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Sebastian Leitner and Robert Stehrer

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Determinants of inequality in selected SEE countries: Results from Shapley value decompositions

Sebastian Leitner and Robert Stehrer*

The Vienna Institute for International
Economic Studies (wiiw)
Rahlgasse 3, A-1060 Vienna, Austria.
Phone ++43 1 533 66 10 - 47
Fax ++43 1 533 66 10 - 50
E-mail: Robert.Stehrer@wiiw.ac.at

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* Corresponding author

Abstract

In this paper we provide a comparative analysis of inequality in household consumption per capita in four South-Eastern European countries, Albania, Bosnia & Herzegovina, Bulgaria, and Serbia. The analysis is based on a largely consistent dataset derived from the World Bank's Living Standards Measurement Study (LSMS) providing data for at least two years for each of these countries and a comparable set of variables. We apply inequality decomposition methods based on regression analysis and variants of the Shapley value approach. We also present results from related methods like a decomposition of the explained variance using different approaches for comparisons. The results suggest that three groups of variables are particularly important for explaining patterns of inequality; these are socio-demographic variables, employment status and education. Regional aspects and nationality or ethnicity plays a less important role though there are some country differences.

JEL-Classification: C20; D63.

Keywords: Inequality decomposition; Gini; Shapley value; Western Balkan countries; a

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1 Introduction

This paper is concerned with determinants of inequality in a sample of Western Balkan countries (Albania, Bulgaria, Bosnia & Herzegovina and Serbia). To our knowledge this is the first attempt to provide a comparative analysis for this set of countries based on individual or household data.[1] Using data from the World Bank's Living Standards Measurement Study (LSMS), described below in more detail, we analyse determinants of inequality with respect to consumer units (e.g. households). In particular we provide decomposition results from regression based methods partly based on the Shapley value approach. The literature on comparative studies of income inequality in transition economies and on Western Balkan countries in particular is rather scarce (see however Milanovic, 1999, analysing inequality with focus on inequality by income sources). In this sense the paper contributes to the literature in providing evidence on this region based on comparable data and using a method which allows for such a cross-country approach.

Before starting let us however present some inequality trends in the countries under consideration using already existing databases. Table 1.1 present available information on Gini coefficients from the WIDER database.[2] This is based on household data with consumption, expenditures or disposable income per capita (i.e. no equivalence scales were used). The Gini coefficients on consumption expenditures are available for Albania, Bulgaria and Bosnia & Herzegovina. For Albania the Gini is rising from about 29 in 1996 to about 31 in 2004; similarly for Bulgaria the Gini was rising from 28 (in 1998) to a level of about 31 in 2001. Bosnia & Herzegovina experienced the strongest increase from 26 in 2001 to 36 in 2005.[3] For Serbia the Gini coefficient based on disposable income per capita is higher with about 40 in 2003 but even slightly declining over time.[4] With respect to the levels compared to other country groups the Gini coefficient is

[1] There are however individual country studies; e.g. INSTAT (2006) and Canova (2006) on Albania.

[2] See http://www.wider.unu.edu.

[3] For Bulgaria also other income or expenditure definitions would be available. In all cases these show increasing trends.

[4] The Gini coefficient based on personal earnings data increasing slightly from 31 to a level of about 35 in 2006.

Country	Income/Expenditure definition	Year	Gini (1)	Gini (2)
Albania	Consumption	1996	29.3	28.0
		2002	28.1	28.2
		2004	31.1	31.1
Bulgaria	Consumption	1995	28.0	29.2
		1997	30.0	32.1
		2001	30.6	32.2
Bosnia & Herzegovina	Consumption	2001	26.0	26.2
		2005	35.8	35.8
Serbia	Disposable Income	2003	40.3	40.3
		2004	39.3	39.3
		2005	39.3	39.3
		2006	38.8	38.8

Notes: Gini (2) reports a Gini coefficient adjusted by WIDER.

Table 1.1: Gini coefficients from WIDER database (households)

slightly above those for Western Europe and Central and European countries on average, but lower compared to other country groups (like Russia, CIS countries, East Asian countries, etc.).

