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Research Article

Going "beyond the mean" in analyzing immigrant health disparities

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Abstract

BACKGROUND
On arrival, immigrants are on average healthier than Italian natives, but their health advantage tends to dissipate over time. This constitutes a relevant public health issue for the hosting societies, as it implies higher health care costs, lower labor market participation among immigrants, and lower tax revenues.

OBJECTIVE
This study is the first to take a "beyond the mean" perspective in analyzing health differences between Italians and short-say immigrants, as well as between short- and long-stay immigrants. It highlights whether health differences are concentrated in specific parts of the distributions and which observed or unobserved factors contribute to these differences.

METHODS
We use unconditional quantile regressions combined with Oaxaca-Blinder decompositions on data from the Italian Health Condition Survey.

RESULTS
We find that the health advantage of short-stay immigrants over both Italians and long-stay immigrants is concentrated in the lower part of the health distributions. In both cases, this is mainly due to unobserved factors. Observed economic characteristics are actually associated with better health for long-stay immigrants compared to short-stay immigrants. Our results reveal the need of monitoring immigrants' health, particularly of those with poorer initial health conditions.

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CONTRIBUTION
We examine immigrant health disparities across the entire health distribution. This helps in shaping effective health policies. Policy interventions should be tailored to immigrants with poor health conditions, for example, by improving their access to the health care system.

1. Introduction

The "healthy immigrant effect" (HIE) – the fact that on arrival immigrants tend to be healthier than natives – is a well-established finding in the literature (Domnich et al. 2012). Previous research has also revealed the transitory nature of the HIE, providing insights into a deterioration of immigrants' health over the length of stay of immigrants in the host country (see, e.g., Bousmah, Combes, and Abu-Zaineh 2019; Giuntella and Stella 2017; Aglipay, Colman, and Chen 2013). However, previous research on both these aspects focused only on mean differences. Mean differences can lead to very different consequences in terms of health care costs and health-related inequalities, according to the underlying differences at the top and bottom of the health distribution. For instance, health care costs are much more affected by changes in the lower part of the health distribution than in the rest of it. Hence, from a policy perspective, it is essential to compare the entire health distribution between natives and immigrants as well as among immigrants themselves to identify where the main differences are concentrated and which factors account for these differences. A better understanding of factors associated with large shifts of the left tail of the health distribution is essential to restrain the negative effects of the deterioration of immigrants' health, such as higher health care costs, lower participation in the labor market, lower tax revenues, and smaller positive externalities for the health of natives (Giuntella and Mazzonna 2015).

In this paper, we take a "beyond the mean" perspective on health differences between Italians and immigrants, as well as between short- and long-stay immigrants. Italy, one of the leading countries harboring international migrants worldwide (UN 2019), has a vested interest in shedding light on the determinants of these differences, as the share of documented immigrants residing in Italy grew from about 2% at the turn of the century to almost 9% in the most recent figures (ISTAT 2020). Previous studies investigating the HIE in Italy also focused on mean differences (see, e.g., Petrelli et al. 2017; Caselli, Loi, and Strozza 2017; Loi et al. 2018; Loi and Hale 2019; Campostrini et al. 2019; Trappolini and Giudici 2021). Hence, they do not permit us to assess whether factors contributing to health differences between Italians and immigrants, as well as among immigrants themselves, have differentiated effects across the health distribution.

We add to the literature by adopting a new approach to the study of the HIE. We com-

pare the entire health distributions, which allows us to answer the following questions: (1) Is the HIE evenly distributed over the entire distributions of physical and mental health or is it concentrated in specific parts of the distribution? (2) Do the factors contributing to differences in the health distribution of Italians and (short-stay) immigrants have differentiated effects across the health distribution? (3) How do the health distributions of long-stay immigrants compare to those of short-stay immigrants? (4) What is the role of observable and unobservable characteristics in explaining these differences?

2. Literature review

2.1 The healthy immigrant effect and its evolution over time

The HIE is a well-documented regularity in the literature (Domnich et al. 2012), and it has been investigated in most high-income destination countries using a wide array of health outcomes. Examples include all-cause and cause-specific mortality (Aldridge et al. 2018; Wallace and Kulu 2015; Khlat and Guillot 2017; Vandenheede et al. 2015), self-rated health (SRH; see, e.g., Ichou and Wallace 2019; Akresh and Frank 2008; De Grande et al. 2014; Wallace and Kulu 2014; Khlat and Guillot 2017), activity limitations (Bostean 2013; Ichou and Wallace 2019), chronic illnesses (McDonald and Kennedy 2004; Newbold 2006), and mental health (see, e.g., Vang et al. 2017; Bousmah, Combes, and Abu-Zaineh 2019). Several explanations have been proposed for the existence of the HIE, such as healthier diets and behaviors prior to migration (Abraido-Lanza et al. 1999; Darmon and Khlat 2001; Blue and Fenelon 2011), the selection of healthier individuals into migration via immigrants' choice or immigration screening processes (Jasso et al. 2004; Marmot, Adelstein, and Bulusu 1984; McDonald and Kennedy 2004; Riosmena, Wong, and Palloni 2013; Farré 2016), migration policies (Constant et al. 2018), underreporting of immigrants' health conditions on arrival (Jasso et al. 2004; McDonald and Kennedy 2004), and the selection of unhealthy individuals into return migration ("salmon bias," see, e.g., Palloni and Arias 2004; Riosmena, Wong, and Palloni 2013).

Nevertheless, not all the evidence in the literature provides support for the HIE. In the European context, Moullan and Jusot (2014) find a north–south gradient in immigrants' health status, with immigrants likely to show better health than natives in countries with more recent immigration (e.g., Italy, Spain, and Greece) and worse health than natives in countries with a long immigration history (e.g., Belgium, France, and Sweden). Analyzing 11 European countries, Solé-Auró, Guillén, and Crimmins (2012) show that in the pooled European sample and in some individual countries (Belgium, France, Germany, the Netherlands, Denmark, Sweden, and Switzerland), elderly immigrants use more health services than natives and that their worse health plays a role in their higher usage. As a last example, Nielsen and Krasnik (2010) find that migrants and ethnic mi-

norities have poorer self-perceived health compared to the majority of the population in Sweden, the United Kingdom, Belgium, the Netherlands, and Spain. But these findings may be due to the fact that some authors do not consider immigrants' length of stay.

Indeed, a growing number of studies show that the health advantage that immigrants enjoy on arrival tends to dissipate over time (for SRH, see, e.g., Newbold 2005; Bousmah, Combes, and Abu-Zaineh 2019; Lubbers and Gijsberts 2019; for outcomes related to physical health, see, e.g., Wallace, Khlat, and Guillot 2019; Antecol and Bedard 2006; Khlat and Darmon 2003; Newbold 2005; Giuntella and Mazzonna 2015; Giuntella and Stella 2017; Biddle, Kennedy, and McDonald 2007; Bousmah, Combes, and Abu-Zaineh 2019; for mental health outcomes, see, e.g., Rivera, Casal, and Currais 2016; Alegría et al. 2007; Cook et al. 2009; Aglipay, Colman, and Chen 2013; Vang et al. 2017; Bousmah, Combes, and Abu-Zaineh 2019). This deterioration has been associated with several factors, such as "negative acculturation," meaning a natural convergence toward the average health status of natives (Jasso et al. 2004), unhealthier diets and behaviors after more time in the hosting country (Darmon and Khlat 2001; Fenelon 2013; Antecol and Bedard 2006; Acevedo-Garcia et al. 2005), immigrants' sorting into strenuous occupations (Orrenius and Zavodny 2013, 2009; Giuntella and Mazzonna 2015), lack of knowledge of both the health care system and immigrant rights, cultural and linguistic barriers in communicating with health practitioners, and discrimination (Powles and Gifford 1990).

2.2 The Italian context

Italy started experiencing consistent immigration flows during the 1990s, fueled by the collapse of the Soviet Union, the expansion of the European Union, and political instability in northern Africa. Since then, the number of foreigners has constantly increased, attracted by increasing demand for low-skilled workers in sectors such as domestic and personal care services, hotels and catering, retail and wholesale trade, construction, and agriculture (Reyneri 2010). According to Italian National Institute for Statistics (ISTAT) data, in 2012 (the year considered in our empirical analysis), there were about 4 million immigrants, and they accounted for about 6.8% of the total resident population (ISTAT 2012). They were extremely heterogeneous in terms of countries of origin: the largest group was represented by Romanians (21%), followed by immigrants from Albania (11.1%), Morocco (10.1%), China (4.9%), and Ukraine (4.5%). There were no relevant differences in the composition of the immigrant population according to length of stay: the share of Romanians was slightly higher among those who had been in the country for less than five years (26%), while that of Albanians and Moroccans was slightly lower (8.5%).[3]

[3] A very similar composition of the groups of short-stay and long-stay immigrants is confirmed in our dataset (see Table A-1 in the appendix).

The first insight into the presence of an HIE in Italy was provided by Moullan and Jusot (2014), who showed that immigrants' self-assessed health is better compared to natives. Subsequent studies that compare mortality rates or other physical and mental health outcomes between immigrants and Italians confirm the existence of an HIE (Fedeli et al. 2015; Pacelli et al. 2016) and suggest that it decreases over time (Petrelli et al. 2017; Caselli, Loi, and Strozza 2017; Loi et al. 2018; Loi and Hale 2019; Campostrini et al. 2019; Trappolini and Giudici 2021). Studies on immigrants' health care use report mixed results. On the one hand, Casadei et al. (2016) report a greater difficulty among immigrants in accessing some modalities of hospitalization, and De Luca, Ponzo, and Andrés (2013) and Devillanova and Frattini (2016) detect an overuse of emergency rooms, as well as an underutilization of specialist and preventive care, for immigrants relative to Italians. On the other hand, Trappolini et al. (2020) show that the use of emergency departments varies according to migrants' country of origin. Moreover, Cacciani et al. (2019) show that even though overall hospitalization is lower among immigrants compared to Italians, there is an excess of hospitalization among immigrants for some causes and countries of origin. Similarly, Aragona et al. (2020) report that although hospitalization rates generally decrease for mental disorders among both Italians and immigrants, they increase among asylum seekers.

The main explanation for the HIE in the Italian context is generally a positive selection effect in the country of origin (Pacelli et al. 2016; Loi et al. 2018; Trappolini and Giudici 2021). Some authors suggest that the salmon bias, which generally concerns the re-emigration to the country of origin of elderly and unhealthy immigrants, can also play a role (Pacelli et al. 2016; Di Napoli et al. 2021). Indeed, if elderly and unhealthy individuals return home, immigrants who remain in Italy would display better health outcomes. According to Campostrini et al. (2019), healthier attitudes and behaviors in the country of origin are also relevant. Authors who examine the loss of immigrants' health advantage over time in Italy suggest that it is primarily attributable to the socioeconomic disadvantage of immigrants and their lack of integration (Petrelli et al. 2017; Loi et al. 2018; Loi and Hale 2019; Campostrini et al. 2019). Also, the gender of immigrants seems to be relevant in the immigrant–Italians health convergence, with long-stay female immigrants showing slightly more pronounced health differences compared to Italians than long-stay male immigrants (Trappolini and Giudici 2021).

