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Abstract

In this paper, we decompose body mass index (BMI) differences between Turkish immigrants and Germans in West Germany for women and men. We focus on isolating the part of BMI differences that can be explained by differences in observed socioeconomic status from the part attributable to differences in coefficients. Our results reveal that female Turkish immigrants are on average more obese than female Germans; however, there exists no significant difference in obesity among males. Our results also indicate that differences in socioeconomic status between female Turkish immigrants and Germans explain significant parts of the obesity disparities between these two groups.

JEL-Code: J150, I140, C210.

Keywords: BMI disparity, Turkish immigrants in Germany, decomposition, quantile regression.

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1 Introduction

Turkish immigrants form the largest ethnic minority in Germany. In 2011, according to the national census, there were almost three million people with a current or previous Turkish nationality living in Germany, accounting for 18.5% of the German population with an immigration background, as well as 3.6 % of the country's entire population (see Germany Federal Office of Migration and Refugees (2013)). The majority of these Turkish immigrants live in West Germany, including Berlin. [1] Similar to African Americans or Hispanic immigrants in the United States, Turkish immigrants in Germany often have a lower social status than the host population and thus face segregation in education and the labor market (see, among others, Glitz (2014), Euwals et al. (2007) and Humpert (2014)).

There are increasingly more studies on health inequalities between immigrants and native-borns, as well as among different racial and ethnic groups in developed countries. Regarding Germany, existing studies in the discipline of public health have already shed light on the difference in health status and health care use between immigrants and native-borns. Among these studies, Glaesmer et al. (2011) find that first-generation immigrants strongly differ in their health care use compared to native-born Germans and second generation immigrants, focusing on primary care (i.e. the day-to-day health care given by health care providers such as community health centers). The results of Kotwal (2010) show that both first and second generation Turks tend to have lower chronic illness rates and rate their health as being better than Germans at younger ages, although the advantage diminishes among higher age strata for the first generation. Other contributions also indicate high rates of being overweight and obesity among Turkish children, adolescents and adult women (see Kirchengast and Schober (2006)) in Vienna, Austria, but not for male adult Turkish immigrants. However, surprisingly little is known about the difference in body mass index (weight relative to the square of height, referred to as BMI hereinafter) or obesity prevalence between Turkish immigrants and German native-borns in Germany.

Our analysis contributes to answering the question of whether differences in BMI between Turkish immigrants and native Germans could be mainly explained by differences in socioeconomic characteristics or whether they are mainly due to unobserved genetic[2] and behavior differences. From the perspective of economists and

[1] Federal Statistical Office of Germany (2014) shows that 2,771,000 Turkish immigrants lived in West Germany and Berlin in 2013, while only 22,000 Turkish immigrants lived in East Germany

[2] Some epidemiology literature indicates that differences in the basal metabolic rate (the minimal rate of energy expenditure in maintaining basic body functions during an awake, but totally rested and post-absorptive state, and in a neutrally temperate environment) or resting metabolic rate (a form of metabolism measurement that measures the amount of energy used by the bodies in a relaxed, but not post-absorptive, state) between race or ethnicities (i.e. see Cole and Henry (2005) for a meta analysis

public health scientists, the difference in obesity prevalence between Turkish immigrants and German native-borns is a matter of concern, given that obesity has been linked to numerous chronic diseases[3], such as type-2 diabetes, coronary disease, hypertension, breast cancer or colon cancer, etc. (see McGee (2005)) All of these problems place pressure upon the health care system by increasing health care costs for the German society.[4] In addition, inequalities in BMI between different ethnic groups may be a refection of other inequalities in socioeconomic status (see, among others, Morris (2006)[5]).

Economic analysis explaining the differences in adiposity (i.e. the state of being fat) between population subgroups are mainly attributed to differences in socioeconomic status, given that low socioeconomic status is often associated with being obese in developed countries; however, the real situation is very heterogeneous and causal links are very complex. Among others, Pampel et al. (2012) used BMI data for 67 countries from across the world to examine the relationship between obesity, economic development and socioeconomic status, including education, occupation and income, finding that those with higher socioeconomic status were less likely to be obese in higher income countries. Cawley et al. (2005) found that obesity is associated with lower earnings for German women, although their IV results yield no evidence of a causal impact of weight on earnings for women or men in Germany. Etile (2014) found that educational expansion in France reduced overall BMI inequality between 1981 and 2003. Previous literature has also found that physical activity (see Burke and Heiland (2011)) and energy intake (see Johnston and Lee (2011)) account for a large part of the obesity gap between African Americans and non-Hispanic whites in the United States.[6]

This paper starts by estimating the mean BMI gap between Turkish immigrants and German natives, using the Blinder-Oaxaca decomposition proposed by Blinder (1973)

on 174 papers published between 1914 and 2001 that focused on basal metabolic rate differences between Caucasians and non-Caucasians) may be another explanation for the ethnical BMI gap, although other studies argue that a racial difference in the basal metabolic rate may not exist (e.g. Cruickshank (1999)). We have not found any literature investigating the differences in basal metabolic rate between Turkish immigrants and native-borns in Germany. Moreover, if differences in the basal metabolic rate between Turkish immigrants and native Germans causes the BMI gap, we would expect to observe a similar level of BMI gap for both women and men, although our empirical results indicate that the immigrant/German native-born BMI gaps disparity is particularly high for women and much lower for men.

[3]Empirical evidence from the U.S. has found that the female black-white weight gap in the U.S. is a significant problem because it causes black-white disparities in type-2 diabetes and excess risk factors (see Brancati et al. (2000)

[4]In 2008, the hospital expenditure on obesity and other hyperalimentation in Germany was 863 million Euros, and on diabetes was 6,342 million Euros(see Federal Statistical Office of Germany (2010)).

[5]Morris (2006) suggests that the black-white obesity disparity in the U.S. contributes to existing black-white disparities in socioeconomic status if obese persons are discriminated against in the labor market.

[6]The results of Johnston and Lee (2011) contrast starkly with those derived in Burke and Heiland (2011) concerning the main driving force behind the female black-white obesity gap in the U.S.

and Oaxaca (1973). From the perspective of public health, the mean BMI difference is too restrictive, since the upper tail of the BMI distribution attracts greater concern, particularly for individuals whose body mass index is higher than 30. Hence, the quantile decomposition method is useful in this setting, as the quantile estimates of the BMI gap at the upper tail of the BMI distribution, e.g. at the 75th and 90th quantile of the BMI distribution, can provide more relevant implications for government policies aiming to reduce obesity.

Our empirical results reveal the existence of obesity disparity between Turkish immigrants and German native-borns, whereby female Turkish immigrants are more obese than Germans, while no significant difference in obesity prevalence exists between male Turkish immigrants and male Germans. The BMI gap is much larger for women than men for most quantiles. Our empirical results also indicate that differences in BMI are due to differences in both observable characteristics and unobserved obesity behavior (i.e. eating habits, physical activities etc.). Overall, our estimates indicate that about half of the mean BMI gap among women (about 50%) can be explained by differences in observed characteristics. The difference between the median BMI for female Turkish immigrants and female German native-borns is smaller than the corresponding gap at the 75th percentile, suggesting that the obesity disparity is larger among fatter rather than thin women. However, for men, the difference in median BMI between Turkish immigrants and German native-borns is larger than the corresponding gap at the 75th percentile.

Our empirical results may particularly assist policy-makers to design anti-obesity policies in a more effective way, by addressing specific target subpopulation groups. Furthermore, our empirical results help to better predict the effects of integration policies. If differences in adiposity between Turkish immigrants and German native-borns could mainly be explained by observed differences in education, labor market and occupational status and income, then integration policies aimed at helping Turkish immigrant children to gain more education and labor market integration policies targeting at socioeconomically disadvantaged immigrants could be effective in reducing obesity rates among Turkish immigrants in Germany. If differences in socioeconomic status cannot explain a significant part of the adiposity gap, policy-makers may focus more on policies aimed at directly helping obese Turkish immigrants to developing health behavior, e.g. reducing their food intake and improving their physical activities, etc.

The remainder of this paper is organized as follows. In section 2, we describe our data used and present descriptive statistics concerning the outcomes of interest. Section 3 discusses the methodological approach. Section 4 presents the decomposition results, before section 5 concludes.

2 Data and Descriptive Statistics

Our empirical analysis employs data from the German Socio-Economic Panel(SOEP). The SOEP, which started in 1984 and is managed by the German Institute for Economic Research (DIW Berlin), is a nationally representative longitudinal survey of approximately 20,000 persons in 11,000 private households in the Federal Republic of Germany. Further details can be found in Wagner et al. (2007).[7]

The dependent variable is BMI, which is calculated as weight in kilograms divided by height in meters squared. Self-reported body weight and body height have been asked in the SOEP questionnaire every two years since 2002. Therefore, we use SOEP data for the years 2002, 2004, 2006, 2008, 2010 and 2012. The identifier of Turkish immigrants is constructed from the following question in SOEP: "What is your country of origin?". We treat individuals who answer "2" (Turkey as country of origin) as Turkish immigrants, and individuals who answer "1" (Germany as country of origin) as Germans.[8]

For our main analysis, we focus exclusively on individuals aged between 20 and 65 who have valid information on body weight and body height,[9] although we drop respondents for whom height or weight were imputed. We also drop all observations in East Germany because the SOEP does not observe Turkish immigrants who live in East Germany. We pool data from different waves, whereby our final sample comprises 948 person-year observations for female Turkish immigrants, 29,610 for female German native-borns, 1,053 for male Turkish immigrants and 27,504 for male German native-borns.[10]

Summary statistics by gender and immigration status pooled for person-waves are presented in Table 1. The average BMI in our sample is 27.797 for female Turkish immigrants, 24.977 for female Germans, 26.957 for male Turkish immigrants and 26.469

[7]SOEP collects information on individuals' demographics, socioeconomic status, self-reported health, income, etc. The survey includes weights to make the sample representative, given that it oversamples immigrants and high-income households. All estimations in this paper are weighted using SOEP sampling weights

[8]In this paper, we treat second generation Turkish immigrants born in Germany as German natives. We also estimated models for different subsamples. The results of the decomposition analysis, however, did not vary significantly when the second generation Turkish immigrants subsamples are excluded from the group of German natives. Additional decomposition results excluding the second generation Turkish immigrants are available upon request.

[9]The variables used in this paper were extracted using the Add-On package PanelWhiz for Stata. PanelWhiz was written by Dr. John P. Haisken-DeNew (john@panelwhiz.eu). The PanelWhiz generated the do file to retrieve the SOEP data used here. Any data or computational errors in this paper are my own. Haisken-Denew and Hahn (2010) describe PanelWhiz in detail.

[10]The reported decomposition results are based on a pooled cross-sections analysis including five year dummies. We also estimated models for separate crosssections. The results of the decomposition analysis, however, did not vary significantly between the different cross-sections.

for male Germans. 65.5% percent of the female Turkish immigrants in our sample are either overweight or obese, compared to 41.2 % of German native-born women. 70% percent of the male Turkish immigrants in our sample are either overweight or obese, compared to 59.6% of German men. All BMI differences are statistically significant across immigrant status for women at the 1% significance level, and at the 5% significance level for men.

(Insert Table 1 here)

Throughout our empirical analysis, we control for age and its square, years of schooling and its square, three dummy variables for marital status (i.e. a dummy variable for being single, and a dummy variable for being separated or widowed with married acting as reference group), the number of children in the household and net annual household income, three dummies for an individual's area of residence (i.e. a dummy variable for rural areas, a dummy variable for areas under urbanization, with urban areas acting as a reference group), four dummy variables indicating the labor market status (not participating, retired, registered unemployed, in training, and part-time job, with full-time job acting as a reference group), as well as four interaction terms with occupational status (part-time job $\times$ white-collar job, part-time job $\times$ not white/blue-collar jobs, full-time job $\times$ white-collar jobs and full-time jobs $\times$ not white/blue-collar jobs, with blue-collar full-time workers acting as a reference group). Due to the data availability, we do not control for direct determinants of body weight such as energy intake, energy expenditure and sport activities.

Table 1 further shows the differences in socioeconomic characteristics between Turkish immigrants and German natives for both males and females. Significant differences in the means are stated for many characteristics for which we control. Among women, Turkish immigrants in the sample are on average 1.6 years younger compared to German native-borns, have 2.8 years less schooling, around 8,600 Euros less household income, are more commonly married and live in urban regions, have more children, less commonly have a full- or part-time job and are more commonly unemployed or inactive in the labor market. When comparing the differences in characteristics among male Turkish immigrants and male German native-borns, the former are on average only 0.286 years younger in age, but still have 2.468 years less schooling, around 10,000 Euros less household income, are more commonly married and live in urban regions, have more children, less commonly have a full- or part-time job and are more commonly unemployed or inactive in the labor market.