In this paper we are mainly interested in the determinants of these inequality levels in the four Western Balkan countries. The aim of this research was to set up a rather consistent dataset allowing for a comparison across countries. Further, from a methodological point of view, we applied existing decomposition methods based on regression approaches. In Section 2 we briefly discuss the data we use in this paper and point to several constraints and problems regarding data availability and quality. We further provide evidence on inequality measures using this dataset. In Section 3 we present the results of a decomposition analysis based on regressions combined with the Shapley value approach. We also compare the results to some alternative - however related - calculations. In this section we mainly draw on existing techniques and therefore keep the technical descriptions to a minimum however providing references to the literature. Section 4 concludes.

2 Data and descriptive evidence

2.1 Data sources

In this study we use data collected from the The World Bank's Living Standards Measurement Study (LSMS). The datasource (LSMS) is well described and explained in detail in Deaton (1997) also pointing towards potential problems and pitfalls. From this data source we collected

information which is available across countries to allows for cross-country comparisons. The countries, years and variables chosen are mainly dictated by the availability of comparable data. Of course, this reliance on LSMS data has some drawbacks as the surveys are not intended for cross country comparisons. However, we do think that the variables we are focusing on and the method applied for decomposition gives allows such a comparison. Furthermore, one has to have in mind that the structure of the available data sets implies that the data have to be collected separately for each country and the years for which data are available differ across countries. Table 2.1 provides an overview of the data coverage. Accordingly, we have been

Country	Years	
Albania	2002, 2005	Consumption
Bulgaria	1995, (1997), 2001	Consumption, Income
Bosnia & Herzegovina	2001, 2004	Consumption
Serbia	2002, 2007	Consumption, Income

Table 2.1: Data coverage

successful to establish a more or less comparable database for four Western Balkan countries, i.e. Albania, Bulgaria, Bosnia & Herzegovina and Serbia. As one can see the years for which the LSMS was conducted differs across countries. Whereas for Bulgaria the survey data are available for 1995 and 2001, these are available for more recent years in the other countries, namely for 2002 or 2005 for Albania, for 2001 and 2004 for Bosnia & Herzegovina, and 2002 and 2007 for Serbia, respectively.[5] With respect to the income variable we decided to use household consumption rather than income data which seems to be more reliable. The drawback on using household consumption data is that we can employ only information about the characteristics of the household head. For this we collected information by sex ('Male' and 'Female'), age groups (<25, 25-34, 35-44, 45-54, 55-64, 65-74, >=75), education (None, low, medium, uppers secondary and tertiary), nationality or ethnical groups, regional classification and employment status of the household head (employed, employer, unemployed, retired and others). Unfortunately, these information is not fully available for all countries and years. Information on nationality/ethnicity is missing for Bosnia & Herzegovina and for Serbia in 2002. From these data we calculated

[5]For some countries - Bulgaria (1995 and 1997) and Albania (2002,2003, and 2004) - a panel structure might be exploited which would allow to control for unobserved heterogeneity in regression analysis. however, as we wanted to compare a broader set of countries we have not yet used this possibility.

household consumption per capita per month (i.e. dividing the total consumption with the number of persons; further we also use a second measure by applying an equivalence scale, total consumption divided by the square root of the number of persons, i.e. we assume an equivalence parameter of $\rho = 0.5$ which is commonly used in the literature. Further, for being able to compare data across countries we converted household consumption using purchasing power parity rates (PPPs) for the respective years. One should note that this transformation does not change the inequality measures provided below.

2.2 Summary statistics and inequality measures

Before presenting the results of the decomposition analysis we shortly present simply summary statistics for each of the countries under consideration based on the collected data. The widely used inequality measures are well documented and explained in a number of papers and books, notably Jenkins (1995) and Sen (1997). In more global context these methods are applied in Milanovic (2005); for an overview see Anand and Segal (2008). In this paper we use the most common ones, the mean logarithmic deviation (MLD or I_0), the Theil measure (I_1), and the half squared coefficient of variation (I_2); formally, $I_0 = \frac{1}{N}\sum_{i=1}^{N} \ln \frac{\mu}{y_i}$, $I_1 = \frac{1}{N}\sum_{i=1}^{N} \frac{y_i}{\mu} \ln \frac{y_i}{\mu}$, and $I_2 = \frac{1}{2} \cdot \frac{1}{N}\sum_{i=1}^{N} \left[\left(\frac{\mu}{y_i}\right)^2 - 1\right] = \frac{1}{2} \cdot \frac{\sigma^2}{\mu^2}$. Here, N denotes the number of units (individuals, households), y_i is the income or expenditure category, $\mu = \frac{1}{N}\sum_{i=1}^{N} y_i$ denotes the mean income or expenditure, and σ denotes the variance. These are special cases of the generalized class of entropy measures, defined as

