstract

European countries experienced significant inflows of migrants in the past decade, including many refugees coming from regions engaged in armed conflicts. While previous research on migrant health largely focused on economic migration, empirical evidence on the health of refugees is sparse. We use administrative data from Austria to differentiate between economic migrants and refugees and analyze their health care expenditures in comparison to natives. The results distinctly show different expenditure patterns. Unlike economic migrants, we find substantially higher expenditures for refugees, most pronounced in the first year upon arrival. The difference is not explained by specific diseases or individual refugee groups, indicating a, generally, inferior health status. Further, by using the quasi-random placement of refugees as a natural experiment, we show that characteristics of the local health care sector do not have a significant effect on expenditure levels.

Keywords: health care utilization, refugees, migration
JEL Classification: I10, I12, H51, F22

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1 Introduction

Europe experienced a substantial increase in immigration in recent years. The number of asylum applications in the European Union surged from 1.1 million in the years 2006–2010 to over 3 million in 2011–2015, with many refugees coming from countries engaged in armed conflicts such as Syria, Afghanistan, and Iraq (Eurostat, 2017). In the receiving countries, these developments increase the ethnic, cultural, and language diversity and pose many challenges to society, ranging from labor market integration issues to the provision of health care.

An extensive body of empirical research has shown that, upon arrival, immigrants tend to be healthier than the native population, a phenomenon known as the healthy immigrant effect. Advantages have been documented in various health outcomes, including health care expenditures (Vargas Bustamante and Chen, 2012; Ku, 2009), subjective well-being (McDonald and Kennedy, 2004), body mass index (BMI) levels (Antecol and Bedard, 2006), and birth outcomes (Farré, 2016; Giuntella, 2017). Another common finding is that outcomes of migrants tend to converge to native levels over time.

Previous research has largely focused on new arrivals, in general, and did not distinguish between refugees and economic migrants, who move to a different country to seek better employment opportunities or living conditions. However, there are good reasons to believe that these two types of migrants have different health status. First, a prominent explanation for the healthy immigrant effect is the positive selection of individuals in the source countries, suggesting that healthier individuals are more likely to migrate. Consistent with this hypothesis, studies have shown better health outcomes of migrants when compared to those who stay in their home countries (Kennedy, Kidd, McDonald, and Biddle, 2015; Farré, 2016). Refugees, on the other hand, are defined as individuals who are forced to leave their place of origin because of war or fear of persecution. Additionally, unlike economic migrants, refugees may experience traumatic events in their home countries and perilous situations during flight, including

violence, lack of shelter, and food insecurity, which may have a direct effect on individual health. It is, therefore, unclear whether the existing evidence on migrant health can be generalized into migration patterns observed in the past years in Europe. A better understanding of health statuses and health care needs can contribute toward designing effective policies for refugees and facilitate their integration into health care systems and the society.

We extend empirical evidence on the health of migrants and refugees using large administrative databases from Austria. The data includes information on the legal status of each migrant, that is, whether the individual is or was an asylum seeker. We use this information to differentiate between economic migrants and refugees who are currently in the asylum process or have been already granted asylum. The panel structure in the data enables us to follow individuals over time, and we analyze health care utilization in the first five years after arrival in Austria. We find that, unlike economic migrants, refugees have significantly higher health care expenditures when compared to natives. This difference is most pronounced in the first year after arrival and decreases subsequently, which indicates a convergence of expenditures over a longer period.

The higher health care expenditures of refugees are largely driven by hospital stays. Results of previous studies indicate that limited accessibility of primary care may increase hospitalizations (Rosano et al., 2012). Therefore, we examine potential determinants of health care utilization in a second step, by using the quasi-random placement of refugees in communities as a natural experiment and the density of physicians as a proxy for the accessibility of primary care. However, we do not find evidence that characteristics of the local health care sector significantly affect expenditures. Conversely, we find a significant correlation between refugees' expenditures within communities, which is consistent with prior results, stressing the importance of social networks in health service utilization.

2 Background

2.1 Existing evidence on refugees' health

Most of the existing empirical evidence on refugees' health documents the prevalence of specific health issues among selected refugee groups. Meta-analyses of these epidemiological studies suggest that refugees frequently experience violence-related health issues (Kalt, Hossain, Kiss, and Zimmerman, 2013), and there is a high prevalence of infectious diseases (Clark and Mytton, 2007) and physical- (Hadgkiss and Renzaho, 2014) and mental (Lindert et al., 2009; Fazel, Wheeler, and Danesh, 2005) health problems. However, the results often rely on small and non-representative samples. For example, refugees are invited to participate in studies via contacts of refugee supporting organizations or when seeking care at health clinics.

An important exception is Chiswick, Lee, and Miller (2008), who contrast the self-reported health status of migrants by the type of visa used to gain entry to Australia. They show that shortly after arrival, refugees using humanitarian visas less often rate their health as good or very good when compared to individuals with employment-related visas. Furthermore, for each immigrant category, they report a decline in health over the time span of 3.5 years after arrival, and the highest decline is recorded for the refugee group. Unfortunately, the used survey data do not encompass a native-born reference group to serve as a contrast for this development. Kohlenberger et al. (2019) provide recent evidence on refugee health in Austria. Using cross-sectional surveys, they show that refugees rate their subjective well-being worse than the resident population.

An important issue when using survey data is the validity of self-reported health state for cross-cultural comparisons. People from different countries may have different reference levels against which they judge their health, and, depending on the language, available response categories may have different associated connotations. Therefore, a comparison of health states across countries may lead to misleading results if differences in reporting styles are not considered (Jürges, 2007). Bauhoff and Göpffarth (2018)

is the only study that we are aware of, that analyzes a large sample of refugees using administrative data. It compares the health care utilization of asylum seekers, who, in Germany, have a restricted access to health services, with regular insured persons. The mixed results suggest that hospital expenditures for refugees are twice as high as for regularly insured, while the expenditures for drugs and outpatient care are lower. Bauhoff and Göpffarth argue that this pattern could be explained by inadequate access to primary care, however, this issue is not further investigated as the data only come from a small number of municipalities. Since the results relate to refugees who have only recently applied for asylum, a second question is how refugees' health care utilization develops over time, as experience with the health care system increases.

Other related studies focus on the determinants of refugees' health care utilization. Devillanova (2008) analyzes the role of information networks in a study on undocumented immigrants in Italy. They reside in the country illegally and, consequently, have only restricted access to the health care system. Strong social ties substantially reduce the time it takes for them to seek medical care at a volunteer association, suggesting that social networks are used as an information device for getting access to health care. Grönqvist, Johansson, and Niknami (2012) explore the role of income inequality on refugees' risk of being hospitalized in Sweden. Similar to our approach, they exploit the assignment of refugees to municipalities as a source of exogenous variation. The results do not reveal significant effects of the level of inequality on refugees' health.

2.2 Migration in Austria

Austria experienced several migration flows in the past decades. As a result, the population with a foreign citizenship increased from 2.5 % in 1970, to 13.8 % in 2015 (Statistik Austria, 2018). In the 1960s and 1970s, the so-called guest workers were actively recruited from the former Yugoslavia and Turkey to fill shortages in the labor market. Originally intended as a temporary measure, many workers and their families

settled permanently in the country. Labor mobility increased again since the accession to the European Union in 1995, as people from other members states started seeking employment opportunities in Austria.

International conflicts brought further waves of migrants. In the past years, the rising numbers of people arriving in Europe has become known as the refugee crisis. In 2015 alone, more than 1 million people arrived in Europe. Most refugees only passed through the country; however, Austria was also among the top destination countries among the EU member states (Eurostat, 2017). From 2005 to 2013, while there were, on an average, 15,000 asylum applications per year, the number peaked in 2015 with more than 88,000 applications (see Figure A1 in the appendix for details). Refugees came from various countries, indicating the large diversity of conflicts in the world. In 2015, the three most frequent nationalities were Afghanistan, Syria, and Iraq, accounting for 72 % of all applications. Conversely, Russia, Afghanistan, and Kosovo were the top three nationalities in 2010, preceded by Serbia and Montenegro, Russia, and India in 2005 (BMI, 2018).

2.3 Asylum process

After receiving an asylum application, the federal office for immigration and asylum assesses the responsibility of Austria to conduct the asylum procedure. During this process, the asylum seeker is placed in one of the three reception centers of the federal government. If the jurisdiction is confirmed, then the asylum seeker is transferred to asylum shelters spread across the country, where he or she receives basic welfare support. This includes accommodation, counseling services, some pocket money (40 € per month), and health insurance. Although the nine regional states in Austria have the task of distributing the refugees between the municipalities, the asylum shelters are typically managed by non-governmental organizations.

Apart from covering individuals in an ongoing asylum process, the basic welfare support also covers recognized refugees for a period of 4 months after granting asylum,

failed asylum seekers who cannot be deported, people entitled to subsidiary protection, foreigners with a right of residency for humanitarian reasons, and war-displaced persons and foreigners who are supposed to be sent to a different country responsible for the asylum process. Refugees are allowed to enter the labor market 3 months after the asylum application, but the access is restricted to selected occupations in the area of seasonal work. This regulation effectively implies an exclusion of asylum seekers from the labor market (Limberger, 2010). Refugees are free to enter the labor market after receiving asylum status or apply for social security benefits if they do not find employment.

The distribution of refugees from reception centers to regional asylum shelters in the states is handled by the federal government in agreement with the respective state. It follows a quota system, wherein the population size of the state is considered. In practice, the states receive lists of applicants who have to be allocated on a daily basis, which then provide feedback on how many and which applicants they are able to accommodate. In the process, the public authorities may take existing family relations and special needs of refugees (e.g. disabilities) into account. There are particular regulations for unaccompanied minors, who are entitled to be accommodated in specific facilities with increased supervision. The operators of the asylum shelters in the states are not involved in the decision-making process (Koppenberg, 2014).

The legal basis for the assignment of refugees follows EU directives that lay down standards for the reception of applicants for international protection (2003/9/EG and 2013/33/EU). Accordingly, countries have the right to assign refugees a place of residence. If a refugee rejects the offered accommodation, the states have the power to withdraw the reception conditions including his or her entitlement to housing and basic welfare support. From the perspective of the asylum seeker, the distribution policy has therefore been described as a 'no choice' principle (Rosenberger and König, 2012).