Figure 1 displays the statistical distribution of the Turkish immigrant/German BMI gap. Figure 2(a) shows this for women and 2(b) for men. Figure 2(a) shows that the BMI gap among women increases as BMI increases, while BMI starts to decrease among the extreme obesity group (approximately 90th quantile or higher). Figure 2(b) shows that the BMI gap between male Turkish immigrants and German men is largest at the point close to the 10th percentile, before this gap decreases as BMI increases. Interestingly, in stark contrast with women, the BMI gap is negative after the 75th percentile, indicating that extreme obesity is more prevalent among male Germans than male Turkish immigrants.

(Insert Figure 1 here)

3 Decomposition Procedures

The aim of this paper is to determine the proportions of the male and female BMI gap that can be attributed to differences in socioeconomic status between Turkish immigrants and German native-borns. Specifically, we determine the proportion of the BMI gap that is attributable to differences between Turkish immigrants and Germans in observable factors, including age structures, education, labor market and occupational status, marital status, household income and residential location. Our empirical analysis comprises two decomposition procedures: the Blinder-Oaxaca decomposition (hereafter BO decomposition) and the distributional decomposition based upon conditional quantile regression (see Firpo et al. (2009)).[11]

We first apply a BO procedure that permits the decomposition of differences in mean BMI into a part caused by differences in observed characteristics (explained part) and a part due to differences in estimated coefficients (unexplained part).[12] The differences in coefficients (unexplained part) may reflect differences in health behaviors between the group of Turkish immigrants and German natives

The main advantage of applying the BO procedure for the decomposition of mean differences between two groups is that it is easy to implement. However, the BO procedure is strictly based upon the assumption of the linear and parametric relationship between BMI and observed characteristics. This is particularly problematic in our application, given that the relationship between socioeconomic characteristics and BMI may be highly non-linear. The non-linearity implies that empirical BO models assuming that BMI is linearly separable in various socioeconomic variables are not correctly specified. Figure 1 already shows that the BO decomposition of the mean BMI disparity does not accurately reflect the BMI gaps at other points in the BMI distribution,

[11] In the appendix C of the supplimentary material, we also provide the decomposition of distributions based upon the unconditional quantile regression as a robustness check.

[12] The following assumptions are implicit in the BO procedure: (1) Y is linearly related to the covariates X, whereby $Y_{gi} = X_i\beta_g + \nu_{gi}$; and (2) the error term ν is conditionally independent of X: $E\left[\nu_g|X\right] = 0$

indicating the potential for socioeconomic characteristics having differential effects on the BMI of fat and thin persons. Therefore, in the next step, we go beyond the mean decomposition of the BMI gap and decompose the BMI differences throughout the BMI distribution. We are aware of only one other study that adopts a distributional perspective when addressing the obesity gap between population subgroups. Johnston and Lee (2011) decomposed the female black/white obesity gap on different points of the BMI distribution using the non-parametric reweighting method developed by DiNardo et al. (1996).

The regression specification of the detailed BO decomposition is shown in equation (1):

$$\Delta^{\mu}_{BMI} = \sum_{k=1}^{K} (\bar{X}_{Tk} - \bar{X}_{Gk})\,\hat{\beta}^{*}_{k} + \sum_{k=1}^{K} \bar{X}_{Tk}\left(\hat{\beta}_{Tk} - \hat{\beta}^{*}_{k}\right) + \sum_{k=1}^{K} \bar{X}_{Gk}\left(\hat{\beta}^{*}_{k} - \hat{\beta}_{Gk}\right) \quad (1)$$

where the BMI gap is defined as $\Delta^{\mu}_{BMI} = \overline{BMI}_{T} - \overline{BMI}_{G}$. $\overline{BMI}_{T}$ is the average BMI of the Turkish immigrant group, $\overline{BMI}_{G}$ is the average BMI of the German native-born group[13]. $\overline{X}_{K}$ is a vector of average values of the K-1 independent variables and the constant term. $\hat{\beta}$ is a vector of coefficient estimates for population subgroup. The first term of equation (1) $\sum_{k=1}^{K} (\bar{X}_{Tk} - \bar{X}_{Gk})\,\hat{\beta}^{*}_{k}$ represents the proportion of the mean BMI gap that can be explained by differences in each observed socioeconomic factors, while the remaining components on the right hand side of equation (1) $\sum_{k=1}^{K} \bar{X}_{Tk}\left(\hat{\beta}_{Tk} - \hat{\beta}^{*}_{k}\right) + \sum_{k=1}^{K} \bar{X}_{Gk}\left(\hat{\beta}^{*}_{k} - \hat{\beta}_{Gk}\right)$ represents the proportion of the mean BMI gap that can not be explained by observed characteristics.

$\hat{\beta}^{*}_{K}$ is the weighting matrix of coefficients for the group differences in the observed characteristics between Turkish immigrants and Germans. Several suggestions have been made in existing literature concerning the choice of $\hat{\beta}^{*}_{K}$. For instance, Oaxaca (1973) and Blinder (1973) suggest using $\hat{\beta}^{*}_{K} = \beta_{Tk}$ or $\hat{\beta}^{*}_{K} = \beta_{Gk}$.[14] Cotton (1988) and Reimers (1983) propose that $\hat{\beta}^{*}_{K}$ is the weighted average of the β_{Tk} and β_{Gk}.[15] Oaxaca and Ransom (1994) and Neumark (1988) suggest using the coefficients from a pooled

[13] $\overline{BMI}_{Tf}$ is the average BMI of the female Turkish immigrant group and $\overline{BMI}_{Tm}$ is the average BMI of the male Turkish immigrant group. $\overline{BMI}_{Gf}$ is the average BMI of the female the male German native-born group, and $\overline{BMI}_{Gm}$ is the average BMI of the male German native-borns group.

[14] In case of $\hat{\beta}^{*}_{K} = \beta_{Tk}$, the differences in observed characteristics are weighted by the coefficients of the Turkish immigrant group and the differences in the coefficients are weighted by the observed characteristics of the German group, with the presumption that the BMI of Turkish immigrants is due to their observed characteristics, while Germans are unduly less obese. By contrast, the presumption of $\hat{\beta}^{*}_{K} = \beta_{Gk}$ is that the BMI of Germans is due to their observed characteristics, while Turkish immigrants are more obese owing to unexplained coefficients effects. The differences in observed characteristics are weighted by the coefficients of the German group and the differences in the coefficients are weighted by the observed characteristics of the poor group.

[15] Cotton (1988) suggests weighting the coefficients by the mean of the coefficient vectors for the two groups, namely $\hat{\beta}^{*}_{K} = 0.5 \times \beta_{Tk} + 0.5 \times \beta_{Gk}$. Similarly, Reimers (1983) proposes weighting the coefficient vectors by the proportions in the two groups.

model over both groups as the reference coefficient. Jann (2008) suggests including a group indicator in the pooled model as an additional covariate, because a pooled model without group status dummy may "inappropriately transfer some of the unexplained parts of the differential into the explained component".[16] In this paper, we perform decompositions using the weights proposed by Oaxaca (1973), Blinder (1973), Neumark (1988) and Jann (2008) and focus on interpreting the results of decomposition using coefficients from a pooled model over both groups as the reference coefficients, with the status of German native-borns being included in the pooled model as an additional covariate.

We also apply the unconditional quantile approach developed by Firpo et al. (2009),[17] which evaluates the impact of changes in the distribution of the observed characteristics on quantiles of the unconditional marginal distribution of the BMI distribution. The proposed method firstly runs regressions of the recentered influence function (RIF).[18] of the unconditional quantile on the observed characteristics, before estimating detailed decomposition results at different percentiles of the BMI distribution. The RIF is simple and easily computable for each quantile of interest. By assuming RIF-OLS regressions locally, we do not need to evaluate the global impact at all points of distributions.

RIF decomposition involves a two-step procedure that decomposes changes or differences in the distribution of BMI between Turkish immigrants and Germans. The first step relies on an influence function (IF) at each quantile τ of the distribution of the outcome variable BMI, which is specifically defined as:

$$RIF(BMI; q_\tau) = q_\tau + IF(BMI; q_\tau) = c_{1,\tau} \bullet \mathbb{1}\left[BMI \le q_\tau\right] + c_{2,\tau}, \quad (2)$$

where $c_{1,\tau} = \frac{1}{f_{BMI}(q_\tau)}$ and $c_{2,\tau} = q_\tau - c_{1,\tau} \bullet (1-\tau)$.
The RIF for a quantile τ is an indicator variable $\mathbb{1}\left[BMI \le Q_\tau\right]$. By assumption, $E[RIF(BMI : \tau)|X] = X\gamma$, a RIF regression replaces the dependent variable Y in a standard regression as the recentered influence function of the statistic of interest, in case of decomposing distributional differences between groups in each quantile.

In the second step of the procedure, we can apply OB type decomposition at various quantiles calculated by the RIF regressions. Assume that the coefficients of the

[16] Fortin (2008) also argues that the coefficients based on a pooled regression including the group status dummy is preferable to coefficients from a pooled model that omits the group status dummy, because in the latter case the estimated coefficients are biased due to omitted variable bias.

[17] All estimations were made using the RIF Regression STATA ado file (rifreg.ado) from Firpo et al. (2009), which can be downloaded at http://faculty.arts.ubc.ca/nfortin/datahead.html.

[18] Firpo et al. (2009) shows that OLS may be viewed as a special case of the recentered influenced function model.

unconditional quantile regression for each group at the quantile point τ are:

$$\hat{\gamma}_{group,\tau} = \left(\sum_{i \in G} X_i \bullet X_i^T \right)^{-1} \bullet \sum_{i \in G} \widehat{RIF}(Y_{gi}; Q_{gropu,\tau}) \bullet X_i, \qquad group = T, G \quad (3)$$

Subsequently, we can write the OB type decomposition at any unconditional quantile point as:

$$\hat{\Delta}^{\tau}_{BMI} = \sum_{k=1}^{K} \left(\overline{X}_{Tk} - \overline{X}_{Gk}\right) \hat{\gamma}^{*}_{k,\tau} + \sum_{k=1}^{K} \overline{X}_{Tk} \left(\hat{\gamma}_{Tk,\tau} - \hat{\gamma}^{*}_{k,\tau}\right) + \sum_{k=1}^{K} \overline{X}_{Gk} \left(\hat{\gamma}^{*}_{k,\tau} - \hat{\gamma}_{Gk,\tau}\right) \quad (4)$$

The first term in equation (4) is the explained part of the BMI gap that can be computed in the same way as for the mean decomposition in equation (1). Similarly, as in the case of the mean decompostion, the detailed decomposition of the unexplained part can also be computed subject to different weights $\hat{\gamma}^{*}_{k,\tau}$ of the coefficients effect. We will follow Jann (2008) and use coefficients from the pooled model that includes a group indicator as an additional covariate.

4 Decomposition Results

Similar to O'Neill and O'Neill (2006), Table 2 first show the results of four regressions of OLS estimates when different reference groups surve as weighting matrix of BO decomposition in our analysis of BMI gap between Turkish immigrants and German native-borns.

Column (1) of Table 2 reports coefficients of the subsample female Turkish immigrants group, column (2) reports German native-borns coefficients, column (3) reports the coefficients of the pooled sample of females without the dummy of German group status, as proposed in Neumark (1988), and column (4) reports coefficients of the pooled sample with the dummy of German group status, as proposed in Jann (2008). Column (5) of Table 2 reports coefficients of male Turkish immigrants group, column (6) reports male German native-borns coefficients, column (7) reports the coefficients of the pooled sample of males without the dummy of German group status, as proposed in Neumark (1988). Column (8) reports coefficients of the pooled sample of males with the dummy of German group status, as proposed in Jann (2008). The year dummies are added in all eight OLS regressions in order to control for the time trend of BMI.

(Insert Table 2 here)

4.1 Blinder-Oaxaca decomposition results

The empirical BO decomposition of this paper uses Jann (2008) procedures in Stata. We mainly focus on the decomposition results reported in column (4) of Table 3, which perform the decomposition using coefficients from a pooled model over both groups as the reference coefficients, with the group dummy included as an additional covariate. We make use of bootstrap standard erros with 100 replications for all estimates in Blinder-Oaxaca decompostions, because Jann (2005) shows bootstrap standard errors of the decomposition results to be unbiased when sampling distributions are not known and regressors are stochastic.

The first row in Table 3 displays the total mean difference in average BMI (2.82 BMI points) between female Turkish immigrants and female Germans. The mean BMI difference is significant at 1% level. Column (4) of Table 3 reports that the total explained effect accounts for 47.1% of average BMI gap. Going across columns (1) to (4) to compare decomposition results performed with different coefficients, we find that observed characteristics play almost the same role as unobservables in explaning the average feamle Turkish immigrant/German BMI gap.