$$I_\alpha = \frac{1}{\alpha(1-\alpha)} \frac{1}{N} \sum_{i=1}^{N} \left[1 - \left(\frac{y_i}{\mu}\right)^\alpha\right] \qquad \text{for } \alpha \neq 0, 1.$$

For $\alpha = 0$ this becomes Theil's 'second' measure (the mean logarithmic deviation or I_0) and for $\alpha = 1$ the Theil measure I_1. These measures are mainly used as they possess favorable decomposition probabilities (see e.g. Sen, 1997, for a summary and details). Further we present the Gini index (G) given by

$$G = \frac{N+1}{N-1} - \frac{2}{N(N-1)\mu} \sum_{i=1}^{N} \rho_i y_i.$$

In this formula ρ_i denotes the rank of unit i in the distribution; the counting is from the top such that the richest unit has rank 1.[6]

Table 2.2 presents the mean of household consumption per capita and the respective inequality measures for the data not applying and applying the equivalence scale.[7] Starting with the

Country	Year	Mean	I_0	I_1	I_2	Gini
		No equivalence scale ($\rho = 1$)				
Albania	2002	158.7	0.137	0.140	0.166	0.290
	2005	177.5	0.158	0.166	0.213	0.311
Bulgaria	1995	203.6	0.126	0.128	0.150	0.272
	2001	245.7	0.152	0.156	0.215	0.295
Bosnia & Herzegovina	2001	457.9	0.140	0.145	0.181	0.291
	2004	442.7	0.131	0.134	0.159	0.288
Serbia	2002	340.1	0.171	0.186	0.265	0.321
	2007	440.6	0.161	0.178	0.242	0.312
		Equivalence scale ($\rho = 0.5$)				
Albania	2002	302.6	0.100	0.103	0.118	0.248
	2005	349.2	0.130	0.140	0.184	0.282
Bulgaria	1995	321.9	0.138	0.136	0.156	0.285
	2001	389.7	0.149	0.148	0.178	0.295
Bosnia & Herzegovina	2001	730.1	0.102	0.102	0.115	0.248
	2004	684.9	0.095	0.096	0.108	0.246
Serbia	2002	554.3	0.171	0.176	0.223	0.320
	2007	717.5	0.158	0.163	0.204	0.309

Table 2.2: Sample inequality measures

Gini coefficient one can see that this is roughly in line with the values reported in Table 1.1 above with values being around 30.[8] For this sample, in Albania and Bulgaria the Gini and inequality measured by the other coefficients was increasing over time; in Bosnia & Herzegovina and Serbia the inequality measures were decreasing. One should note that the levels of the inequality measures are not strictly comparable in terms of levels which mainly reflect their respective properties (see e.g. Sen, 1997). In most countries the mean income in the sample was increasing; the

[6]The formula is equivalent to the more commonly known expression $G = \frac{1}{\mu N(N-1)} \sum_{i>j} \sum_j |y_i - y_j|$. which however is computationally less convenient.

[7]In the Appendix we provide further detailed results with respect to household characteristics.

[8]The values for Serbia are not strictly comparable as in 1.1 these are based on disposable income.

only exception being Bosnia & Herzegovina. When applying an equivalence scale of $\rho = 0.5$ the mean income is increasing as expected There is however no clear tendency with respect to the inequality measures: These are lower in Albania, Bosnia & Herzegovina, and Serbia but slightly higher Bulgaria.

3 Determinants of inequality

In this section we present results from a decomposition analysis to explain the sources of income inequality by the characteristics of households ('income recipients approach'). The method chosen in this paper is based on regression analysis and the Shapley value approach. In the next subsection we provide a simplified introduction to this method without going into technical details but referring to the relevant literature where these techniques are described in more detail. Similarly, we do not refrain the potential advantages and disadvantages of this method compared to the more classical decomposition methods of inequality measures which can be found in the literature. This is followed by a presentation of the respective results.