In the empirical analysis, we focus on Upper Austria, one of the nine states in Austria. Figure 1 shows the regional distribution of migrants and refugees in Upper Austria in 2010, the middle of our analysis period. Refugees are accommodated in

47.7 % of the Upper Austrian municipalities. The share of refugees varies strongly between 0 % and 8.9 %, with a mean of 0.25%. The figure clearly shows that refugees are distributed across the whole state. Refugees are also placed in smaller municipalities, which in the past only had a small share of the foreign population; this finding indicates the successful avoidance of a strong clustering of refugees in certain areas. We also examined the influence of observable refugee characteristics in the distribution process, revealing no substantial association between individual characteristics and features of the assigned municipalities.[1]

2.4 Health care system

The social security system in Austria includes mandatory public health insurance that covers almost the entire population (Hofmarcher, 2013). It is characterized by free choice and easy access to health care providers; additionally, this system is devoid of strict gate-keeping mechanisms. Compared to other European countries, the Austrian health care system has a high density of physicians and hospital beds (OECD, 2017). Primary health care is mainly provided by general practitioners (GPs), who are typically self-employed and operate in single practices. Additional health care is provided by medical specialists in the outpatient sector and hospitals. The health insurance covers health-related costs in the inpatient and outpatient sector with only minor copayments. Private health insurance plays only a minor role in Austria and accounts for 5 percent of total health expenditure (OECD, 2013). It is used to complement the public health insurance, for example, to cover the additional costs for private rooms in hospitals. However, hospitals are also reimbursed by public insurance for treatment costs of privately insured patients. These expenditures can therefore be observed in the data used.

[1] Following Grönqvist, Johansson, and Niknami (2012), we regress municipality characteristics including average education level, (un-)employment rate, health care expenditures, population size and election results on refugee sex and age, and don't find statistically significant effects for refugees in the first year upon arrival. In contrast, we find significant effects for economic migrants and refugees after the granting of asylum, indicating that individuals who are less restricted in their choice of residence sort across municipalities (see Table A2 in the appendix for estimation output).

Affiliation to one of the 22 social security institutions is determined by occupation and the place of residence and cannot be chosen freely. The majority of the population is covered by nine regional health insurance funds. They include all the active and retired private-sector employees, individuals receiving unemployment or social security benefits, and the co-insured dependents of these individuals. These funds also cover refugees who are entitled to receive the basic welfare support during the asylum process and refugees who receive social security benefits or private-sector employment after receiving asylum status. All insured persons are entitled to use the same health care services.

2.5 Data

For our empirical analysis, we use administrative data from the Austrian Social Security Database (ASSD), which contains labor market histories and other social security relevant episodes at the individual level (Zweimüller et al., 2009). It also includes socio-demographic characteristics such as citizenship and information about the refugee status. The ASSD can be linked to data from the Upper Austrian Regional Health Insurance Fund, which provides detailed information about the covered health care expenditures. The fund operates in the state of Upper Austria and has more than 1 million members, representing roughly three-quarters of the Upper Austrian population.

Expenditures related to physician visits in the outpatient sector are largely based on a fee-for-service scheme. Conversely, expenditures for hospital inpatient treatment follow the Austrian diagnosis-related group (DRG) system. Similar to other DRG systems, hospital cases are classified into a limited number of groups, according to diagnoses and treatment. Hospitals receive the same reimbursement for cases within each group, with supplementary (reduced) payments for longer (shorter) hospital stays. Additionally, the data include expenditures for prescription drugs. Overall, the data include most health care expenditures covered by public health insurance. An im-

portant exception is visits to a hospital's outpatient departments. Although these departments are primarily designed for medical emergencies, they can also serve as substitutes for physician visits. We have data on the number of visits to outpatient departments (but no expenditures) for selected years, which we use in supplementary analyses.

Concerning hospital stays, the data include the diagnosis, following the 10^{th} revision of the International Classification of Diseases (ICD-10), which we use to characterize patients' health conditions. We differentiate between causes for hospital visits, following the World Health Organization's study of the global burden of disease (WHO, 2008), which classifies diagnoses into the following three broad groups: injuries, non-communicable disease, and a residual category. We divide the residual category into maternal and perinatal conditions as well as communicable conditions and nutritional deficiencies; this is because differences in fertility between groups may affect differences in conditions related to pregnancy and childbirth. Non-communicable diseases account for most of the observed health care expenditures (see below), and hence we further analyze the most common conditions within this group.

We construct a dataset of annual health care expenditures for the years 2005–2015 for individuals aged 18–64 years. The analysis is restricted to persons who are insured throughout the corresponding calendar year, that is, we exclude individuals with insurance breaks. We determine the migration status on the first day of each calendar year to differentiate between three groups. First, refugees are defined as persons who are currently in the asylum process or have been seeking asylum in the past. Second, economic migrants are individuals with non-Austrian citizenship living in Austria, who have never sought asylum. Although most people in this category are in employment, it also includes persons who have been in Austria for different reasons such as education. Third, the native population comprises all individuals with Austrian citizenship and without any migration background. Since the ASSD starts at 1972, we observe the date marking the first entry of immigrants into the Austrian labor market and check if they held foreign citizenship before 2005. We analyze recent

migrants and refugees in their first five years in Austria and label the first full calendar year after arrival as year one. Observations of migrants after 5 years are excluded from the data.

In total, the dataset includes nearly 6 million observations for more than 850,000 people. The majority belongs to the native population, but the data also contains 74,758 economic migrants and 9,771 refugees. Table 1 shows the large diversity in the regions of origin of the two migrant groups. Among economic migrants, German citizens comprise the largest group in the sample (25.6 %), followed by individuals from Hungary (10.2 %) and Romania (8.9 %). Considering refugees, the most frequent source countries are Russia[2] (18.0 %), Afghanistan (14.2 %), Syria (9.9 %) and former Yugoslavia (7.2 %). As mentioned above, the data also include information on refugees after the completion of the asylum procedure. Naturally, the share of asylum seekers within the refugee group decreases with the time that refugees spend in the country, from (by definition) 100 % in the first year to 85.5 % in the second year and to 38.2 % five years after arrival.

3 Differences in health care expenditures

3.1 Descriptive comparison

Table 2 shows descriptive statistics of the analysis sample separated into three groups. Migrants are significantly younger when compared to the native population, with the average age (across all observations) being 33.3 years for economic migrants, and 31.9 years for refugees, when compared to 39.5 years for Austrian citizens. Additionally, males are overrepresented when compared to females in both migrant groups.

Concerning average annual health care utilization, expenditures of economic migrants are substantially lower when compared to natives. This holds for total expenditures as well as for different expenditure components. The descriptive comparison

[2]The majority of refugees with Russian citizenship are presumably Chechens displaced by the war in the North Caucasus (Vatchagaev, 2008).

between native and refugees reveals ambiguous results. While both groups show similar values for physician fees and prescription drugs, refugees have substantially higher expenditures for hospital visits. If health conditions are considered separately, higher expenditure for refugees is found in almost all diagnoses, with largest differences in hospital stays in connection with maternal and perinatal conditions and mental disorders. Certainly, raw differences in expenditures can be influenced by differences in characteristics and regional variations of health care use, which we allow in the regression analysis.

3.2 Estimation strategy

We compare health care expenditures between migrants and natives by estimating the following model:

$$h_{it} = \alpha + M'_{it}\beta + X'_{it}\gamma + \delta_{c(i,t)} + \theta_t + \mu_{it} \tag{1}$$

where h_{it} denotes health expenditures for individual i in year t. M_{it} is a vector of five dummy variables, indicating the year that migrants spend in the country, beginning with the first full calendar year after arrival. The native population constitutes the omitted category. The corresponding coefficients thereby reveal the evolution of migrants' expenditures in the first five years when compared to those of natives. X_{it} contains personal level characteristics such as sex and a full set of dummy variables, indicating years of age. $\delta_{c(i,t)}$ adds fixed effects for the community of residence. Therefore, we implicitly compare immigrants and natives who live in the same municipality to allow for potential regional differences in health care utilization. Finally, we include year fixed effects θ_t. We estimate equation (1) separately for refugees and economic migrants. Both migrant groups are compared to natives to reveal potential differences in the level and the development of health care expenditures over time.

A further distinction is made between a simple repeated cross-sectional analysis of all migrants and a sample of migrants who stay in the country. In repeated cross

sections, selective return migration or emigration to different countries may bias the development of outcomes over time (Abramitzky, Boustan, and Eriksson, 2014; Riosmena, Wong, and Palloni, 2013). For example, if migrants with a low health status are more likely to return to their home countries, an analysis of cross sections of migrants would mechanically indicate that their average health improves over time. We address this issue by estimating health-expenditure profiles for immigrants who stay in the country for at least 5 years upon their arrival ("stayers") and compare the results with the full sample of migrants in a repeated cross section analysis. Compared to the full sample, individuals who stay in the country for 5 years are also of interest because they are more likely to stay in Austria permanently.

3.3 Aggregate expenditures

Table 3 summarizes the estimates of equation 1 for the total annual health care expenditures. Columns 1 and 2 show the results for the cross section and stayer sample of economic migrants. In the cross section, health care expenditures in the first year after arrival are 204 € below those of natives of the same age and sex, which corresponds to 19 % of the mean annual expenditures in the sample (1077 €). In the 2 to 5 years after arrival, the estimates also suggest lower health care expenditures of economic migrants with a difference varying between 146 € and 128 €. Similar results are obtained using the sample of migrants who stay in Austria for at least 5 years. Expenditures of migrants in the first five years are between 58 € and 141 € lower than those of natives. Although the difference from the first to the second year decreases in both samples, the point estimates do not reveal a clear pattern of convergence of health expenditures.

The results are consistent with findings from other countries showing better health outcomes and lower health care expenditures of migrants when compared to natives. The limited evidence for convergence of expenditures may be attributed to the analysis only for the first years after the arrival. A comparison of the different samples of

economic migrants reveals even lower expenditures for the full sample of migrants when compared to those who stay in the country for at least 5 years. A plausible explanation is a correlation between mobility and health among economic migrants. In other words, migrants with lower health care expenditures are more likely to emigrate again in the first five years after moving to Austria.

