Sources of Ethnic Inequality in Bulgaria: Evidence of Minority Discrimination

DRAFT

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Abstract

Bulgarian Roma and Turks, who both constitute more than 10 percent of Bulgaria's population, unambiguously face some of the most egregious material poverty and discrimination in contemporary Europe. Income inequality between ethnic minorities and ethnic Bulgarians in contemporary Bulgaria is dramatic; mean and median monthly net wages and total household incomes of ethnic minorities are half of Bulgarian households and wage earners. The aim of this paper is to decompose the factors leading to this inequality. By employing a Blinder-Oaxaca decomposition as well as a set of log-linear models, this paper estimates the extent to which differences in endowments – e.g. differences in educational attainment, regional differences, household composition, and demographics – explain inequalities between Bulgarian minorities and ethnic Bulgarians versus the role of factors specific to minorities – e.g. employer discrimination, opaque structural discrimination, and any other characteristics specific to this ethnic group. This paper uses 2013 cross-sectional data collected in a joint Open Society–World Bank effort termed the Bulgarian Longitudinal Inclusive Society Survey. The estimates obtained here provide clear evidence that after accounting for labor market relevant differences betweeen ethnic groups, one's status as a minority depreciates labor market earnings and household income while being associated with higher levels of government transfer income. The estimates produced here provide strong and statistically significant evidence showing that while differences in certain endowment factors, namely education, explain a portion of the inequalities between minorities and ethnic Bulgarians, other non-endowment factors (e.g. structural and employment discrimination) are driving the bulk of economic inequality between Bulgarian's ethnic groups. Lastly, this paper decomposes the factors associated with observered differences in the economic characteristics of Roma and Turks who live in segregated communities and those who do not in order to estimate the potential role segregation effects may play in suppressing econonmic outcomes for minorities; the estimates produced here do not provide evidence that segregation explains the heterogeniety of economic outcomes within minorities.

Contents

1 Introduction and Literature Review

Bulgarian Roma unambiguously face some of the most egregious social exclusion, material poverty, and discrimination in contemporary Europe. Presently, Bulgarian Roma – often pejoratively termed gypsies or tsigani – constitute roughly 10 percent of the population of Bulgaria (European Commission 2014).[1] The European Union Agency for Fundamental Rights along with other EU agencies, the United Nations Development Program, the World Bank, and the Open Society Foundation have identified the degree of Roma discrimination and ethnic inequality in Bulgaria as abhorrent (*see* Ram 2014; The Economist 2015).[2]

Despite calls by civil society and the European Union – alongside abundant evidence of extreme material poverty and lack of opportunity among Bulgarian Roma – the current political make-up of Bulgaria has ensured that efforts to reduce inequality and discrimination against Roma are waning. Rather, forces of discrimination have been on the rise since the 2017 Bulgarian elections when a coalition of three ultra-rightwing parties were brought into government by Boyko Borisov, who has held the office of prime minister for a nearly continuously stretch since 2009 (*see* Dnevnik 2018). In order to maintain control of the government after an election that significantly reduced the size of the Citizens for European Development of Bulgaria (GERB), the prime minister's party went into coalition with the United Patriots, a coalition of three ultra nationalist, anti-Roma parties that was formed in 2016.[3]

[1]The analysis for this paper was conducted in R. The Rmarkdown file used to create this PDF can be found at the Github repository for this project: https://github.com/AsherDvirDjerassi/BLISS---ROMA .

[2]According to the Bulgarian national census, Roma make up 5% of the population. However, it is widely agreed that the census dramatically underestimates the true size of the Roma population due to lack of proper registration of Roma, distrust of officials, and intentional obscuration of ethnicity for fear of prejudice (*see* European Commission (2014) and The Economist (2015)).

[3]The following parties constitute the United Patriots: The VMRO (a faction of the Bulgarian National Movement), the National Front for the Salvation of Bulgaria (NFSB), and Ataka.

As of October 2018, 7 out of 20 ministers and deputies minister in government come from the ultra-rightwing United Patriots. Valeri Simeonov, co-leader of the ultra-right wing coalition, currently holds the position of the Deputy Prime Minister and is tasked with overseeing Bulgaria's National Council on Co-operation on Ethnic and Integration Issues, which is intended to coordinate policy on minority rights with Bulgarian and European NGOs. Despite holding a position designed to defend minority rights, Simeonov has called the country's Roma minority "ferocious humanoids" whose women "have the instincts of street dogs"(Katie French 2018).

1.1 Evidence of Systematic Prejudice

Drawing from survey data, Alexey Pamporov, a leading Bulgarian sociologist with the Bulgarian Academy of Sciences, writes that "approximately 30% of Bulgarians do not want Roma people living in the country"(2012). Stereotypes of Roma as "lazy," "dirty," "deceitful," and "thievish" proliferate throughout Bulgarian media, popular culture, and mainstream discourse. Pamporov argues that the prevalence of these deleterious stereotypes reinforces residential and educational segregation and leads to labor market discrimination.

Pamporov, along with researchers from the Open Society Foundation, conducted content analysis on Bulgaria's leading newspapers in the few months preceding the 2009 parliamentary elections. Of the articles analyzed, 716 were identified as mentioning Roma either directly or indirectly, while "61.5% seemingly attempted to be politically correct." These articles used "the endonyms Roma, Romani or other derivatives from these terms, [but] in the majority of articles, referring to ethnicity did not improve the articles' value and informativeness... [A quarter of articles] used the exonym Gypsies. In 55.4% of cases the protagonists are referred to as swarthy... Ethnic identity is not mentioned at all in only 1% of the articles" (Pamporov 2012,

145). While Bulgarian newspapers vary widely in the share of articles that provide positive, negative, or neutral representations of Roma, typically between 11 and 33 percent of a newspaper's coverage was classified as negative.

In a set of anonymous questionnaires presented in 2011 to ethnic Bulgarians working as doctors, social workers, or teachers, it is clear that while most ethnic minorities in Bulgaria generally have positive associations, Roma do not (Metodieva et al. 2012). Pomaks (ethnic-Bulgarians whose ancestors converted to Islam) and Turks are most strongly associated with being "hardworking" and "religious," while Jews and Armenians are associated with business acumen and cleverness. In sharp contrast, "Roma are depicted as criminals, lazy, dirty, liars, and uneducated both by the national level survey and in the target groups' samples."

1.2 Ethnic Inequality and Discrimination in Bulgaria

While it is beyond the scope of this article to establish the complete array of possible consequences that such stereotypes engender, the pervasiveness of negative stereotypes gives strong reason to believe that discrimination against Bulgarian Roma is widespread and plays a significant role in shaping the gap between Roma and ethnic Bulgarians.

Amnesty International (2018) claims that "marginalization and widespread discrimination against Roma persists." In addition to employment discrimination, Amnesty stresses the obstacles Bulgarian Roma face in accessing public services, particularly education, healthcare, housing, and infrastructure (particularly sewage, trash collection, and clean roads). The most striking and visceral manifestation of ethnic inequality in Bulgaria is the severe inadequacy of infrastructure and housing in Roma communities. According to a 2011 survey conducted by the EU Agency for

Fundamental Rights, which surveyed Roma households in primarily Roma neighborhoods and ethnic Bulgarians that lived near to these communities, 39 percent of Roma dwellings had no piped water inside compared with 4 percent of non-Roma dwellings nearby (European Union Agency for Fundamental Rights (2014)). 75 percent of such Roma dwellings in segregated neighborhoods had no indoor toilet, relative to 31 percent of non-Roma dwellings nearby.

The root of this widespread segregation, inadequate housing, and sub-par infrastructure lies partly in the forced settlement of Bulgarian Roma in 1958. After the completion of full land collectivization by the Communist regime, the Bulgarian politburo outlawed the often migratory living patterns of Roma.[4]. Like the Communist Party's policy towards Bulgarian Turks, ethnic self-identification was heavily discouraged and collective advocacy for Roma causes was censured. The combination of sudden urbanization, lack of political representation, and prejudice on the part of the Communist regime created conditions where Roma were segregated into ghettos. After the fall of communism in the early 1990s, the collapse of state structures allowed for Bulgarian Roma to effectively squat in a manner comparable to Brazilian favelas and slums found elsewhere in the Global South (*see* Barany 2000). Such communities lacked and continue to lack de jure access to public services: the state often does not recognize a formal responsibility in providing public services to Roma and Turkic dwellings in communities that not legally recognized.

There are open questions as to what the relative role of labor market discrimination plays in determining economic inequality between ethnic groups in Bulgaria. In terms of labor market outcomes, the gap between Roma and ethnic Bulgarians is very wide. For those of prime working age, 20–64 years old, 68 percent of non-Roma Bulgarians had at least part-time employment compared to 49 percent of Roma.[5]

[4] *See* Ilieva (2012) discussion of the Bulgarian Census

[5] The employment rate of ethnic Bulgarians comes from Eurostat, while the employment rate

However, it may be the case that employment discrimination is not as instrumental in explaining this gap as the ubiquity of negative stereotypes and prejudice may suggest. Rather, it may be the case that the gap in labor market outcomes between Roma and the rest can be largely explained by differences in relevant labor market characteristics that are outside of ethnicity, such as how much education one has, the skills one possesses, and the region one lives in. In terms of education, Roma have paltry educational outcomes relative to ethnic Bulgarians. According to the 2011 Fundamental Rights Agency Roma Survey, 67 percent of adult Roma reported leaving school before the age of 16. In contrast, a mere 26 percent of non-Roma living in the same communities as these Roma reported leaving school before 16.