3.1 The Shapley value approach to decomposition

Recently the literature has provided some additional decomposition methods which is based on regression results and the Shapley value approach as introduced by Shorrocks (1999) in the inequality literature; see Fields and Yoo (2000), Morduch and Sicular (2002), Fields (2003), Wan (2004), and Gunatilaka and Chotikapanich (2006) for such applications; see also Cowell and Fiorio (2009) for a critical review. Finally, Israeli (2007) shows how the Shapley-approach is related to the method proposed by Fields (2003) and also points to some advantages of the former which is applied in this paper as well. The most important advantage of the Shapley value approach is that this take the potential correlation amongst regressors into account. One should however note that the latter two contributions aim at decomposing the R^2 of the regressions whereas in this paper we decompose the resulting inequality measure. This is more similar to the contributions by Wan (2004) Gunatilaka and Chotikapanich (2006).

We explain the Shapley value approach using a simple example with three explanatory variables. This low dimension is useful as it allows to introduce the idea in a simple way. Furthermore, below we use groups of variables (rather than individual variables) for the decomposition

analysis.[9] We first regress consumption levels y_i on these explanatory variables x_i $(i = 1, 2, 3)$,

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \varepsilon$$

where ε denotes the error term. The predicted consumption level is then given by

$$\hat{y}_{123} = \hat{\beta}_0 + \hat{\beta}_1 x_1 + \hat{\beta}_2 x_2 + \hat{\beta}_3 x_3.$$

This predicted value is then used to calculate the Gini coefficient $\hat{G}^{(0)}_{\{123\}}$, where subscripts denote the variables included. In the first round we then eliminate one variable and calculate the predicted consumption levels $\hat{y}_{\{23\}}, \hat{y}_{\{13\}}$ and $\hat{y}_{\{12\}}$. The corresponding Gini coefficients are then given by $\hat{G}^{(1)}_{\{23\}}, \hat{G}^{(1)}_{\{13\}}$ and $\hat{G}^{(1)}_{\{12\}}$ respectively. Analogously, in the second round we eliminate two variables, thus calculating $\hat{y}_{\{1\}}, \hat{y}_{\{2\}}$ and $\hat{y}_{\{3\}}$. The resulting Gini coefficients are $\hat{G}^{(2)}_{\{1\}}, \hat{G}^{(2)}_{\{2\}}$ and $\hat{G}^{(2)}_{\{3\}}$. The final round would then be to only include the constant; the resulting Gini coefficient would thus be $\hat{G}^{(3)}_{\{\}} = 0$.

The marginal contributions are then calculated using the Gini coefficients. The first round marginal contribution of each variable are $C^{(1)}_1 = \hat{G}^{(0)}_{\{123\}} - \hat{G}^{(1)}_{\{23\}}, C^{(1)}_2 = \hat{G}^{(0)}_{\{123\}} - \hat{G}^{(1)}_{\{13\}}$ and $C^{(1)}_3 = \hat{G}^{(0)}_{\{123\}} - \hat{G}^{(1)}_{\{12\}}$. The marginal contributions in the second round of the first variable are given by

$$C^{(2,1)}_1 = \hat{G}^{(1)}_{\{12\}} - \hat{G}^{(2)}_{\{2\}} \qquad \text{and} \qquad C^{(2,2)}_1 = \hat{G}^{(1)}_{\{13\}} - \hat{G}^{(2)}_{\{3\}}.$$

The average of these contributions is then marginal contribution of the first variable in the second round, i.e. $C^{(2)}_1 = \frac{1}{2}(C^{(2,1)}_1 + C^{(2,2)}_1)$. Similarly, we calculate $C^{(2)}_2$ and $C^{(2)}_3$. The third round contribution then is given by $C^{(3)}_1 = \hat{G}^{(2)}_{\{1\}} - \hat{G}^{(3)}_{\{\}} = \hat{G}^{(2)}_{\{1\}}$ as $\hat{G}^{(3)}_{\{\}} = 0$ and analogously for $C^{(3)}_2 = \hat{G}^{(2)}_{\{2\}}$ and $C^{(3)}_3 = \hat{G}^{(2)}_{\{3\}}$.