Columns 3 and 4 present the results for refugees. Unlike economic migrants, the estimates show significantly higher health care expenditures of refugees when compared to natives. In the cross section, the difference in expenditures in the first year is estimated to be 1073 €, representing 98 % of the sample mean. In the following years, the difference decreases substantially but remains statistically significant at 375 € in the fifth year in Austria. Similar results are obtained using the sample of refugees who stay for over 5 years, with slightly smaller differences in the first year after arrival and slightly higher differences in the following years.[3]

Figure 2 graphically illustrates the estimation results for refugees. It also displays estimates when we decompose total health care expenditures into its components and analyze physician fees, prescription drugs, and hospital stays, separately. In the first year after the arrival, the results reveal higher expenditure incurred for all the three health care resources. The point estimates (see Table A3 in the appendix for the estimation output) suggest the largest difference concerning expenditures in case of hospitalization, with higher expenditures of 866 € for refugees, representing 145 % of the sample mean. Over the period of 5 years, the results point toward a convergence of observed expenditures. The estimated difference decreases substantially for all health care resources and becomes statistically insignificant for physician fees and prescription drugs until the fifth year.

Results are very similar when we restrict the analysis to refugees who stay in the country for over 5 years (see Table A5 in the appendix for estimation output). In

[3]As described in the in section 2.5 refugees are defined as persons who are currently in the asylum process *or* have been seeking asylum in the past. In the appendix (Figure A2 and Table A4), we additionally present results for refugees, who are still in the asylum process, only. This group has an assigned place of residence that cannot be changed independently. The results are very similar to those in Figure 2 and Table A3.

general, comparing the results of the cross section and stayer sample does not indicate any correlation between refugees' health state and migration to different countries (including voluntary departures and deportations). Therefore, we continue with the full sample of refugees in the remaining analysis because of the larger sample size and increased precision of the estimates. As noted above, the data does not provide information on expenditures for visits to hospitals' outpatient departments. However, we observe the number of visits for the period 2011–2015, which we use in a separate analysis to assess if these visits serve as a substitute for other forms of health care. Results suggest a higher utilization of hospital outpatient departments by refugees when compared to natives. Similar to other health resources, the difference declines over the period of 5 years.

3.4 Health conditions

Expenditures for hospital treatment account for a large part of total expenditures, and we observe the largest difference between refugees and natives for this type of health care. Therefore, we examine causes for hospitalizations by separately estimating equation 1 for groups of hospital diagnoses.

Figure 3 summarizes the results. Refugees have significantly higher expenditures for communicable conditions and nutritional deficiencies, with point estimates ranging between 84 € and 36 €. This group of diagnoses includes infectious diseases such as pneumonia, tonsillitis, and tuberculosis. For women, we analyze expenditures related to maternal and perinatal conditions, wherein we again find substantially higher expenditures for refugees when compared to natives. This difference may be partly explained by higher levels of fertility among the refugee population. Conversely, the results do not indicate a statistically significant difference for expenditure-related to injuries.

We find the largest difference in expenditures for non-communicable conditions. In the first year, the estimates suggest higher expenditures of 489 € for refugees when

compared to natives. The difference shrinks substantially in the following years but remains significant at 192€ in the fifth year after the arrival. This group of diagnoses includes diseases associated with the cardiovascular system and cancer, which are widespread in the general population. Additionally, it includes mental disorders and diseases of the digestive system, the musculoskeletal system, and the genitourinary system, which are more common among the relatively young refugee population (see Table A6 in the appendix for the detailed incidence rates). We further analyze the most frequent ICD-10 chapters within the group of non-communicable conditions because this group is responsible for most of the observed hospital stays. Figure 4 shows that, during the first year, refugees have substantially higher expenditures for all analyzed health conditions. The largest difference can be seen for hospital visits related to mental and behavioral disorders wherein the estimates suggest higher expenditures of 155€. This result is consistent with the existing evidence, suggesting high prevalence rates of mental health issues among refugees (Lindert et al., 2009). Over time, the point estimates indicate a decrease in expenditures. After 5 years, refugees' expenditures for mental disorders are 67€ higher than those of the native population. For diseases of the digestive system, musculoskeletal system, and connective tissue, results show that, after 5 years, refugees' expenditures are not statistically different when compared to those of natives. Conversely, we do not find a pattern of convergence of expenditures for diseases of the genitourinary system.

For all health conditions, we observe the largest difference in the first year after the arrival. Although the gap in expenditures decreases over time and indicate a convergence in the long run, health care expenditures do not reach native levels within 5 years.

3.5 Refugees' characteristics

In another set of estimations, we assess whether the revealed pattern in the development of health care expenditures is observed generally or only among a particular

group of refugees. Figure 5 summarizes the estimation results when we restrict the analysis to refugees and natives with specific characteristics. When comparing female and male refugees to their native counterparts, the estimates suggest significantly higher expenditures for both sexes in the first year after the arrival, with a larger difference for women (1726 €) than for men (707 €). A further distinction is made with respect to age for which we split the data into individuals above and below 30 years. Here, we also find significantly higher expenditures for refugees in both groups. The difference is larger among the older population, which also has higher average health care expenditures. For all analyzed subgroups of refugees, there is a marked decrease in expenditures over time. Point estimates suggest that the difference in health expenditures between refugees and natives has more than halved over the period of five years.

In Figure 6, we explore potential heterogeneity with respect to refugees' source countries. We group refugees according to their citizenship into Africa, the Middle East, Eastern Europe including Russia, and Western Balkan (see Table A1 in the appendix for details). Concerning the development of health care expenditures, we observe similar patterns among all groups. The difference in health care expenditures is largest in the first year after the arrival and decreases with the time that refugees spend in Austria. The estimation results suggest the largest difference for refugees from Eastern Europe, where the difference decreases from 2127 € in the first year to 444 € in the fifth year after the arrival. Concerning refugees from Africa and the Middle East, expenditures are not statistically significant, when compared to those of natives, in the fourth or fifth year after the arrival. This heterogeneity could be related to differences in the average health status and health behavior, that is, refugees' decisions about opting for health care may be influenced by the experience with the health care system in refugees' source countries. However, when analyzing subgroups of the refugee population, a limitation is that the obtained confidence intervals are large due to the small sample size.

4 Determinants of health care utilization

Results in the previous sections suggest substantially higher health care expenditures of refugees when compared to natives, which are predominantly driven by hospitalizations. Among the general population, existing evidence indicates that limited access to primary care may increase hospitalizations (Rosano et al., 2012). This relationship could be even more relevant for refugees who are unfamiliar with the health care system and hence, potentially, strongly affected due to a lack of primary health care. Accordingly, we test how variables indicating the accessibility of (primary) care at the local level affect refugees' health care expenditures. As argued in section 2.3, refugees are quasi-randomly assigned to municipalities where they receive basic welfare support. Therefore, the placement is largely exogenous with respect to their health care needs and preferences, avoiding usual concerns related to residential sorting. We further examine the role of social networks. Information and norms may be shared within networks, and hence we expect that health care utilization is correlated within communities.

4.1 Estimating equation

We explore determinants of refugees' health care utilization by estimating

$$h_{it} = \alpha + S'_{it}\beta + N'_{it}\gamma + X'_{it}\delta + \mu_{it}, \tag{2}$$

where h_{it} again denotes the total annual health care expenditures or an expenditure component. S_{it} is a vector of variables characterizing the local health care sector—namely a dummy variable indicating the availability of a hospital, the density of GPs, and the density of medical specialists (excluding dentists). Density is defined as the number of physicians per 1,000 population within each of the 178 municipalities comprising refugees.

N_{it} is a vector of social network variables for which we include the average level

of health care expenditures of refugees[4], migrants, and natives within the community. When we analyze the different expenditure components, we use the average values of the corresponding health care services as covariates. Additionally, we include a set of control variables X_{it}, including an individual's age, sex, the region of origin, and time spent in Austria. In this analysis, we only use data from refugees during the asylum procedure. This is because, after the granting of asylum, refugees may move to another place to get access to better employment opportunities or for other reasons.

The descriptive statistics of explanatory variables, at a municipality level, are presented in Table 4, showing a significant variation in characteristics of the local health care sector. Refugee municipalities that have hospitals account for 8 %. The average number of general practitioners (specialists) per 1,000 insured individuals is 1.62 (0.49), with a standard deviation of 1.13 (1.12). In general, individual levels of health care utilization can be expected to vary significantly due to differences in health state and health care needs. Table 4 shows that there is also a large variation among municipalities. For example, natives' average total health care expenditures range from 475 € in the municipality with the lowest average spending to a maximum value of 2,386 €. For all categories of health care expenditures, we observe the greatest variance among refugees followed by migrants and natives. A plausible explanation is that the number of observations of refugees and migrants per community is significantly smaller when compared to natives.

4.2 Results

Table 5 summarizes the estimation results of equation 2. The results do not indicate an important influence of the local health care sector on the overall resource use. Neither the density of general practitioners who are predominantly responsible for primary care nor the density of specialists has a statistically significant effect on total health care expenditures. Likewise, we do not find significant effects for the different components of expenditures. Most notably, for hospitalization expenditures, the point estimates

[4]We leave out a person's own expenditure when calculating the average.

for physician density are positive but not statistically significant. This indicates that variation in access to primary care does not explain hospital expenditures among our sample of refugees.

Considering the expenditure levels, we find that refugees' total expenditures are positively related to the level of expenditure of other refugees in the community. The point estimate suggests that an increase of 1€ in average expenditure is associated with a 0.19€ increase at the individual level. An analysis on health care services suggests that this effect is largely explained by the correlation of expenditures for physician visits among refugees. We also find that refugees' physician visits are positively related to economic migrants' expenditures in the community, but this effect is smaller, and there is no significant effect on total expenditures. Conversely, refugees' total expenditures are also positively associated with expenditures of natives in the municipality, which appears to be explained by effects related to prescribed drugs. Overall, we find smaller effects on expenditures for hospitalizations when compared to physician fees and drug prescriptions. This can be attributed to the fact that physician visits and prescriptions are more dependent on individual preferences for health care, while hospital stays are strongly related to (objective) health care needs, and hence the influence of other factors is limited.