Table 3 also reports the contribution of each groups of variables to explained effects(panel A) and unexplained effects (panel B) of the BMI gap between female Turkish immigrants and female Germans[19]. Here we group the observable characteristics into five groups: (1) the group of demographic factors includes variables age age^2,dummy of being single,dummy of being separated, number of children in households, two dummies of residing in rural regions and regions under urbanization; (2) the group of education includes the variables years of schooling and years of schooling^2; (3) the group of labor market and occupational status include variables that indicating full-time jobs, part-time jobs, white collar, blue collar, other jobs, in training, registered unemployed, retired, not participating in labor market; (4) annual household income ; and (5) the group of year dummies. A comparison accross columns in Table 3 show that the estimated results for explained effects and the unexplained effects are rather similar when various weights are used to calculate counterfactuals. Years of schooling and years of schooling^2 together stand out as the factors with the most explanatory power (1.089 out of 2.820, or 38.4%) for observed obesity disparity. Compared to education, the impacts of other groups of variables or single variables on the BMI gap are rather small. For example, explained effects linked to household income only account for 2.4% of the mean BMI gap, the labor market and occupational status and the demographic factors account for 2.4% and 4.0%, respectively. The year fixed effects re-

[19] In this paper we only report the contribution of each group of explanatory variables to explained effects and unexplained effects. The decomposition results of each explanatory variables are available upon request.

duce the BMI gap by -1.8%, suggesting that the explained part of the obesity disparity has shrinked between year 2002 and 2012, once other observed observed factors are controlled for.

(Insert Table 3 here)

The first row of Table 4 reports the mean BMI difference (0.461 BMI points) between male Turkish immigrants and male German native-borns, which is statistically significant at the 1% level. As with the BO decomposition procedures for women, we follow O'Neill and O'Neill (2006) and use four different coefficients to weight the coefficients effect. Going across columns (1) to (4) to compare decomposition results performed with weighting matrix of coefficients, we find that observed characteristics play much stronger role in explaining the average male BMI gap than females, although the average male BMI gap is much smaller than the average female BMI gap. Column (4) of Table 4 reports that the total explained effect accounts for 78.5% of average BMI gap.

Table 4 also reports the contribution of group variables and single variables to the explained (the middle panel) and the unexplained part (the bottom panel) of the BMI gap between male Turkish immigrants and male German native-borns. Here, we also group our controlling variables and present the contributions of groups of variables rather than each control variable, following the same rule as in section 4.1. Age, family status, region, etc. together stand as the group of factors with the strongest explanatory power (0.192 out of 0.461 BMI points, or 41.6%) for observed obesity disparity. The impact of years of schooling and years of schooling^2 together also have a large explanatory power (0.153 out of 0.461 BMI points, or 33.2%). Explained effects linked to the labor market and occupational status account for 20.1%, although household income does not have a statistically significant effect on the male BMI gap. The year dummies together reduce the BMI gap by -11.8%, suggesting that the explained part of the obesity disparity shrinks between 2002 and 2012, after having controlled for other observed factors.

(Insert Table 4 here)

4.2 RIF regression decomposition results

As shown by figure 1, the BMI disparity for both women and men are not constant along with the BMI distribution. Such a pattern underscores the importance of examining BMI differences throughout the distribution. Therefore BO decomposition of mean obesity difference cannot reflect the hetegeneous gap between Turkish immigrants and Germans for fat and thin people, resulting in misleading decomposition results.

Table 5 presents the OB type BMI gap decomposition at the 10th, 25th, 50th,75th and 90th percentiles of the unconditional distributions of BMIs with full controls for observed characteristics. The OB type decomposition procedure based upon the RIF-OLS regression corresponds to the coefficients suggested by Jann (2008) as the reference coefficicents to calculate counterfactuals. The first row of Table 5 reports that conditional on observed characteristics, female Turkish immigrants have higher BMI than female Germans throughout the BMI distributions. Overall, it appears that the differences in BMI between female Turkish immigrants and female Germans at the median and the 75th quantile are largest. Column (3) shows the BMI gap (3.274 BMI points) for women at the 50% quantile, which is larger than the mean BMI gap estimated in Table 3 and at the 10% and 25% quantiles. Column (4) reports that the BMI gap at the 75% quantile is 3.919 BMI points, which is larger than the BMI gap at the median. Column (5) reports that the BMI gap for women at the 90% quantile is 3.031 BMI points, which is smaller than the median and larger than the mean. At the 50% quantile and 75% quantile, observed characteristics play almost the same role as unobserved obesity behaviors in explaning the feamle Turkish immigrant/German BMI gap, with 45.2% and 51.9% of the BMI differential explained by observed characteristics,respectively. At the 90% quantile, the major part of the BMI differential is due to observed characteristics(77.9%).

Overall, it appears that the differences in BMI between female Turkish immigrants and female Germans are significantly due to differences in observed characteristics at the mean, median and 75th quantiles. The main contribution to the BMI gap is provided by education throughout the BMI distributions. Household income also plays a constant role in explaining the female BMI gap, whereas the role of the labor market and occupation status and demographic factors are somewhat mixed. Observing the columns to compare the coefficients of each group of variables, education explains 39.5%, 44.7% and 66.3% of the female BMI gap at the 50%, 75% and 90% percentiles, respectively, whereas household income explains 2.8%, 4.4% and 11.9%, respectively. This reveals the fact that the explained part is greater at upper quantiles of the BMI distribution. Consequently, integration policies targeted at reducing education disparities between female Turkish immigrants and female Germans may be more effecting in reducing obesity in Germany. The labor market and occupational status plays no role at the 50% and 75% percentiles, while it explains 13.9% of the BMI gap at the 90% percentile. Demographic factors such as e.g. age, family status and residential area plays no role at the 75th percentile, while interestingly differences in demographic factors reduce the explained part of the observed obesity gap at the 90th percentile. We also find that the negative coefficients of year fixed effects in the explained part of the BMI at various quantiles show a time trend reducing the BMI gap between female Turkish immigrants and female Germans. We do not discuss the detailed decomposition of the coefficient effect because none of the estimated coefficients are statistically significant, except at the 90th percentile.

(Insert Table 5 here)

Table 6 reports the estimated BMI gap of the RIF-OLS regression at the 10th, 25th, 50th, 75th and 90th percentiles of the BMI distribution, as well as corresponding detailed decompositions. In contrast to the female population, the BMI distribution of male Turkish immigrants relative to male Germans varies little throughout the top three-quarters of the BMI distribution. Overall, it appears that the BMI gap between male Turkish immigrants and male Germans is sizable among individuals at the 10th, 25th and 50th percentiles, yet small and statistically insignificant among fat individuals at the 75th and 90th percentiles. In contrast to BMI at other percentiles, the BMI gap is negative (-0.529 BMI points) at the 90th percentile of the BMI distribution, indicating that extreme fatness is more prevalent among male Germans than male Turkish immigrants.

(Insert Table 6 here)

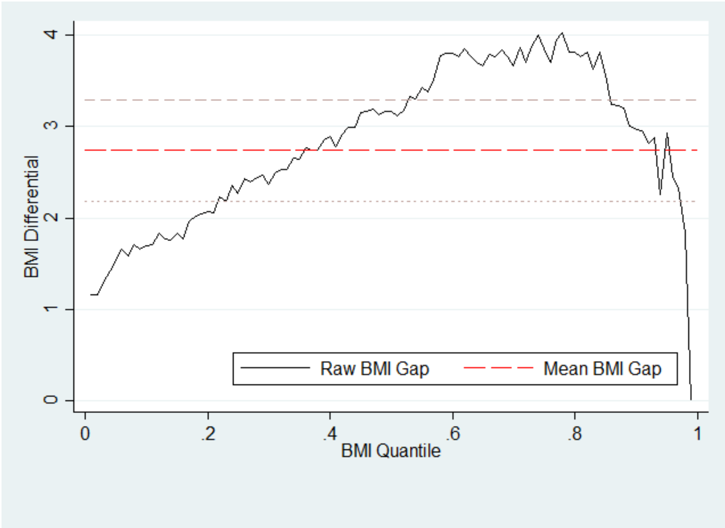
5 Conclusion

Our empirical approach is based upon decomposing BMI differences between two subpopulation groups into a component that can be explained by observed socioeconomic status and unobserved behaviors. To the best of our knowledge, this is the first attempt to consider the role of socioeconomic status in explaining BMI differences between Turkish iImmigrants and German native-borns in Germany, applying both a BO method to examine the BMI gap at the mean and a quantile regression framework to examine the BMI gap along BMI distributions. Compared with the standard Blinder-Oaxaca decomposition of mean differences between population subgroups, the distributional decomposition method based upon unconditional quantile regression provides additional insights into the potential heterogeneous Turkish immigrant/German native-born BMI gap concerning both fat and thin persons, with important differences in the explained part of the BMI gap observed between the results of conditional quantile and unconditional quantile methods.

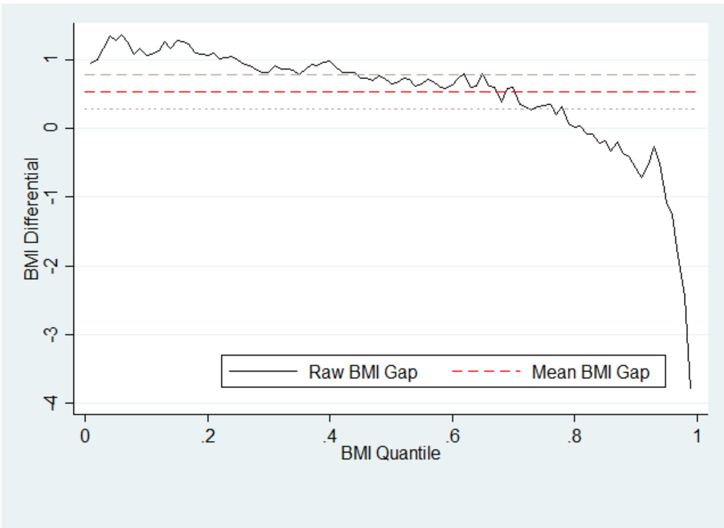
Our empirical results confirm that large BMI differences exist between adult female Turkish immigrants and native Germans. This study demonstrates that education is an important driving force behind the mean female Turkish immigrant/German native-born BMI gap. Moreover, differences in household income and labor market and occupational status also account for the observed BMI gap among women at the 90th percentile. Compared to women, there is much smaller mean gap in BMI between male Turkish immigrants and male Germans. Comparing the male BMI gap at various quantile points, we find a small and statistically insignificant BMI gap at the 75th and 90th percentiles. Although we do not investigate changes in BMI over time, the results from this paper provide new empirical evidence of health inequality and BMI assimilation. Accordingly, the negative coefficients of group of year dummies at mean and various quantiles suggest a decreasing Turkish immigrant/German native-born BMI gap between 2002 and 2012.

The main policy implications of our results are as follows. For obese women, anti-obesity policies may address female Turkish immigrants and female Germans differently, because around 50% of the obesity gap at mean, the 50th quantile and 75th quantile are attributable to differencens in obesity behavior other than differences in observable characteristics. It may not be necessary for public policies targeting obese men to distinguish between male Turkish immigrants and German native-borns.

Figure 1: Body Mass Index Disparity by Quantile



(a) Female



(b) Male

NOTE.—Figure 1 displays the statistical distribution of the Turkish immigrants-German native-borns BMI gap. Figure 2(a) shows for women and 2(b) shows for men. In the 2(a) shows the BMI gap among women is increasing as the quantile of BMI increases, while the BMI start to decrease among the extreme fat group (approximately 90th quantile or higher), 2(b) shows that for for men, the BMI between Turkish immigrants and German native-borns is largest at the point close to 10th percentile, then the BMI gap decreases as the quantile of BMI increases. Interestingly, contrast starkly with women, the BMI gap is less than 0 after the 75th percentile, indicating that extre fatness is more prevalent among male German native-borns than male Turkish immigrants. Data source: German Socio-Economic Panel(GSOEP).