Although the studies mentioned so far contributed to the identification and explanation of the HIE and its evolution over time, they considered only mean impacts. As noticed by Carrieri and Jones (2017), this shortcoming is due to the common unavailability of continuous health variables in standard social or health surveys as well as to the only recent development of "beyond the mean" econometric techniques (for a review, see Fortin, Lemieux, and Firpo 2011). However, from a policy perspective, it is fundamental to assess whether differences in health conditions of immigrants and Italians are concentrated in specific parts of the health distribution and whether factors contributing to these

differences have differentiated effects across the health distribution. Indeed, this could help policymakers in preventing the effects of those factors that worsen especially the left tail of the health distribution, which is associated with larger costs for both individuals and the health care system.

3. Research hypotheses

In this paper, we contribute to the literature by taking a "beyond the mean" perspective and comparing the entire distributions of two continuous health variables (described in the next section) between Italians and short-stay immigrants, as well as between short- and long-stay immigrants, and examining whether these differences are related to observable or unobservable characteristics. Although the literature discussed in the previous section concentrates on mean differences, it can be useful for deriving hypotheses regarding the four research questions presented in the introduction. The main explanation of the HIE in the Italian context is a positive selection effect in the country of origin. If this is the case, the health distribution of short-stay immigrants should be truncated in its left tail. Hence, when comparing the health distributions of Italians and short-stay immigrants, we should observe larger differences in the lower quantiles of the health distribution (ceteris paribus). This leads to our first hypothesis:

> *Hypothesis 1 (H1):* The HIE is concentrated in the lower part of the physical and mental health distributions.

Furthermore, if the HIE is due to a selection effect, differences in health distributions between Italians and short-stay immigrants (especially in the lower part of the distributions) should not be related to observable characteristics. Hence, we can formulate a second hypothesis:

> *Hypothesis 2 (H2):* Differences in health distribution between Italians and short-stay immigrants are mainly due to unobservable factors.

It is worth noting that these two hypotheses would be consistent also with the underreporting of immigrants' health conditions on arrival if individuals with the worst health conditions are more likely to underreport them.

Deriving hypotheses for differences in the health distributions of short- and long-stay immigrants is more complicated because our empirical analysis is based on cross-sectional data. Indeed, in a cross-sectional setting, these differences can arise because of two phenomena: i) differences in the two underlying populations; ii) the deterioration of immigrants' health conditions over time. To capture the first phenomenon, we should compare the health distribution of current short-stay immigrants and the health

distribution of long-stay immigrants when they first arrived in Italy. Unfortunately, our data does not allow us to do this. However, as mentioned above, the composition of the immigrant population in Italy was quite stable up to the year considered in this study. Furthermore, the approximate age of arrival appears quite similar for short-stay and long-stay immigrants (see subsection 4.2 for more details). Hence, we do not expect large differences in the two underlying populations. In contrast, various studies have documented the deterioration of immigrants' health conditions over time and provided various explanations for it. Therefore, we derive some hypotheses for the differences in the health distributions of short- and long-stay immigrants by considering the implications of these explanations. The two main explanations for the loss of immigrants' health advantage over time in Italy are their socioeconomic disadvantage and their lack of integration. If immigrants' health worsens over time because of some socioeconomic disadvantage (e.g., low income, poor living and housing conditions, etc.), this is likely to occur at all levels of the health distribution, shifting the latter progressively to the left as the length of stay increases. Moreover, differences in the health distributions of short- and long-stay immigrants should be mainly due to the effects of socioeconomic variables (employment status, type of occupation, wealth). This leads to hypotheses H3a and H4a:

> *Hypothesis 3a (H3a):* The entire physical and mental health distributions of long-stay immigrants lie to the left of those of short-stay immigrants.
>
> *Hypothesis 4a (H4a):* Differences in the health distributions of short- and long-stay immigrants are mainly due to effects of socioeconomic variables (employment status, type of occupation, wealth).

In contrast, if the loss of immigrants' health over time is due to their lack of integration and/or to difficulties in accessing the health care system, individuals with worse initial health conditions should be more affected. This would imply that the left tail of immigrants' health distributions shifts progressively to the left as their length of stay increases. Moreover, differences in the health distributions of short- and long-stay immigrants should be mainly due to some unobservable factors.[4] Hence, we have the following alternative hypotheses:

> *Hypothesis 3b (H3b):* Differences in the health distributions of short- and long-stay immigrants are concentrated in the lower part of the physical and mental health distributions.

[4] If differences in the lower part of the health distributions are due to immigrants' difficulties in accessing the health care system, they could be explained by immigrants' knowledge of the health care system, linguistic barriers, and discrimination in the country of arrival. Unfortunately, the data used in the empirical analysis does not provide this information. Hence, in this case we attribute differences in the health distributions to unobservable factors.

Hypothesis 4b (H4b): Differences in the health distributions between short- and long-stay immigrants are mainly due to unobservable factors.

Other explanations of the deterioration of immigrants' health conditions over time, such as migrants' negative acculturation (a natural convergence of immigrants' health toward the average health status of Italians as they remain in the country) or a negative change in migrants' health perceptions over time, would be consistent with either H3a or H3b according to whether these phenomena occur at all levels of the health distribution or only for individuals with bad health. We have no information to distinguish between these two cases. However, the methodology used in the empirical analysis allows us to discuss other implications of these explanations in section 5.

4. Data and methods

4.1 Data

We use data from the most recent wave (2012–2013) of the Italian National Health Survey (INHS) conducted by the Italian National Institute of Statistics (ISTAT 2016). This survey has been carried out since 1994, but only its most recent wave comprises information on the length of stay of immigrants, which is key to our analysis. The survey is representative at the national level and consists of 49,811 households (119,073 individuals). Our final sample consists of 69,051 individuals (64,073 Italians and 4,978 immigrants) aged 20–64. Our analysis does not include individuals younger than 20 because health indicators based on self-assessed questions could be influenced by parental input at those ages (Breidablik, Meland, and Lydersen 2009; Wade and Vingilis 1999). We also exclude individuals older than 64, as immigrants are younger than Italians (ISTAT 2018).

We identify as immigrants those individuals without Italian citizenship but with regular residence permits (thus with complete entitlement for national health care programs), because the INHS does not provide information on individuals' countries of birth. However, it is important to underline that the Italian citizenship policy (Law 91/1992) requires ten years of residence for naturalization, with a bureaucratic process that can take up to three years.[5] Since immigration to Italy became a relevant phenomenon only at the end of the 1990s and the beginning of the 2000s, the share of naturalized immigrants in 2012 (the year considered in our empirical analysis) was very small (around 3% of all immigrants aged 18–65, with an average length of stay of 18 years).[6] Hence, the group

[5] Alternatively, naturalization can occur in the case of marriage with an Italian citizen, and it requires two years of residence after the marriage. However, in the case, the immigrant's inclusion in the Italian system may be very different than for other immigrants because he or she can rely on the spouse's knowledge and networks.

[6] The figures inside the parentheses were computed using the 2011–2012 ISTAT survey on "Social Condition and Integration of Foreign Citizens." Using this dataset, we calculated that immigrants without Italian citizen-

of foreign-born immigrants and the group of non-Italians almost overlap. As a consequence, we are confident that distinguishing between Italians and immigrants according to citizenship does not affect our results and that our results are comparable with those of other studies that define immigrants according to place of birth.

In the survey, information on duration of stay is measured by the variable "years of residence in Italy," which has six possible answers: "0–3," "4–6," "7–9," "10–12," "12+," and "foreign citizens born in Italy." Those whose length of stay is in the first category (zero to three years) we identify as short-stay immigrants; all others are identified as long-stay immigrants. We use this three-year cut-off to come as close as possible to the definition of short-stay immigrants used by international migration statistics (OECD 2003). This generates a sample of 522 short-stay immigrants and 4,456 long-stay immigrants. However, we also perform a robustness check of our results (see subsection 5.3), by using a six-year cut-off (that is, by defining as short-stay immigrants those whose length of stay is in the first two categories: 0–3 and 4–6). Results remain virtually unchanged.

4.2 Health outcomes and explanatory variables

The health measures used in our analysis are two summary indicators of physical and mental health: the physical component summary (PCS) and the mental component summary (MCS). These two indices are based on answers to the 12 questions of the SF-12 (Short Form Health Survey) questionnaire (Apolone et al. 2005), which investigates eight multi-item dimensions. Four of these dimensions involve physical health: physical functioning, the role of limitations due to physical health, body pain, and general health. The other four dimensions relate to mental conditions: vitality, social functioning, emotional state, and mental health. According to the answers provided for each item of these dimensions, a total score for both physical and mental health is computed, generating two continuous variables (the PCS and MCS) that range from 0 to 100, where higher scores correspond to better health.

The PCS and MCS have the advantage of being quasi-objective health status indices. That is, they report health problems that have been diagnosed by health professionals or very peculiar aspects of an individual's health (Lindeboom and Kerkhofs 2009; Heger 2018). On the one hand, quasi-objective health indices smooth the reporting heterogeneity bias that characterizes self-assessed health measures (Bago d'Uva et al. 2008). On the other hand, by still relying on self-reported conditions (Ziebarth 2010), they yield information that would not be available otherwise (Pfarr, Schmid, and Schneider 2012).

ship represent more than 99% of those who have been in Italy for less than 11 years and 94% of those who have been in Italy for more than 11 years. Unfortunately, this dataset has a different sampling method and different health questions than the one used in our empirical analysis, and we could not merge the two datasets.

Another important advantage of the PCS and MCS is that they are continuous variables, thus allowing a "beyond the mean" analysis.

Our analysis controls for important health determinants: age and gender, educational levels, employment status and type of occupation, family composition, wealth,[7] smoking habits, residence area, city size, and citizenship by area of origin (see section 5 for more details). Unfortunately, as with the majority of standard social and health surveys, the INHS does not provide information on immigrants' health in the country of origin, reasons for migrating, knowledge about the health care system, linguistic barriers, and discrimination in the country of arrival, which would be helpful information for analyzing the HIE. It does not provide information on immigrants' ages at arrival either. If long-stay immigrants arrived in Italy at younger age, they may have experienced more difficulties in the integration process, with negative consequences for their health. Hence, the estimated differences between the two groups, at the same age, may capture differences in age at arrival rather than a length-of-stay effect. We checked whether this could represent an important problem for our analysis by using available information on immigrants' length of stay to compute an "approximate age at arrival."[8] Although we did not use this variable as a control, because the approximation could create problems of measurement error in the model estimation, we do not think this missing information represents a relevant problem for our analysis because the average "approximate age at arrival" is very similar for long-stay and short-stay immigrants (30 and 33 years, respectively).