Similar results regarding the positive correlation of health service utilization have been documented for migrants in Canada (Deri, 2005). Additionally, existing evidence suggests that social networks affect the health care of undocumented migrants (Devillanova, 2008). The findings are consistent with the assumption that individual behavior is influenced by one's social network. However, even in (quasi-)random settings, the identification of causal peer effects is challenging (Manski, 1993; Angrist, 2014). Shared influences, such as non-governmental organizations' (NGOs) employees or volunteers, who support refugees during the asylum procedure may influence health care expenditures of all refugees in a community. They can advise refugees on when and where to seek health care or even accompany them to physician visits. Unfortunately, the data does not hold information on the exact care and support that refugees

receive outside of the health system. Similarly, the positive correlation of expenditures for prescription drugs between refugees and natives could be related to variation in practice styles between municipalities, that is, differences in physicians regarding the appropriateness of medical care.

5 Conclusion

We investigate disparities in health care utilization among migrants and natives using administrative data from Austria and use information on asylum status to differentiate between economic migrants and refugees. The results indicate distinctly different patterns between the two groups. In accordance with the existing literature on the healthy immigrant effect, economic migrants have lower health care expenditures when compared to Austrian citizens. Conversely, we find substantially higher expenditures for refugees, which is most pronounced in the first year after the arrival. This is consistent with epidemiological studies documenting high prevalence rates of disorders among refugee groups, and also Bauhoff and Göpffarth (2018) showing higher aggregate health care expenditures for asylum-seekers compared to regularly insured persons in Germany. Our results also indicate a convergence of expenditures over time; however, a statistically significant difference remains for most analyzed health outcomes and refugee groups over a period of 5 years. This is in contrast to Chiswick, Lee, and Miller (2008), who show that the low self-rated health of refugees in Australia over time declines faster compared to other immigrant groups.

Furthermore, we show that the characteristics of the local health care sector do not have a significant effect on refugees' health care expenditures. This indicates that the high level of health care among refugees is not a result of inadequate (primary) health care. Instead, a plausible explanation is that health care needs are higher for refugees when compared to natives and economic migrants, especially in the first years after the arrival. Analysis of various health conditions suggests that the increased expenditure cannot be attributed to a specific disease, but a generally inferior health

status of refugees.

The higher expenditures may be attributed to differences in the selection between economic migrants and refugees or consequences of events surrounding the flight. Although we cannot differentiate between these potential explanations directly, the observed pattern of particularly high expenditure in the first year and the subsequent decline indicate a temporary increase in health issues that can hardly be explained by a negative selection of individuals alone.

A limitation of the data is that we only observe the utilization of health care and not the *true* health status or well-being. Individuals may have unmet health care needs that do not appear in the data. A related issue is that some forms of health care and support, such as social care and counseling related to mental health, are not covered by the health insurance but provided by NGOs or paid for by the patient. For a complete picture of refugees' (relative) health and the development over time, further research with additional outcome dimensions is needed.

Compliance with ethical standards

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Conflict of Interest: The authors declare that they have no conflict of interest.

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6 Tables and figures

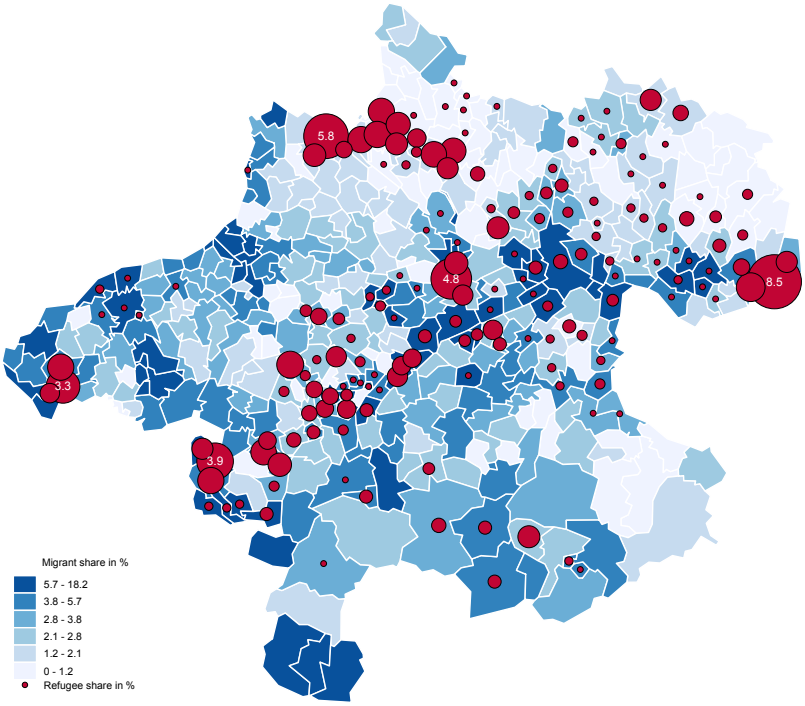

Figure 1: Distribution of economic migrants (blue) and refugees in an ongoing asylum process (red) in Upper Austrian communities in 2010, presented as a share of all insured persons of the Upper Austrian Regional Health Insurance Fund.

Table 1: Distribution of citizenship in the analysis sample

Economic migrants		Refugees	
%	Citizenship	%	Citizenship
25.6	Germany	18.0	Russian Federation
10.2	Hungary	14.2	Afghanistan
8.9	Romania	9.9	Syria
7.8	Turkey	8.3	Former Yugoslavia
6.6	Bosnia & Herzegovina	4.7	Iran
4.6	Slovakia	4.2	Niger
4.2	Czech Republic	3.8	Iraq
3.9	Former Yugoslavia	3.8	Armenia
3.8	Poland	3.5	Turkey
2.6	Croatia	3.4	Georgia
22.0	*Else*	26.2	*Else*
%	Region	%	Region
34.3	EU Eastern Enlargement	34.0	Middle East
29.7	EU 15 EFTA	20.0	Eastern Europe
18.8	Western Balkan	13.0	Africa
7.9	Turkey and Eastern Black Sea	12.6	Western Balkan
3.0	Asia	11.9	Turkey and Eastern Black Sea
1.8	Eastern Europe	8.3	Asia
1.7	Africa	0.2	EU Eastern Enlargement
1.6	America	0.0	America
1.1	Middle East	0.0	EU 15 EFTA
0.1	Australia and Oceania	0.0	Australia and Oceania

Notes: This table displays the ten most frequent citizenships among economic migrants (N=74,758) and refugees (N=9,771). The former Yugoslavia may include refugees from Kosovo, whose legal status is still disputed, and other regions of the former Socialist Federal Republic of Yugoslavia. The complete division of countries into regions can be found in the appendix in table A1

Table 2: Descriptive statistics of the analysis sample

	(1) Native population	(2) Economic migrants	(3) Refugees
Individual characteristics			
Age in years	39.5	33.3	31.9
Female (%)	49.8	45.5	38.6
Health care expenditures (€)			
Total expenditures	1,091.8	643.1	1,509.7
Physician fees	310.2	181.2	305.1
Prescription drugs	187.3	62.7	212.8
Inpatient hospital expenditures	594.3	399.2	991.8
Outpatient department visits[1]	0.48	0.38	0.56
Hospital diagnoses according to WHO categories (€)			
Noncommunicable diseases	480.0	219.2	622.1
Injuries	58.6	30.9	70.1
Communicable and nutritional conditions	21.3	20.2	73.6
Maternal and perinatal conditions[2]	27.4	93.7	175.4
Selected noncommunicable diseases (€)			
Mental and behavioural disorders	75.4	24.8	188.6
Diseases of the digestive system	55.3	37.5	73.6
Diseases of the musculoskeletal system and connective tissue	62.1	25.8	46.8
Diseases of the genitourinary system	39.2	34.1	83.1
Number of observations	5,742,364	200,692	23,616
Number of individuals	787,910	74,758	9,771

Notes: This table shows mean values of the three groups in the analysis dataset. Classification of hospital diagnoses, according to WHO (2008) and the most frequent ICD-10 chapters within the category of noncommunicable diseases. [1]We only observe outpatient department visits for selected years (2011–2015): Native population 2,860,839; economic migrants 91,410; and refugees 9,118. [2]Expenditures for maternal and perinatal conditions are calculated as averages for the female population only.

Table 3: Health care expenditures of migrants and natives

	Economic migrants		Refugees	
	(1) cross section	(2) stayer sample	(3) cross section	(4) stayer sample
Time in Austria				
1^{st} year	-204.4***	-115.2***	1072.5***	1096.6***
	(9.8)	(12.7)	(82.1)	(92.9)
2^{nd} year	-127.5***	-57.6***	624.8***	663.6***
	(12.1)	(13.4)	(51.3)	(88.8)
3^{rd} year	-139.0***	-90.2***	597.2***	587.7***
	(12.5)	(11.9)	(79.4)	(71.6)
4^{th} year	-141.8***	-110.7***	321.0***	328.7***
	(11.7)	(12.8)	(59.1)	(74.2)
5^{th} year	-146.0***	-140.8***	375.4***	375.1***
	(13.0)	(13.1)	(63.6)	(63.6)
Female	166.3***	162.1***	159.7***	158.1***
	(3.3)	(3.3)	(3.4)	(3.4)
N	5,940,301	5,863,502	5,763,702	5,752,575
Mean	1077.1	1083.5	1093.9	1092.9

Notes: Columns report coefficients from estimation of equation (1) comparing natives and different migrant samples. Columns 1 and 3 use all observations for economic migrants and refugees in the analysis sample. Columns 2 and 4 restrict the sample to those who stay in Austria for at least 5 years. Coefficients on age, calendar year, and community dummies are not shown. The mean of the dependent variable is displayed at the bottom of the table. Robust standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.