Table 1: Descriptive Statistics

	Female			Male		
	Turkish Immigrants (1)	German native-borns (2)	Differences (1)-(2)	Turkish Immigrants (3)	German native-borns (4)	Differences (3)-(4)
BMI	27.797	24.977	2.738***	26.957	26.496	0.531*
	(5.363)	(5.018)	(0.552)	(3.488)	(4.373)	(0.252)
Obese (=1 if BMI $\geq$ 30)	0.313	0.147	0.166***	0.179	0.173	0.006
	(0.042)	(0.007)	(0.044)	(0.027)	(0.007)	(0.0282)
Overweight (=1 if BMI $\geq$ 25)	0.655	0.412	0.243***	0.7	0.596	0.0104**
	(0.039)	(0.009)	(0.041)	(0.031)	(0.009)	(0.0325)
Age,education family status,region, income etc						
Age	41.577	43.13	-1.615	43.067	43.47	-0.286
	(11.032)	(12.431)	(1.154)	(10.67)	(12.285)	(0.997)
Years of schooling	9.413	12.207	-2.803***	9.911	12.379	-2.468***
	(2.256)	(2.547)	(0.208)	(1.965)	(2.693)	(0.200)
Married (dummy)	0.889	0.556	0.328***	0.87	0.542	0.331***
	(0.314)	(0.497)	(0.0283)	(0.337)	(0.498)	(0.026)
Separated,divorced or widowed (dummy)	0.082	0.17	-0.089***	0.079	0.119	0.042*
	(0.274)	(0.375)	(0.021)	(0.27)	(0.324)	(0.020)
Single (dummy)	0.029	0.274	-0.239***	0.051	0.338	-0.289***
	(0.169)	(0.446)	(0.0208)	(0.22)	(0.473)	(0.014)
No. Children in HH.	1.327	0.555	0.774***	1.349	0.507	0.840***
	(1.22)	(0.872)	(0.121)	(1.172)	(0.863)	(0.13)
Urban	0.738	0.508	0.193***	0.701	0.513	0.193***
	(0.44)	(0.5)	(0.0529)	(0.458)	(0.5)	(0.0529)
Urbanization	0.233	0.323	-0.0613	0.268	0.324	-0.0613
	(0.423)	(0.468)	(0.0507)	(0.443)	(0.468)	(0.0507)
Rural	0.029	0.169	-0.132***	0.031	0.163	-0.132***
	(0.168)	(0.375)	(0.0182)	(0.174)	(0.369)	(0.0182)
HH. Income (1,000 Euros)	28.999	37.663	-8.643***	30.065	40.121	-10.02***
	(15.591)	(29.188)	(1.246)	(15.392)	(37.758)	(1.248)
Log(HH. Income)	10.14	10.346	-0.205***	10.189	10.412	-0.221***
	(0.593)	(0.661)	(0.0443)	(0.014)	(0.666)	(0.045)
Labor market and occupational status						
Full time job	0.179	0.33	-0.151***	0.615	0.738	-0.128**
	(0.384)	(0.47)	(0.0311)	(0.487)	(0.44)	(0.045)
Full time jobs $\times$ white collar jobs	0.061	0.237	-0.177***	0.089	0.34	-0.254***
	(0.239)	(0.425)	(0.0231)	(0.284)	(0.474)	(0.026)
Full time jobs $\times$ not white/blue collar	0.016	0.016	-0.0004	0.063	0.061	0.0003
	(0.125)	(0.126)	(-0.001)	(0.244)	(0.24)	(0.022)
Part time job	0.201	0.336	-0.134***	0.025	0.054	-0.031
	(0.401)	(0.472)	(0.0350)	(0.155)	(0.227)	(0.009)
Part time job $\times$ white collar	0.06	0.222	-0.163***	0.006	0.024	-0.0182***
	(0.237)	(0.416)	(0.0217)	(0.077)	(0.153)	(0.004)
Part time job $\times$ not white/blue collar	0.005	0.011	-0.0059	0.002	0.004	-0.003
	(0.071)	(0.104)	(0.0045)	(0.04)	(0.067)	(0.002)
Training	0.0003	0.018	-0.0110	0.009	0.021	-0.0121***
	(0.0178)	(0.135)	(-0.0082)	(0.093)	(0.143)	(0.003)
Registered unemployed	0.108	0.065	0.0410	0.188	0.065	0.130***
	(0.311)	(0.247)	(0.0230)	(0.391)	(0.247)	(0.027)
Not active in labor market	0.458	0.169	0.285***	0.049	0.037	0.0108
	(0.499)	(0.375)	(0.0379)	(0.217)	(0.188)	(0.037)
Retired	0.044	0.064	-.0213	0.116	0.068	0.049
	(0.205)	(0.245)	(0.0193)	(0.32)	(0.251)	(0.068)
No. Observations	948	29610		1053	27504	

Means and standard deviations are weighted using the SOEP weight. Linearized standard error in parentheses, the significance level of the mean differences are calculated using a t-test. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 2: OLS regression coefficients of SES variables from BMI regressions for individuals 20-65 (SOEP 2002–2012)

	Female				Male			
Dep.Var.	BMI	BMI	BMI	BMI	BMI	BMI	BMI	BMI
	Turkish immigrants Coefficients	German native-borns Coefficients	Pooled Coefficients	Pooled Coefficients	Turkish immigrants Coefficients	German native-borns Coefficients	Pooled Coefficients	Pooled Coefficients
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age	0.153	0.297***	0.293***	0.293***	0.146	0.244***	0.247***	0.247***
	(0.186)	(0.053)	(0.051)	(0.051)	(0.326)	(0.060)	(0.059)	(0.059)
Age^2	-0.085	-0.280***	-0.275***	-0.274***	0.032	-0.220***	-0.222***	-0.220***
	(0.222)	(0.059)	(0.057)	(0.057)	(0.384)	(0.069)	(0.069)	(0.069)
Years of schooling	1.099	0.501	0.482*	0.494*	-0.801	-0.970***	-1.300***	-1.031***
	(0.784)	(0.314)	(0.273)	(0.281)	(1.067)	(0.338)	(0.302)	(0.318)
Years of schooling ^{2}	-5.331	-2.367**	-2.310**	-2.350**	1.278	2.690**	3.836***	2.901**
	(3.694)	(1.119)	(0.979)	(1.006)	(4.472)	(1.227)	(1.109)	(1.162)
Full time jobs × white collar jobs	0.494	-0.215	-0.207	-0.205	2.837	-0.158	-0.132	-0.136
	(0.867)	(0.165)	(0.161)	(0.161)	(3.479)	(0.279)	(0.276)	(0.275)
Full time jobs × other jobs	0.137	-0.047	-0.052	-0.053	-1.424	-0.728	-0.745*	-0.768*
	(0.604)	(0.329)	(0.316)	(0.316)	(1.777)	(0.454)	(0.441)	(0.444)
Part time jobs ×	-0.766	-0.189	-0.201	-0.199	0.366	0.238	0.193	0.232
	(0.628)	(0.378)	(0.367)	(0.367)	(0.916)	(0.357)	(0.345)	(0.345)
Part time jobs ×white collar jobs	-0.452	0.398	0.401	0.399	-1.464	-0.547*	-0.547*	-0.547*
	(1.615)	(0.505)	(0.494)	(0.494)	(0.983)	(0.330)	(0.320)	(0.321)
Part time jobs ×other jobs	5.679***	-0.034	0.041	0.040	-2.872***	-0.377	-0.395	-0.416
	(0.848)	(1.005)	(0.987)	(0.987)	(1.058)	(0.601)	(0.586)	(0.588)
Training (dummy)	1.675	-0.503	-0.485	-0.483	0.457	-0.082	-0.105	-0.046
	(1.126)	(0.376)	(0.367)	(0.367)	(1.510)	(0.442)	(0.436)	(0.439)
Not participating in labor market(dummy)	-0.5987	-0.1827	-0.1969	-0.1999	0.0519	-0.1094	-0.0927	-0.1133
	(0.9201)	(0.7290)	(0.6947)	(0.6943)	(0.9010)	(0.3164)	(0.3066)	(0.3061)
Retired (dummy)	-0.070	0.556*	0.546*	0.543*	-1.708	0.616*	0.527	0.536
	(0.802)	(0.309)	(0.296)	(0.296)	(1.660)	(0.365)	(0.359)	(0.360)
Registered unemployed	-0.144	0.140	0.114	0.111	0.721	0.665	0.636	0.655
	(0.549)	(0.330)	(0.303)	(0.304)	(1.226)	(0.431)	(0.415)	(0.414)
Separated,divorced or widowed (dummy)	-0.744	-0.379	-0.389	-0.387	1.2200	-0.712***	-0.742***	-0.687***
	(0.557)	(0.250)	(0.238)	(0.238)	(1.873)	(0.243)	(0.240)	(0.241)
Single (dummy)	-1.079	-0.611**	-0.606**	-0.602**	-1.360	-0.834***	-0.846***	-0.783***
	(0.845)	(0.268)	(0.262)	(0.262)	(2.013)	(0.284)	(0.280)	(0.281)
No. Children in HH.	0.193	-0.078	-0.061	-0.064	0.126	-0.109	-0.077	-0.109
	(0.164)	(0.093)	(0.087)	(0.088)	(0.514)	(0.111)	(0.108)	(0.108)
Log (HH Income)	-0.053	0.111	0.105	0.106	-0.034	-0.536***	-0.547***	-0.526***
	(0.444)	(0.160)	(0.158)	(0.158)	(0.477)	(0.144)	(0.142)	(0.142)
Rural(dummy)	1.663	0.066	0.073	0.077	-1.244	0.150	0.072	0.138
	(1.432)	(0.215)	(0.211)	(0.212)	(1.082)	(0.271)	(0.270)	(0.270)
Regions under urbanization (dummy)	-0.052	0.217	0.209	0.212	0.281	0.117	0.077	0.112
	(0.464)	(0.194)	(0.187)	(0.188)	(0.908)	(0.221)	(0.217)	(0.217)
German native-borns (dummy)				-0.099				-1.493***
				(0.278)				(0.560)
Constant term	16.482***	15.484***	15.734***	15.732***	27.028**	31.851***	34.180***	33.499***
	(5.933)	(2.574)	(2.315)	(2.314)	(11.916)	(2.794)	(2.570)	(2.557)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1053	27634	28687	28687	948	29746	30694	30694
R^2	0.116	0.075	0.075	0.075	0.223	0.079	0.088	0.090

Estimations are weighted using SOEP sampling weights. Standard error in parentheses are robust and clustered at the level of SOEP primary sampling units (2799 clusters). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
The referece group is a married individual living in urban regions and having blue collar full time job.

Table 3: Two-fold Blind-Oaxaca decomposition of Female Turkish Immigrants/German-Native Borns BMI Gap

	(1) Using Turkish Immig. Coef. from col. 1, Table 2	(2) Using German Native-borns Coef. from col. 2 Table 2	(3) Using Pooled Coef. from col. 3 Table 2	(4) Using Pooled Coef. from col. 4 Table 2
Mean BMI Gap (Δ_{BMI})	2.820***	2.820***	2.820***	2.820***
	(0.268)	(0.269)	(0.267)	(0.239)
A. Composition(explained) effects attributable to				
Age,family status,region, etc	0.195	0.133*	0.176**	0.114*
	(0.471)	(0.071)	(0.072)	(0.066)
	[6.9%]	[4.7%]	[6.2%]	[4.0%]
Education	1.447***	1.047***	1.262***	1.089***
	(0.275)	(0.108)	(0.112)	(0.102)
	[51.3%]	[37.1%]	[44.8%]	[38.6%]
Labor market status and occupation	-0.222	0.073	0.080*	0.069*
	(0.381)	(0.048)	(0.046)	(0.040)
	[-7.9%]	[2.6%]	[2.8%]	[2.4%]
Log(HH Income)	0.007	0.110***	0.113***	0.108***
	(0.083)	(0.023)	(0.023)	(0.022)
	[0%]	[3.9%]	[4.0%]	[3.8%]
Year fixed effects	-0.034	-0.053***	-0.053**	-0.052***
	(0.050)	(0.019)	(0.023)	(0.019)
	[-1.2%]	[-1.9%]	[-1.9%]	[-1.8%]
Total explained by observed characteristics	1.394***	1.310***	1.578***	1.328***
	(0.441)	(0.126)	(0.143)	(0.111)
	[49.4%]	[46.5%]	[56.0%]	[47.1%]
B. Unexplained or coefficents effects attributable to				
Age,family status,region, etc	0.979	1.042	0.999	1.061
	(3.950)	(4.509)	(4.692)	(4.078)
Education	-0.130	0.270	0.055	0.229
	(3.586)	(3.573)	(3.528)	(3.100)
Labor market status and occupation	0.401	0.107	0.010	0.110
	(0.794)	(0.659)	(0.574)	(0.632)
Log(HH Income)	5.194	5.091	5.089	5.093
	(4.167)	(3.857)	(3.597)	(4.216)
Year fixed effects	-0.195	-0.177	-0.177	-0.177
	(0.349)	(0.366)	(0.401)	(0.389)
Constants	-4.824	-4.824	-4.824	-4.824
	(6.958)	(6.606)	(6.769)	(6.777)
Total unexplained	1.426***	1.510***	1.242***	1.493***
	(0.470)	(0.273)	(0.206)	(0.236)
In % of Δ_{BMI}	[50.6%]	[53.5%]	[44.0%]	[52.9%]
N	30694	30694	30694	30694

Estimations are weighted using SOEP sampling weights. Standard error in parentheses are robust and clustered at the level of SOEP primary sampling units (2799 clusters). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
The referece group is a married individual living in urban regions and having blue collar full time job. Age,family status,region, etc: Age, Age^2, single, separated, no. children in HH., residing in rural regions, residing in regions under urbanization
Education: years of schooling, years of schooling^2
Labor market and occupational status: part-time jobs,four interactions indicating occupational status (part-time job × white collar job, part-time job × not white/blue collar jobs, full time job × white collar jobs and full-time jobs × not white/blue collar jobs) in training, registered unemployed, retired, not participating in labor market
The corresponding percentages of the mean BMI gap are reported in the bracket.