4.3 Empirical strategy

We follow the unconditional quantile regression approach of Firpo, Fortin, and Lemieux (2009), which is based on a linear approximation of the unconditional quantiles through a recentered influence function (RIF). This estimation approach allows us to perform a Oaxaca-Blinder (OB) decomposition (Blinder 1973; Oaxaca 1973) at various quantiles of the physical and mental health distributions (Firpo, Fortin, and Lemieux 2018). Compared to other decomposition methods (e.g., the method proposed by Machado and Mata 2005, based on conditional quantile regressions), the use of a linear specification for RIF regressions allows us to compute approximate partial effects of a single covariate on the unconditional quantiles. In our setting, this method is fundamental to assessing which factors are associated with differences in the various parts of the physical and mental

[7] Unfortunately, the INHS does not provide numeric measures of wealth or income, so we rely on a self-evaluation of a family's economic resources in the last 12 months and a housing wealth index, which is calculated through Principal Component Analysis (PCA) by exploiting information regarding home ownership and typology, the number of rooms and bathrooms per person, and the presence of heating, a lift, water stains, mold, and fungus. For details, see Vyas and Kumaranayake (2006).

[8] More precisely, we defined this as the difference between the current age and the central value of the "years of residence" class (e.g., five years if the class is "4–6," eight years if the class is "7–9," and so on).

health distributions. More specifically, the method works as follows: For a given health measure (H), a set of variables that link individuals' health with the various quantiles of the health distribution is computed (one variable for each quantile, the RIF functions) and then used as dependent variable in OLS regressions on the explanatory variables X. An important property of the RIF function is that its expectation yields the original value of the quantile. Hence, given the linear specification of the RIF regression, the observed sample quantile of the health measure, q_τ, can be written as:

$$q_\tau = E[X]\hat{\delta}_\tau, \tag{1}$$

where $\hat{\delta}_\tau$ is the vector of the RIF regression coefficients.

A similar logic to the Oaxaca-Blinder decomposition at the mean can be applied also in the context of the RIF regression as described in Equation (1) (for a review, see Fortin, Lemieux, and Firpo 2011). Formally, differences in estimated health levels between group 1 and group 2 at each quantile can be decomposed as follows:

$$\hat{\Delta}_H^\tau = (\bar{X}_1 - \bar{X}_2)\hat{\delta}_1 + \bar{X}_2(\hat{\delta}_1 - \hat{\delta}_2), \tag{2}$$

where $\bar{X}_1$ and $\bar{X}_2$ are the sample means of the explanatory variables X for the two groups and $\hat{\delta}_1$ and $\hat{\delta}_2$ represent the coefficients of the regression for the two groups. As suggested by Jann (2008a), we transform the coefficients of all categorical variables in the model so that the results of the detailed decomposition are invariant to the choice of the base category. Standard errors of the contribution of explanatory variables to the first and second part of Equation (2) are computed using the delta method (for a detailed discussion, see Jann 2008b).

The first term in Equation (2) is the part of health differences that is "explained" by different endowments of observed covariates between the two groups. This is also known as composition effect. The second term in Equation (2) measures the part of health differences that is accounted for by differences in the coefficients associated with the covariates and the constant i.e., different "health returns" of the covariates in the two groups. This is sometimes called elasticity effect. To clarify the interpretation of the two types of effects, suppose that a given quantile of the health distribution of two groups differs because one group is relatively younger than the other but individuals at the same age in the two groups have similar health conditions (ceteris paribus). In this case we should observe a large composition effect and a negligible elasticity effect associated with age. In contrast, if individuals at the same age in the two groups have different health conditions (ceteris paribus), we should observe a sizable elasticity effect associated with age. This means that elasticity effects represent "unexplained" differences. That is, they capture the presence of some unobservable factors that generate different health

conditions for a given covariate (as in the previous example) or overall (when they are associated with the constant).

The linear specification of Equation (2) allows us to sum up the composition effects (or elasticity effects) of two or more variables, as we do in presenting our results in section 5.

5. Results and discussion

5.1 Descriptive statistics

Table 1 illustrates the differences in the PCS and MCS distributions of short-stay immigrants compared to Italians and to long-stay immigrants (aged 20–64). They suggest the presence of an HIE, as well as worse health outcomes of long-stay immigrants compared to short-stay immigrants in terms of both physical and mental health. Mean differences are quite small. The average PCS (MCS) of short-stay immigrants is about 2 (1.8) points higher than the one of Italians and about 1.5 (0.7) points higher than the one of long-stay immigrants. Considering the whole distributions, however, health differences in their lower parts are much larger, whereas they are almost negligible in their upper parts. The bottom PCS (MCS) decile for short-stay immigrants is 9.1 (7.4) points higher than that of Italians and 6.7 (3.3) points higher than that of long-stay immigrants. These results provide an answer to our first and third research questions and confirm hypotheses H1 and H3b (H3a): the HIE and differences in the health distributions of short- and long-stay immigrants are concentrated in the lower parts of the physical and mental health distributions.

Table 1: Physical and mental component summaries for Italians, short-stay immigrants, and long-stay immigrants

	I	I_s	I_l	I-I_s (p-value)	I-I_l (p-value)	I_l-I_s (p-value)
PCS						
Mean	52.947	54.913	53.412	–1.965 (0.000)	–0.465 (0.002)	–1.500 (0.000)
Q10	34.462	43.557	36.896	–9.095 (0.000)	–2.434 (0.000)	–6.661 (0.000)
Q25	49.155	53.770	50.201	–4.615 (0.000)	–1.046 (0.000)	–3.569 (0.000)
Q50	55.207	56.000	55.207	–0.793 (0.000)	0.000 (0.990)	–0.793 (0.000)
Q75	57.000	57.000	57.000	0.000 (–)	0.000 (–)	0.000 (–)
Q90	58.000	58.000	58.000	0.000 (–)	0.000 (–)	0.000 (–)
MCS						
Mean	49.279	51.117	50.412	–1.838 (0.000)	–1.133 (0.000)	–0.705 (0.105)
Q10	28.005	35.367	32.107	–7.362 (0.000)	–4.102 (0.000)	–3.260 (0.000)
Q25	41.411	44.973	43.620	–3.562 (0.000)	–2.208 (0.000)	–1.353 (0.000)
Q50	49.101	51.047	50.684	–1.945 (0.000)	–1.582 (0.000)	–0.363 (0.020)
Q75	54.335	55.387	55.161	–1.051 (0.000)	–0.825 (0.000)	–0.226 (0.014)
Q90	58.331	58.208	58.387	0.123 (0.195)	–0.056 (0.215)	0.179 (0.084)

Notes: I: Italians; I_s: Short-stay immigrants; I_l: Long-stay immigrants; PCS: Physical component summary; MCS: Mental component summary; Q: Quantile. Numbers are weighted. The significance levels of the mean differences were calculated using a two-sided t-test. For the definitions of the PCS and MCS, see subsection 4.2.

These differences could be partly explained by the fact that short- and long-stay immigrants are younger than Italian citizens (see Table A-1 in the appendix). However, Table A-1 shows that the distribution of other characteristics is more unfavorable for immigrants' health. First, Italian citizens and long-stay immigrants have generally higher educational levels compared to short-stay immigrants. Second, both short- and long-stay immigrants are more likely to be unemployed compared to Italian citizens, and they primarly work in blue collar jobs. This is in line with the idea that immigrants are more likely to work in strenuous occupations and suffer from over-education with respect to Italians (Dell'Aringa and Pagani 2011; Fullin and Reyneri 2011), with possible negative consequences in terms of health (Rosano et al. 2012). Third, the majority of immigrants reports poor or absolutely inadequate wealth, as well as low levels of housing wealth, and this is generally associated with worse health outcomes at both a theoretical and empirical level (Chang 1996; Hernandez, Blazer et al. 2006).

Differences between Italians and immigrants in terms of other characteristics may have more ambiguous consequences for health. Both short- and long-stay immigrants are concentrated in the center and north of Italy, where health care services are better and more easily accessed (Masseria and Giannoni 2010; Toth 2014). But disparities in health care utilization between immigrants and Italians are well documented (De Luca, Ponzo, and Andrés 2013). Immigrants (especially long-stay) are somewhat more concentrated in medium-sized and large cities, with possible negative consequences in terms of mental health (Gruebner et al. 2017). They are also more likely to be single and less likely

to be single parents. While the absence of a partner is generally associated with worse health, the presence of children might have more ambiguous effects (Barrett and Turner 2005; Ross, Mirowsky, and Goldsteen 1990). Negligible differences between Italians and immigrants emerge in terms of health behaviors (incidence of habitual and occasional smokers).

In short, immigrants are healthier than Italian citizens, but health conditions of long-stay immigrants are worse than those of short-stay immigrants, and both these phenomena are more concentrated in the lower part of the health distribution. This could reflect the fact that immigrants are younger than Italians, and they age as they remain in the country. However, immigrants are also less educated and poorer, and they face more difficulties in the labor market compared to Italian citizens. All these elements should have negative consequences in terms of health. In turn, they are more concentrated in the centre-north of Italy, where health care services are better than in the south, although immigrants may suffer from health care utilization disparities with respect to Italians.

In what follows, we examine the relative importance of these variables in explaining health differentials between Italians and immigrants as well as between long- and short-stay immigrants. To this end, we first run RIF regressions for the PCS and MCS of the three groups of interest (Italians, short-stay immigrants, and long-stay immigrants), including all the variables reported in Table A-1.[9]

5.2 Oaxaca-Blinder decomposition results

Tables 2 and 3 show the OB decomposition of differences between Italians and short-stay immigrants at various PCS and MCS quantiles, while Tables 4 and 5 do the same for differences between long-stay and short-stay immigrants. A negative (positive) difference means that a given PCS or MCS quantile is lower (higher) among Italians and long-stay immigrants compared to short-stay immigrants. Panel A reports the overall composition and elasticity effects, whereas panel B illustrates the specific composition and elasticity effects associated with the covariates. To facilitate the reading of the tables, we present only the aggregate effect of some broad groups of covariates, as defined in Table A-1. For example, the group "age and gender" represents the sum of the effects of all sex-age dummy variables, the group "education" represents the sum of the effects of all education dummies, and so on. To interpret these results, recall that we transformed the estimated coefficients of all categorical variables in the model by expressing them as deviations from the grand mean. This ensures that results of the detailed decomposition are invariant to the choice of the base category. Hence, differences in the constant terms do not represent differences in the quantiles associated with the base categories, but represent overall unexplained differences.

[9] RIF regression results are available upon request.