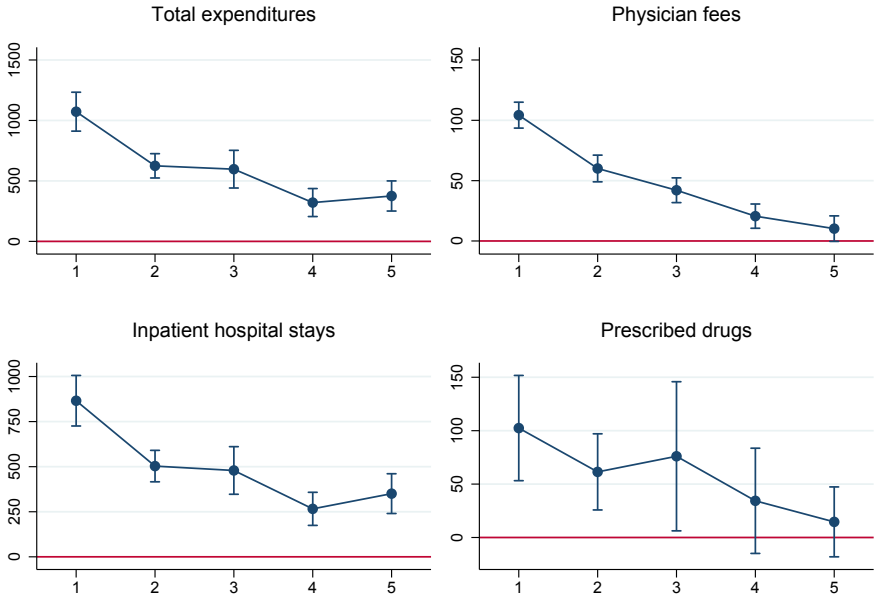

Figure 2: Refugees' relative expenditures for different health care services. The graph plots point estimates and 95 % confidence intervals of equation 1, comparing the health care expenditures of refugees and natives. See Table A3 for estimation output.

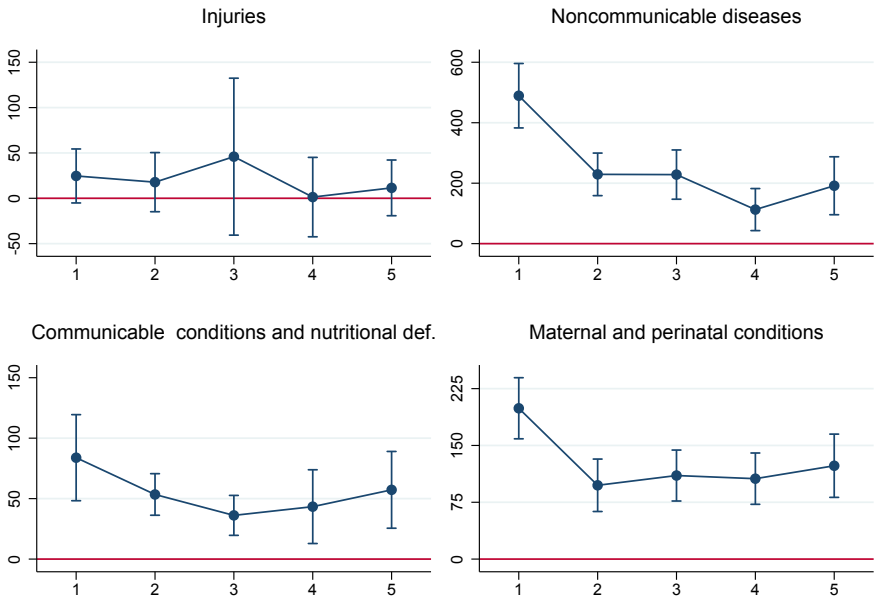

Figure 3: Refugees' relative expenditures for different hospital diagnoses. The graph plots point estimates and 95 % confidence intervals of equation 1, comparing the health care expenditures of refugees and natives. See Table A7 for estimation output.

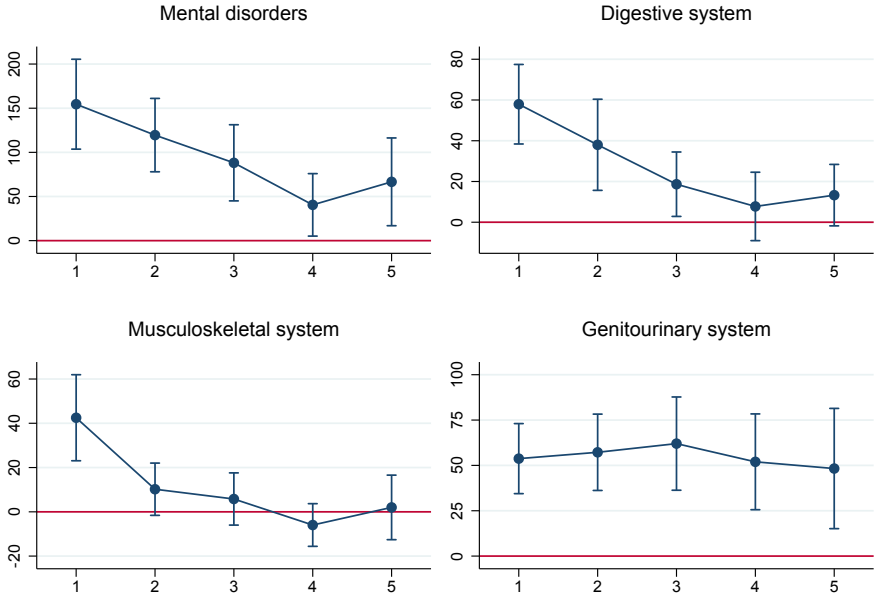

Figure 4: Refugees' relative expenditures for selected noncommunicable diseases. The graph plots point estimates and 95 % confidence intervals of equation 1, comparing the health care expenditures of refugees and natives. See Table A8 for estimation output.

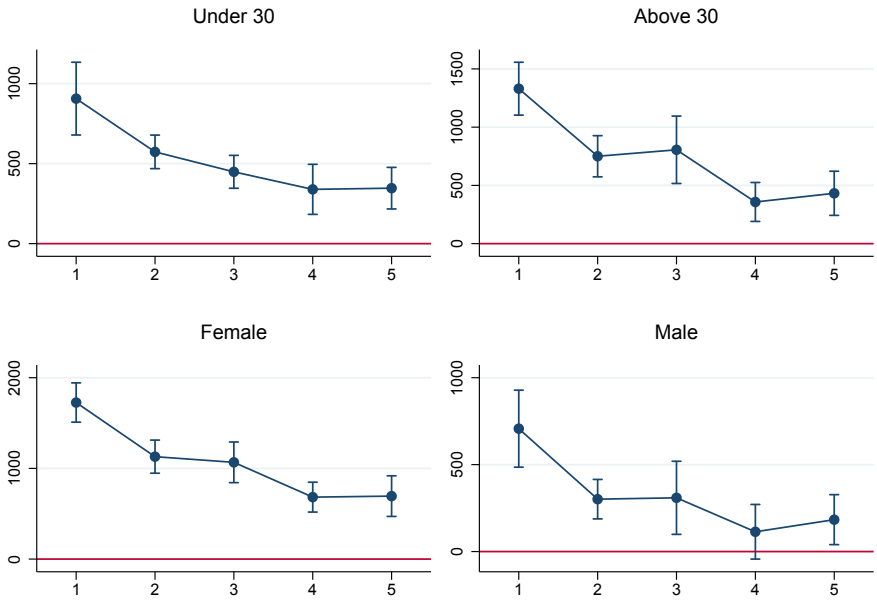

Figure 5: Refugees' relative expenditures for selected subgroups. The graph plots point estimates and 95 % confidence intervals of equation 1, comparing the health care expenditures of refugees and natives. See Table A9 for estimation output.

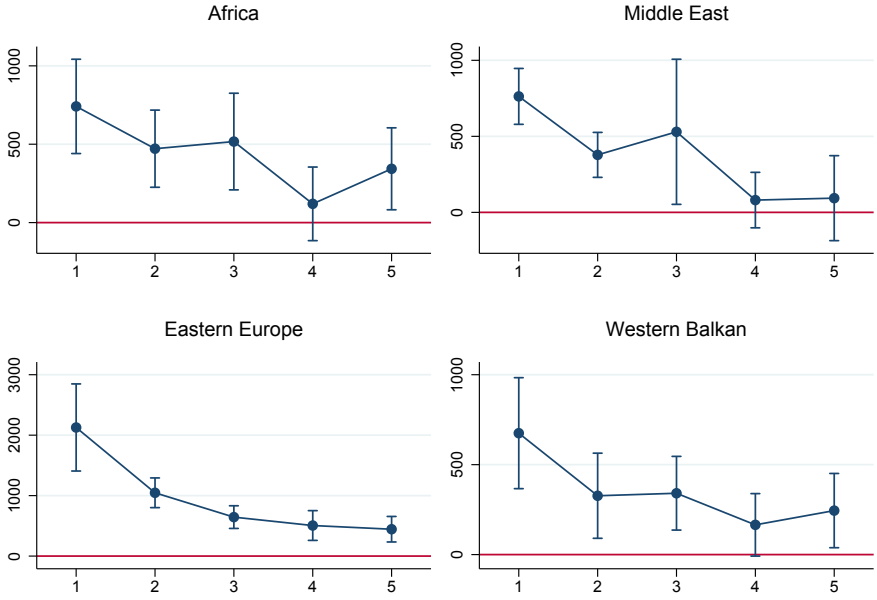

Figure 6: Refugees' relative expenditures for selected regions of origin. The graph plots point estimates and 95 % confidence intervals of equation 1, comparing the health care expenditures of refugees and natives. See Table A10 for estimation output.

Table 4: Municipality characteristics

	(1) Mean	(2) S.D.	(3) Min	(4) Max
Local health care sector				
GPs (per 1000 insured)	1.62	1.13	0	9.77
Specialists (per 1000 insured)	0.49	1.12	0	5.57
Hospital	0.08	0.27	0	1
Expenditures of natives				
Total expenditures	1,123.45	253.09	474.94	2,386.33
Physician fees	316.24	51.97	175.84	657.84
Inpatient hospital expenditures	615.19	193.26	214.71	1,808.52
Prescription drugs	192.03	63.35	77.91	594.85
Expenditures of migrants				
Total expenditures	885.46	520.83	126.22	3,992.67
Physician fees	246.39	82.18	71.44	722.99
Inpatient hospital expenditures	551.61	459.56	0	3,489.93
Prescription drugs	87.47	103.21	11.16	973.72
Expenditures of refugees				
Total expenditures	1,353.09	1,635.71	0	16,733.75
Physician fees	307.29	155.29	0	998.89
Inpatient hospital expenditures	880.56	1,423.36	0	13,901.8
Prescription drugs	165.24	326.67	0	3,340.33

Notes: This table shows summary statistics of the municipalities with comprising refugees. Column 1 shows the mean value, and column 2 the corresponding standard deviation. Columns 3 and 4 show the minimum and maximum values in the sample. N=178.