Decomposing the relative impact of factors driving ethnically-based economic inequality is essential to the enterprise of bridging this ethnic divide. With funds dedicated to the plight of Bulgarian Roma withering alongside the rise of ultra-rightwing political parties, ensuring the efficiency of each euro dedicated to ameliorating Roma poverty has even more urgency.

2 Data

This paper uses the Bulgarian Longitudinal Inclusive Society Survey (BLISS). BLISS is part of a larger panel survey collected between February 2010 and April 2013 from a representative sample of Bulgarian households at the behest of the World Bank and the Open Society Institute–Sofia. Information on demographics, education, taxes, transfers, and other relevant labor market information on the household and individual household members were collected.

for Roma was collected in the second wave of the European Union Minorities and Discrimination Survey, 2016.

Distinctive among comparable surveys in Bulgaria, this panel survey was constructed to identify a representative sample of those who identify as ethnically Roma, Turkish, and Bulgarian. To garner sufficient variation among Bulgarian minorities, BLISS surveyed a greater number of Roma and Turkish households than would be proportionate to their share of the population (i.e. a 'booster' sample). This representative survey was able to follow households and the members of those households across the survey period (February 2010 to April 2013) with quite little attrition. The planned size of the main sample in the first round was 2,384 households, and 99% of this sample was realized. A Bulgarian Roma booster sample of 296 households was planned; 99% of surveyed households responded. Figure 1 presents the raw and weighted count of households in the 2013 survey by ethnic group.

2.1 Data Quality

Table 1, 2, and 3 compares the 2013 BLISS data to the EU-SILC – one of the most widely used surveys in the EU dedicated to ascertaining socio-economic data – and to Bulgaria's administrative data.[6] In contrast to both the EU-SILC and the BLISS, Bulgarian administrative data ought to be quite close to the accurate figures, particularly as it relates to social transfer spending. Contrasting these surveys with administrative data provides us with an opportunity to investigate the relative quality of this data.

Table 1 displays aggregate household income by data source. Both the BLISS and the EU-SILC have quite similar results. In terms of annual heating allowances, the EU-SILC and the BLISS survey produce aggregate estimates of 37 and 35 million

[6]See tables 4.2 through 4.8 in Euromod country report for Bulgaria that is linked here for the EU-SILC and administrative data discussed in this section: https://www.euromod.ac.uk/sites/default/files/country-reports/year7/Y7_BG_CR_Final_0.pdf

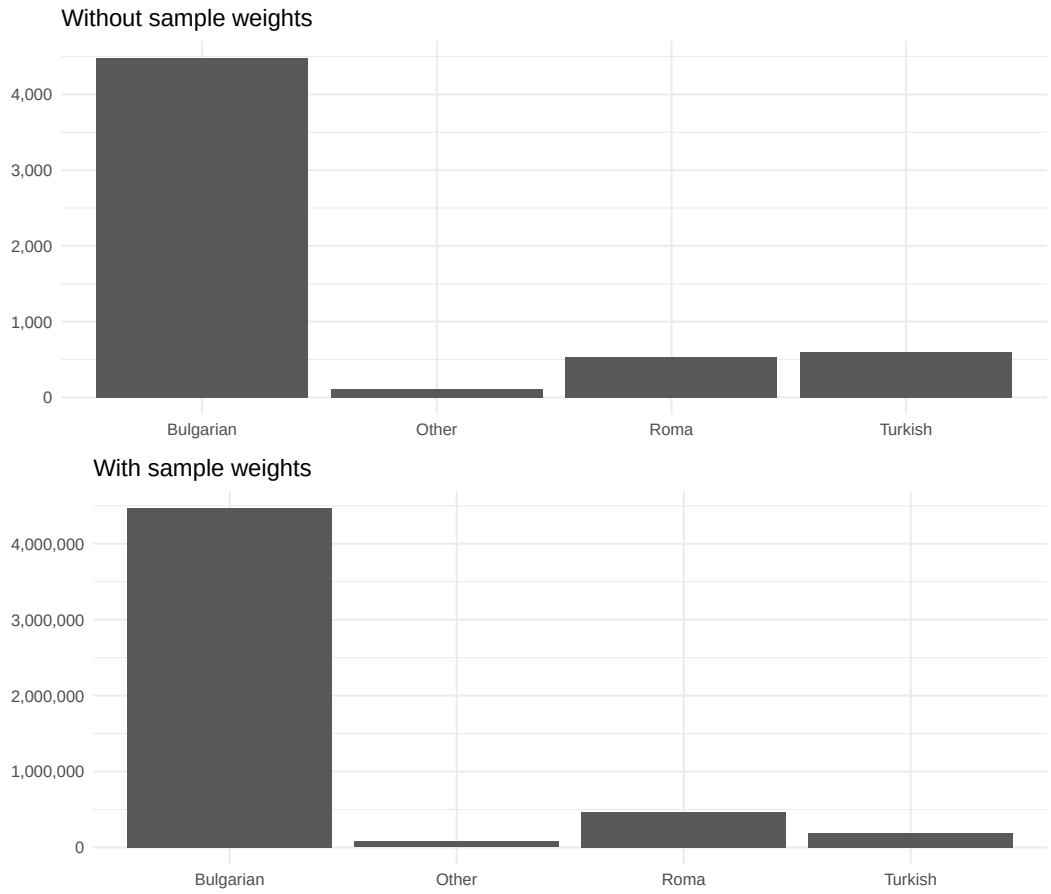


Figure 1: Count of total households by ethnic group by weighted and unweighted sample

Table 1: Aggregate Household Income by Data (2013 Bulgarian leva, millions)

	Aggregate Income			Ratios	
	BLISS	EU-SILC	Administrative Data	BLISS/EU-SILC	BLISS/Administrative Data
annual heating allowance	37	35	75	1.06	0.49
total net average annual wages	13675	25646	27765	0.53	0.49
total net monthly household income	903	NA	NA	NA	NA
household pension income	6339	9469	7461	0.67	0.85
household infant benefits	76	73	142	1.04	0.54
household child benefits	259	236	352	1.10	0.74
household social assistance income	18	23	54	0.78	0.33
unemployment insurance benefits	124	363	351	0.34	0.35

Note: All monetary units are in millions of 2013 Bulgarian leva. For the administrative data and the EU-SILC, families are the unit of observation for infant and child benefits while social assistance and heating allowance recipiency is reported on the household level.

leva. For heating, child, and infant benefits very similar aggregate estimates are shared between these two surveys, with BLISS estimates between 1.04 and 1.10 times greater than the EU-SILC.

However, these two surveys perform poorly relative to the administrative data. This phenomena is shared with many surveys that attempt to be representative. The aggregate income predicted by the BLISS is frequently less than half that of the administrative data. This is often the case because of under-reporting.

Table 2: Total recipients in thousands by survey and income source

	Total Recipients			Ratios	
	BLISS	EU-SILC	Administrative Data	BLISS/EU-SILC	BLISS/Administrative Data
households receiving heating allowances	128	35	75	3.66	1.71
individuals employed	NA	2930	2935	NA	NA
households receiving pensions	NA	2967	2670	NA	NA
households receiving infant benefits	13	38	62	0.34	0.21
households receiving child benefits	403	344	537	1.17	0.75
individuals receiving unemployment insurance benefits	NA	18	50	NA	NA
households receiving social assistance income	36	201	117	0.18	0.31

Note: For the BLISS data, total recipients are restricted to households because this table is only concerned with the BLISS weighted at the household level. Given that the BLISS was designed to be representative at the household level, receipt of income which is accounted for by the survey at the individual level is not reported. For the administrative data and the EU-SILC, families are the unit of observation for infant and child benefits while social assistance and heating allowance recipiency is reported on the household level.

The same relationship seen in figure 1 is also seen in figure 2. Relative to the administrative data, both the BLISS data and the EU-SILC estimate sizeably different numbers of households seeing income from each source enumerated. However, it is unambiguously the case that the BLISS performs worse than the EU-SILC.

However, this poor performance is likely a result of the weights that the survey uses, rather than a factor that will introduce sizable bias. The main concern for our purposes is whether the bias introduced by sampling errors dramatically varies by ethnic group.

Table 3: Total net monthly household income deciles by survey

			Unweighted BLISS		
Decile	EU-SILC	Weighted BLISS	Complete Sample	Roma	Bulgarians
1	361	103	65	58	125
2	470	170	138	80	187
3	647	210	188	115	225
4	826	250	225	150	260
5	1023	286	265	177	300
6	1221	325	302	211	341
7	1407	374	354	250	400
8	1619	448	433	308	467
9	2043	575	550	370	600
10	3411	3500	3500	1000	3500

Note: All figures are reported as 2013 Bulgarian leva. The EU-SILC data was reported in 2013 Euros and was appropriately converted to 2013 leva. The BLISS data reports total monthly household net income, while the EU-SILC data reports total monthly average disposable household income.

Table 3 is able to address this question by looking at net monthly household income deciles by survey and by ethnic group. While the EU-SILC clearly reports higher incomes than the BLISS, these lower incomes hold for both Roma and ethnic Bulgarians. Table 3 can be read as evidence that the mechanisms that introduced errors into the BLISS survey and pushed down income have affected the two predominant ethnic groups of interest in very similar ways. Otherwise stated, table 3 suggests that the income information of both ethnic groups have been biased similarly.