Table 2: Decomposition results of differentials between Italians and short-stay immigrants in physical component summary

	Q10	Q25	Q50	Q75	Q90
Δ_{I-I_s}	–7.562	–2.776	–0.494	–0.273	–0.328
	(0.731)	(0.216)	(0.126)	(0.112)	(0.297)
	[0.000]	[0.000]	[0.000]	[0.014]	[0.270]
Panel A					
Composition effect	–0.168	–0.267	–0.159	–0.268	–0.386
	(0.409)	(0.099)	(0.031)	(0.030)	(0.062)
	[0.681]	[0.007]	[0.000]	[0.000]	[0.000]
Elasticity effect	–7.394	–2.509	–0.335	–0.005	0.058
	(0.804)	(0.230)	(0.126)	(0.113)	(0.300)
	[0.000]	[0.000]	[0.008]	[0.965]	[0.847]
due to covariates	–0.333	–0.990	–0.366	–0.498	0.271
due to constant	–7.061	–1.519	0.031	0.493	–0.213
Panel B: Detailed decomposition					
Composition effect					
Age and gender	–3.097	–1.004	–0.358	–0.335	–0.373
	(0.208)	(0.063)	(0.023)	(0.021)	(0.030)
Education	0.360	0.109	0.034	0.024	0.035
	(0.084)	(0.023)	(0.007)	(0.006)	(0.011)
Occupation	-0.163	0.088	0.044	0.025	0.049
	(0.168)	(0.033)	(0.010)	(0.011)	(0.029)
Family composition	0.603	0.116	0.038	0.009	0.037
	(0.158)	(0.035)	(0.011)	(0.010)	(0.025)
Wealth	2.089	0.414	0.071	-0.010	-0.135
	(0.234)	(0.049)	(0.012)	(0.011)	(0.031)
Risk behavior	0.011	0.001	0.000	0.001	0.014
	(0.015)	(0.003)	(0.001)	(0.001)	(0.008)
Geography	0.029	0.010	0.013	0.019	-0.012
	(0.075)	(0.019)	(0.006)	(0.006)	(0.012)
Elasticity effect					
Age and gender	0.206	–0.130	–0.118	–0.115	–0.003
	(0.740)	(0.194)	(0.105)	(0.082)	(0.216)
Education	–0.126	–0.214	–0.143	–0.068	–0.293
	(0.453)	(0.211)	(0.105)	(0.097)	(0.213)
Occupation	1.005	–0.190	–0.068	–0.134	–0.464
	(0.526)	(0.376)	(0.220)	(0.130)	(0.197)
Family composition	0.734	0.257	–0.101	0.101	0.251
	(0.697)	(0.257)	(0.191)	(0.155)	(0.492)
Wealth	–1.664	–0.488	–0.056	–0.216	0.455
	(0.865)	(0.322)	(0.182)	(0.266)	(0.459)
Risk behavior	0.776	–0.120	0.098	–0.140	–0.143
	(0.648)	(0.420)	(0.228)	(0.280)	(0.873)
Geography	–0.959	–0.034	0.051	0.121	0.485
	(0.607)	(0.163)	(0.087)	(0.082)	(0.256)
Citizenship	–0.305	–0.070	–0.029	–0.046	–0.017
	(0.451)	(0.126)	(0.072)	(0.064)	(0.158)
Constant	–7.061	–1.519	0.031	0.493	–0.213
	(1.606)	(0.733)	(0.437)	(0.464)	(1.252)

Notes: I: Italians; I_s: Short-stay immigrants; Q: Quantile. Standard errors are clustered at family level and reported in parentheses. P-values are reported in brackets. P-values for the categories of the detailed decomposition are omitted for the sake of clarity.

Tables 2 and 3 show the role of covariates in explaining differences in the distributions of physical and mental health between Italians and short-stay immigrants. Hence, they provide evidence to answer our second research questions and to test our second

hypothesis (H2). For physical health, composition effects explain much of the distance between Italians and short-stay immigrants in the upper part of the distribution, whereas elasticity effects play a major role in the bottom part of the distribution (Table 2). The detailed decomposition reveals that composition effects in the upper part of the distribution are mainly related to age and gender, which are in favor of short-stay immigrants. The elasticity effect at the bottom of the distribution is negative and largely due to differences in the constant term – that is, to some unobserved factors. In a nutshell, most of the PCS differentials between Italians and short-stay immigrants in the upper part of the distribution are explained by differences in the age composition of the two groups. In contrast, differences in the lower part of the distribution are largely associated with some unobservable factors that contribute to a higher PCS of short-stay immigrants compared to Italians.

A similar story emerges if we consider differences in mental health conditions (Table 3). In this case, the composition effect dominates in the top decile, whereas the elasticity effect plays a major role in the rest of the distribution. The elasticity effect associated with education, wealth, and family composition is in favor of immigrants for the median and the third quartile (meaning that for these quantiles, at the same level of education, wealth, and family composition, immigrants enjoy better health than Italians). In the bottom quartile and decile, the positive "health returns" of employment and type of occupation are more than offset by a large and negative difference in the constants.

In short, our results show that the HIE is mainly due to large differences in the lower part of the physical and mental health distributions (confirming H1) and that these differences are mainly related to some unobservable factors (confirming H2). This evidence is in line with explanations of the HIE that refer to selection (into migration or into return migration), because the selection process is likely to "eliminate" from the immigrant group individuals with the worst health conditions (those at the bottom of the distribution). This would be consistent also with underreporting of immigrants' health conditions, if again this occurs only for the worst health conditions.

Table 3: Decomposition results of differentials between Italians and short-stay immigrants in mental component summary

	Q10	Q25	Q50	Q75	Q90
Δ_{I-I_s}	–6.044	–2.332	–1.130	–0.872	–0.208
	(1.157)	(0.827)	(0.569)	(0.570)	(0.513)
	[0.000]	[0.005]	[0.047]	[0.126]	[0.686]
Panel A					
Composition effect	1.494	0.904	0.236	0.008	-0.351
	(0.464)	(0.275)	(0.137)	(0.102)	(0.104)
	[0.001]	[0.001]	[0.085]	[0.938]	[0.001]
Elasticity effect	–7.539	–3.237	–1.366	–0.879	0.143
	(1.216)	(0.842)	(0.577)	(0.575)	(0.523)
	[0.000]	[0.000]	[0.018]	[0.127]	[0.784]
due to covariates	–0.588	1.913	–0.877	–2.022	–0.384
due to constant	–6.951	–5.150	–0.489	1.142	0.527
Panel B: Detailed decomposition					
Composition effect					
Age and gender	–1.063	–0.977	–0.549	–0.397	–0.371
	(0.175)	(0.119)	(0.069)	(0.052)	(0.052)
Education	–0.052	0.019	–0.007	–0.032	–0.032
	(0.059)	(0.033)	(0.018)	(0.015)	(0.017)
Occupation	–0.370	–0.118	–0.128	–0.098	–0.097
	(0.172)	(0.102)	(0.047)	(0.036)	(0.040)
Family composition	0.362	0.127	–0.006	–0.041	–0.144
	(0.174)	(0.092)	(0.048)	(0.040)	(0.046)
Wealth	2.377	1.741	0.884	0.579	0.305
	(0.322)	(0.192)	(0.093)	(0.065)	(0.057)
Risk behavior	–0.115	–0.065	–0.027	–0.021	–0.021
	(0.068)	(0.038)	(0.016)	(0.012)	(0.013)
Geography	0.356	0.177	0.068	0.017	0.009
	(0.083)	(0.045)	(0.027)	(0.023)	(0.025)
Elasticity effect					
Age and gender	–0.931	–0.194	0.002	0.250	–0.008
	(1.102)	(0.657)	(0.473)	(0.462)	(0.515)
Education	–0.349	–0.654	–0.094	–0.880	–0.719
	(1.015)	(0.742)	(0.426)	(0.406)	(0.329)
Occupation	1.671	1.521	0.505	–0.008	0.285
	(0.838)	(0.543)	(0.823)	(0.778)	(0.694)
Family composition	–0.473	–0.212	–0.919	–0.356	0.040
	(1.943)	(1.043)	(0.691)	(0.687)	(0.607)
Wealth	0.034	–0.110	–0.869	–1.099	0.045
	(1.652)	(1.260)	(0.983)	(0.910)	(1.063)
Risk behavior	0.913	1.823	0.196	–0.593	–0.741
	(0.979)	(0.858)	(1.089)	(1.016)	(0.485)
Geography	–1.079	–0.176	0.287	0.377	0.444
	(1.029)	(0.615)	(0.405)	(0.424)	(0.449)
Citizenship	–0.375	–0.085	0.016	0.288	0.270
	(0.729)	(0.491)	(0.309)	(0.322)	(0.287)
Constant	–6.951	–5.150	–0.489	1.142	0.527
	(3.198)	(2.039)	(1.900)	(1.797)	(1.604)

Notes: I: Italians; I_s: Short-stay immigrants; Q: Quantile. Standard errors are clustered at family level and reported in parentheses. P-values are reported in brackets. P-values for the categories of the detailed decomposition are omitted for the sake of clarity.

Tables 4 and5 show the role of covariates in explaining differences in the distributions of physical and mental health between short-stay and long-stay immigrants. Hence, they provide evidence to answer our fourth research question and to test our fourth hy-

pothesis (H4a vs. H4b). The worse physical health conditions of long-stay immigrants compared to short-stay immigrants are concentrated in the bottom quartile and decile, where again the elasticity effect dominates (it accounts for about 75% of the differentials in the bottom quartile and for 86% in the bottom decile). In this part of the distribution, the elasticity effects associated with occupation and family composition are actually positive, but they are more than offset by a large negative difference in the constants – that is, negative effects of some unobserved factors. For mental health, quantile differences between short-stay and long-stay immigrants are negligible (Table 5). Interestingly, however, in the bottom part of the distribution, elasticity effects associated with occupation are again positive. That is, they are in favor of long-stay immigrants.

These results suggest that the worse physical health conditions of long-stay immigrants compared to short-stay immigrants are not related to some socioeconomic disadvantage, and in particular they are not related to labor market phenomena. Indeed, long-stay immigrants are more likely to be employed, with better health associated with their type of occupation. Hence, we can reject hypothesis 4a (H4a) and conclude that explanations of immigrants' health deterioration over time based on the type of occupation do not appear consistent with our findings. An explanation for the deterioration of immigrants' physical health over time that is consistent with our findings is related to difficulties in accessing the health care system (lack of knowledge, linguistic barriers, discrimination, etc.). Indeed, these difficulties become important when the need to access health care services is stronger, that is, when health is particularly bad. If immigrants with more critical health conditions do not receive adequate health services, their health is likely to worsen faster over time, and, as highlighted in hypothesis H4b, differences in the health distributions of short- and long-stay immigrants should be due mainly to some unobservable factors. Our results confirm this hypothesis. Our findings would be consistent also with a negative change in immigrants' health perceptions over time, but only if this change occurs mainly for individuals with worse health conditions. We are not aware of studies supporting this hypothesis. Hence, we reckon that difficulties in accessing the health care system play a more important role in driving our results.[10]

[10] As mentioned in subsection 4.1, the INHS does not allow us to control for factors such as lack of knowledge, linguistic barriers, and discrimination. However, previous research corroborates this explanation, finding evidence of unequal access to health care services for immigrants compared to Italians (De Luca, Ponzo, and Andrés 2013; Devillanova and Frattini 2016).