Table 5: Determinants of health care expenditures

	(1) Total expenditures	(2) Physician fees	(3) Hospital expenditure	(4) Prescribed drugs
Local health care sector				
Hospital	-125.200	-13.598	-71.051	-10.435
	(156.893)	(12.756)	(135.681)	(48.915)
Specialist density	75.271	7.483	69.439	5.300
	(58.825)	(4.945)	(53.186)	(14.174)
GP density	38.776	3.456	31.829	2.314
	(73.063)	(3.993)	(69.099)	(13.832)
Level of health care expenditures in community				
Refugees	0.188**	0.353***	0.091	0.110
	(0.080)	(0.039)	(0.057)	(0.076)
Migrants	0.124	0.182***	0.114	-0.031
	(0.085)	(0.061)	(0.101)	(0.038)
Native	0.547**	-0.044	0.257	0.814**
	(0.241)	(0.116)	(0.257)	(0.379)
Individual characteristics				
2^{nd} year	-353.884***	-21.973**	-309.833***	-18.773
	(103.170)	(9.029)	(89.592)	(35.087)
3^{rd} year	-368.161**	-34.887***	-270.610*	-54.485
	(165.898)	(9.820)	(154.462)	(33.764)
4^{th} year	-629.669***	-52.913***	-563.914***	-10.719
	(158.044)	(11.599)	(124.857)	(66.860)
5^{th} year	-537.004***	-68.156***	-419.088***	-45.574
	(182.507)	(13.728)	(160.858)	(52.847)
Female	1004.393***	187.216***	789.653***	24.908
	(102.694)	(7.311)	(89.072)	(35.572)
Mean	1740.7	330.9	1162.2	247.5

Notes: This table shows the estimation results of equation 2 for different categories of health care expenditures. Coefficients on control variables, including age and the region of origin, are not shown. Mean The mean of the dependent variable is displayed in at the bottom of the table. N=14,964. Robust standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.

A Appendix

This Web appendix (not for publication) provides additional material discussed in the unpublished manuscript 'Health care utilization of refugee' by Thomas Schober and Katrin Zocher.

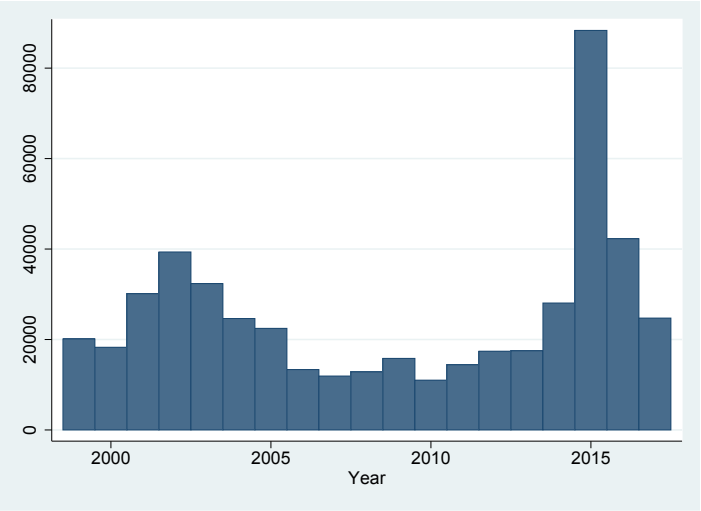

Figure A1: Number of annual asylum applications in Austria (BMI, 2018)

Table A1: Division of countries into regions

Region	Country
Africa	Algeria, Angola, Benin, Burkina Faso, Burundi, Cameroon, Chad, Congo (Brazzaville), Congo, Dem. Rep., Cote d'Ivoire, Djibouti, Egypt, Eritrea, Ethiopia, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Libya, Madagascar, Mali, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia, Zimbabwe
America	America (unclassifiable), Argentina, Bahamas, Barbados, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Netherlands Antilles, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, United States (USA), Uruguay, Venezuela
Asia	Bangladesh, Bhutan, Cambodia, China, Hong Kong, India, Indonesia, Japan, Kazakhstan, Korea, Dem. VR, Korea, Rep., Kyrgyzstan, Malaysia, Mongolia, Myanmar, Nepal, Philippines, Republic of China (Taiwan), Singapore, Sri Lanka, Tajikistan, Thailand, Turkmenistan, Uzbekistan, Vietnam
Australia and Oceania	Australia, Fiji, New Zealand
EU 15 EFTA	Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom of Great Britain
EU Eastern Enlargement	Bulgaria, Cyprus, Czech Republic, Estonia, Former Czechoslovakia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia
Eastern Europe	Former Soviet Union, Russian Federation, Belarus, Ukraine, Moldova
Middle East	Afghanistan, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Pakistan, Palestine West Bank Gaza, Qatar, Saudi Arabia, Syria, Yemen
Turkey and Eastern Balck Sea	Turkey, Armenia, Azerbaijan, Georgia
Western Balkan	Albania, Bosnia and Herzegovina, Croatia, Former Yugoslavia, Kosovo, Macedonia, Montenegro, Serbia, Serbia and Montenegro

Note: Only countries with observations in the analysis sample were assigned to a region.

Table A2: Regression results – features of municipalities and individual characteristics

	(1) Total expenditure	(2) Physician fees	(3) Hospital expenditure	(4) Prescribed drugs	(5) Outpatient dep. visits	(6) Population size	(7) Employment rate	(8) Unemploym. rate	(9) Share with tertiary educ.	(10) Share of right wing votes
Panel A: Refugees within asylum process										
Female	7.638	1.482	4.030	2.127	-0.001	-192.287	-0.146	-0.035	-0.072	-0.374
	(10.726)	(1.669)	(7.770)	(1.976)	(0.001)	(1427.671)	(0.137)	(0.062)	(0.177)	(0.275)
Age	-0.002	0.084	-0.170	0.084	-0.000	4.856	0.005	-0.004	-0.003	-0.007
	(0.562)	(0.088)	(0.411)	(0.102)	(0.000)	(78.349)	(0.007)	(0.003)	(0.009)	(0.014)
N	4,984	4,984	4,984	4,984	2,606	5,301	2,604	2,604	2,604	719
Mean	1,472.7	317.4	916.8	238.4	0.1	31,022.1	73.7	4.1	10.2	20.1
Panel B: Economic migrants										
Female	28.926***	4.927***	18.235***	5.765***	0.001	3473.140***	-0.221***	0.059**	0.321***	-0.374***
	(3.825)	(0.649)	(2.736)	(0.682)	(0.001)	(607.698)	(0.048)	(0.024)	(0.069)	(0.093)
Age	-1.137***	-0.216***	-0.709***	-0.212***	-0.000	-138.220***	0.002	-0.002	-0.013***	-0.004
	(0.223)	(0.039)	(0.159)	(0.040)	(0.000)	(33.649)	(0.003)	(0.001)	(0.004)	(0.005)
N	28,703	28,703	28,703	28,703	14,422	30,839	14,099	14,099	14,099	6,029
Mean	1,549.2	330.9	967.3	251.1	0.2	35,372.6	73.7	4.4	10.9	21.1
Panel C: Refugees with asylum										
Female	14.770***	1.889***	9.204***	3.677***	-0.000	2010.135*	-0.190***	0.047*	0.174***	-0.196*
	(3.233)	(0.509)	(2.446)	(0.566)	(0.000)	(1080.200)	(0.046)	(0.027)	(0.065)	(0.105)
Age	-0.619***	-0.090***	-0.464***	-0.065**	-0.000	-219.709***	0.010***	-0.005***	-0.012***	0.002
	(0.162)	(0.026)	(0.123)	(0.028)	(0.000)	(54.794)	(0.002)	(0.001)	(0.003)	(0.005)
N	19,740	19,740	19,740	19,740	15,398	19,642	15,319	15,319	15,319	3,886
Mean	1,802.3	384.1	1,122.3	295.9	0.1	67,118.0	72.5	5.3	12.8	21.2

Notes: This table summarizes the results from regressing features of municipalities on sex and age of refugees within the asylum process in the first year after arrival (panel A), economic migrants (panel B), and refugees who received asylum and are in Austria at least 5 years (panel C). Dependent variables in columns 1–5 are averages of health care utilization within the municipality calculated with data from the Upper Austrian Regional Health Insurance Fund. Column 6 uses population size (https://www.land-oberoesterreich.gv.at/149128.htm), columns 7–9 labor market statistics provided by Statistics Austria (http://www.statistik.at), and column 10 the share of votes for the right-wing Freedom Party of Austria at the election for the National Council in 2006, 2008 and 2013 (https://www.land-oberoesterreich.gv.at/42981.htm). Municipality characteristics are measured one year before arrival in panels A and B, and in the year of observation in panel C. The sample size varies due to missing observations. The mean of the dependent variable is displayed at the bottom of the table. Regressions control for (panel A and B) year of arrival, (panel C) year of observation and region of origin. Robust standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.

Table A3: Expenditures for different health care services (Figure 2)

	(1) Total expend.	(2) Physician fees	(3) Inpat. hosp. expend.	(4) Prescription drugs	(5) Outp. dep. visits
1^{st} year	1072.5***	104.3***	865.8***	102.4***	0.142***
	(82.1)	(5.5)	(71.5)	(25.)	(0.009)
2^{nd} year	624.8***	60.1***	503.3***	61.4***	0.126***
	(51.3)	(5.6)	(44.5)	(18.2)	(0.012)
3^{rd} year	597.2***	42.1***	479.1***	76.0**	0.097***
	(79.4)	(5.2)	(67.4)	(35.6)	(0.013)
4^{th} year	321.0***	20.6***	266.1***	34.3	0.091***
	(59.1)	(5.1)	(46.8)	(25.1)	(0.015)
5^{th} year	375.4***	10.2*	350.5***	14.6	0.070***
	(63.6)	(5.4)	(56.3)	(16.7)	(0.015)
N	5,763,702	5,763,702	5,763,702	5,763,702	2,663,827
Mean	1,093.9	310.3	596.2	187.4	0.5

Notes: This table shows the estimation results of equation 1, comparing total health care expenditures (column 1), physician fees (2), inpatient hospital expenditures (3), prescription drugs (4), and visits to outpatient departments (5) of refugees and natives. Coefficients on sex, age, calendar year, and community dummies are not shown. The mean of the dependent variable is displayed at the bottom of the table. Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.