Table 3 and table 4 both show that ethnic minorities in Bulgaria see substan-

Table 4: Net household income quintiles by survey and sample group

	Complete sample			Main sample		Booster sample	
	Bulgarian	Turkish	Roma	Turkish	Roma	Turkish	Roma
20%	187	37	80	36	88	38	64
40%	260	60	150	58	150	62	70
60%	341	117	211	103	222	117	175
80%	467	180	308	154	313	200	200
100%	3500	450	1000	420	1000	450	450

Note: Incomes are reported in 2013 Bulgarian leva. Observations included in the booster sample come from neighborhoods and communities that are ethnically segregated. While observations in the 'main sample' do not come from such segregated communities. Any social consequences or characteristics associated with segregated neighborhoods should dominate in the booster sample.

tially smaller net household income than ethnic Bulgarians. As is clear from table 4, the net household income for Turkish households is even markedly lower than survey respondents who identify as Roma. Despite having a higher status in Bulgaria, Turks see lower incomes.

A complex feature of ethnic identity in Bulgaria is the fact that many who identify as Turkish are seen and treated as Roma by the majority of Bulgarians. In addition to families identifying as Turkish to elevate and escape prejudice, Marušiakova and Popov (2000) shows that the line between these ethnic identities are often blurred. Therefore, for much of the analysis done in this paper, Roma, Turks, and other minorities will be grouped together as ethnic minorities.

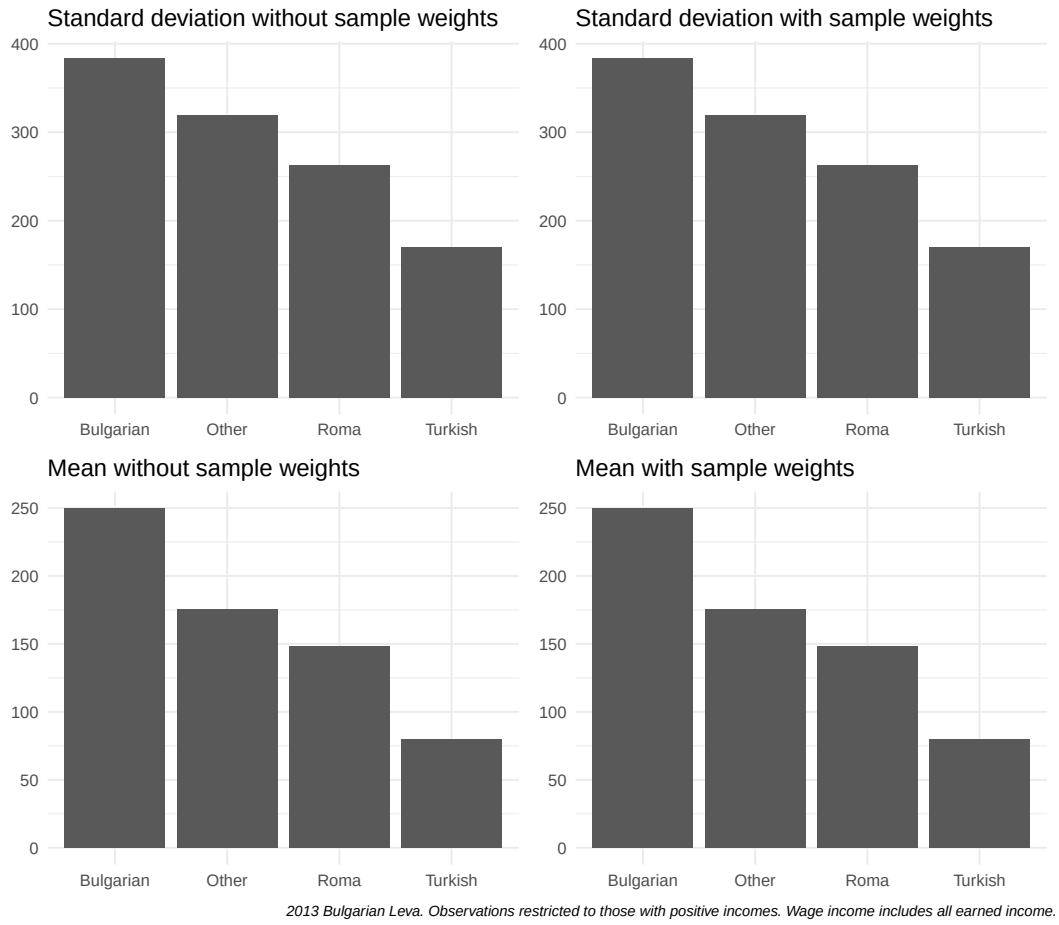


Figure 2: Mean monthly average net wages by ethnic group by weighted and unweighted samples

2.2 Distribution of incomes for weighted and unweighted samples

Figure 2 displays the distribution of mean monthly average net wages by ethnic group and by their samples both weighted and unweighted. The data presented in this figure only accounts of observations with positive wages. The mean and standard deviation are the same for both the weighted and unweighted samples.

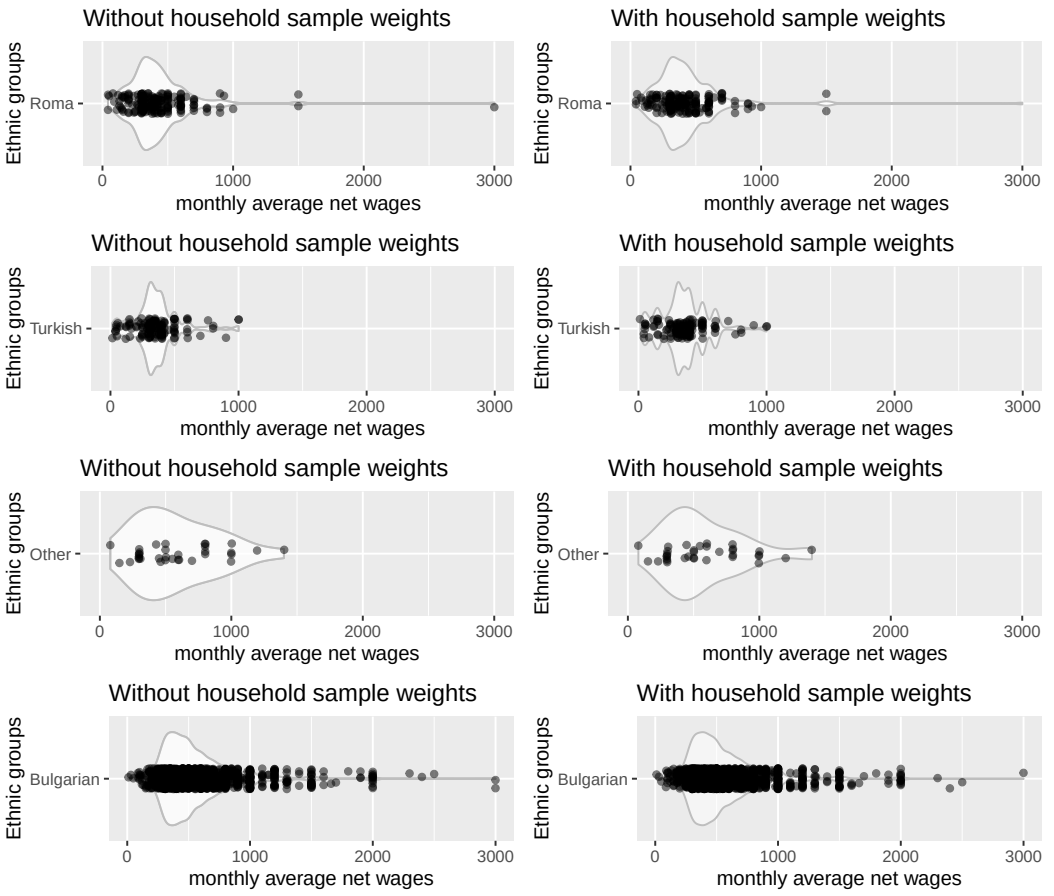


Figure 3: Monthly average net wages for households with positive incomes by weighted and unweighted sample

2.2.1 Monthly average net wages

As with figure 2, where the mean wage of minorities is clearly less than ethnic Bulgarians, figure 3 and 4 are able to more clearly communicate the extent to which the income distribution is shifted upward for ethnic Bulgarians relative to Turks and Roma.