Table 4: Decomposition results of differentials between long-stay immigrants and short-stay immigrants in physical component summary

	Q10	Q25	Q50	Q75	Q90
$\Delta_{I_l - I_s}$	–4.999	–2.146	–0.415	–0.127	–0.445
	(0.868)	(0.241)	(0.112)	(0.099)	(0.240)
	[0.000]	[0.000]	[0.000]	[0.198]	[0.064]
Panel A					
Composition effect	–0.869	–0.525	–0.156	–0.181	–0.192
	(0.660)	(0.167)	(0.051)	(0.050)	(0.078)
	[0.188]	[0.002]	[0.002]	[0.000]	[0.014]
Elasticity effect	–4.131	–1.620	–0.259	0.054	–0.253
	(1.052)	(0.271)	(0.118)	(0.107)	(0.249)
	[0.000]	[0.000]	[0.029]	[0.615]	[0.311]
due to covariates	2.366	–0.329	0.028	–0.327	0.555
due to constant	–6.497	–1.291	–0.288	0.381	–0.808
Panel B: Detailed decomposition					
Composition effect					
Age and gender	–0.744	–0.386	–0.139	–0.133	–0.124
	(0.341)	(0.096)	(0.034)	(0.031)	(0.040)
Education	–0.054	–0.005	0.006	0.007	0.018
	(0.125)	(0.030)	(0.010)	(0.009)	(0.014)
Occupation	0.451	0.059	0.010	–0.000	–0.012
	(0.241)	(0.043)	(0.012)	(0.012)	(0.021)
Family composition	0.034	–0.025	0.019	–0.013	–0.063
	(0.335)	(0.091)	(0.030)	(0.028)	(0.044)
Wealth	0.086	0.024	0.007	0.004	–0.001
	(0.216)	(0.058)	(0.012)	(0.008)	(0.022)
Risk behavior	0.022	–0.002	–0.002	–0.000	0.001
	(0.049)	(0.007)	(0.006)	(0.003)	(0.006)
Geography	–0.570	–0.169	–0.055	–0.036	–0.021
	(0.249)	(0.073)	(0.020)	(0.019)	(0.023)
Citizenship	–0.092	–0.021	–0.003	–0.009	0.011
	(0.126)	(0.035)	(0.011)	(0.010)	(0.019)
Elasticity effect					
Age and gender	–0.074	–0.309	–0.217	–0.201	–0.227
	(0.764)	(0.196)	(0.092)	(0.075)	(0.178)
Education	0.367	–0.150	–0.138	–0.052	–0.249
	(0.618)	(0.200)	(0.090)	(0.083)	(0.172)
Occupation	1.330	0.043	–0.029	–0.129	–0.364
	(0.750)	(0.326)	(0.176)	(0.111)	(0.164)
Family composition	2.118	0.740	0.091	0.183	0.341
	(1.260)	(0.353)	(0.178)	(0.141)	(0.407)
Wealth	0.823	–0.392	–0.051	–0.166	0.638
	(1.526)	(0.391)	(0.167)	(0.214)	(0.381)
Risk behavior	–0.509	0.122	0.322	–0.067	–0.198
	(0.925)	(0.442)	(0.200)	(0.235)	(0.692)
Geography	–1.300	–0.284	0.039	0.104	0.508
	(0.679)	(0.172)	(0.079)	(0.075)	(0.202)
Citizenship	–0.388	–0.099	0.011	0.002	0.106
	(0.516)	(0.139)	(0.065)	(0.056)	(0.127)
Constant	–6.497	–1.291	–0.288	0.381	–0.808
	(2.590)	(0.809)	(0.387)	(0.394)	(1.010)

Notes: I_s: Short-stay immigrants; I_l: Long-stay immigrants; Q: Quantile. Standard errors are clustered at family level and reported in parentheses. P-values are reported in brackets. P-values for the categories of the detailed decomposition are omitted for the sake of clarity.

It is worth noting that our findings are not consistent with selection into return mi-

gration. Indeed, if unhealthy immigrants are more likely to return home, the left tail of immigrants' health distribution should shift rightward over time, and the elasticity effect associated with the constant in Tables 4 and 5 should be positive in the bottom part of the distribution (ceteris paribus). But we observe the opposite. On the other hand, if immigrants with better health are more likely to return home or to move to other destinations, the upper tail of the distribution should shift leftward, and, in Tables 4 and 5, we should observe a negative elasticity effect of the constant in the upper part of the distribution. We do observe a negative elasticity effect for the top decile of the PCS distribution (Table 4), but it is very small.[11]

Finally, our analysis does not support the hypothesis of a "negative acculturation,", a natural convergence of immigrants' health toward the average health status of Italians as they remain in the country, or of a negative change in migrants' health perceptions over time. Indeed, both these hypotheses should lead to larger elasticity effects associated with covariates when we consider differences between Italians and short-stay immigrants (Tables 2 and 3) than when we consider differences between Italians and long-stay immigrants, which are reported in Tables A-2 and A-3 in the appendix. By comparing Tables 2 and3 and Tables A-2 and A-3, we can see that this is not the case.

In short, explanations of immigrants' health deterioration over time based on the type of occupation, "negative acculturation" or selection into return migration do not appear to be consistent with our findings, whereas our results are in line with explanations based on the presence of some unobserved factors that worsen particularly the health of individuals with worse health conditions (e.g., immigrants' lack of integration and difficulties in accessing the health care system).

[11] According to Burgio et al. (2016), the return migration bias in Italy can be considered negligible due to the increasing level of stability of the foreign population, the good quality of health facilities, and the professional competence of health personnel.

Table 5: Decomposition results of differentials between long-stay immigrants and short-stay immigrants in mental component summary

	Q10	Q25	Q50	Q75	Q90
$\triangle_{I_l - I_s}$	–1.442	–0.827	–0.396	–0.598	–0.042
	(0.994)	(0.681)	(0.466)	(0.470)	(0.420)
	[0.147]	[0.225]	[0.395]	[0.203]	[0.921]
Panel A					
Composition effect	–0.159	–0.091	0.043	–0.025	–0.014
	(0.479)	(0.248)	(0.151)	(0.171)	(0.141)
	[0.739]	[0.714]	[0.778]	[0.882]	[0.921]
Elasticity effect	–1.283	–0.736	–0.439	–0.572	–0.028
	(1.061)	(0.682)	(0.475)	(0.489)	(0.442)
	[0.227]	[0.281]	[0.356]	[0.243]	[0.950]
due to covariates	–0.236	2.563	–0.339	–2.327	–0.921
due to constant	–1.047	–3.300	–0.100	1.754	0.893
Panel B: Detailed decomposition					
Composition effect					
Age and gender	–0.201	–0.176	–0.160	–0.301	–0.127
	(0.209)	(0.110)	(0.069)	(0.084)	(0.073)
Education	–0.112	–0.067	0.001	0.015	0.013
	(0.086)	(0.047)	(0.027)	(0.031)	(0.027)
Occupation	0.166	0.106	0.057	0.033	–0.010
	(0.151)	(0.073)	(0.040)	(0.042)	(0.040)
Family composition	0.259	0.027	0.122	0.201	0.115
	(0.261)	(0.139)	(0.091)	(0.098)	(0.084)
Wealth	0.088	0.122	0.093	0.094	0.015
	(0.229)	(0.112)	(0.069)	(0.077)	(0.046)
Risk behavior	–0.026	–0.013	–0.003	–0.005	–0.000
	(0.056)	(0.027)	(0.011)	(0.013)	(0.004)
Geography	–0.115	–0.048	–0.043	–0.046	–0.008
	(0.148)	(0.080)	(0.045)	(0.055)	(0.047)
Citizenship	–0.218	–0.042	–0.024	–0.017	–0.011
	(0.116)	(0.064)	(0.046)	(0.053)	(0.044)
Elasticity effect					
Age and gender	–0.153	0.550	0.391	0.511	0.228
	(0.921)	(0.544)	(0.383)	(0.383)	(0.414)
Education	–0.172	–0.353	–0.044	–1.073	–0.875
	(0.843)	(0.602)	(0.346)	(0.343)	(0.285)
Occupation	1.848	1.370	0.420	0.043	0.392
	(0.750)	(0.467)	(0.650)	(0.624)	(0.566)
Family composition	–2.018	–0.547	–0.670	–0.246	0.055
	(1.568)	(0.883)	(0.595)	(0.582)	(0.526)
Wealth	0.573	–0.103	–0.854	–1.580	–0.161
	(1.352)	(1.051)	(0.810)	(0.783)	(0.904)
Risk behavior	1.518	2.082	0.338	–0.333	–1.015
	(1.178)	(0.794)	(0.877)	(0.829)	(0.455)
Geography	–1.180	0.002	0.337	0.376	0.407
	(0.843)	(0.505)	(0.330)	(0.353)	(0.369)
Citizenship	–0.650	–0.439	–0.257	–0.024	0.048
	(0.614)	(0.396)	(0.255)	(0.271)	(0.238)
Constant	–1.047	–3.300	–0.100	1.754	0.893
	(2.850)	(1.761)	(1.547)	(1.511)	(1.369)

Notes: I_s: Short-stay immigrants; I_l: Long-stay immigrants; Q: Quantile. Standard errors are clustered at family level and reported in parentheses. P-values are reported in brackets. P-values for the categories of the detailed decomposition are omitted for the sake of clarity.

5.3 Robustness checks

To check whether our results are sensitive to the particular cut-off used to distinguish between short-stay and long-stay immigrants, we replicated the analysis by defining short-stay immigrants as those who have been in Italy for up to six years (long-stay immigrants are all the others). Tables A-4 and A-5 in the appendix refer to the differences in the PCS and MCS between Italians and short-stay immigrants, whereas Tables A-6 and A-7 to the differences in the PCS and MCS of long-stay and short-stay immigrants.

Tables A-4 and A-5 are very similar to Tables 2 and 3, confirming our main results regarding the HIE. In particular, differences in the PCS and MCS between Italians and short-stay immigrants are concentrated in the bottom part of the distribution (confirming H1), and they are mainly due to the elasticity effects – that is, to some unobservable factors (confirming H2).

Tables A-6 and A-7 are also very similar to Tables 4 and 5, confirming our main conclusions regarding the differences in the health distributions of short- and long-stay immigrants: these differences are again concentrated in the bottom part of the distribution (confirming H3b) and are mainly due to some unobservable factors (confirming H4b). The only notable differences between Tables A-6 and A-7 and Tables 4 and 5 regard the size of the elasticity effects associated with some covariates (occupation, family composition, risk behaviors, and geography). However, since all elasticity effects capture the presence of some unobserved factors (that is, they are part of the "unexplained" component of the differences), our main results do not change.

6. Conclusions

Knowing whether differences in the health conditions of short- and long-stay immigrants are concentrated in specific parts of the health distribution is essential for policymakers because, for example, health care costs are much more affected by changes in the lower part of the distribution than in the rest of it. Moreover, a better understanding of the factors associated with large shifts of the left tail of the health distribution is essential to restrain the negative effects of the deterioration of immigrants' health, such as higher health care costs, lower participation in the labor market, lower tax revenues, and smaller positive externalities for the health of natives.