Finally, by averaging the marginal contributions of each variables over all rounds results in the total marginal effect of each variable $j = 1, 2, 3$, i.e.

$$C_j = \tfrac{1}{3} \cdot \left(C^{(1)}_j + C^{(2)}_j + C^{(3)}_j\right).$$

The proportion of inequality not explained is then given by

$$C_R = G - \hat{G}^{(0)}_{\{123\}}.$$

The approach can be easily extended to any number of explanatory factors and to other inequality measures as we will show below.

[9] One could then go a step further and apply a hierarchical analysis within these groups of variables which however is not done in this paper focusing on cross country differences or similarities in broader categories.

3.2 Results

Based on this approach we first regressed household consumption expenditures on a number of variables including age, sex, employment status categories, regional dummies, educational categories and nationality or ethnicity. The exact variables used differ somewhat across countries and we report the underlying regression results in Appendix Tables B.1 to B.4. The explained part of the variance is about 20 % reported as the R^2 in these tables. The signs of the coefficients are in most cases in line with the expectations however in a low number of cases are counterintuitive.[10]

The results from the inequality decomposition using the Shapley value approach are reported in Tables 3.1 to 3.4 for the four countries respectively. For each country we present the results for the three measures of inequality introduced above (Gini, I_0 and I_2), and for household consumption per capita and equivalent household income (with $\rho = 0$). These tables present

	Gini				$I0$				$I2$			
	2002		2005		2002		2005		2002		2005	
Variable	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %
					Equivalence scale: $\rho = 1$							
Age and sex	0.019	6.5	0.052	16.8	0.002	1.7	0.016	9.8	0.002	1.3	0.017	7.9
Employment status	0.017	6.0	0.030	9.5	0.002	1.3	0.007	4.6	0.001	0.9	0.008	3.7
Education	0.032	11.0	0.047	15.1	0.006	4.2	0.012	7.5	0.006	3.8	0.013	6.0
Nationality/Ethnicity	0.039	13.6	0.004	1.3	0.013	9.2	0.002	1.0	0.014	8.4	0.002	0.8
Region	0.028	9.7	0.036	11.6	0.007	4.9	0.010	6.1	0.007	4.0	0.010	4.5
Unexplained	0.154	53.3	0.142	45.7	0.108	78.8	0.112	70.9	0.135	81.6	0.164	77.0
Total	0.290	100.0	0.311	100.0	0.137	100.0	0.158	100.0	0.166	100.0	0.213	100.0
					Equivalence scale: $\rho = 0.5$							
Age and sex	-0.015	-6.0	-0.012	-4.3	-0.007	-7.4	-0.007	-5.2	-0.008	-7.0	-0.008	-4.2
Employment status	0.029	11.6	0.055	19.3	0.005	4.7	0.015	11.4	0.005	4.2	0.018	10.0
Education	0.053	21.3	0.063	22.3	0.012	11.6	0.016	12.1	0.013	10.9	0.017	9.3
Nationality/Ethnicity	0.022	8.8	0.002	0.6	0.007	6.6	0.001	0.5	0.007	6.2	0.001	0.4
Region	0.023	9.2	0.035	12.5	0.004	4.2	0.008	5.9	0.004	3.7	0.008	4.4
Unexplained	0.136	55.1	0.140	49.6	0.080	80.3	0.098	75.3	0.097	82.1	0.147	80.1
Total	0.248	100.0	0.282	100.0	0.100	100.0	0.130	100.0	0.118	100.0	0.184	100.0

Table 3.1: Shapley value decomposition: Albania

the contributions to the inequality measures under consideration in absolute term and in percent of the inequality measure. Before describing the results in more detail let us note some important

[10]We also experimented on various transformations of the data by using logarithms for example. Wan (2004) suggested to transform the data using Box-Cox or Box-Tidwell transformations. We also tried to use to use quantile estimation which is more robust to outliers. However this did not improve the results a great deal and when doing the decomposition analysis results are similar to those reported on the regressions reported.