Table 4: Two-fold Blind-Oaxaca decomposition of Male Turkish Immigrants/German-Native Borns BMI Gap

	(1) Using Turkish Immig. Coef. from col. 5, Table 2	(2) Using German Native-borns Coef. from col. 6 Table 2	(3) Using Pooled Coef. from col. 7 Table 2	(4) Using Pooled Coef. from col. 8 Table 2
Mean BMI Gap (Δ_{BMI})	0.461***	0.461***	0.461***	0.461***
	(0.145)	(0.138)	(0.120)	(0.141)
A. Explained effects attributable to				
Age,family status,region, etc	0.285	0.186***	0.197***	0.192***
	(0.175)	(0.047)	(0.045)	(0.047)
	[61.8%]	[40.3%]	[42.7%]	[41.6%]
Education	0.401**	0.147**	0.159***	0.153***
	(0.202)	(0.065)	(0.059)	(0.055)
	[87.0%]	[31.9%]	[34.5%]	[33.2%]
Labor market status and occupation	-0.158	0.010***	0.094***	0.093***
	(0.1407)	(0.0379)	(0.0299)	(0.0343)
	[-34.3%]	[2.2%]	[20.4%]	[20.1%]
Log(HH Income)	0.012	-0.025	-0.024	-0.024
	(0.060)	(0.024)	(0.021)	(0.019)
	[2.6%]	[-5.4%]	[-5.2%]	[-5.2%]
Year fixed effects	-0.058*	-0.051***	-0.052***	-0.052***
	(0.035)	(0.017)	(0.015)	(0.018)
	[-12.6%]	[-11.1%]	[-11.3%]	[-11.3%]
Total explained by observed characteristics	0.482*	0.357***	0.374***	0.362***
	(0.265)	(0.091)	(0.071)	(0.077)
In % of Δ_{BMI}	[103.2%]	[77.4%]	[81.1%]	[78.5%]
B. Unexplained or coefficients effects attributable to				
Age,family status,region, etc	-2.204	-2.104	-2.115	-2.110
	(2.580)	(2.766)	(2.500)	(2.739)
Education	2.656	2.910	2.898	2.904
	(2.414)	(2.472)	(2.362)	(2.511)
Labor market status and occupation	0.195	-0.063	-0.057	-0.056
	(0.208)	(0.170)	(0.168)	(0.151)
Log(HH Income)	-1.77	-1.670	-1.671	-1.671
	(2.916)	(3.139)	(3.101)	(3.113)
Year fixed effects	0.041	0.034	0.034	0.034
	(0.268)	(0.247)	(0.258)	(0.237)
Constant term	0.997	0.997	0.997	0.997
	(3.943)	(3.978)	(3.962)	(3.903)
Total unexplained	-0.021	0.105	0.087	0.010
	(0.260)	(0.157)	(0.122)	(0.157)
In % of Δ_{BMI}	[-3.2%]	[22.6%]	[18.9%]	[21.5%]
N	28687	28687	28687	28687

Estimations are weighted using SOEP sampling weights. Standard error in parentheses are robust and clustered at the level of SOEP primary sampling units (2799 clusters). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
The referece group is a married individual living in urban regions and having blue collar full time job. Age,family status,region, etc: Age, Age^2, single, separated, no. children in HH., residing in rural regions, residing in regions under urbanization
Education: years of schooling, years of schooling^2
Labor market and occupational status: part-time jobs,four interactions indicating occupational status (part-time job × white collar job, part-time job × not white/blue collar jobs, full time job × white collar jobs and full-time jobs × not white/blue collar jobs) in training, registered unemployed, retired, not participating in labor market
The corresponding percentages of the raw BMI gap are reported in the bracket.

Table 5: Unconditional Quantile Decomposition Results of Female Turkish Immigrants/German-Native Borns BMI Gap (SOEP, 2002-2012)

	(1) 10th percentile	(2) 25th percentile	(3) 50th percentile	(4) 75th percentile	(5) 90th percentile
Decomposition Method: RIF regressions without reweighting					
Turkish immigrants	21.537***	23.767***	27.170***	31.312***	34.678***
	(0.185)	(0.274)	(0.351)	(0.438)	(0.445)
German native-borns	19.826***	21.479***	23.895***	27.393***	31.647***
	(0.036)	(0.032)	(0.053)	(0.069)	(0.118)
BMI gap: $\Delta^{\tau}_{BMI} = E\left(RIF_{\tau}\left[In\left(BMI_{tf}\right)\right]\right) - E\left(RIF_{\tau}\left[In\left(BMI_{gf}\right)\right]\right)$	1.711***	2.288***	3.274***	3.919***	3.031***
	(0.184)	(0.280)	(0.348)	(0.451)	(0.456)
A. Explained effects attributable to					
Age,family status,region, etc	0.203***	0.203***	0.161**	0.055	-0.183
	(0.047)	(0.056)	(0.073)	(0.103)	(0.158)
	[11.9%]	[8.9%]	[6.2%]	[1.4%]	[-6%]
Education	0.421***	0.807***	1.293***	1.752***	2.009***
	(0.0760)	(0.084)	(0.119)	(0.173)	(0.232)
	[24.6%]	[35.3%]	[39.5%]	[44.7%]	[66.3%]
Labor market and occupational status	-0.113***	-0.112***	-0.039	0.107	0.421***
	(0.029)	(0.037)	(0.047)	(0.066)	(0.109)
	[-6.6%]	[-4.9%]	[-1.2%]	[2.7%]	[13.9%]
Log (HH Income)	0.014	0.039**	0.093***	0.174***	0.236***
	(0.013)	(0.016)	(0.022)	(0.036)	(0.054)
	[0.8%]	[1.7%]	[2.8%]	[4.4%]	[11.9%]
Year fixed effects	-0.017**	-0.025**	-0.029**	-0.052**	-0.121**
	(0.008)	(0.012)	(0.014)	(0.024)	(0.050)
	[-1.0%]	[1.1%]	[-0.9%]	[-1.3%]	[-4.0%]
Total explained by observed characteristics	0.509***	0.910***	1.479***	2.035***	2.362***
	(0.090)	(0.084)	(0.147)	(0.231)	(0.284)
In % of Δ^{τ}_{BMI}	[29.7%]	[39.8%]	[45.2%]	[51.9%]	[77.9%]
B. Unexplained or coefficients effects attributable to					
Age,family status,region, etc	6.953	7.907	0.151	-5.458	2.911
	(4.708)	(5.310)	(4.968)	(7.814)	(6.320)
Education	-4.076	-1.187	-8.556	0.213	22.159***
	(3.218)	(3.764)	(5.393)	(5.940)	(6.272)
Labor market status and occupatio	0.490	0.373	0.263	-0.762	0.096
	(0.550)	(0.669)	(0.775)	(1.261)	(1.543)
Log (HH Income)	0.835	-3.420	6.192	7.767	12.392
	(6.249)	(4.880)	(5.729)	(7.591)	(9.859)
Year fixed effects	0.135	-0.201	-0.628	0.124	-0.491
	(0.488)	(0.497)	(0.498)	(0.684)	(0.610)
Constant term	-3.134	-2.095	4.372	0.0003	-36.398**
	(7.218)	(6.801)	(8.262)	(12.557)	(14.882)
Total unexplained effects	1.202***	1.378***	1.795***	1.884***	0.669
	(0.197)	(0.279)	(0.326)	(0.429)	(0.535)
In % of Δ^{τ}_{BMI}	[70.3%]	[60.2%]	[54.8%]	[48.1%]	[22.1%]
N	30694	30694	30694	30694	30694

Estimations are weighted using SOEP sampling weights. Standard error in parentheses are robust and clustered at the level of SOEP primary sampling units (2799 clusters). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
The referece group is a married individual living in urban regions and having blue collar full time job. Age,family status,region, etc: Age, Age^2, single, separated, no. children in HH., residing in rural regions, residing in regions under urbanization
Education: years of schooling, $\text{years of schooling}^2$
Labor market and occupational status: part-time jobs,four interactions indicating occupational status (part-time job $\times$ white collar job, part-time job $\times$ not white/blue collar jobs, full time job $\times$ white collar jobs and full-time jobs $\times$ not white/blue collar jobs) in training, registered unemployed, retired, not participating in labor market
The corresponding percentages of the mean BMI gap are reported in the bracket.

Table 6: Unconditional Quantile Decomposition Results of Male Turkish Immigrants/German Native-Borns BMI Gap (SOEP, 2002-2012)

	(1) 10th percentile	(2) 25th percentile	(3) 50th percentile	(4) 75th percentile	(5) 90th percentile
Decomposition Method: RIF regressions without reweighting					
Turkish immigrants	23.051***	24.703***	26.499***	29.005***	31.396***
	(0.1744)	(0.1443)	(0.1801)	(0.2172)	(0.4169)
German native-borns	21.917***	23.685***	25.846***	28.680***	31.925***
	(0.042)	(0.038)	(0.035)	(0.063)	(0.106)
BMI gap: $\Delta^{\tau}_{BMI} = E\left(RIF_{\tau}\left[ln\left(BMI_{tm}\right)\right]\right) - E\left(RIF_{\tau}\left[ln\left(BMI_{gm}\right)\right]\right)$	1.134***	1.019***	0.653***	0.326	-0.529
	(0.178)	(0.150)	(0.183)	(0.233)	(0.421)
A. Explained effects attributable to					
Age,family status,region, etc	0.255***	0.182***	0.223***	0.127*	0.230**
	(0.060)	(0.063)	(0.058)	(0.076)	(0.103)
	[22.5%]	[17.9%]	[34.2%]	[39.0%]	[-43.5%]
Education	-0.091	0.054	0.146***	0.417***	0.352***
	(0.075)	(0.061)	(0.054)	(0.083)	(0.114)
	[-8.0%]	[5.3%]	[22.4%]	[127.9%]	[-66.5%]
Labor market status and occupation	-0.046	-0.019	0.023	0.109**	0.293***
	(0.044)	(0.034)	(0.031)	(0.050)	(0.079)
	[-4.1%]	[-1.9%]	[3.5%]	[1.28%]	[-55.4%]
Log (HH Income)	-0.083***	-0.088***	-0.034*	-0.029	0.098**
	(0.021)	(0.020)	(0.019)	(0.023)	(0.048)
	[-7.3%]	[-8.6%]	[-5.2%]	[-8.9%]	[-18.5%]
Year fixed effects	-0.012	-0.023**	-0.038***	-0.071***	-0.126***
	(0.011)	(0.010)	(0.011)	(0.022)	(0.047)
	[-1.1%]	[-2.3%]	[-5.8%]	[21.8%]	[23.8%]
Total explained by observed characteristics	0.022	0.105	0.321***	0.553***	0.847***
	(0.098)	(0.091)	(0.077)	(0.107)	(0.167)
In % of Δ^{τ}_{BMI}	[1.9%]	[10.3%]	[49.2%]	[169.6%]	[-159.9%]
B. Unexplained or Coefficients effects attributable to					
Age,family status,region, etc	-2.189	-2.496	1.405	0.912	-12.156**
	(4.647)	(3.330)	(2.788)	(3.234)	(5.530)
Education	-0.111	-2.866	7.610**	4.750	4.645
	(3.865)	(2.641)	(2.997)	(4.070)	(5.250)
Labor market status and occupation	0.258	-0.182	0.010	0.193	-0.305
	(0.257)	(0.228)	(0.207)	(0.236)	(0.348)
Log (HH Income)	-5.219	-5.637	-1.890	-6.356	2.477
	(4.530)	(3.896)	(2.536)	(4.776)	(7.312)
Year fixed effects	0.874**	0.475	0.257	-0.659*	-0.141
	(0.382)	(0.328)	(0.295)	(0.396)	(0.617)
Constant term	7.498	11.619**	-7.058*	0.932	4.104
	(7.318)	(5.715)	(4.065)	(6.807)	(8.779)
Total unexplained	1.112***	0.913***	0.333	-0.228	-1.375***
	(0.204)	(0.173)	(0.204)	(0.258)	(0.466)
In % of Δ^{τ}_{BMI}	[98.1%]	[89.7%]	[50.8%]	[-69.6%]	[259.9%]
N	28687	28687	28687	28687	28687

Estimations are weighted using SOEP sampling weights. Standard error in parentheses are robust and clustered at the level of SOEP primary sampling units (2799 clusters). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
The referece group is a married individual living in urban regions and having blue collar full time job. Age,family status,region, etc: Age, Age^2, single, separated, no. children in HH., residing in rural regions, residing in regions under urbanization
Education: years of schooling, years of schooling^2
Labor market and occupational status: part-time jobs,four interactions indicating occupational status (part-time job × white collar job, part-time job × not white/blue collar jobs, full time job × white collar jobs and full-time jobs × not white/blue collar jobs) in training, registered unemployed, retired, not participating in labor market
The corresponding percentages of the raw BMI gap are reported in the bracket.