In this paper, we take a "beyond the mean" perspective on health differences. Using data from the Italian Health Condition Survey of 2012–2013, we combine unconditional quantile regressions with Oaxaca-Blinder decompositions at various quantiles to examine differences in the entire distributions of physical and mental health between Italians and short-stay immigrants, as well as between short- and long-stay immigrants.

Our findings reveal that short-stay immigrants have better physical and mental health

compared to Italians and to long-stay immigrants, and that in all cases, these differences are concentrated in the lower part of the health distributions (first decile and quartile). Differences in the upper part of the distributions are small and mainly due to composition effects – that is, to different observable characteristics of the three groups considered (in particular, age and gender). Differences in the lower part of the distributions are large (especially for physical health) and mainly due to elasticity effects – that is, to unobservable factors. Interestingly, when comparing long-stay and short-stay immigrants, in the lower part of the distribution the elasticity effects associated with occupation are actually positive, suggesting that any given type of occupation is associated with better health for long-stay immigrants than for short-stay immigrants. However, these positive effects are more than offset by a large negative difference in the constants – that is, by the negative effects of some unobserved factors.

With respect to differences between Italians and short-stay immigrants, this evidence is in line with explanations of the HIE that refer to selection (into migration or into return migration), because the selection process is likely to "eliminate" individuals with the worst health conditions from the immigrant group (those that are at the bottom of the distribution). This would also be consistent with underreporting of immigrants' health conditions, if again it occurs only for the worst health conditions. With respect to differences between long-stay and short-stay immigrants, as discussed above, our findings are not consistent with explanations of immigrants' health deterioration over time based on the type of occupation, "negative acculturation," or selection into return migration. In contrast, our results are in line with explanations based on the presence of unobserved factors that worsen particularly the health of individuals with worse health conditions. One of these unobserved factors could be represented by immigrants' difficulties in accessing the health care system: if immigrants with more critical health conditions do not receive adequate health services, their health is likely to worsen faster over time, shifting the left tail of immigrants' health distributions progressively to the left as their length of stay increases, as we observe.

In general, from a policy perspective, the predominance of the elasticity effect suggests applying either health or social policies to prevent any deterioration in immigrants' physical and mental health conditions (Doorslaer and Koolman 2004). Since health differences between short-stay and long-stay immigrants are concentrated in the lower part of the distributions, these policies should be especially aimed at monitoring immigrants' health and tailored to immigrants with poor health conditions. This could be achieved by targeting either the providers (e.g., by improving the knowledge of health care practitioners on culturally adapted health care) or the users (e.g., by increasing health literacy) (Rechel 2011). More generally, the fact that long-stay immigrants could actually exhibit lower levels of health compared to short-stay immigrants because of worse access to health care services should be a warning for all countries that suffer from inequalities in immigrants' access to health services (for Europe, see, e.g., Guidi et al. 2015).

Some limitations of our study need to be acknowledged. First, due to lack of longitudinal data, our results cannot be interpreted causally because we cannot observe changes in individuals' health over time. Hence, our results are purely descriptive. Moreover, we cannot attribute differences in the health conditions of short-stay and long-stay immigrants only to the deterioration of immigrants' health over time because we are comparing two different populations. However, for the year considered in this study, the two populations of short-stay and long-stay immigrants are quite similar both in terms of country of birth and in terms of approximate age at arrival. Hence, we can observe whether our results (in terms of the specific parts of the distributions where differences are concentrated, the relative importance of composition and elasticity effects, and the sign of the latter) are in line with some explanations of the worsening of immigrants' health conditions over time. Using our approach in a longitudinal setting would be a great contribution of future research.

Second, our results cannot be generalized because our distributional analysis reflects the specificity of the Italian context. However, the approach adopted in this paper, and the discussion of how some explanations of the HIE (and of the worsening of immigrants' health over time) can be related to differences in the health distributions, may provide useful hints for analyzes of the HIE in other countries and longitudinal settings.

Third, some important information is missing in our dataset. The survey does not contain information on immigrants' health before departure and at arrival, or on immigrants' reasons for migrating, which would be important to better test the selection hypothesis. As mentioned before, information about immigrants' knowledge of the health care system, linguistic barriers, and discrimination in the country of arrival are also missing. Hence, we cannot test whether differences in the lower part of the health distributions are actually due to immigrants' difficulties in accessing the health care system or to other, unobservable factors. Finally, we do not have information on immigrants who return to their home countries. In particular, we do not know their numbers, what health conditions they have, and how many years they spent in Italy. However, we discussed above how return migration may affect the health distributions of the two groups of immigrants and showed that this phenomenon may be consistent with the estimated differences between Italians and short-stay immigrants, but not with those between short- and long-stay immigrants. Enriching the analysis with this type of information would represent a valuable contribution of future research.

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Appendix

Table A-1: Summary statistics – Explanatory variables

	I	I_s	I_l	I-I_s (p-value)	I-I_l (p-value)	I_l-I_s (p-value)
Age and gender						
F (20-34)	0.130	0.320	0.201	–0.190 (0.000)	–0.071 (0.000)	–0.119 (0.000)
F (35-44)	0.125	0.139	0.175	–0.013 (0.437)	–0.050 (0.000)	0.036 (0.046)
F (45-54)	0.131	0.075	0.108	0.056 (0.000)	0.023 (0.000)	0.033 (0.008)
F (55-64)	0.114	0.039	0.051	0.075 (0.000)	0.063 (0.000)	0.012 (0.177)
M (20-34)	0.136	0.274	0.171	–0.138 (0.000)	–0.035 (0.000)	–0.103 (0.000)
M (35-44)	0.125	0.095	0.172	0.030 (0.040)	–0.047 (0.000)	0.077 (0.000)
M (45-54)	0.126	0.049	0.085	0.077 (0.000)	0.041 (0.000)	0.036 (0.001)
M (55-64)	0.112	0.009	0.037	0.103 (0.000)	0.076 (0.000)	0.028 (0.000)
Education						
High education	0.161	0.089	0.115	0.072 (0.000)	0.046 (0.000)	0.026 (0.102)
Middle education	0.451	0.371	0.431	0.080 (0.001)	0.020 (0.048)	0.060 (0.022)
Low education	0.388	0.540	0.453	–0.152 (0.000)	–0.066 (0.000)	–0.087 (0.002)
Occupation						
White-collar job	0.258	0.015	0.044	0.243 (0.000)	0.214 (0.000)	0.029 (0.000)
Blue-collar job	0.184	0.434	0.483	–0.250 (0.000)	–0.299 (0.000)	0.049 (0.074)
Self-employed	0.156	0.101	0.103	0.055 (0.001)	0.053 (0.000)	0.002 (0.904)
Unemployed	0.131	0.216	0.181	–0.085 (0.000)	–0.050 (0.000)	–0.035 (0.114)
Not participating	0.271	0.233	0.188	0.038 (0.097)	0.083 (0.000)	–0.045 (0.057)
Family composition						
Single	0.127	0.401	0.239	–0.274 (0.000)	–0.112 (0.000)	–0.162 (0.000)
Childless couple	0.144	0.185	0.127	–0.040 (0.072)	0.017 (0.030)	–0.057 (0.013)
Couple with child(ren)	0.622	0.341	0.558	0.280 (0.000)	0.064 (0.000)	0.217 (0.000)
Single father	0.020	0.026	0.015	–0.006 (0.502)	0.005 (0.160)	–0.012 (0.209)
Single mother	0.087	0.046	0.061	0.041 (0.001)	0.026 (0.000)	0.014 (0.251)
Wealth						
Excellent wealth	0.020	0.016	0.012	0.004 (0.590)	0.007 (0.002)	–0.003 (0.649)
Appropriate wealth	0.611	0.294	0.360	0.318 (0.000)	0.251 (0.000)	0.067 (0.017)
Poor wealth	0.305	0.565	0.494	–0.260 (0.000)	–0.189 (0.000)	–0.071 (0.020)
Abs. inadequate wealth	0.064	0.126	0.133	–0.062 (0.001)	–0.069 (0.000)	0.007 (0.699)
Housing wealth index	–0.006	–0.968	–0.932	0.962 (0.000)	0.926 (0.000)	0.036 (0.644)
Risk behavior						
Habitual smoker	0.238	0.201	0.213	0.037 (0.084)	0.025 (0.001)	0.012 (0.592)
Occasional smoker	0.023	0.020	0.022	0.003 (0.639)	0.001 (0.554)	0.002 (0.801)
Non smoker	0.739	0.779	0.765	–0.040 (0.063)	–0.027 (0.001)	–0.014 (0.541)
Geography						
North West	0.254	0.311	0.342	–0.058 (0.037)	–0.088 (0.000)	0.030 (0.288)
North East	0.184	0.227	0.263	–0.043 (0.078)	–0.079 (0.000)	0.036 (0.157)
Centre	0.191	0.257	0.254	–0.066 (0.018)	–0.063 (0.000)	–0.003 (0.916)
South	0.251	0.163	0.101	0.088 (0.000)	0.150 (0.000)	–0.062 (0.003)
Islands	0.120	0.041	0.040	0.080 (0.000)	0.080 (0.000)	–0.001 (0.955)
Very small city	0.294	0.281	0.254	0.013 (0.629)	0.041 (0.000)	–0.028 (0.313)
Small city	0.272	0.274	0.245	–0.002 (0.928)	0.027 (0.012)	–0.029 (0.261)
Medium city	0.168	0.220	0.194	-0.053 (0.036)	–0.026 (0.008)	–0.026 (0.302)
Large city	0.266	0.224	0.308	0.042 (0.102)	–0.042 (0.001)	0.083 (0.002)
Citizenship						
EU	–	0.306	0.307	– (–)	– (–)	0.001 (0.975)
Europe non-EU	–	0.225	0.244	– (–)	– (–)	0.019 (0.448)
Africa	–	0.205	0.200	– (–)	– (–)	–0.005 (0.844)
West and South-Central Asia	–	0.110	0.085	– (–)	– (–)	–0.025 (0.196)
East Asia	–	0.090	0.067	– (–)	– (–)	–0.023 (0.252)
America	–	0.063	0.097	– (–)	– (–)	0.033 (0.016)

Notes: I: Italians; I_s: Short-stay immigrants; I_l: Long-stay immigrants; F: Females; M: Males; Abs: Absolutely. Numbers are weighted. The significance levels of the mean differences were calculated using a two-sided t-test.