	Gini				$I0$				$I2$			
	2001		2004		2001		2004		2001		2004	
Variable	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %
					No equivalence scale							
Age and sex	0.066	22.5	0.091	32.1	0.017	12.1	0.026	19.9	0.018	9.7	0.028	17.4
Employment status	0.039	13.6	0.049	17.4	0.009	6.7	0.013	9.8	0.009	5.1	0.014	8.5
Education	0.028	9.8	0.014	5.1	0.005	3.4	0.000	0.2	0.005	2.7	0.000	-0.1
Nationality/Ethnicity	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.000	0.0
Region	0.011	3.9	0.003	1.1	0.002	1.8	0.001	0.5	0.002	1.3	0.001	0.4
Unexplained	0.146	50.2	0.126	44.3	0.106	76.0	0.091	69.6	0.147	81.3	0.118	73.9
Total	0.291		0.283		0.140		0.131		0.181		0.159	
					Equivalence scale ($\rho = 0.5$)							
Age and sex	0.004	1.5	0.019	6.7	-0.001	-1.0	0.003	2.3	-0.001	-1.2	0.003	1.8
Employment status	0.055	22.0	0.068	24.2	0.011	11.2	0.016	12.0	0.012	10.6	0.017	10.7
Education	0.061	24.5	0.048	16.8	0.014	13.8	0.010	8.0	0.015	13.3	0.011	7.2
Nationality/Ethnicity	n.a.	n.a.	n.a.	0.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Region	0.009	3.6	0.003	1.1	0.001	1.3	0.000	0.3	0.001	1.1	0.000	0.2
Unexplained	0.120	48.3	0.145	51.2	0.076	74.7	0.101	77.5	0.088	76.3	0.128	80.1
Total	0.248		0.283		0.102		0.131		0.115		0.159	

Table 3.2: Shapely value decomposition: Bosnia & Herzegovina

	Gini				$I0$				$I2$			
	1995		2001		1995		2001		1995		2001	
Variable	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %
					No equivalence scale							
Age and sex	0.005	1.9	0.081	27.6	-0.002	-1.4	0.024	15.8	-0.002	-1.2	0.025	11.4
Employment status	0.076	27.8	0.055	18.5	0.019	15.1	0.016	10.3	0.019	12.7	0.017	7.8
Education	0.038	13.9	0.027	9.0	0.008	6.1	0.006	3.7	0.007	4.8	0.005	2.2
Nationality/Ethnicity	0.000	0.0	-0.004	-1.4	-0.001	-0.8	-0.003	-1.7	-0.002	-1.2	-0.005	-2.4
Region	0.003	1.0	0.001	0.2	0.000	0.1	0.000	0.1	0.000	0.1	0.000	0.0
Unexplained	0.151	55.3	0.135	46.0	0.102	81.0	0.109	71.8	0.127	84.8	0.174	81.0
Total	0.272		0.295		0.126		0.152		0.150		0.215	
					Equivalence scale ($\rho = 0.5$)							
Age and sex	-0.010	-3.6	0.085	28.8	-0.015	-11.0	0.030	19.8	-0.017	-10.7	0.026	14.7
Employment status	0.111	38.8	0.066	22.3	0.049	35.4	0.020	13.3	0.046	29.3	0.022	12.3
Education	0.049	17.2	0.028	9.4	0.015	11.2	0.006	4.3	0.013	8.5	0.005	2.9
Nationality/Ethnicity	-0.011	-3.8	-0.008	-2.6	-0.012	-8.6	-0.008	-5.6	-0.010	-6.5	-0.007	-4.2
Region	0.012	4.3	0.000	0.1	0.004	2.8	0.000	0.0	0.003	1.8	0.000	0.0
Unexplained	0.134	47.1	0.124	42.0	0.097	70.2	0.102	68.2	0.121	77.6	0.132	74.2
Total	0.285		0.295		0.138		0.149		0.156		0.178	