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Appendices

Appendix A Variable description

Table A1: Variable Descriptions

Variable	Description
BMI	Body Mass Index
Obese	1 if BMI$\geq$ 30,
Overweight or obese	1 if BMI$\geq$ 25
Age	Age of individual in years
Age^2	Age squared
Years of education	Years of individual's education
Years of education^2	Years of individual's education squared
Full time job	1 if individual has a full time job including
civil-/military service;	0 otherwise ;
Part time job	1 if individual has a part time job;0 otherwise
White collar job	1 if individual has a white collar job ; 0 otherwise
Non white/blue collar	1 if individual has a job that is self-employed, in apprenticeship or with armed forces; 0 otherwise
Training	1 if individual is in vocational training; 0 otherwise
Registered Unemployed	1 if currently registered unemployed; 0 otherwise
Not active in the labor market	1 if individual does not participate at the labor market and is neither in retirement nor registered unemployed; 0 otherwise
Retired	1 if individual receives pension and not active in the labor market;0 otherwise
Married(dummy)	1 if individual is married ;0 otherwise
Separated,divorced or widowed(dummy)	1 if individual is Separated(dummy),divorced or widowed; 0 otherwise
Single	1 if individual is single; 0 otherwise
No. Children	Number of children in individual'S Housholds
Income	Annual Post Government Household Income
Urban	1 if individual resides in a county catogorized as urban areas; 0 otherwise
Urbanisation	1 if individual resides in a county catogorized as areas under urbanisation; 0 otherwise
Rural	1 if individual resides in a county catogorized as rural areas; 0 otherwise

Rural areas, areas under urbanisation and urban areas are defined by the German Federal Institute for Research on Building,Urban Affairs and Spatial Development (BBSR)

Appendix B Unconditional quantile regression estimates

Table B1: Unconditional Quantile Regression for Female Turkish Immigrants (SOEP, 2002-2012)

	RIF 10th percentile	RIF 25th percentile	RIF 50th percentile	RIF 75th percentile	RIF 90th percentile
Age	0.404**	0.456**	0.083	-0.217	0.456
	(0.192)	(0.212)	(0.276)	(0.418)	(0.404)
Age^2	-0.334	-0.336	0.079	0.481	-0.315
	(0.206)	(0.226)	(0.309)	(0.473)	(0.523)
Years of schooling	-0.485	-0.279	-2.623***	-1.828*	1.182
	(0.694)	(0.653)	(0.836)	(1.077)	(1.163)
Years of schooling^2	-0.222	-1.817	8.579**	5.395	-6.322
	(3.136)	(2.916)	(3.582)	(4.433)	(4.756)
Full time job × white collars	1.345	2.938**	1.326	0.464	1.283
	(1.391)	(1.153)	(1.743)	(1.944)	(3.126)
Full time job × other jobs	1.874*	2.798*	-2.626	-4.520***	-2.807
	(1.091)	(1.567)	(2.897)	(1.474)	(2.356)
Part time job	0.510	0.459	1.035	-0.204	-0.485
	(0.580)	(0.747)	(1.085)	(1.579)	(2.490)
Part time job × white collars	-0.222	-1.186	-1.123	-2.118	-1.505
	(1.288)	(1.359)	(1.321)	(1.407)	(1.482)
Part time job × other jobs	-3.569	-0.632	-7.427***	-4.504	-2.315
	(4.718)	(2.454)	(2.796)	(2.914)	(2.864)
Training	7.836**	-3.992*	-2.150	-0.976	2.613
	(3.849)	(2.298)	(1.604)	(2.406)	(2.369)
Not participating in labor market	0.139	-0.056	0.159	-0.911	0.816
	(0.509)	(0.731)	(0.955)	(1.476)	(2.544)
Retired	-0.305	-1.097	-0.945	-3.498	0.481
	(1.570)	(1.351)	(1.764)	(2.535)	(4.875)
Registered unemployed	1.023	0.487	1.723	0.441	0.619
	(0.852)	(0.962)	(1.605)	(1.881)	(2.568)
Separated,divorced or widowed	-1.145	-0.511	0.218	2.359	2.999
	(0.962)	(1.019)	(1.246)	(1.747)	(1.995)
Single	0.763	1.106	-3.138*	-0.381	-0.698
	(2.041)	(2.596)	(1.738)	(2.500)	(2.016)
No. children in HH.	0.114	-0.063	-0.277	0.152	-0.151
	(0.305)	(0.275)	(0.332)	(0.510)	(0.671)
Log (HH. income)	0.006	-0.518	0.151	-0.096	0.044
	(0.681)	(0.570)	(0.529)	(0.711)	(0.780)
Rural	-0.469	-0.378	-1.120	-0.150	-3.164**
	(1.047)	(1.237)	(1.364)	(1.759)	(1.609)
Urbanization	0.787*	1.262**	-0.013	0.375	-0.134
	(0.469)	(0.585)	(0.901)	(1.088)	(1.126)
Constant term	14.724	20.079***	37.745***	44.060***	14.784
	(9.741)	(7.697)	(8.578)	(11.782)	(15.144)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
N	948	948	948	948	948
R^2	0.108	0.168	0.161	0.121	0.074

Bootstrap standard errors(100 reps.) in parentheses are robust and clustered at at the level of SOEP primary sampling units(2799 clusters)

$^* p < 0.1$, $^{**} p < 0.05$, $^{***} p < 0.01$

Table B2: Unconditional Quantile Regression for Female Germans (SOEP, 2002-2012)

	RIF 10th percentile	RIF 25th percentile	RIF 50th percentile	RIF 75th percentile	RIF 90th percentile
Age	0.147***	0.179***	0.140***	0.236***	0.497***
	(0.027)	(0.033)	(0.031)	(0.049)	(0.085)
Age^2	-0.119***	-0.133***	-0.078**	-0.196***	-0.535***
	(0.029)	(0.035)	(0.036)	(0.058)	(0.100)
Years of schooling	-0.069	-0.422***	-1.247***	-1.885***	-2.591***
	(0.154)	(0.151)	(0.157)	(0.257)	(0.452)
Years of $schooling^2$	-0.180	0.767	3.744***	5.723***	8.143***
	(0.552)	(0.560)	(0.570)	(0.921)	(1.597)
Full time job × white collars	0.224	0.182	0.175	-0.442*	-0.648
	(0.155)	(0.135)	(0.173)	(0.257)	(0.452)
Full time job × other jobs	-0.347	-0.574**	-0.644*	-1.069**	-1.308*
	(0.301)	(0.286)	(0.372)	(0.452)	(0.748)
Part time jobs	-0.013	-0.047	0.360*	0.280	0.294
	(0.147)	(0.157)	(0.197)	(0.322)	(0.625)
Part time job × white collars	-0.073	-0.018	-0.276*	-0.767***	-1.423***
	(0.104)	(0.121)	(0.165)	(0.285)	(0.510)
Part time job × other jobs	-0.111	-0.910**	-0.468	0.020	0.494
	(0.298)	(0.381)	(0.411)	(0.571)	(1.102)
Training	-0.155	-0.111	0.142	0.011	-1.170*
	(0.360)	(0.400)	(0.346)	(0.697)	(0.694)
Not participating in labor market	-0.269*	-0.304**	-0.050	-0.262	0.081
	(0.154)	(0.146)	(0.180)	(0.262)	(0.527)
Retired	0.039	0.075	0.454*	1.188***	0.812
	(0.133)	(0.166)	(0.244)	(0.398)	(0.653)
Registered unemployed	-0.148	0.043	0.413	0.956**	1.855***
	(0.185)	(0.172)	(0.256)	(0.380)	(0.652)
Separated,divorced or widowed	-0.359***	-0.640***	-0.827***	-0.963***	-0.728*
	(0.094)	(0.085)	(0.124)	(0.243)	(0.387)
Single	-0.809***	-0.721***	-0.902***	-0.966***	-0.499
	(0.127)	(0.142)	(0.168)	(0.251)	(0.399)
No. children in HH.	0.034	0.103**	0.010	-0.206**	-0.472***
	(0.040)	(0.048)	(0.060)	(0.103)	(0.146)
Log (HH. income)	-0.076	-0.181***	-0.459***	-0.862***	-1.178***
	(0.072)	(0.059)	(0.102)	(0.164)	(0.271)
Rural	0.050	0.174*	0.148	0.095	0.286
	(0.086)	(0.104)	(0.149)	(0.198)	(0.347)
Urbanization	0.064	-0.012	0.054	0.220	0.408
	(0.078)	(0.090)	(0.103)	(0.160)	(0.258)
Constant term	17.870***	22.188***	33.372***	44.060***	51.181***
	(1.328)	(1.371)	(1.457)	(2.551)	(4.550)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
N	29610	29610	29610	29610	29610
R^2	0.048	0.075	0.074	0.051	0.029

Bootstrap standard errors(100 reps.) in parentheses are robust and clustered at at the level of SOEP primary sampling units(2799 clusters)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table B3: Unconditional Quantile Regression for Male Turkish Immigrants (SOEP, 2002-2012)

	RIF 10th percentile	RIF 25th percentile	RIF 50th percentile	RIF 75th percentile	RIF 90th percentile
Age	0.186	0.168	0.253*	0.217	-0.371
	(0.199)	(0.178)	(0.133)	(0.155)	(0.302)
Age^2	-0.182	-0.144	-0.215	-0.098	0.603
	(0.212)	(0.197)	(0.149)	(0.198)	(0.389)
Years of schooling	0.698	0.194	1.918***	0.978*	1.308
	(0.717)	(0.520)	(0.524)	(0.557)	(1.053)
Years of schooling^2	-3.310	-1.517	-9.308***	-4.744*	-5.456
	(3.458)	(2.441)	(2.377)	(2.443)	(4.799)
Full time job × white collars	0.648	-0.404	-0.028	1.616*	1.852
	(0.543)	(0.569)	(0.614)	(0.873)	(1.580)
Full time job × other jobs	-1.279	0.089	0.575	0.443	-0.490
	(1.162)	(0.668)	(0.806)	(0.909)	(1.055)
Part time job	0.732	-0.996	-0.866	-2.027***	-2.452***
	(0.746)	(1.099)	(0.980)	(0.699)	(0.870)
Part time job × white collars	-1.613	-2.592	0.335	0.321	-0.026
	(1.634)	(2.766)	(2.454)	(1.994)	(1.215)
Part time job × other jobs	-0.021	2.263	3.632*	11.048**	27.473*
	(0.959)	(1.460)	(2.071)	(5.065)	(14.207)
Training	-2.727	0.632	3.842**	2.816**	0.665
	(3.586)	(1.822)	(1.890)	(1.412)	(2.055)
Not participating in labor market	-1.027	-1.736	-0.735	0.534	-0.871
	(1.856)	(1.090)	(0.775)	(1.156)	(2.424)
Retired	0.670	0.122	-0.238	-1.171	-1.953
	(0.756)	(0.686)	(0.664)	(1.221)	(1.789)
Registered unemployed	0.206	-1.040*	-0.263	0.939	-0.202
	(0.532)	(0.531)	(0.450)	(0.661)	(0.864)
Separated,divorced or widowed	0.931*	-0.303	-1.583**	-1.399*	-1.068
	(0.552)	(0.638)	(0.635)	(0.744)	(1.523)
Single	-0.713	-0.975	-1.853**	-1.001	-1.515*
	(1.266)	(0.963)	(0.739)	(0.673)	(0.885)
No. children in HH.	0.353**	0.179	0.124	0.196	0.434
	(0.170)	(0.154)	(0.151)	(0.209)	(0.311)
Log (HH. income)	-0.133	-0.149	-0.032	-0.485	-0.190
	(0.404)	(0.324)	(0.313)	(0.392)	(0.830)
Rural	0.230	0.800**	2.352***	3.993***	0.105
	(0.558)	(0.378)	(0.552)	(1.358)	(1.604)
Urbanization	-0.104	-0.238	0.318	0.000	-0.468
	(0.426)	(0.324)	(0.389)	(0.428)	(0.796)
Constant term	14.915**	20.979***	10.040**	21.280***	28.919***
	(5.940)	(5.332)	(4.914)	(5.275)	(9.455)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
N	1053	1053	1053	1053	1053
R^2	0.049	0.061	0.107	0.099	0.053