Table A-2: Decomposition results of differentials between Italians and long-stay immigrants in physical component summary

	Q10	Q25	Q50	Q75	Q90
Δ_{I-I_l}	–2.562	–0.631	–0.079	–0.146	0.117
	(0.846)	(0.220)	(0.066)	(0.065)	(0.097)
	[0.002]	[0.004]	[0.236]	[0.025]	[0.229]
Panel A					
Composition effect	–0.086	–0.089	–0.052	–0.111	–0.225
	(0.250)	(0.059)	(0.018)	(0.017)	(0.039)
	[0.732]	[0.130]	[0.004]	[0.000]	[0.000]
Elasticity effect	–2.477	–0.541	–0.027	–0.035	0.342
	(0.868)	(0.225)	(0.068)	(0.066)	(0.104)
	[0.004]	[0.016]	[0.692]	[0.599]	[0.001]
due to covariates	-1.913	–0.313	–0.346	–0.146	–0.253
due to constant	–0.564	–0.228	0.319	0.112	0.595
Panel B: Detailed decomposition					
Composition effect					
Age and gender	–1.826	–0.585	–0.200	–0.175	-0.206
	(0.099)	(0.028)	(0.009)	(0.009)	(0.013)
Education	0.156	0.047	0.015	0.010	0.015
	(0.035)	(0.009)	(0.003)	(0.002)	(0.005)
Occupation	–0.401	0.060	0.046	0.037	0.087
	(0.126)	(0.029)	(0.009)	(0.009)	(0.022)
Family composition	0.164	0.023	0.008	0.000	0.016
	(0.059)	(0.013)	(0.004)	(0.004)	(0.009)
Wealth	1.821	0.355	0.063	-0.008	–0.116
	(0.166)	(0.036)	(0.010)	(0.010)	(0.025)
Risk behavior	0.007	0.001	0.000	0.001	0.010
	(0.010)	(0.002)	(0.001)	(0.001)	(0.003)
Geography	–0.007	0.009	0.015	0.024	–0.031
	(0.075)	(0.017)	(0.005)	(0.005)	(0.012)
Elasticity effect					
Age and gender	–0.247	0.145	0.081	0.060	0.181
	(0.672)	(0.158)	(0.056)	(0.058)	(0.097)
Education	–0.235	0.003	0.007	–0.010	–0.042
	(0.572)	(0.134)	(0.044)	(0.042)	(0.060)
Occupation	–0.538	–0.264	–0.052	–0.016	–0.126
	(0.707)	(0.173)	(0.055)	(0.053)	(0.078)
Family composition	–0.979	–0.366	–0.182	–0.061	–0.007
	(1.551)	(0.405)	(0.114)	(0.093)	(0.134)
Wealth	–2.304	–0.061	–0.004	–0.056	–0.200
	(1.777)	(0.389)	(0.132)	(0.120)	(0.131)
Risk behavior	1.268	–0.240	–0.223	–0.073	0.058
	(1.036)	(0.393)	(0.124)	(0.122)	(0.231)
Geography	0.947	0.420	0.064	0.049	0.016
	(0.697)	(0.159)	(0.053)	(0.054)	(0.077)
Citizenship	0.176	0.050	-0.036	–0.039	–0.133
	(0.515)	(0.136)	(0.044)	(0.042)	(0.055)
Constant	–0.564	-0.228	0.319	0.112	0.595
	(2.957)	(0.757)	(0.244)	(0.227)	(0.339)

Notes: I: Italians; I_l: Long-stay immigrants; Q: Quantile. Standard errors are clustered at family level and reported in parentheses. P-values are reported in brackets. P-values for the categories of the detailed decomposition are omitted for the sake of clarity.

Table A-3: Decomposition results of differentials between Italians and long-stay immigrants in mental component summary

	Q10	Q25	Q50	Q75	Q90
Δ_{I-I_l}	–4.602	–1.505	–0.734	–0.274	–0.166
	(0.592)	(0.318)	(0.206)	(0.229)	(0.191)
	[0.000]	[0.000]	[0.000]	[0.233]	[0.385]
Panel A					
Composition effect	1.398	0.986	0.414	0.179	–0.058
	(0.275)	(0.160)	(0.083)	(0.065)	(0.067)
	[0.000]	[0.000]	[0.000]	[0.006]	[0.387]
Elasticity effect	–6.000	–2.492	–1.148	–0.452	–0.107
	(0.632)	(0.342)	(0.215)	(0.234)	(0.201)
	[0.000]	[0.000]	[0.000]	[0.053]	[0.593]
due to covariates	–0.097	–0.642	–0.759	0.160	0.258
due to constant	–5.904	–1.850	–0.389	–0.612	–0.366
Panel B: Detailed decomposition					
Composition effect					
Age and gender	–0.551	–0.501	–0.275	–0.206	–0.177
	(0.081)	(0.050)	(0.028)	(0.022)	(0.022)
Education	–0.018	0.009	–0.005	–0.017	-0.018
	(0.027)	(0.015)	(0.008)	(0.007)	(0.008)
Occupation	–0.682	–0.306	–0.179	–0.115	–0.106
	(0.129)	(0.075)	(0.040)	(0.034)	(0.038)
Family composition	0.113	0.038	–0.003	–0.014	–0.046
	(0.065)	(0.034)	(0.018)	(0.015)	(0.017)
Wealth	2.149	1.536	0.769	0.503	0.252
	(0.201)	(0.115)	(0.057)	(0.043)	(0.043)
Risk behavior	–0.086	–0.049	–0.020	–0.015	–0.015
	(0.026)	(0.015)	(0.006)	(0.005)	(0.005)
Geography	0.474	0.259	0.127	0.042	0.052
	(0.082)	(0.046)	(0.026)	(0.021)	(0.023)
Elasticity Effect					
Age and gender	–1.089	–1.044	–0.503	–0.151	–0.302
	(0.536)	(0.293)	(0.167)	(0.192)	(0.182)
Education	–0.098	–0.223	–0.053	0.164	0.128
	(0.371)	(0.225)	(0.130)	(0.152)	(0.141)
Occupation	–0.031	0.232	0.079	–0.066	–0.087
	(0.445)	(0.255)	(0.165)	(0.200)	(0.212)
Family composition	1.535	0.397	–0.374	–0.339	–0.229
	(0.821)	(0.596)	(0.363)	(0.342)	(0.336)
Wealth	–0.399	0.076	0.007	0.462	0.243
	(0.797)	(0.492)	(0.406)	(0.499)	(0.434)
Risk behavior	–0.607	–0.263	–0.146	–0.260	0.268
	(1.222)	(0.606)	(0.362)	(0.373)	(0.349)
Geography	0.098	–0.213	–0.066	0.023	0.003
	(0.456)	(0.285)	(0.167)	(0.181)	(0.164)
Citizenship	0.493	0.396	0.296	0.329	0.233
	(0.313)	(0.193)	(0.129)	(0.153)	(0.133)
Constant	–5.904	–1.850	–0.389	–0.612	–0.366
	(2.088)	(1.140)	(0.728)	(0.827)	(0.782)

Notes: I: Italians; I_l: Long-stay immigrants; Q: Quantile. Standard errors are clustered at family level and reported in parentheses. P-values are reported in brackets. P-values for the categories of the detailed decomposition are omitted for the sake of clarity.

Table A-4: Decomposition results of differentials between Italians and short-stay immigrants in physical component summary – Short-stay immigrants defined as immigrants with a length of stay up to six years

	Q10	Q25	Q50	Q75	Q90
Δ_{I-I_s}	–6.530	–2.148	–0.381	–0.273	–0.139
	(0.878)	(0.313)	(0.085)	(0.076)	(0.156)
	[0.000]	[0.000]	[0.000]	[0.000]	[0.371]
Panel A					
Composition effect	–0.474	–0.317	–0.162	–0.249	–0.368
	(0.320)	(0.077)	(0.024)	(0.023)	(0.051)
	[0.139]	[0.000]	[0.000]	[0.000]	[0.000]
Elasticity effect	–6.057	–1.831	–0.220	–0.024	0.229
	(0.913)	(0.316)	(0.086)	(0.078)	(0.161)
	[0.000]	[0.000]	[0.011]	[0.761]	[0.156]
due to covariates	–2.291	–0.529	–0.225	–0.180	–0.055
due to constant	–3.765	–1.302	0.005	0.156	0.284
Panel B: Detailed decomposition					
Composition effect					
Age and gender	–2.967	–0.960	–0.339	–0.313	–0.353
	(0.152)	(0.043)	(0.015)	(0.014)	(0.023)
Education	0.238	0.072	0.022	0.016	0.023
	(0.053)	(0.014)	(0.004)	(0.004)	(0.007)
Occupation	–0.244	0.080	0.045	0.030	0.066
	(0.135)	(0.030)	(0.009)	(0.009)	(0.024)
Family composition	0.503	0.093	0.031	0.006	0.030
	(0.132)	(0.030)	(0.009)	(0.009)	(0.021)
Wealth	1.943	0.382	0.064	–0.011	–0.132
	(0.183)	(0.039)	(0.010)	(0.010)	(0.026)
Risk behavior	0.013	0.001	0.000	0.001	0.017
	(0.016)	(0.003)	(0.001)	(0.001)	(0.006)
Geography	0.040	0.015	0.014	0.021	–0.019
	(0.063)	(0.015)	(0.005)	(0.005)	(0.011)
Elasticity effect					
Age and gender	0.180	–0.060	0.010	0.009	0.274
	(0.899)	(0.288)	(0.078)	(0.065)	(0.136)
Education	0.079	–0.060	0.016	0.057	-0.081
	(0.629)	(0.240)	(0.065)	(0.059)	(0.107)
Occupation	–0.157	–0.225	–0.080	–0.089	-0.184
	(0.988)	(0.393)	(0.106)	(0.085)	(0.132)
Family composition	1.047	0.855	0.046	0.128	0.098
	(1.154)	(0.346)	(0.144)	(0.124)	(0.234)
Wealth	–2.261	–0.477	–0.054	–0.183	–0.108
	(1.494)	(0.534)	(0.138)	(0.131)	(0.196)
Risk behavior	–0.806	–0.667	–0.191	–0.070	–0.092
	(1.976)	(0.753)	(0.198)	(0.165)	(0.405)
Geography	–0.075	0.108	0.047	0.012	0.114
	(0.516)	(0.196)	(0.059)	(0.052)	(0.111)
Citizenship	–0.298	–0.004	–0.020	–0.045	–0.075
	(0.638)	(0.213)	(0.057)	(0.050)	(0.104)
Constant	–3.765	–1.302	0.005	0.156	0.284
	(3.244)	(1.110)	(0.327)	(0.272)	(0.547)

Notes: I: Italians; I_s: Short-stay immigrants; Q: Quantile. Standard errors are clustered at family level and reported in parentheses. P-values are reported in brackets. P-values for the categories of the detailed decomposition are omitted for the sake of clarity.