For all ethnic groups, the distribution of wage income presents a left-skew as

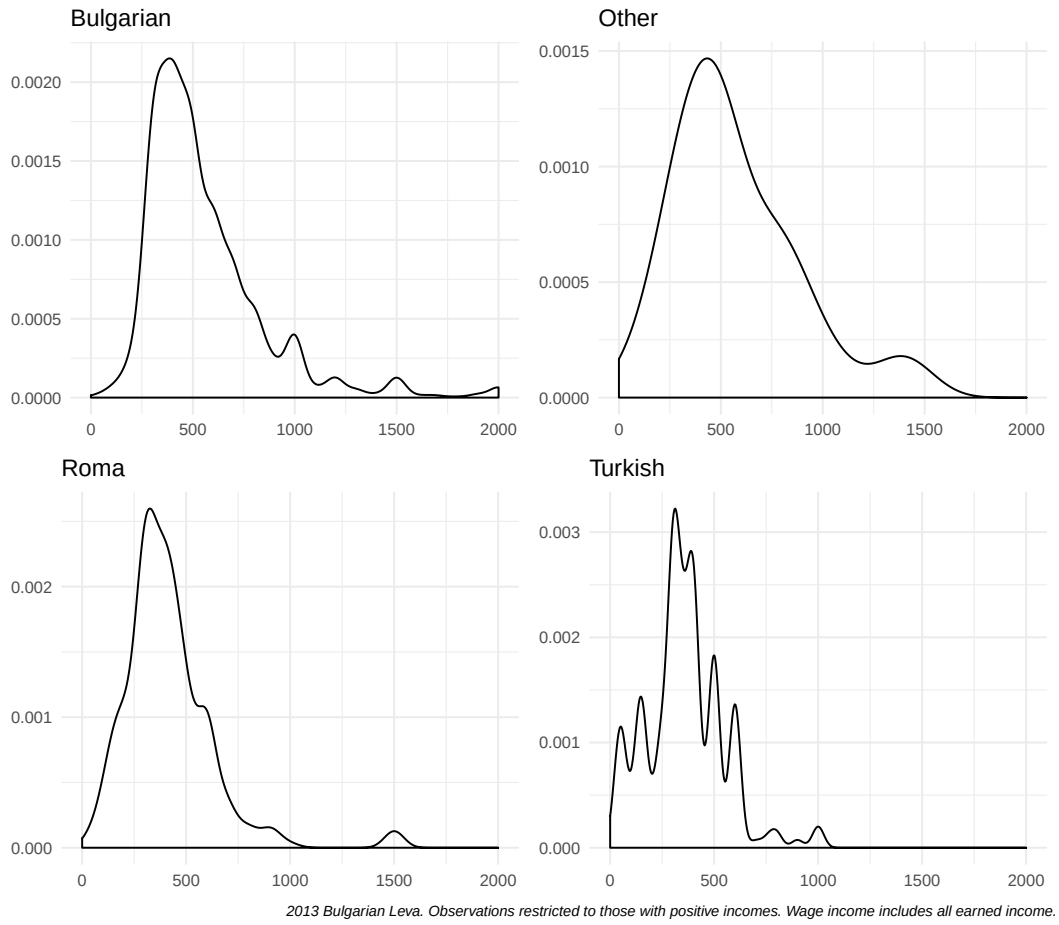


Figure 4: Distribution of monthly average net wages with household weights

always the case with distribution of income in market economies. However, for both Turks and Roma there is a sizablely larger group concentrated at the low end of the wage distribution and fewer resting at the top.

2.2.2 Total net monthly household income

The extent to which ethnic minorities are concentrated lower on the distribution is even more aparent when looking at the distribution of net total monthly household income in figure 5. In this figure, household income is strikingly less for ethnic minorities and to a greater degree than wage inequality between ethnic groups would suggest. This is likely the result of low levels of female labor force participation and lower levels of employment, generally, amongst ethnic minorities.

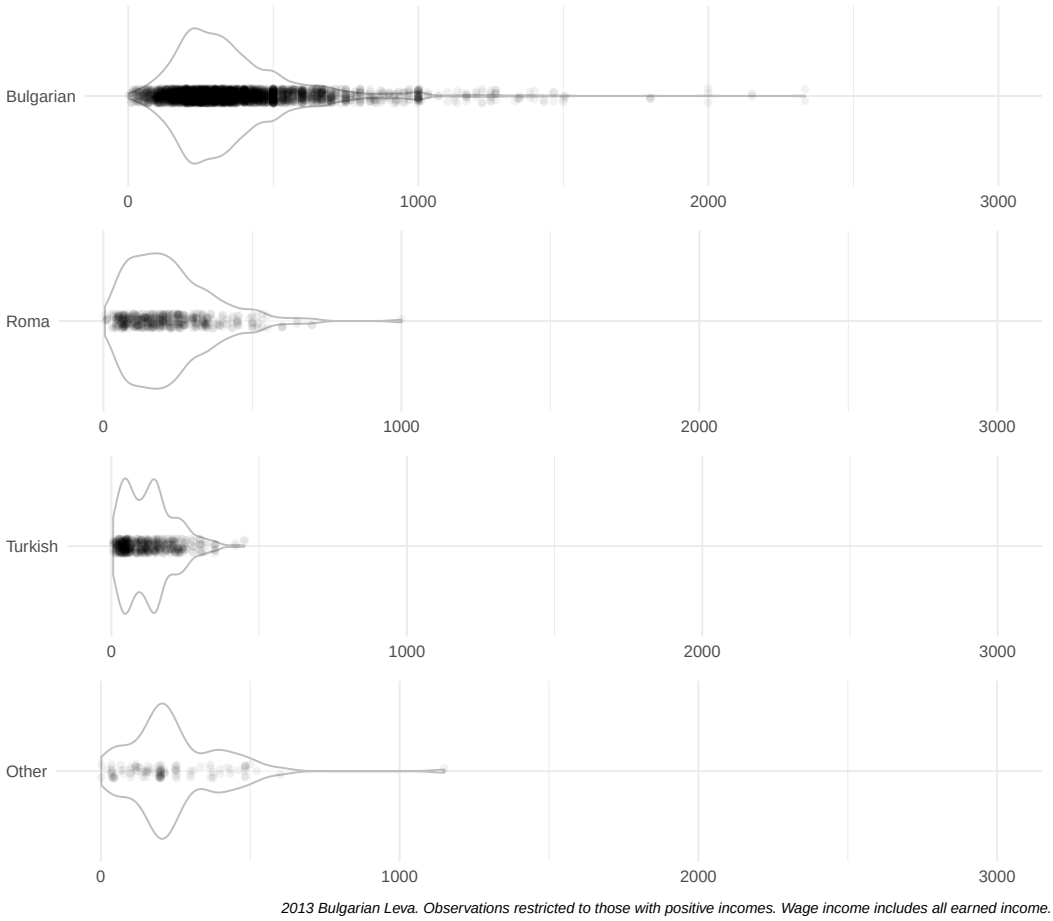


Figure 5: Distribution of total net household public assistance income for household with positive public assistance income. Household weights have been applied.

2.2.3 Public Assistance Income

Figure 6 looks at the distribution of government transfer or public assistance income (social assistance, heating allowance, child, and infant benefits) for household's with positive transfer income. As is clear, Roma and Turkish households quite clearly see income from such government benefits more frequently than Bulgarian households, but the distribution is quite similar between ethnic groups. The fact that household public assistance is distributed around 700 leva for all ethnic groups, stands against the widespread notion in Bulgaria that minorities utilize the public assistance system unfairly.