Bootstrap standard errors(100 reps.) in parentheses are robust and clustered at at the level of SOEP primary sampling units(2799 clusters)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table B4: Unconditional Quantile Regression for Male Germans (SOEP, 2002-2012)

	RIF 10th percentile	RIF 25th percentile	RIF 50th percentile	RIF 75th percentile	RIF 90th percentile
Age	0.283***	0.276***	0.207***	0.289***	0.364***
	(0.035)	(0.029)	(0.024)	(0.043)	(0.078)
Age^2	-0.259***	-0.246***	-0.173***	-0.273***	-0.367***
	(0.037)	(0.032)	(0.028)	(0.049)	(0.087)
Years of schooling	0.614***	0.580***	0.385***	0.155	0.615*
	(0.193)	(0.162)	(0.123)	(0.245)	(0.332)
Years of $schooling^2$	-2.404***	-2.487***	-1.874***	-1.396	-3.246***
	(0.695)	(0.590)	(0.443)	(0.881)	(1.188)
Full time job × white collars	-0.004	-0.046	-0.147*	-0.383**	-0.875***
	(0.096)	(0.084)	(0.086)	(0.149)	(0.244)
Full time job × other jobs	-0.556***	-0.598***	0.025	-0.060	0.223
	(0.186)	(0.150)	(0.147)	(0.257)	(0.451)
Part time jobs	-0.206	-0.307	-0.287	0.067	-0.303
	(0.295)	(0.220)	(0.240)	(0.390)	(0.596)
Part time job × white collars	-0.479	-0.108	0.329	0.824	1.227
	(0.450)	(0.346)	(0.281)	(0.540)	(0.972)
Part time job × other jobs	-0.891	-0.330	-0.271	0.340	-0.378
	(0.846)	(0.583)	(0.606)	(1.031)	(2.134)
Training	-1.517***	-0.471	-0.383	-0.113	-0.267
	(0.530)	(0.290)	(0.299)	(0.441)	(0.710)
Not participating in labor market	-1.344***	-0.683***	-0.588***	-0.026	-0.226
	(0.377)	(0.223)	(0.180)	(0.333)	(0.525)
Retired	-0.124	-0.041	-0.024	0.701**	1.481***
	(0.156)	(0.132)	(0.169)	(0.294)	(0.460)
Registered unemployed	-0.480**	-0.226	-0.048	-0.060	0.190
	(0.219)	(0.154)	(0.138)	(0.294)	(0.455)
Separated,divorced or widowed	-0.261**	-0.094	-0.444***	-0.601***	-0.018
	(0.122)	(0.098)	(0.129)	(0.190)	(0.374)
Single	-0.657***	-0.688***	-0.844***	-0.958***	-0.252
	(0.139)	(0.122)	(0.121)	(0.189)	(0.332)
No. children in HH.	0.015	-0.053	-0.073	-0.253***	-0.057
	(0.052)	(0.050)	(0.046)	(0.075)	(0.122)
Log (HH. income)	0.380***	0.404***	0.153**	0.137	-0.434**
	(0.100)	(0.073)	(0.073)	(0.120)	(0.206)
Rural	0.223**	0.305***	0.133	0.194	-0.606**
	(0.114)	(0.101)	(0.106)	(0.158)	(0.277)
Urbanization	0.266***	0.254***	0.154*	0.315**	-0.083
	(0.095)	(0.091)	(0.085)	(0.159)	(0.232)
Constant term	7.376***	9.343***	17.093***	20.351***	24.820***
	(1.799)	(1.640)	(1.288)	(2.416)	(3.588)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
N	27504	27504	27504	27504	27504
R^2	0.066	0.090	0.071	0.040	0.023

Bootstrap standard errors(100 reps.) in parentheses are robust and clustered at at the level of SOEP primary sampling units(2799 clusters)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Appendix C Decompostion based on condidional quantile regressions

For comparison reasons, this section provides quantile decomposition results based upon conditional quantile methods (see Koenker and Bassett (1978)).

The Machado-Matta procedure (hereafter MM procedure) is based upon conditional quantile regressions, as first proposed by Mata and Machado (2005) and further developed by Melly (2005) and Chernozhukov et al. (2013). The MM procedure suggests a linear functional form specification in the independent variables X, which can be estimated using conditional quantile regression methods. It simulates and draws quantiles at random, constructing counterfactual distributions before inverting back globally to recover counterfactual quantiles.

In our application, the MM decomposition procedures redecomposed the distributional difference of BMI between Turkish immigrants and Germans by estimating the inverse conditional distribution function for the group of German native-borns in the imputation function of BMI observations for the group of Turkish immigrants, i.e.

$$BMI_G^C = F^{-1}_{BMI_G|X_G}\left(F_{BMI_T|X_T}(BMI|X), X\right)$$

where X is a vector of control variables, T refers to the group of Turkish immigrants and G refers to the German native-borns group.

MM procedure draws quantiles τ_s from a uniform distribution s = 1,...,S at random through simulations. The conditional distribution function $F_{BMI_T|X_T}$ describes the stochastic assignment of BMI with characteristics X for Turkish immigrants and the τ th quantile of the BMI distribution for Germans is $\tau_T(BMI|X) = F_{BMI_G|X_G}(BMI|X), \tau \in$

$(0, 1)$,. Both BMI_G^C and $\tau_T(BMI|X)$ follow uniform distribution. Therefore, the functional form of the conditional quantile regression model can be written as:

$$Q_{g,\tau}(BMI|X) = F^{-1}_{BMI_{group}|X_{group}}(\tau, X) = X\beta_{group,\tau}, \qquad group = T, G \tag{5}$$

In detail, in the first step, a simulated τ_s is drawn randomly from a uniform distribution s=1,...,S, before a linear quantile regression for the τ_sth quantile is estimated. The estimated results are used to predict simulated BMI values for the immigrant group (Y_{Ts}) and counterfactual BMI values for the German native-born group (Y_{Gs}^C) according to the conditional quantile regressions $Y_{Ts} = F^{-1}_{Y_T|X_T}(\tau_s, X)$ and $Y_{Ns}^c = F^{-1}_{Y_G|X_G}(\tau_s, X)$. The conditional quantile function at the $\tau_s th$ quantile in group Turkish immigrants and

Germans are, respectively: $Y^C_{Ts} = F^{-1}_{Y_T|XT}(\tau_s, X)$ and $Y^C_{Gs} = F^{-1}_{Y_G|XG}(\tau_s, X)$. Finally, we compare the simulated distributions of Y_{Ts} and Y^C_{Gs} to obtain the coefficient effect and the composition effect.[20] The counterfactual distribution is estimated by cdeco using the conditional distribution of the dependent variable BMI given independent variables in the sample with group=0 (German native-borns) and the independent variable distribution in the sample with group=1 (Turkish immigrants).

There are discussions concerning the links and differences between conditional quantile and unconditional quantile regressions. Among others, Mata and Machado (2005) suggest that conditional distribution $F_{Y|X}(y|X = x)$ has to be integrated over the distribution of X to obtain the unconditional distribution of Y ,i.e. F_y. Firpo et al. (2009) points out that "quantile regression estimates cannot be used to assess the more general economic or policy impact of a change of X on the corresponding quantile of the unconditional distribution of Y." Borah and Basu (2013) concludes that conditional quantile regression may generate results that are often not generalizable or interpretable in a policy or population context. By contrast, the unconditional quantile regression method provides more interpretable results as it marginalizes the effect over the distributions of other covariates in the model. However, one limitation of the MM method is that it involves a large number of tedious computations for our data set, with more than 60,000 person-year observations. Moreover, we could only obtain aggregate decomposition results by using the MM methods, as opposed to detailed decomposition results.

Table C1 reports the results of the MM method using Melly's procedure with full controls for age, education, labor market and occupational status, household income and year dummies. The MM method is applied in our BMI gap decomposition using the unobserved obesity behavior for Germans as a reference group. The estimates are computed using the stata implementation "cdeco"(see Chernozhukov et al. (2013)).

Panel A of Table C1 reports the results among women, whereby the estimated BMI gaps obtained by MM methods are consistent with those obtained by the RIF-OLS regression.

The results of the aggregate decomposition reported in the first three rows of C1 show that explained effects play a large role in BMI disparity at the 10th, 25th and 50th percentiles. Moreover, explained and unexplained effects are almost equal at the 75th percentile point, while the unexplained effects are much more important at the top distributions (i.e. 90th percentiles). Indeed, some significant behavioral effects emerge at the 90th percentile. However, in the aggregate decomposition, the explained

[20]The conditional quantile estimates were computed with the STATA ado file cdeco.ado proposed by Chernozhukov et al. (2013), which can be downloaded from the website `http://www.econ.brown.edu/fac/blaise_melly/code_counter.html`

and unexplained parts at all five percentiles estimated by RIF regressions vary with those obtained by the MM method with conditional quantile regression. Observing the columns to compare the quantile decomposition effects, we find that the RIF regression estimates lower values of explained effects at the 10th, 25th and 50th percentiles of the BMI distribution, whereas the estimated BMI gap attributable to characteristics is much larger than the MM decomposition results at the top (90th and 75th percentiles) of the BMI distribution.

Table C1 also reports the results of the MM method among males in the bottom panel. Compared with Table 6 of the paper, the difference in the BMI gap between the RIF-OLS estimates and MM estimates tends to be very small, while estimates of the explained and unexplained parts of the BMI gap tend to vary substantially across different percentiles.

Table C1: Quantile Decomposition Results of Turkish Immigrants/German-Native Borns BMI Gap (SOEP, 2002-2012)
Decomposition Method: Machado-Matta-Melly

	(1) 10th percentile	(2) 25th percentile	(3) 50th percentile	(4) 75th percentile	(5) 90th percentile
		A.**Female**			
Estimated BMI gap: $\Delta^{\tau}_{BMI} = Q_{\tau}[BMI_{tf}] - Q_{\tau}[BMI_{gf}]$	1.8458***	2.510***	3.274***	3.704***	3.281***
	(0.238)	(0.218)	(0.281)	(0.362)	(0.509)
Total explained by characteristics	1.1354**	1.521***	1.958***	1.861**	0.575
	(0.499)	(0.400)	(0.457)	(0.629)	(0.874)
In % of Δ_{BMI}	[61.5%]	[60.6%]	[59.8%]	[50.2%]	[15.1%]
Tobal unexplained by coefficients	0.710*	0.989***	1.316***	1.843***	2.706***
	(0.491)	(0.368)	(0.453)	(0.663)	(1.062)
In % of Δ_{BMI}	[38.5%]	[39.4%]	[40.2%]	[49.8%]	[84.9%]
		B:**Male**			
Estimated BMI gap: $\Delta^{\tau}_{BMI} = Q_{\tau}\left[BMI_{tm}\right) - Q_{\tau}\left(BMI_{gm}\right]$	1.156***	1.041***	0.754***	0.204	-0.423
	(0.181)	(0.148)	(0.157)	(0.206)	(0.342)
Total explained by characteristics	0.774*	0.854**	0.404	-0.032	0.046
	(0.414)	(0.336)	(0.306)	(0.335)	(0.457)
In % of Δ_{BMI}	[67.0%]	[82.0%]	[53.6%]	[-15.6%]	[-10.9%]
Total unexplained	0.383	0.187	0.350	0.236	-0.469
	(0.461)	(0.375)	(0.340)	(0.376)	(0.516)
In % of Δ_{BMI}	[33.0%]	[18.0%]	[46.4.1%]	[115.6%]	[110.9%]

Weighted estimation using weights provided by the SOEP. Standard error in parentheses are robust and clustered at the level of SOEP primary sampling units (2799 clusters). The referece group is a married individual livng in urban regions andhaving blue collar full time job. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Appendix D Three components decompositions

This appendix discusses specifications on "threefold" OB type decomposition, that is, the outcome difference is divided into three components(see Jann (2008)).

$$\Delta^{\mu}_{BMI} = \sum_{k=1}^{K} (\bar{X}_{Tk} - \bar{X}_{Gk})\, \hat{\beta}_{Gk} + \sum_{k=1}^{K} \bar{X}_{Gk} \left(\hat{\beta}_{Tk} - \hat{\beta}_{Gk}\right) + \sum_{k=1}^{K} (\bar{X}_{Tk} - \bar{X}_{Gk})^{T} \left(\hat{\beta}_{Tk} - \hat{\beta}_{Gk}\right) \tag{6}$$