Table A-5: Decomposition results of differentials between Italians and short-stay immigrants in mental component summary – Short-stay immigrants defined as immigrants with a length of stay up to six years

	Q10	Q25	Q50	Q75	Q90
Δ_{I-I_s}	–5.880	–1.957	–1.148	–0.684	–0.253
	(0.585)	(0.505)	(0.306)	(0.346)	(0.277)
	[0.000]	[0.000]	[0.000]	[0.048]	[0.361]
Panel A					
Composition effect	1.323	0.781	0.199	–0.009	–0.314
	(0.363)	(0.211)	(0.108)	(0.084)	(0.086)
	[0.000]	[0.000]	[0.066]	[0.912]	[0.000]
Elasticity effect	–7.203	–2.738	–1.346	–0.675	0.061
	(0.661)	(0.527)	(0.313)	(0.351)	(0.288)
	[0.000]	[0.000]	[0.000]	[0.055]	[0.833]
due to covariates	–0.656	0.042	–1.166	–0.446	–0.350
due to constant	–6.547	–2.780	–0.180	–0.229	0.411
Panel B: Detailed decomposition					
Composition effect					
Age and gender	–1.002	–0.922	–0.510	–0.372	–0.340
	(0.137)	(0.085)	(0.048)	(0.037)	(0.039)
Education	–0.032	0.013	–0.006	–0.023	–0.023
	(0.039)	(0.022)	(0.012)	(0.010)	(0.011)
Occupation	–0.501	–0.198	–0.152	–0.109	–0.104
	(0.139)	(0.081)	(0.042)	(0.034)	(0.038)
Family composition	0.315	0.111	–0.005	–0.035	–0.124
	(0.147)	(0.077)	(0.041)	(0.034)	(0.038)
Wealth	2.300	1.658	0.828	0.538	0.282
	(0.241)	(0.140)	(0.068)	(0.049)	(0.046)
Risk behavior	–0.138	–0.078	–0.032	–0.025	–0.025
	(0.043)	(0.024)	(0.010)	(0.008)	(0.008)
Geography	0.380	0.196	0.075	0.016	0.020
	(0.070)	(0.038)	(0.022)	(0.019)	(0.020)
Elasticity effect					
Age and gender	–0.999	–0.777	–0.408	0.001	–0.250
	(0.583)	(0.429)	(0.254)	(0.289)	(0.254)
Education	–0.044	–0.697	-0.005	–0.071	0.039
	(0.392)	(0.384)	(0.209)	(0.255)	(0.257)
Occupation	0.549	0.505	0.301	0.269	0.189
	(0.506)	(0.480)	(0.298)	(0.353)	(0.316)
Family composition	0.470	0.181	–0.248	0.023	0.066
	(1.084)	(0.640)	(0.403)	(0.401)	(0.415)
Wealth	–1.007	–0.166	–0.460	–0.250	–0.166
	(0.905)	(0.750)	(0.538)	(0.658)	(0.521)
Risk behavior	0.695	0.682	–0.417	–0.582	–0.387
	(1.000)	(0.957)	(0.652)	(0.634)	(0.341)
Geography	–0.349	0.089	–0.039	–0.054	–0.051
	(0.348)	(0.309)	(0.204)	(0.209)	(0.200)
Citizenship	0.030	0.225	0.110	0.219	0.210
	(0.379)	(0.326)	(0.204)	(0.238)	(0.205)
Constant	–6.547	–2.780	–0.180	–0.229	0.411
	(1.932)	(1.532)	(1.038)	(1.147)	(0.963)

Notes: I: Italians; I_s: Short-stay immigrants; Q: Quantile. Standard errors are clustered at family level and reported in parentheses. P-values are reported in brackets. P-values for the categories of the detailed decomposition are omitted for the sake of clarity.

Table A-6: Decomposition results of differentials between long-stay immigrants and short-stay immigrants in physical component summary – Short-stay immigrants defined as immigrants with a length of stay up to six years

	Q10	Q25	Q50	Q75	Q90
$\Delta_{l_l - l_s}$	–4.857	–1.828	–0.369	–0.171	–0.306
	(0.956)	(0.310)	(0.088)	(0.082)	(0.145)
	[0.000]	[0.000]	[0.000]	[0.039]	[0.035]
Panel A					
Composition effect	–0.812	–0.699	–0.191	–0.195	–0.220
	(0.600)	(0.174)	(0.051)	(0.051)	(0.076)
	[0.176]	[0.000]	[0.000]	[0.000]	[0.004]
Elasticity effect	–4.044	–1.128	–0.179	0.024	–0.086
	(1.079)	(0.317)	(0.095)	(0.093)	(0.163)
	[0.000]	[0.000]	[0.061]	[0.795]	[0.597]
due to covariates	0.485	0.026	0.182	–0.034	0.149
due to constant	–4.529	–1.154	–0.361	0.058	-0.235
Panel B: Detailed decomposition					
Composition effect					
Age and gender	–0.945	–0.507	–0.182	–0.164	–0.137
	(0.335)	(0.099)	(0.032)	(0.032)	(0.042)
Education	0.000	0.002	–0.001	0.000	0.004
	(0.057)	(0.017)	(0.005)	(0.005)	(0.007)
Occupation	0.283	0.037	0.007	0.003	0.002
	(0.161)	(0.036)	(0.009)	(0.009)	(0.016)
Family composition	0.172	–0.039	0.043	0.015	–0.055
	(0.344)	(0.104)	(0.034)	(0.033)	(0.049)
Wealth	–0.014	–0.010	–0.009	–0.005	0.005
	(0.192)	(0.051)	(0.012)	(0.011)	(0.020)
Risk behavior	0.068	0.000	–0.002	–0.000	0.003
	(0.056)	(0.010)	(0.004)	(0.003)	(0.006)
Geography	–0.468	–0.187	–0.042	–0.041	–0.027
	(0.202)	(0.065)	(0.017)	(0.018)	(0.023)
Citizenship	0.091	0.005	–0.005	–0.003	–0.014
	(0.140)	(0.040)	(0.013)	(0.012)	(0.019)
Elasticity effect					
Age and gender	–0.001	–0.182	–0.085	–0.057	0.124
	(0.939)	(0.271)	(0.081)	(0.072)	(0.132)
Education	0.309	–0.076	0.034	0.107	–0.036
	(0.689)	(0.226)	(0.066)	(0.061)	(0.100)
Occupation	0.385	0.029	–0.039	–0.088	–0.068
	(0.971)	(0.346)	(0.096)	(0.083)	(0.125)
Family composition	3.354	1.564	0.303	0.235	0.116
	(1.467)	(0.438)	(0.153)	(0.122)	(0.204)
Wealth	–0.593	–0.367	–0.073	–0.211	0.008
	(1.790)	(0.547)	(0.171)	(0.148)	(0.197)
Risk behavior	–2.320	–0.635	–0.011	0.007	–0.204
	(1.710)	(0.665)	(0.185)	(0.163)	(0.347)
Geography	–0.047	–0.182	0.033	–0.025	0.153
	(0.700)	(0.199)	(0.063)	(0.059)	(0.104)
Citizenship	–0.602	–0.126	0.020	–0.003	0.056
	(0.675)	(0.209)	(0.060)	(0.055)	(0.091)
Constant	–4.529	–1.154	–0.361	0.058	–0.235
	(3.432)	(1.097)	(0.343)	(0.298)	(0.505)

Notes: l_s: Short-stay immigrants; l_l: Long-stay immigrants; Q: Quantile. Standard errors are clustered at family level and reported in parentheses. P-values are reported in brackets. P-values for the categories of the detailed decomposition are omitted for the sake of clarity.

Table A-7: Decomposition results of differentials between long-stay immigrants and short-stay immigrants in mental component summary – Short-stay immigrants defined as immigrants with a length of stay up to six years

	Q10	Q25	Q50	Q75	Q90
$\Delta_{I_l - I_s}$	–1.685	–0.605	–0.980	–0.507	–0.163
	(0.651)	(0.463)	(0.300)	(0.329)	(0.268)
	[0.010]	[0.192]	[0.001]	[0.123]	[0.542]
Panel A					
Composition effect	0.150	0.092	0.118	–0.096	–0.058
	(0.463)	(0.240)	(0.169)	(0.173)	(0.151)
	[0.746]	[0.700]	[0.485]	[0.578]	[0.702]
Elasticity effect	–1.835	–0.697	–1.099	–0.411	–0.106
	(0.763)	(0.502)	(0.323)	(0.355)	(0.300)
	[0.016]	[0.165]	[0.001]	[0.247]	[0.724]
due to covariates	–1.198	0.321	–1.027	–0.870	–0.989
due to constant	–0.636	–1.018	–0.072	0.459	0.883
Panel B: Detailed decomposition					
Composition effect					
Age and gender	–0.128	–0.107	–0.134	–0.277	–0.096
	(0.248)	(0.129)	(0.087)	(0.092)	(0.084)
Education	–0.011	0.001	0.008	0.007	0.014
	(0.040)	(0.022)	(0.016)	(0.015)	(0.015)
Occupation	0.093	0.058	0.050	0.013	–0.015
	(0.095)	(0.049)	(0.034)	(0.032)	(0.030)
Family composition	0.270	0.009	0.170	0.115	0.082
	(0.310)	(0.153)	(0.108)	(0.109)	(0.101)
Wealth	0.079	0.085	0.025	0.015	–0.027
	(0.190)	(0.096)	(0.068)	(0.068)	(0.046)
Risk behavior	–0.066	–0.032	–0.002	–0.011	0.003
	(0.050)	(0.025)	(0.011)	(0.013)	(0.010)
Geography	–0.074	0.040	–0.028	0.003	–0.010
	(0.142)	(0.075)	(0.053)	(0.053)	(0.044)
Citizenship	–0.013	0.038	0.029	0.037	–0.009
	(0.123)	(0.066)	(0.050)	(0.049)	(0.042)
Elasticity effect					
Age and gender	–0.377	–0.125	–0.044	0.292	–0.086
	(0.676)	(0.410)	(0.250)	(0.279)	(0.250)
Education	0.095	–0.532	0.042	–0.192	–0.079
	(0.436)	(0.356)	(0.208)	(0.239)	(0.235)
Occupation	0.647	0.321	0.269	0.367	0.299
	(0.566)	(0.433)	(0.287)	(0.331)	(0.322)
Family composition	–1.186	–0.001	0.238	0.280	0.163
	(0.900)	(0.710)	(0.488)	(0.399)	(0.327)
Wealth	–0.973	–0.301	–0.716	–0.863	–0.355
	(0.896)	(0.721)	(0.601)	(0.686)	(0.600)
Risk behavior	1.540	0.817	–0.488	–0.443	–0.793
	(1.320)	(0.918)	(0.604)	(0.589)	(0.418)
Geography	–0.430	0.379	–0.004	–0.136	–0.100
	(0.445)	(0.321)	(0.211)	(0.222)	(0.212)
Citizenship	–0.514	–0.236	–0.322	–0.175	–0.037
	(0.412)	(0.293)	(0.199)	(0.229)	(0.205)
Constant	–0.636	–1.018	–0.072	0.459	0.883
	(2.319)	(1.519)	(1.096)	(1.166)	(1.022)

Notes: I_s: Short-stay immigrants; I_l: Long-stay immigrants; Q: Quantile. Standard errors are clustered at family level and reported in parentheses. P-values are reported in brackets. P-values for the categories of the detailed decomposition are omitted for the sake of clarity.