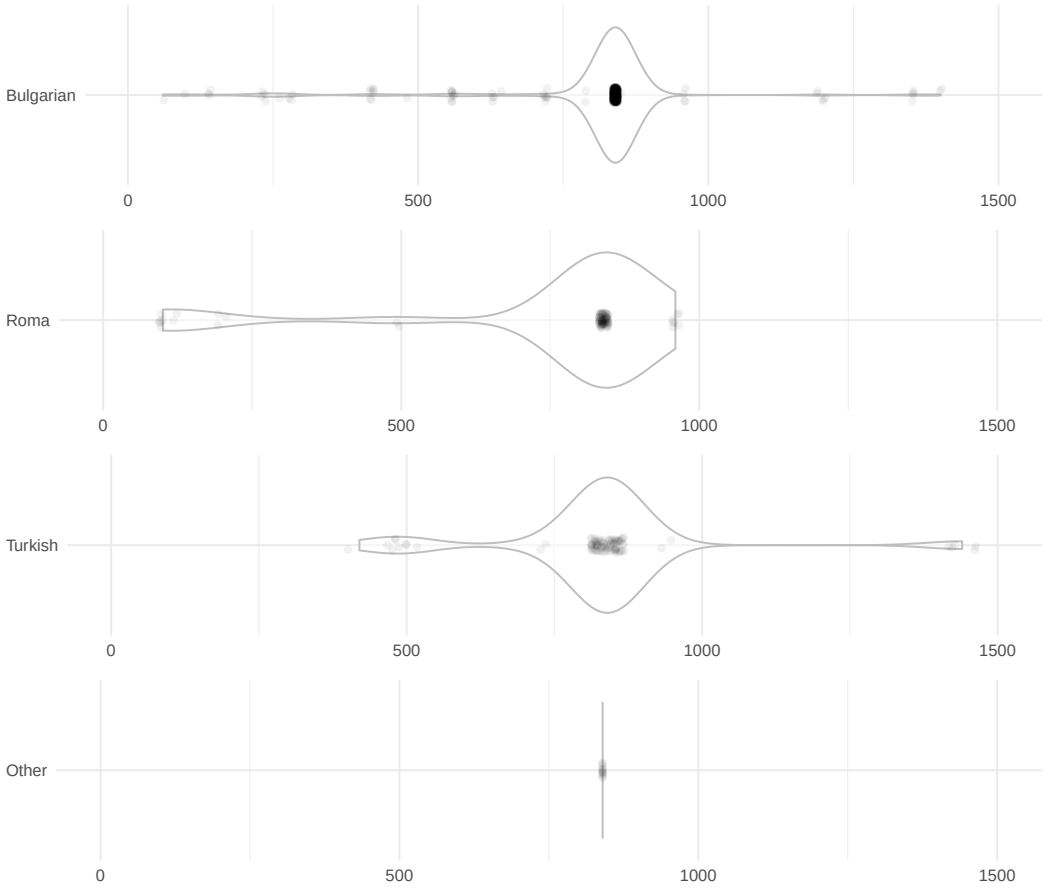


Figure 6: Distribution of net monthly income with household weights

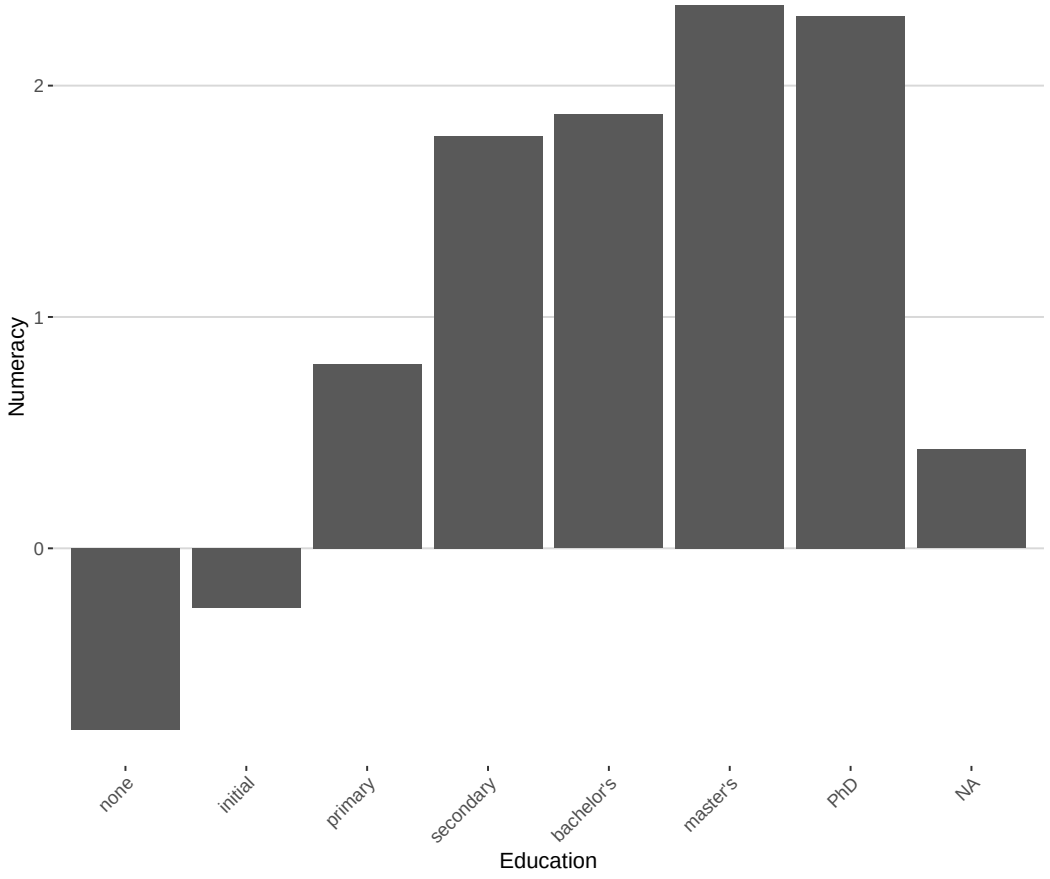


Figure 7: Mean numeracy score by education level

2.3 Education and standarized test results

Given that education quality may differ between ethnic groups and across the whole population, the BLISS asked a random sample of adult respondents to take a standarized numeracy and literacy test. Figure 7 shows that there is clearly a strong positive relationship between mean numeracy score and one's level of education. This suggests that this measure of numeracy may be a useful measure of cognitive skills generally that may be able to overcome heterogeneity in school quality.

A simple OLS estimation of the effect of education on numeracy and literacy test results also confirms this relationship implying the strength of these tests as measure of labor market relevant skills.

Table 5: OLS estimates: Educational attainment on standarized test score

	Dependent variable:	
	Numeracy	Literacy
	(1)	(2)
initial	0.525	0.195
	(0.381)	(0.400)
primary	1.580***	1.480***
	(0.334)	(0.351)
secondary	2.565***	2.220***
	(0.323)	(0.339)
bachelor's	2.659***	2.505***
	(0.341)	(0.359)
master's	3.131***	2.898***
	(0.338)	(0.355)
PhD	3.085***	2.982***
	(0.653)	(0.686)
Constant	−0.784**	−0.502
	(0.318)	(0.334)
Observations	1,674	1,674
R^2	0.131	0.109
Adjusted R^2	0.128	0.106
Residual Std. Error (df = 1667)	1.710	1.797
F Statistic (df = 6; 1667)	41.968***	34.114***
Note:	*p<0.1; **p<0.05; ***p<0.01	

Figure 8 display a box-plot for all ethnic groups by monthly average net wages by their highest level of education. For nearly all levels of education, Turks and Roma see lower earnings. But as would be predicted and as the OLS model estimated previously confirmed, higher education is associated with higher wages. This figure,

confirms that increasing education levels amongst Roma and Turks may serve as a mechanism to foster economic inequality. However, other policy options are needed in order to guarantee that the returns to educations are the same for all ethnic groups.

2.4 Segregation

Lastly, figure 9, presented here, differentiates monthly net household income by ethnicity and sample type. This figure sheds light on the potential negative effect of neighborhood segregation on income. Households from the main sample are households living in non-ethnically segregated communities, while those from the booster sample do live in segregated communities. While Roma households in segregated communities, see lower household incomes on average relative to non-segregated households, this relationship is more muted for Turkish households. This figure suggests that there is some ambiguity as to whether there is a segregation effect at play. Later in this paper, the question of whether a segregation effect plays a prominent role in driving heterogeneity within ethnic minorities is closely examined.

3 Methodology

In order to understand the sources of economic inequality between Bulgaria's ethnic minorities and ethnic Bulgarians this paper seeks to decompose the factors that accounts for such inequalities by employing two empirical methods: a log-linear model and a Blinder-Oaxaca Decomposition. These empirical methods seek to explain ethnic inequality along three distinct dependent variables: 1) average net monthly wages (i.e. earned income), 2) total annual net household income, and 3) total annual household social assistance income, which is defined as total household income

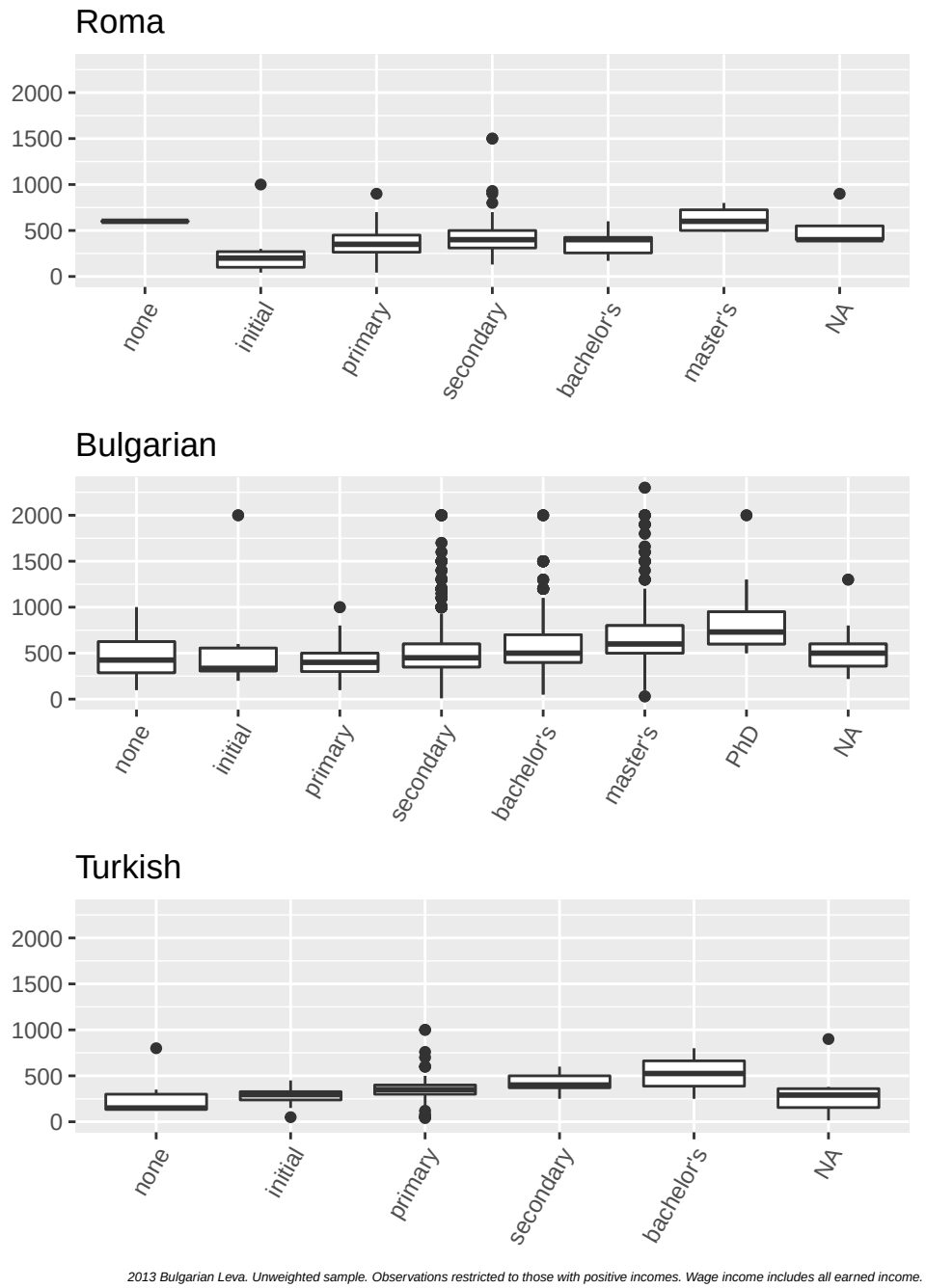
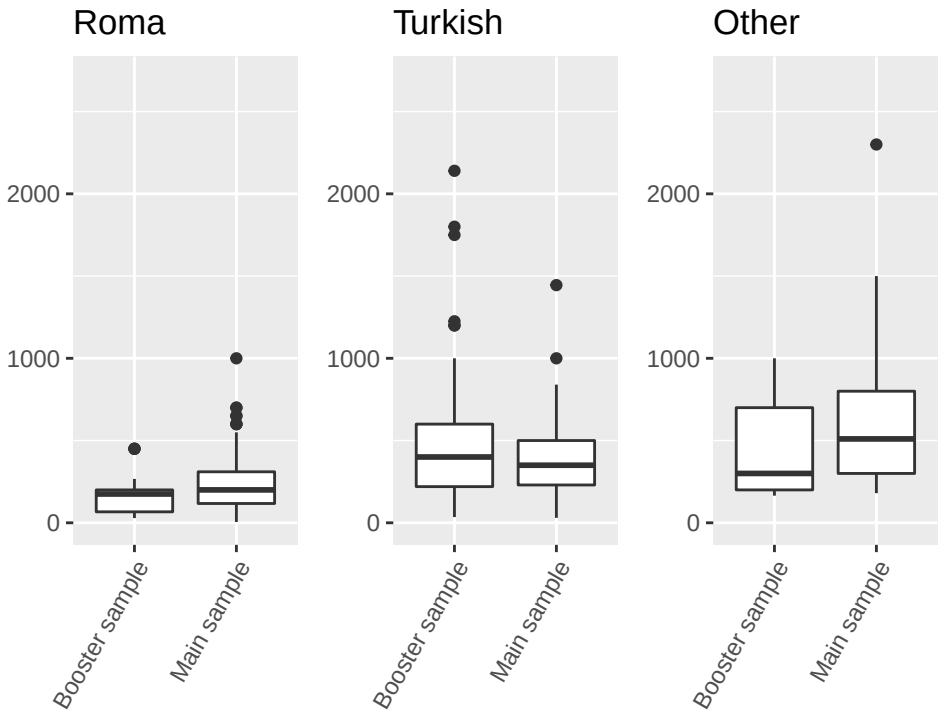