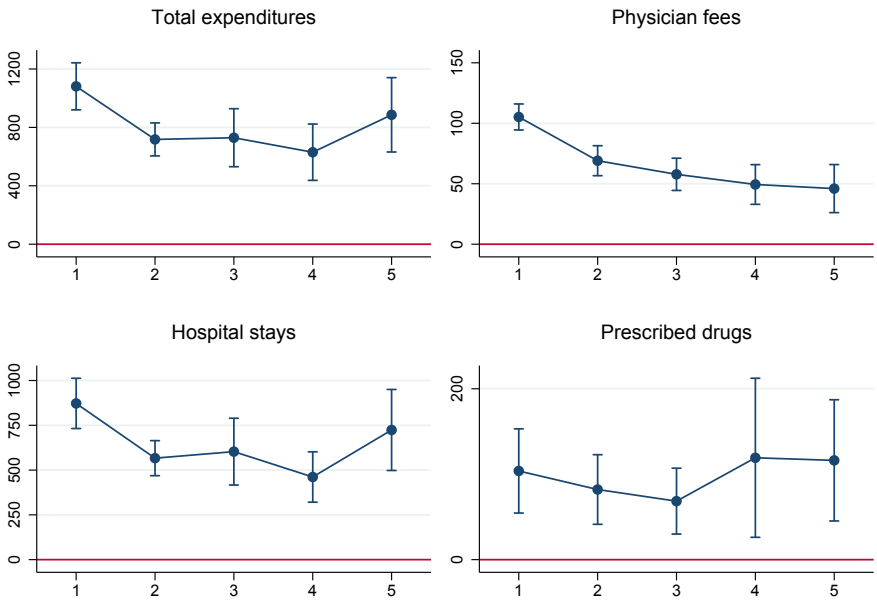

Figure A2: Refugees' relative expenditures for different health care services. The graph plots point estimates and 95 % confidence intervals of equation 1, comparing the health care expenditures of refugees, who are in the asylum process and natives. See Table A4 for estimation output.

Table A4: Expenditures for different health care services (Figure A2)

	(1) Total expend.	(2) Physician fees	(3) Inpat. hosp. expend.	(4) Prescription drugs	(5) Outp. dep. visits
1^{st} year	1081.3***	105.2***	872.2***	103.8***	0.142***
	(82.2)	(5.5)	(71.6)	(25.2)	(0.009)
2^{nd} year	717.7***	69.0***	566.6***	82.1***	0.129***
	(57.6)	(6.3)	(49.9)	(20.8)	(0.014)
3^{rd} year	729.3***	57.8***	603.0***	68.5***	0.094***
	(101.4)	(6.8)	(95.1)	(19.7)	(0.017)
4^{th} year	630.1***	49.4***	461.4***	119.2**	0.097***
	(98.4)	(8.4)	(71.7)	(47.5)	(0.024)
5^{th} year	886.2***	46.0***	724.0***	116.2sym***	0.058**
	(130.0)	(10.1)	(115.4)	(36.2)	(0.026)
N	5,757,199	5,757,199	5,757,199	5,757,199	2,661,683
Mean	1,094.0	310.4	596.1	187.5	0.5

Notes: This table shows the estimation results of equation 1, comparing total health care expenditures (column 1), physician fees (2), inpatient hospital expenditures (3), prescription drugs (4), and visits to outpatient departments (5) of refugees, who are in the asylum process, and natives. Coefficients on sex, age, calendar year, and community dummies are not shown. The mean of the dependent variable is displayed at the bottom of the table. Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.

Table A5: Expenditures for different health care services using stayer sample

	(1) Total expend.	(2) Physician fees	(3) Inpat. hosp. expend.	(4) Prescription drugs	(5) Outp. dep. visits
1^{st} year	1096.6***	74.9***	936.9***	84.8***	0.084
	(92.9)	(9.2)	(81.0)	(28.5)	(0.060)
2^{nd} year	663.6***	55.4***	554.7***	53.5**	0.104***
	(88.8)	(8.3)	(80.1)	(24.8)	(0.034)
3^{rd} year	587.7***	39.1***	508.5***	40.2**	0.080***
	(71.6)	(6.8)	(62.8)	(20.1)	(0.025)
4^{th} year	328.7***	23.6***	254.2***	50.8	0.082***
	(74.2)	(6.0)	(56.5)	(34.3)	(0.020)
5^{th} year	375.1***	10.1*	350.5***	14.4	0.070***
	(63.6)	(5.4)	(56.3)	(16.7)	(0.015)
N	5,752,575	5,752,575	5,752,575	5,752,575	2,658,299
Mean	1092.9	310.3	595.2	187.3	0.5

Notes: This table shows the estimation results of equation 1, comparing total health care expenditures (column 1), physician fees (2), inpatient hospital expenditures (3), prescription drugs (4), and visits to outpatient departments (5) of refugees and natives. Coefficients on sex, age, calendar year, and community dummies are not shown. The mean of the dependent variable is displayed at the bottom of the table. Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.

Table A6: Incidence rates for hospital diagnoses

GBD cause code and name	*Migration background* Austrians	Refugees	Migrants	Total
1 Communicable, maternal, perinatal and nutritional conditions	0.0131	0.0460	0.0284	0.0292
1A Infectious and parasitic diseases	0.0043	0.0125	0.0056	0.0075
1A1 Tuberculosis	0.0001	0.0014	0.0003	0.0006
1A2 Sexually transmitted diseases excluding HIV	0.0008	0.0023	0.0016	0.0016
1A3 HIV/AIDS	0.0001	0.0010	0.0001	0.0004
1A4 Diarrhoeal diseases	0.0012	0.0020	0.0016	0.0016
1A5 Childhood-cluster diseases	0.0000	0.0000	0.0000	0.0000
1A6 Miningitis	0.0001	0.0001	0.0000	0.0001
1A7 Hepatitis	0.0002	0.0020	0.0003	0.0008
1A8 Malaria	0.0000	0.0002	0.0000	0.0001
1A9 Tropical-cluster diseases	0.0000	0.0000	0.0000	0.0000
1A11 Dengue	0.0000	0.0000	0.0000	0.0000
1A14 Intestinal nematode infections	0.0000	0.0001	0.0000	0.0000
1A15 Other infectious diseases	0.0019	0.0036	0.0016	0.0024
1B Respiratory infections	0.0027	0.0090	0.0044	0.0054
1B1 Lower respiratory infections	0.0015	0.0039	0.0016	0.0023
1B2 Upper respiratory infections	0.0009	0.0039	0.0024	0.0024
1B3 Otitis media	0.0003	0.0013	0.0005	0.0007
1C Maternal conditions	0.0060	0.0243	0.0185	0.0163
1C1 Maternal haemorrhage	0.0003	0.0005	0.0006	0.0005
1C2 Maternal sepsis	0.0001	0.0003	0.0002	0.0002
1C3 Hypertensive disorders of pregnancy	0.0002	0.0003	0.0004	0.0003
1C4 Obstructed labour	0.0001	0.0002	0.0002	0.0002
1C5 Abortion	0.0019	0.0079	0.0053	0.0050
1C6 Other maternal conditions	0.0038	0.0162	0.0128	0.0109
1D Conditions arising during the perin	0.0000	0.0000	0.0001	0.0000
1D1 Prematurity and low birth weight	0.0000	0.0000	0.0000	0.0000
1D2 Birth asphyxia and birth trauma	0.0000	0.0000	0.0000	0.0000
1E Nutritional deficiencies	0.0003	0.0017	0.0005	0.0008
1E1 Protein-energy malnutrition	0.0000	0.0000	0.0000	0.0000
1E2 Iodine deficiency	0.0000	0.0000	0.0000	0.0000
1E3 Vitamin a deficiency	0.0000	0.0000	0.0000	0.0000
1E4 Iron-deficiency anaemia	0.0003	0.0016	0.0005	0.0008
1E5 Other nutritional disorders	0.0000	0.0001	0.0000	0.0000
2 Noncommunicable diseases	0.0981	0.1311	0.0743	0.1012
2A Malignant neoplasms	0.0046	0.0033	0.0016	0.0032
2A1 Mouth and oropharynx cancers	0.0002	0.0000	0.0001	0.0001
2A2 Oesophagus	0.0000	0.0000	0.0000	0.0000
2A3 Stomcach cancer	0.0001	0.0000	0.0000	0.0000
2A4 Colon and rectum cancers	0.0004	0.0002	0.0001	0.0002
2A5 Liver cancer	0.0001	0.0000	0.0000	0.0000
2A6 Pancreas cancer	0.0001	0.0000	0.0000	0.0000
2A7 Trachea, bronchus and lung cancers	0.0004	0.0004	0.0001	0.0003
2A8 Melanoma and other skin cancers	0.0005	0.0001	0.0001	0.0002
2A9 Breast cancer	0.0009	0.0009	0.0003	0.0007
2A10 Cervix uteri cancer	0.0001	0.0001	0.0001	0.0001
2A11 Corpus uteri cancer	0.0001	0.0000	0.0000	0.0000
2A12 Ovary cancer	0.0001	0.0001	0.0000	0.0001
2A13 Prostate cancer	0.0003	0.0001	0.0000	0.0001
2A14 Bladder cancer	0.0001	0.0000	0.0000	0.0000
2A15 Lymphomas and multiple myeloma	0.0004	0.0003	0.0002	0.0003
2A16 Leukaemia	0.0001	0.0001	0.0000	0.0001
2A17 Other malignant neoplasms	0.0013	0.0013	0.0005	0.0010
2B Other neoplasms	0.0053	0.0054	0.0042	0.0050
2C Diabetes mellitus	0.0016	0.0015	0.0008	0.0013

Table A6: Incidence rate (cont.)