The three components decomposition shown in equation (6) is constructed in the perspective of the German native-borns group. That is, the group differences are weighted by the coefficients of group German native-borns to determine the endowment effect. The BMI gap can also be expressed from the perspective of the group Turkish immigrants. The first component $\sum_{k=1}^{K} (\bar{X}_{Tk} - \bar{X}_{Gk})\, \hat{\beta}_k$, is the part of the mean BMI gap that can be explained by differences in each observed socioeconomic factors(the "endowment effect"). The second component $\sum_{k=1}^{K} \bar{X}_{Gk} \left(\hat{\beta}_{Tk} - \hat{\beta}_{Gk}\right)$, is the part of the mean BMI gap that is due to differences in coefficients including the differences in the intercept ("coefficients effect"). And the third component $\sum_{k=1}^{k} (\bar{X}_{Tk} - \bar{X}_{Gk})^{T} \left(\hat{\beta}_{Tk} - \hat{\beta}_{Gk}\right)$,

The threefold decomposition based on RIF regressions can be formulated as follows:

$$\hat{\Delta}^{\tau}_{BMI} = \sum_{k=1}^{K} \left(\overline{X}_{Tk} - \overline{X}_{Gk}\right) \hat{\gamma}_{gk,\tau} + \sum_{k=1}^{K} \overline{X}_{Gk} \left(\hat{\gamma}_{Tk,\tau} - \hat{\gamma}_{Gk,\tau}\right) + + \sum_{k=1}^{K} \left(\overline{X}_{Tk} - \overline{X}_{Gk}\right) \left(\hat{\gamma}_{Tk,\tau} - \hat{\gamma}_{Gk,\tau}\right) \tag{7}$$

Similar to the BO decomposition shown in equation (6), the three components decomposition based upon RIF regressions at the quantile τ shown in equation (7) is also constructed in using the German native-borns as reference group. The BMI gap at the quantile τ can also be expressed from using Turkish immigrants as the reference group. The first component $\sum_{k=1}^{K} \left(\overline{X}_{Tk} - \overline{X}_{Gk}\right) \hat{\gamma}_{gk,\tau}$, is the part of the mean BMI gap that can be explained by differences in each observed socioeconomic factors(the "endowment effect"). The second component $\sum_{k=1}^{K} \overline{X}_{Gk} \left(\hat{\gamma}_{Tk,\tau} - \hat{\gamma}_{Gk,\tau}\right))$, is the part of the mean BMI gap that is due to differences in coefficients including the differences in the intercept ("coefficients effect"). And the third component $\sum_{k=1}^{K} \left(\overline{X}_{Tk} - \overline{X}_{Gk}\right) \left(\hat{\gamma}_{Tk,\tau} - \hat{\gamma}_{Gk,\tau}\right)$, is an interaction term.

In appendix B, Table D1 reports threefold decomposition results of the BMI gap between female Turkish immigrants and German native-borns. Column (1) reports BO decomposition with full controls for age, education, labor market status, occupation, household income and year fixed effect. Column (2) to (6) report the OB-type decomposition of the RIF regression at the 10th, 25th, 50th,75th and 90th percentiles of the unconditional distribution of BMIs with full controls dependent variables.

Table D2 provides estimates of model (6) for the male Turkish immigrants/German native-borns BMI gap. Column (1) reports BO decomposition with full controls for age, education, labor market status, occupation, household income and year fixed effect. Column (2) to (6) report the OB-type decomposition of the RIF regressions at the 10th, 25th, 50th, 75th and 90th percentiles of the unconditional distribution of BMIs with full controls dependent variables.

Table D1: The BMI Gap between Female Turkish Immigrants and Germans: BO and Unconditional Quantile 3 Components Decomposition Results (SOEP, 2002-2012)

	(1) BO Mean	(2) RIF 10th percentile	(3) RIF 25th percentile	(4) RIF 50th percentile	(5) RIF 75th percentile	(6) RIF 90th percentile
BMI Gap	2.820***	1.711***	2.288***	3.274***	3.919***	3.031***
	(0.203)	(0.183)	(0.300)	(0.323)	(0.443)	(0.429)
Endowment effects attributable to:						
Age,family status,region, etc	0.133*	0.212***	0.233***	0.186***	0.082	-0.156
	(0.073)	(0.053)	(0.067)	(0.066)	(0.091)	(0.138)
Education	1.047***	0.305***	0.704***	1.169***	1.731***	2.207***
	(0.103)	(0.094)	(0.094)	(0.101)	(0.154)	(0.272)
Labor market and occupational status	0.073*	-0.107***	-0.102***	-0.040	0.105	0.411***
	(0.041)	(0.036)	(0.034)	(0.048)	(0.075)	(0.121)
Log (HH Income)	0.110***	0.016	0.037***	0.095***	0.177***	0.242***
	(0.022)	(0.011)	(0.016)	(0.026)	(0.048)	(0.065)
Year fixed effects	-0.053***	-0.015*	-0.024*	-0.030**	-0.053**	-0.121***
	(0.020)	(0.008)	(0.013)	(0.014)	(0.027)	(0.046)
Total endowment effects	1.310***	0.410***	0.848***	1.340***	2.043***	2.584***
	(0.132)	(0.126)	(0.120)	(0.118)	(0.203)	(0.348)
Coefficients effects attributable to						
Age,family status,region, etc	0.979	7.234	8.600*	-0.117	-4.943	2.675
	(4.412)	(4.531)	(4.503)	(6.184)	(8.016)	(7.226)
Education	-0.130	-5.148	-2.282	-9.289*	0.191	23.563***
	(3.555)	(3.588)	(3.847)	(5.215)	(7.522)	(6.376)
Labor market and occupational status	0.401	0.677	0.544	0.193	-0.814	0.214
	(0.780)	(0.543)	(0.712)	(0.743)	(1.355)	(1.961)
Log (HH Income)	5.194	0.851	-3.488	6.316	7.921	12.637
	(3.845)	(5.426)	(5.130)	(4.708)	(8.053)	(8.141)
Year fixed effects	-0.195	0.179	-0.197	-0.690	0.010	-0.473
	(0.416)	(0.389)	(0.510)	(0.555)	(0.662)	(0.859)
Constant term	-4.824	-3.134	-2.095	4.372	0.000	-36.398**
	(6.859)	(7.269)	(7.193)	(8.266)	(13.725)	(15.122)
Total coefficients effects	1.426***	0.659	1.083	0.785	2.455***	2.218***
	(0.444)	(0.823)	(0.718)	(0.579)	(0.720)	(0.584)
Interaction effects attributable to						
Age,family status,region, etc	0.063	-0.290	-0.724	0.242	-0.542	0.209
	(0.422)	(0.626)	(0.567)	(0.458)	(0.602)	(0.712)
Education	0.400	1.188***	1.198***	0.858*	0.043	-1.601***
	(0.304)	(0.400)	(0.333)	(0.477)	(0.593)	(0.543)
Labor market and occupational status	-0.294	-0.193	-0.181	0.071	0.054	-0.10t′8
	(0.344)	(0.284)	(0.325)	(0.411)	(0.375)	(0.664)
Log (HH Income)	-0.103	-0.017	0.069	-0.126	-0.158	-0.251
	(0.074)	(0.109)	(0.106)	(0.091)	(0.154)	(0.160)
Year fixed effects	0.019	-0.046	-0.004	0.064	0.025	-0.019
	(0.050)	(0.037)	(0.044)	(0.066)	(0.080)	(0.109)
Total interaction effects	0.084	0.642	0.358	1.109*	-0.579	-1.770**
	(0.464)	(0.812)	(0.643)	(0.587)	(0.686)	(0.701)
N	30694	30694	30694	30694	30694	30694

Weighted estimation using weights provided by the SOEP. Standard error in parentheses are robust and clustered at the level of SOEP primary sampling units (2799 clusters).The referece group is a married individual livng in urban regions andhaving blue collar full time job. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Age,family status,region, etc: Age, Age^2, single, separated, no. children in HH., residing in rural regions, residing in regions under urbanization

Education: years of schooling, years of $schooling^2$

Labor market and occupational status: part-time jobs,four interactions indicating occupational status (part-time job $\times$ white collar job, part-time job $\times$ not white/blue collar jobs, full time job $\times$ white collar jobs and full-time jobs $\times$ not white/blue collar jobs), in training, registered unemployed, retired, not participating in labor market

Table D2: The BMI gap between Male Turkish Immigrants and Germans: BO and Unconditional Quantile 3 Components Decomposition Results (SOEP, 2002-2012)

	BO Mean (1)	RIF 10th percentile (2)	RIF 25th percentile (3)	RIF 50th percentile (4)	RIF 75th percentile (5)	RIF 90th percentile (6)
BMI Gap	0.461***	1.134***	1.016***	0.653***	0.326	-0.529
	(0.130)	(0.204)	(0.189)	(0.162)	(0.228)	(0.324)
Age,family status,region, etc	0.186***	0.240***	0.169***	0.214***	0.124*	0.227*
	(0.057)	(0.060)	(0.054)	(0.053)	(0.070)	(0.119)
Education	0.147**	-0.110	0.022	0.145**	0.433***	0.379***
	(0.060)	(0.082)	(0.067)	(0.057)	(0.084)	(0.125)
Labor market and occupational status	0.010***	-0.047	-0.010	0.031	0.105**	0.303***
	(0.034)	(0.041)	(0.033)	(0.029)	(0.053)	(0.072)
Log (HH Income)	-0.025	-0.086***	-0.091***	-0.035**	-0.031	0.098*
	(0.022)	(0.025)	(0.025)	(0.014)	(0.026)	(0.053)
Year fixed effects	-0.051***	-0.008	-0.022***	-0.036***	-0.072***	-0.128***
	(0.017)	(0.011)	(0.008)	(0.012)	(0.027)	(0.045)
Total emdowment effects	0.357***	-0.011	0.067	0.318***	0.558***	0.878***
	(0.082)	(0.110)	(0.096)	(0.073)	(0.134)	(0.218)
Age,family status,region, etc	-2.204	-2.431	-2.701	1.203	1.074	-12.497**
	(2.598)	(5.531)	(2.929)	(2.926)	(3.204)	(5.593)
Education	2.656	-0.413	-3.219	7.054***	4.809	5.038
	(2.319)	(3.823)	(2.767)	(2.547)	(3.902)	(5.618)
Labor market and occupational status	0.195	0.294	-0.222	0.114	0.652*	0.597
	(0.245)	(0.272)	(0.296)	(0.291)	(0.392)	(0.481)
Log (HH Income)	-1.707	-5.332	-5.759	-1.931	-6.494	2.533
	(2.899)	(3.767)	(3.529)	(3.036)	(4.306)	(6.745)
Year fixed effects	0.041	0.990***	0.512*	0.315	-0.688*	-0.199
	(0.265)	(0.372)	(0.298)	(0.269)	(0.365)	(0.512)
Constant term	0.997	7.498	11.619**	-7.058*	0.932	4.104
	(3.697)	(6.132)	(5.838)	(3.749)	(6.293)	(9.007)
Total coefficients effects	-0.021	0.606	0.230	-0.303	0.284	-0.423
	(0.286)	(0.522)	(0.469)	(0.313)	(0.434)	(0.694)
Age,family status,region, etc	0.010	0.256	0.219	0.211	-0.158	0.344
	(0.178)	(0.368)	(0.274)	(0.215)	(0.283)	(0.357)
Education	0.253	0.321	0.386	0.557***	-0.075	-0.421
	(0.185)	(0.374)	(0.324)	(0.206)	(0.299)	(0.460)
Labor market and occupational status	-0.258*	-0.035	0.030	-0.112	-0.455**	-0.912***
	(0.152)	(0.182)	(0.186)	(0.181)	(0.227)	(0.354)
Log (HH Income)	0.037	0.115	0.125	0.042	0.141	-0.055
	(0.064)	(0.082)	(0.077)	(0.064)	(0.092)	(0.143)
Year fixed effects	-0.007	-0.119***	-0.039	-0.059	0.031	0.060
	(0.030)	(0.043)	(0.030)	(0.036)	(0.057)	(0.087)
Total interaction effects	0.125	0.539	0.721*	0.638**	-0.517	-0.983
	(0.273)	(0.470)	(0.374)	(0.298)	(0.440)	(0.700)
N	28687	28687	28687	28687	28687	28687

Weighted estimation using weights provided by the SOEP. Standard error in parentheses are robust and clustered at the level of SOEP primary sampling units (2799 clusters).The referece group is a married individual livng in urban regions andhaving blue collar full time job. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Age,family status,region, etc: Age, Age^2, single, separated, no. children in HH., residing in rural regions, residing in regions under urbanization
Education: years of schooling, years of schooling^2
Labor market and occupational status: part-time jobs,four interactions indicating occupational status (part-time job $\times$ white collar job, part-time job $\times$ not white/blue collar jobs, full time job $\times$ white collar jobs and full-time jobs $\times$ not white/blue collar jobs) in training, registered unemployed, retired, not participating in labor market