Figure 8: Monthly average net wages by education level for those with positive earnings



ıple. Observations restricted to those with positive incomes. Wage income includes all earned income.

Figure 9: Monthly net household income by ethnicity and sample type with household sample weights

from the low-income social assistance program, the low-income monthly heating allowance, and the cash benefits for children and infants.[7]

One chief aim of this paper is to decompose the role of endowment factors – i.e. observables relevant to economic outcomes like education and family composistion – on economic differences between ethnic groups and the role of residential segregation. Otherwise stated, this paper seeks to estimate the impact of differences in relevant economic characteristics, such as educational attainment, family composition, and residential segregation, on inequalities of earnings, net household income, and government transfer income. Through decomposing the role of observable factors, the potential role of more opaque and unobservable forces, such as labor market discrimination and structural discrminiation, can be better understood and estimated. In the three subsections enumerated below, these three distinct empirical strategies used to explore ethnic inequality in Bulgaria are outlined.

3.1 Log-linear Approach

Below is the explicit functional form of the log-linear models estimated for the three depedent variables in question. For each dependent variable, three models are estimated: 1) One model of the form below but without the segregation term, 2) another model with the segregation term, and 3) a third model that combines all ethnic groups into one independent variable. For each model an array of relevant economic characteristics are controlled for. In total nine log-linear model are esti-

[7]The respective identifiers provided for these variables in the World Bank data dictionary for the BLISS 2013 are as follows: M2_Q16_perYear (average net wages per year), M10_Q19 (total net monthly household income), M5A_Q4_11 (monthly social assistance income), M5A_Q5_11 (monthly heating allowance), M5A_Q2_11 (monthly child benefits), and M5A_Q3_11 (monthly infant benefits).

mated.

$$ln(income_i) = \beta_0 + \beta_1 Roma_i + \beta_2 Turk_i + \beta_3 Non - Segregated_i + X_i^T \gamma + \epsilon_i$$

3.2 Blinder-Oaxaca Decomposition

Through a threeway Blinder-Oaxaca decomposition, the relative impact of education, region, family size, and other characteristics on income disparities between ethnic minorities and ethnic Bulgarians can be ascertained. Of even more importance, a Blinder-Oaxaca decomposition can provide strong evidence for the extent to which economic inequality between ethnic groups is due to structural and employment discrimination.

In the immediate subsections below, the explicit form of the Blinder-Oaxaca decomposition is presented. For sake of simplicity, the explicit form is presented for a general dependent variable termed income. As is done in the analysis below, all ethnic minorities are grouped together.

The Blinder-Oaxaca decomposition is based off of two linear regression models:

(1) $$\text{income}_{Minorities_i} = \beta_1 Region_{Minorities_i} + ... + x^T_{Minorities_i}\gamma + \epsilon_{Minorities_i}$$

(2) $$\text{income}_{Bulgarians_i} = \beta_1 Region_{\,Bulgarians_i} + ... + x^T_{Bulgarians_i}\gamma + \epsilon_{Bulgarians_i}$$

The fitted values from these two linear models are subtracted from one another as follows:

(3) $$\overline{\text{income}}_{Bulgarians} - \overline{\text{income}}_{Minorities} = \overline{X}_{Bulgarians}\,\hat{\beta}^T_{Bulgarians} - \overline{X}_{Minorities}\,\hat{\beta}^T_{Minorities}$$

From here equation 3 can be further decomposed into the portions of the difference in mean income that results from differences in a) endowments, b) coefficients, and c) the interaction of the two.

a) Endowments: These are differences in observable and relevant characteristics, like one's level of education, age, and the region in which they live, that explain the gap in income between ethnic minorities and ethnic Bulgarians.

$$(a) \qquad \hat{\boldsymbol{\beta}^{\boldsymbol{T}}}_{Bulgarians}(\overline{X}_{Bulgarians} - \overline{X}_{Minorities})$$

b) Coefficients: This component of the three-way Blinder-Oaxaca decomposition expresses the gap that is not explained by observable. For the same observable, such as for the same level of education, the coefficients term expresses how this observable is related to different economic outcomes based on which group one belongs to. For example, if for the same level of education, ethnic-Bulgarians typically saw higher incomes, the coefficient term would pick-up this difference in how the same endowment may see different economic consequences. Typically in the literature, this portion of the Blinder-Oaxaca decomposition is considered as an estimate of the role of discrimination.

$$(b) \qquad \overline{\mathbf{X}^T}_{Minorities}(\hat{\boldsymbol{\beta}}_{Bulgarians} - \hat{\boldsymbol{\beta}}_{Minorities})$$

c) Interactions: Lastly, this term identifies the portion of the gap that is due to the multiplicative effect of differences in endowments and differences in the economic returns on those endowments. To continue with the example that regards education, if ethnic minorities generally saw lower returns to education and lower levels of education, this term would estimate that multiplicative effect.

$$(b) \qquad (\overline{X}_{Bulgarians} - \overline{X}_{Minorities})^T(\hat{\boldsymbol{\beta}}_{Bulgarians} - \hat{\boldsymbol{\beta}}_{Minorities})$$

4 Results

4.1 Estimated Log-Linear Models

Presented below in table 5 are nine models; three models attempt to explain monthly average net wages, three explain net monthly household income, and the final three models seek to explain public assistance. For all three types of models, the population is restricted to households and individuals that see positive incomes from the dependent variables being estimated (e.g. only those who saw wage income are included in the sample population for the first three models). In all nine models, the dependent variable is log transformed; this step was taken in response to the standard right skew that income distributions typically take.

The regression output displayed in table 5 shows that despite controlling for a plethora of relevant economic factors that may be driving ethnic inequality, one's status as an ethnic minority decreases earned income and household income for observations with positive earnings and household income, respectively. Models 1 and 2 estimate that relative to ethnic Bulgarians one's status as a Turk decreases wages amongst the employed by 15.9 and 18.8 percent, respectively. The analog figure for those who identify as Roma is 20.4 percent.

As discussed, those who identify as Turks in Bulgaria are often identified and characterized as Roma by parties who are relevant in determining economic outcomes (e.g. employers, policy makers, etc.). Therefore, in place of including an independent variables for Roma, Turks, and other ethnic minorities, models 3, 6, and 9 merely contain a dummy variable for all ethnic minorities; such an approach may appropriately deal with a potentially artificial or non-relevant distinctions for the purposes here between different ethnic minorities in Bulgaria.