GBD cause code and name	*Migration background* Austrians	Refugees	Migrants	Total
2D Endocrine disorders	0.0026	0.0031	0.0017	0.0025
2E Neuropsychiatric conditions	0.0180	0.0314	0.0116	0.0203
2E1 Unipolar dipressive disorders	0.0027	0.0088	0.0021	0.0045
2E2 Bipolar affective disorders	0.0004	0.0000	0.0002	0.0002
2E3 Schizophrenia	0.0014	0.0029	0.0007	0.0017
2E4 Epilepsy	0.0011	0.0010	0.0006	0.0009
2E5 Alcohol use disorders	0.0025	0.0026	0.0012	0.0021
2E6 Alzheimer and other dementias	0.0001	0.0000	0.0000	0.0000
2E7 Parkinson disease	0.0001	0.0000	0.0000	0.0000
2E8 Multiple sclerosis	0.0006	0.0003	0.0001	0.0003
2E9 Drug use diorders	0.0005	0.0011	0.0003	0.0006
2E10 Post-traumatic stress disorders	0.0001	0.0034	0.0001	0.0012
2E11 Obsessive-compulsive disorder	0.0000	0.0001	0.0000	0.0000
2E12 Panic disorder	0.0004	0.0005	0.0004	0.0004
2E13 Insomnia (primary)	0.0001	0.0001	0.0000	0.0001
2E14 Migraine	0.0005	0.0009	0.0007	0.0007
2E15 Mental retardation attributable to lead exposure	0.0001	0.0001	0.0000	0.0001
2E16 Other neuropsychiatric disorders	0.0091	0.0128	0.0058	0.0092
2F Sense organ diseases	0.0073	0.0077	0.0040	0.0063
2F1 Glaucoma	0.0003	0.0006	0.0001	0.0003
2F2 Cataracts	0.0010	0.0009	0.0004	0.0008
2F3 Refracitve errors	0.0000	0.0000	0.0000	0.0000
2F4 Hearing loss, adult onset	0.0009	0.0008	0.0004	0.0007
2F5 Macular degeneration and other	0.0051	0.0056	0.0031	0.0046
2G Cardiovascular diseases	0.0118	0.0093	0.0058	0.0090
2G1 Rheumatic heart disease	0.0000	0.0002	0.0000	0.0001
2G2 Hypertensive heart disease	0.0012	0.0020	0.0008	0.0013
2G3 Ischaemic heart disease	0.0023	0.0015	0.0009	0.0016
2G4 Cerebrovascular disease	0.0011	0.0008	0.0004	0.0008
2G5 Inflammatory heart disease	0.0004	0.0005	0.0002	0.0004
2G6 Other cardiovascular diseases	0.0069	0.0046	0.0035	0.0050
2H Respiratory diseases	0.0052	0.0137	0.0058	0.0082
2H1 Chronic obstructive pulmonary disea	0.0008	0.0011	0.0005	0.0008
2H2 Asthma	0.0003	0.0010	0.0004	0.0006
2H3 Other respiratory diseases	0.0042	0.0118	0.0050	0.0070
2I Digestive diseases	0.0155	0.0258	0.0150	0.0188
2I1 Peptic ulcer disease	0.0003	0.0011	0.0005	0.0006
2I2 Cirrhosis of the liver	0.0004	0.0003	0.0001	0.0003
2I3 Appendicitis	0.0013	0.0026	0.0022	0.0020
2I4 Other digestive diseases	0.0138	0.0220	0.0123	0.0160
2J Genitourinary diseases	0.0132	0.0213	0.0140	0.0162
2J1 Nephritis and nephrosis	0.0017	0.0045	0.0021	0.0028
2J2 Benign prostatic hypertrophy	0.0002	0.0001	0.0000	0.0001
2J3 Other genitourinary diseases	0.0116	0.0179	0.0123	0.0139
2K Skin diseases	0.0039	0.0065	0.0036	0.0047
2L Musculoskeletal diseases	0.0194	0.0176	0.0116	0.0162
2L1 Rheumatoid arthritis	0.0002	0.0001	0.0001	0.0001
2L2 Osteoarthritis	0.0023	0.0008	0.0006	0.0012
2L3 Gout	0.0001	0.0000	0.0000	0.0000
2L4 Low back pain	0.0028	0.0044	0.0026	0.0033
2L5 Other musculoskeletal disorders	0.0148	0.0127	0.0087	0.0121
2M Congenital anomalies	0.0008	0.0011	0.0008	0.0009
2M1 Abdominal wall defect	0.0000	0.0000	0.0000	0.0000
2M2 Anencephaly	0.0000	0.0000	0.0000	0.0000
2M3 Anorectal atresia	0.0000	0.0000	0.0000	0.0000

Table A6: Incidence rate (cont.)

GBD cause code and name	*Migration background* Austrians	Refugees	Migrants	Total
2M4 Cleft lip	0.0000	0.0000	0.0000	0.0000
2M5 Cleft palate	0.0000	0.0000	0.0000	0.0000
2M6 Oesophageal	0.0000	0.0000	0.0000	0.0000
2M7 Renal agenesis	0.0000	0.0000	0.0000	0.0000
2M8 Down syndrome	0.0000	0.0000	0.0000	0.0000
2M9 Congenital heart anomalies	0.0001	0.0002	0.0001	0.0001
2M10 Spina bifida	0.0000	0.0000	0.0000	0.0000
2M11 Other congenital anomalies	0.0007	0.0008	0.0006	0.0007
2N Oral conditions	0.0015	0.0015	0.0010	0.0013
2N1 Dental caries	0.0001	0.0000	0.0000	0.0000
2N2 Periodontal disease	0.0000	0.0000	0.0000	0.0000
2N4 Other oral diseases	0.0014	0.0014	0.0010	0.0013
3 Injuries	0.0176	0.0177	0.0121	0.0158

Notes: The table shows the annual incidence rates for hospital diagnoses for Austrians, refugees, migrants and over all groups. The classification follows the studies of the global burden of disease (GBD) by the World Health Organization (WHO, 2008).

Table A7: Hospital expenditures for different health conditions (Figure 3)

	(1) Injuries	(2) Non-communicable	(3) Communicable and nutritional cond.	(4) Maternal and perinatal cond.
1^{st} year	24.6	489.3***	83.9***	199.1***
	(15.2)	(54.4)	(18.2)	(20.6)
2^{nd} year	17.8	229.2***	53.4***	97.4***
	(16.6)	(35.9)	(8.8)	(17.7)
3^{rd} year	45.9	228.4***	36.1***	110.3***
	(44.1)	(41.6)	(8.4)	(17.2)
4^{th} year	1.3	112.7***	43.4***	106.2***
	(22.3)	(35.5)	(15.6)	(17.3)
5^{th} year	11.5	191.5***	57.3***	123.2***
	(15.7)	(48.9)	(16.2)	(21.3)
N	5,763,702	5,763,702	5,763,702	2,868,302
Mean	58.6	480.7	21.5	27.9

Notes: This table shows the estimation results of equation 1, comparing hospital expenditures for specific health conditions of refugees and natives. Coefficients on sex, age, calendar year, and community dummies are not shown. The mean of the dependent variable is displayed at the bottom of the table. Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.

Table A8: Expenditures for selected noncommunicable diseases (Figure 4)

	(1) Mental disorders	(2) Digestive system	(3) Musculoskeletal system	(4) Genitourinary system
1^{st} year	154.5***	57.9***	42.5***	53.7***
	(26.0)	(10.0)	(9.9)	(9.9)
2^{nd} year	119.5***	38.0***	10.2*	57.2***
	(21.2)	(11.4)	(6.0)	(10.7)
3^{rd} year	88.1***	18.7**	5.8	62.0***
	(22.0)	(8.1)	(6.0)	(13.1)
4^{th} year	40.5**	7.8	-6.0	52.0***
	(18.0)	(8.6)	(4.9)	(13.5)
5^{th} year	66.6***	13.3*	2.0	48.3***
	(25.4)	(7.7)	(7.4)	(16.9)
Mean	75.9	55.4	62.1	39.4

Notes: This table shows the estimation results of equation 1, comparing health care expenditures of refugees and natives. Dependent variable in column 1 are expenditures for hospital visits related to mental and behavioral disorders (ICD-10 Chapter V), diseases of the digestive system (Chapter XI) in column 2, diseases of musculoskeletal system and connective tissue (Chapter XIII) in column 3, and diseases of the genitourinary system (Chapter XIV) in column 4. Coefficients on sex, age, calendar year, and community dummies are not shown. The mean of the dependent variable is displayed at the bottom of the table. N=5,763,702. Robust standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.

Table A9: Expenditures for selected subgroups of individuals (Figure 5)

	Sex		Age	
	(1) Female	(2) Male	(3) ≤ 30	(4) > 30
1^{st} year	1726.4***	706.9***	906.4***	1330.4***
	(110.580)	(112.952)	(115.981)	(115.753)
2^{nd} year	1129.5***	301.4***	573.7***	750.3***
	(93.162)	(57.891)	(53.511)	(90.168)
3^{rd} year	1067.0***	309.3***	448.8***	805.7***
	(114.422)	(107.265)	(52.434)	(147.630)
4^{th} year	683.1***	113.9	339.4***	357.8***
	(83.903)	(80.175)	(79.803)	(85.307)
5^{th} year	694.4***	183.7**	346.7***	432.3***
	(114.244)	(73.284)	(66.262)	(96.751)
N	2,868,302	2,895,400	1,609,194	4,154,508
Mean	1,200.9	987.9	674.3	1,256.5

Notes: This table shows the estimation results of equation (1), comparing total annual health care expenditures of selected subgroups of refugees and natives. Columns 1 and 2 differentiates between men and women, columns 3 and 4 splits the sample according to age. Coefficients on sex, age, calendar year, and community dummies are not shown. The mean of the dependent variable is displayed at the bottom of the table. Robust standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.

Table A10: Heterogeneity with respect to refugees' region of origin (Figure 6)

	(1) Africa	(2) Middle East	(3) Eastern Europe	(4) Western Balkan
1^{st} year	741.3***	762.9***	2127.3***	675.0***
	(153.4)	(93.8)	(367.4)	(157.4)
2^{nd} year	471.5***	378.2***	1047.1***	327.2***
	(125.6)	(75.4)	(125.3)	(120.7)
3^{rd} year	517.1***	529.9**	644.6***	341.1***
	(157.3)	(243.5)	(95.7)	(104.5)
4^{th} year	119.7	80.8	505.7***	165.4*
	(119.8)	(93.1)	(125.5)	(88.6)
5^{th} year	343.1**	93.5	444.3***	244.7**
	(133.3)	(142.6)	(107.6)	(105.3)
N (total)	5,743,284	5,746,546	5,745,244	5,743,503
Mean	1092.3	1092.5	1092.8	1092.2

Notes: This table shows the estimation results of equation (1) for total annual health care expenditures. In each column, only only refugees from the displayed region of origin are compared to the native population. Coefficients on sex, age, calendar year, and community dummies are not shown. The mean of the dependent variable is displayed at the bottom of the table. Robust standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.