Table 6: Log-Linear Regression Output

	Dependent variable:								
	log('monthly average net wages')			log('total net monthly household income')			log('public assistance income')		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Female	−0.268***	−0.266***	−0.269***	−0.031	−0.033	−0.033	0.067	0.065	0.062
	(0.028)	(0.028)	(0.028)	(0.043)	(0.043)	(0.043)	(0.046)	(0.046)	(0.046)
No children under 20	−0.019	−0.025	−0.027	−0.279***	−0.277***	−0.269***	−0.732***	−0.722***	−0.759***
	(0.031)	(0.032)	(0.032)	(0.053)	(0.053)	(0.053)	(0.157)	(0.157)	(0.158)
Education	0.143***	0.142***	0.142***	0.201***	0.202***	0.205***	−0.072***	−0.070***	−0.081***
	(0.013)	(0.013)	(0.013)	(0.021)	(0.021)	(0.021)	(0.024)	(0.024)	(0.024)
Age: 30 - 49	0.036	0.033	0.039	−0.155**	−0.155**	−0.157**	0.083	0.085	0.087
	(0.043)	(0.043)	(0.043)	(0.075)	(0.075)	(0.075)	(0.059)	(0.059)	(0.060)
Age: 50+	−0.107**	−0.103**	−0.097**	−0.354***	−0.355***	−0.354***	−0.131*	−0.143*	−0.170**
	(0.044)	(0.044)	(0.044)	(0.075)	(0.075)	(0.075)	(0.078)	(0.080)	(0.079)
Numeracy	−0.008	−0.008	−0.008	0.023*	0.023*	0.023*	−0.005	−0.004	−0.004
	(0.009)	(0.009)	(0.009)	(0.014)	(0.014)	(0.014)	(0.015)	(0.015)	(0.015)
Literacy	0.003	0.003	0.004	0.015	0.015	0.015	0.001	0.002	0.005
	(0.009)	(0.009)	(0.009)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Semantics	0.029***	0.029***	0.028***	0.028*	0.029*	0.028*	0.044***	0.043***	0.042***
	(0.010)	(0.010)	(0.010)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Region	0.003*	0.003*	0.003	0.001	0.001	0.001	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
Other Ethnic Minority	0.192	0.192		−0.124	−0.133		0.321*	0.317*	
	(0.133)	(0.133)		(0.193)	(0.193)		(0.167)	(0.167)	
Roma	−0.190***	−0.192***		−0.232***	−0.234***		0.058	0.061	
	(0.057)	(0.057)		(0.075)	(0.075)		(0.074)	(0.074)	
Turkish	−0.127	−0.072		−0.422***	−0.493***		0.375***	0.353***	
	(0.111)	(0.118)		(0.138)	(0.151)		(0.093)	(0.098)	
Non-Segregated		0.100	0.086		−0.149	−0.068		−0.057	−0.123
		(0.073)	(0.069)		(0.129)	(0.119)		(0.081)	(0.077)
Ethnic Minority			−0.129***			−0.262***			0.171***
			(0.050)			(0.068)			(0.063)
Constant	5.665***	5.578***	5.592***	6.017***	6.157***	6.067***	7.154***	7.203***	7.311***
	(0.076)	(0.099)	(0.096)	(0.123)	(0.172)	(0.164)	(0.109)	(0.129)	(0.124)
Observations	907	907	907	963	963	963	444	444	444
R^2	0.236	0.238	0.232	0.271	0.272	0.270	0.177	0.177	0.163
Adjusted R^2	0.226	0.227	0.222	0.262	0.262	0.261	0.154	0.153	0.142

Note: *p<0.1; **p<0.05; ***p<0.01

As is the case when estimating Roma and Turks independently, after controlling for a host of economic relevant factors – i.e. where one resides, whether one lives in an ethnically segregated neighborhood, one's level of education, family composition, standardized test scores, gender, and age – ethnic minorities in Bulgaria are estimated to see lower earnings (-16.1 percent), lower household net income (-23.3 percent), and greater household public assistance income (+12.4 percent) relative to ethnic Bulgarians. These estimates are statistically significant at the 10 percent level, in the case of model 9, and the 1 percent level, in the case of models 3 and 6.

The empirical approach taken here is not able to definitively uncover the mechanisms driving observed inequality along ethnic lines; it cannot determine the extent to which the statistically significant effect of one's ethnic minority status is the result of employment discrimination, structural discrimination, and other minority specific factors. However, the results obtained here do provide strong evidence that factors, that include employment discrimination, are responsible for depressing wages amongst employed Roma and Turks by potentially 20 percent relative to ethnic Bulgarians with the same relevant economic characteristics. Furthermore, one's ethnic status may depress total net household income by between 20 percent (Roma estimates from models 4 and 5) and nearly 50 percent (Turkish estimates from models 4 and 5).

Likely due to lower wages earning and total net household income, public assistance income is estimated 35 percent higher amongst Turks and 17 percent for ethnic minorities as a whole than ethnic Bulgarians with comparable observable. Additionally, living in an non-ethnically segregated neighborhood is not associated with public assistance income being higher than those who do not live in such neighborhoods.

4.2 Decomposition of the sources of inequality between ethnic minorities and ethnic-Bulgarians

The log-linear estimates in the previous section were able to show that inequality between ethnic groups in Bulgaria is clearly not a mere function of differing endowments, such as differing levels of education, numeracy, family structure, and other economically relevant observable. Rather, in the previous section the log-linear estimates obtained clearly maintained that one's minority status depressed wages, incomes, and increased public assistance income above and beyond what one's economic observable would predict. In this section a Blinder-Oaxaca Decomposition is employed to the estimate the extent to which different endowments explain ethnic economic inequality between ethnic groups and to further estimate the role that factors specific to one's ethnicity (e.g. discrimination) play in driving economic inequality.

Table 7: Threeway Decomposition by Ethnic Minorities and Ethnic Bulgarians

	Wage Income	Household Income	Public Assistance
coef(endowments)	42.40583	227.98756	-356.7806
se(endowments)	15.47740	39.67649	201.2401
coef(coefficients)	60.08831	142.62069	-476.4871
se(coefficients)	21.83177	51.46032	162.1314
coef(interaction)	26.23993	58.04329	213.9428
se(interaction)	22.41636	62.88095	210.5802

Note: Incomes are reported in 2013 Bulgarian leva.

The mean monthly difference in wages between the ethnic minorities and ethnic Bulgarians is 128 leva. The respective figures for net annual household income and annual income from public assistance is 428 leva and -619 leva. Table 7 displays the output of a three-way Blinder-Oaxaca decomposition that attempts to explain this

differential in income. For all three decompositions, the gap that is explained by differences in endowments and the portion explained by differences in coefficients are statistically significant.

The threefold decomposition estimated here suggests that, of the 128, 428, and -619 leva difference, roughly 42, 227, and -356 leva of this gap are the result of differences in endowments (e.g. age, gender, and education). Otherwise stated, the models here estimate that 33, 53, and 57 percent of the mean difference in wages, total household income, and social assistance income, respectively, between ethnic minorities and ethnic Bulgarians can be explained by differences in endowments.

In regards to wage and public assistance income, a larger share of the respective 128 and -619 leva gap result from differences in coefficients than endowments (46.8 and 76.89 percent, respectively). 33 percent of the 428 leva mean difference in net household income is explained by difference in the coefficients.

As was stated in the methodology section, the coefficient component of the decomposition uncovers how the same endowment is associated with a different flows of income for the two groups. Differences in coefficients are typically explained as evidence of discrimination. However, it would not typically be the case that the channel by which discrimination has consequence is solely through one coefficient or another. Rather, the effect of discrimination is cumulative. Therefore, in figure 2, which presents the decomposition of many of the coefficients estimated, the role of discrimination is slightly difficult to make sense of. Many independent variables do not have statistically significant effects, despite both the coefficient and endowment effects estimated having large and statistically significant explanatory power.

However, figure 2 does tell an important piece of the story of ethnic inequality with regards to education. The coefficient term with regards to wage and household

income shows smaller returns to education for ethnic minorities than ethnic Bulgarians. An additional level of educational certification (e.g. high school diploma to bachelor's) is associated with 77 leva increase in household income and 48 leva rise in wage income for ethnic Bulgarians relative to ethnic minorities.

As is clear from figure 2, education stands quite alone in having a large statistically significant role in explaining the gap between ethnic minorities and ethnic Bulgarians; this stands true for all three models. In terms of both net household income and wage income, the combined size of the endowment and coefficient terms explain most of the gap between ethnic minorities and ethnic Bulgarians.

4.3 Decomposing the sources of inequality between minorities in segregated and non-segregated communities

The Blinder-Oaxaca estimated for the previous section did not account for the role of residential segregation in driving inequality between ethnic minorities and ethnic Bulgarian nor within ethnic minorities. This section deals with that issue by estimating three Blinder-Oaxaca models of the exact form estimated in the previous section, except that the two groups being compared are ethnic minorities who live in segregated communities and ethnic minorities who do not.

Between ethnically segregated communities and within ethnic minorities, there are large mean differences in income. The greatest differences is with respect to public assistance income, where such transfer income is on average 769 leva greater in segregated communities than non-segregated communities. In terms of annual household income, households in segregated communities see annual household incomes of 136 leva less. While differences in wages are an average 5.8 leva less per month for those in segregated communities with positive wage income.

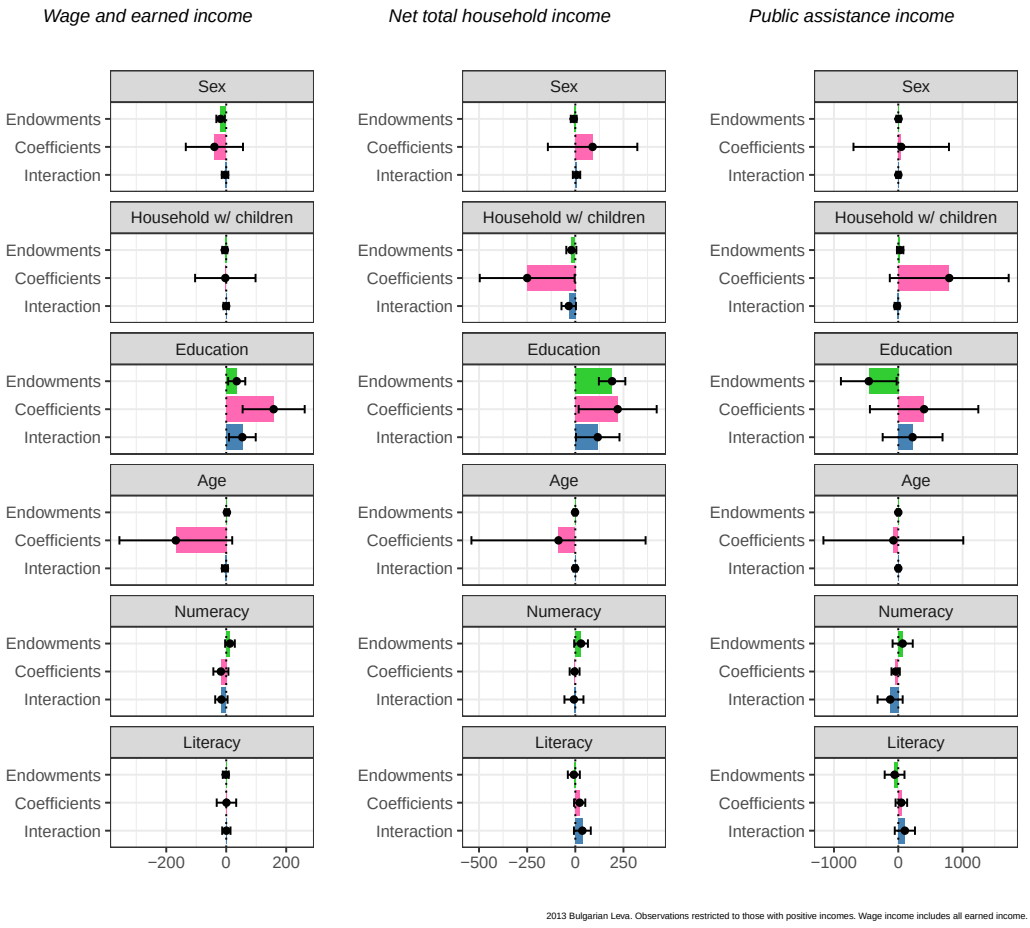


Figure 10: Threeway Blinder-Oaxaca Decomposition by Ethnic Status

Table 8: Threeway Decomposition of Segregation Effects within Ethnic Minorities

	Wage Income	Household Income	Public Assistance
coef(endowments)	42.228192	16.95861	-175.49458
se(endowments)	34.791282	53.31108	215.14332
coef(coefficients)	-28.378960	42.59951	-552.07136
se(coefficients)	41.359572	62.09121	287.88069
coef(interaction)	-7.983271	77.30854	-42.28731
se(interaction)	43.710130	56.06499	245.33948

Note: Incomes are reported in 2013 Bulgarian leva.

As before, table 8 outlines the main results of the decomposition. Unlike table 7, all three Blinder-Oaxaca models estimated here see no statistically significant results. The standard errors for the endowment, coefficient, and interaction terms are quite sizable. In figure 3, which outlines the decomposition by each independent variable, this same relationship holds: there are no statistically significant terms in figure 3 either.

Even though the mean differences in income between segregated communities and non-segregated communities are large, the estimated provided here are insufficient evidence to establish the role, nature, and mechanisms behind any segregation effect.

5 Discussion

The empirical strategy and estimates provided here, both those of the log-linear models and the Blinder-Oaxaca decomposition, strongly suggest that differences in endowments are not the only factor in driving economic inequality between ethnic minorities and ethnic Bulgarians. There seems to be strong case that factors specific to ethnic minorities are driving a sizable portion of the gap in mean income.

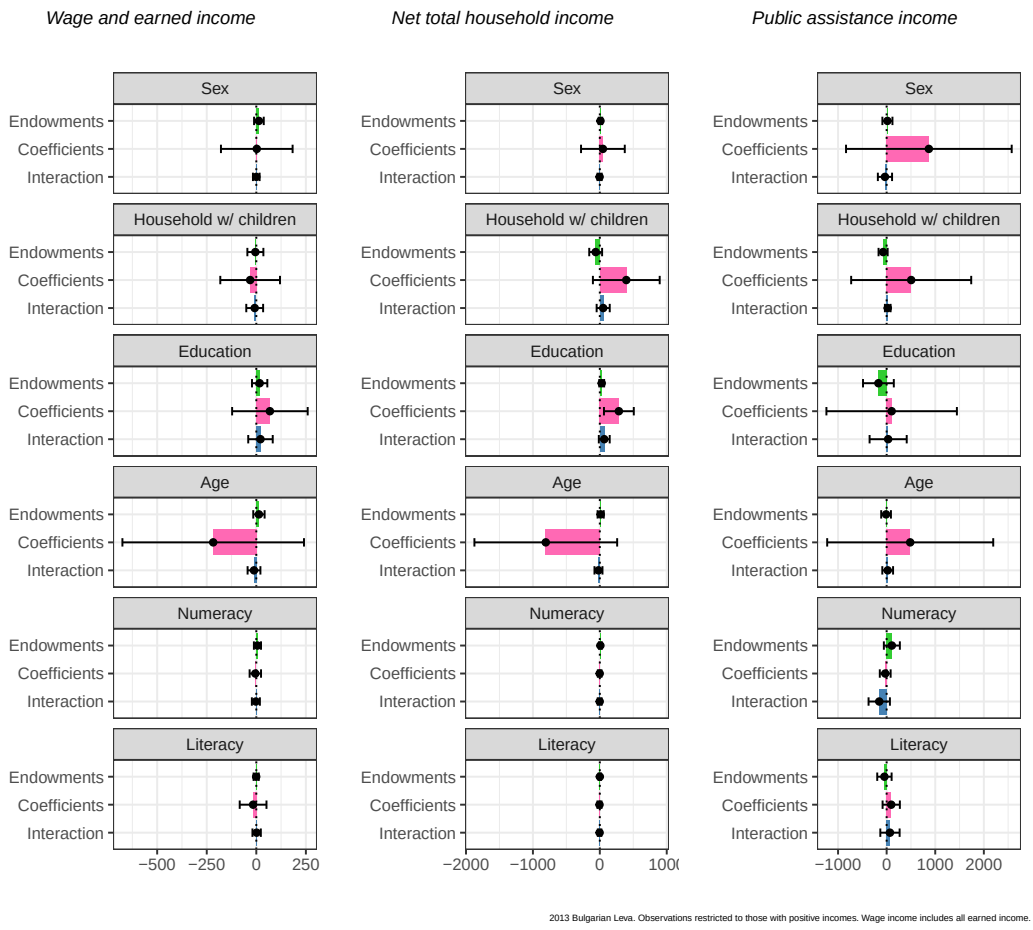


Figure 11: Threeway Decomposition of Segregation Effects within Ethnic Minorities

These factors are likely some combination of employer discrimination and structural discrimination.

The Blinder-Oaxaca models estimate that between roughly 30 and 60 percent of the difference in mean income between these groups can explained by differences in endowments. This can be read as strongly evidence of employment discrimination and structural discrimination that does not concern the distribution of endowments. According to the estimates produced here, employment discrimination may cause up roughly 50 percent or more of the difference in mean wages between minorities and ethnic Bulgarians.

There is strong evidence that education plays an important role in driving inequality. Roughly a third of the difference in mean income from wages, public assistance, and total household income can be explained by lower levels of education (i.e. lower levels of educational endowment). Given that changing coefficients may be more difficult than changing endowments, investment in education amongst ethnic minorities is clearly a fruitful path.

Lastly, despite not finding a clearly statistically significant relationship between segregation and income – that is with exception of model 3 in table 5 that finds a large and statistically significant segregation effect on public assistance income, there is reason to look closer into the role of segregation. The gap in income between ethnic minorities living in such communities and outside of them are so large that there is likely a mechanism driving this that is related to segregation.

However, while reducing ethnic segregation may be a fruitful path, the contours of that policy program must be more thoroughly considered than this paper has allowed for and the mechanisms by which segregation cause income inequality ought to be better understood.

6 Conclusion

This paper provides strong evidence that the size of ethnic inequality is large, that discrimination likely plays a predominant role, and increasing education is likely one of the clearest paths to reducing inequality. However, there are additional steps that ought to be taken in future research.

1) The empirical approach taken here ought to be expanded to questions of employment inequality.

2) The relationship between wage discrimination, public assistance use, and lower rates of employment amongst minorities ought to be considered. Namely, if expected earnings for ethnic minorities are depressed relative to ethnic Bulgarians because of wage discrimination, there may be cause for ethnic minorities to find informal work so to retain public assistance income or work abroad. In turn, wage discrimination may be artificially suppressing employment rates amongst minorities.

3) Unlike the methods used here, employment must be considered with a non-linear estimation technique, such as a probit model. Therefore, future research ought to employ a Blinder-Oaxaca model that utilize a probit model at its heart.

4) Future analysis ought to deal with the selection issues faced. In our data on wages, for instance, data is only available for those employed. Meaning, wage information for those who are not employed are unknown. It may be the case that wage discrimination is even more severe than this data suggests because the wage that employer would be willing to hire at is below the minimum wage. However, selection issues also apply to public assistance use and segregation.

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