Table 3.3: Shapely value decomposition: Bulgaria

	Gini				$I0$				$I2$			
	2002		2007		2002		2007		2002		2007	
Variable	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %
					No equivalence scale							
Age and sex	0.071	22.0	0.077	24.6	0.021	12.1	0.026	15.9	0.020	7.6	0.025	10.4
Employment status	0.010	3.3	0.005	1.5	0.000	-0.1	-0.003	-2.0	0.000	0.0	-0.003	-1.2
Education	0.074	23.1	0.088	28.2	0.021	12.5	0.028	17.4	0.021	7.9	0.028	11.4
Nationality/Ethnicity	n.a.	n.a.	-0.002	-0.6	n.a.	n.a.	-0.001	-0.8	n.a.	n.a.	-0.001	-0.5
Region	0.004	1.1	0.006	2.0	-0.001	-0.8	0.000	-0.3	-0.002	-0.6	-0.001	-0.2
Unexplained	0.162	50.5	0.138	44.3	0.130	76.3	0.112	69.8	0.225	85.1	0.194	80.1
Total	0.321		0.312		0.171		0.161		0.265		0.242	
					Equivalence scale ($\rho = 0.5$)							
Age and sex	0.062	19.5	0.063	20.3	0.022	12.8	0.024	14.9	0.019	8.4	0.021	10.2
Employment status	0.014	4.4	0.005	1.8	0.001	0.4	-0.003	-2.1	0.001	0.4	-0.003	-1.4
Education	0.089	27.9	0.104	33.6	0.029	17.2	0.035	22.0	0.027	12.0	0.033	16.1
Nationality/Ethnicity	n.a.	n.a.	-0.004	-1.3	n.a.	n.a.	-0.003	-2.0	n.a.	n.a.	-0.003	-1.3
Region	0.003	1.0	0.009	2.8	-0.003	-2.0	0.000	-0.1	-0.003	-1.2	0.000	0.1
Unexplained	0.151	47.1	0.132	42.9	0.123	71.6	0.106	67.3	0.179	80.4	0.155	76.3
Total	0.320		0.309		0.171		0.158		0.223		0.204	

Table 3.4: Shapley value decomposition: Serbia

properties: First, the contributions in absolute values sum up to the overall inequality measure reported in Table 2.2 due to the decomposability property of the Shapley value. Second, regarding results for the three inequality measures one can see that the unexplained part of inequality is much larger for the generalized entropy measures I_0 and I_2 compared to the Gini coefficient. For the latter the unexplained part is around 50 %. This is remarkable as the R^2 reported in the regressions ranges between 20 and 30 % in most cases. The explanation for this is likely to be that the OLS regression (on the untransformed data) does not very well predict the values at the tails of the distribution (which is likely to be more relevant for the entropy measures). For these reasons we thus focus on the results based on the Gini coefficient. Third, the contributions to inequality can seemingly be negative which is a critical point referred to in the literature. In the next section below we therefore present results from alternative approaches (but still based on the Shapley value) which circumvent this problem.

For *Albania* education and ethnicity explains the largest part of inequality in 2002 with 11 and 13.6 % respectively. However, there is a remarkable shift towards inequality explained mainly by age and sex (16.8 %), region (11.6 %) and education (15.1 %) in 2005.[11] The results when applying equivalence scaling give with 19.3 % much more explanatory power to the employment

[11]The summary statistics in the Appendix show a large increase in one region which might also point towards a data problem. Further, the number of for other ethnical groups are quite small.

status in both years; education is however the most important source of inequality with more than 20 %. The regional aspect again becomes important in 2005 only. For *Bosnia & Herzegovina* in the case of no equivalence scale applied age and sex together with employment status are the most important sources of inequality (explaining about 35 % in 2001 and almost 50 % in 2004 when taken together) with education playing a less important role with about 10 % and 5 % respectively. However, when applying the equivalence scaling employment status (22 and 24.2 %) and education (24.5 and 16.8 %) make up the largest part in the explanation. In *Bulgaria* again employment status (27.8 %) and education (17.2 %) are the most important variables in 1995; however, in 2001 it is age and sex together with employment status (with 27.6 and 18.5 %, respectively). In this case the results are similar when using the scaled consumption data. Finally, for *Serbia* in both cases and both years age and sex (22 and 24.6 % in both years) and education (23.1 and 28.2 %) are the most important determinants of inequality with only little changes for the two years.

Summarizing, the results suggest a dominant role for basically three variables: age and sex, employment status and education though in most cases only two of these account for almost half of the explained inequality measured by the Gini coefficient. This pattern is however not stable over years for which data are available and also differ when applying an equivalence scale. In a technical sense this could point towards either problems with the underlying data, the survey itself, or changes in correlations amongst the explanatory variables. Ethnicity and regional aspects only play a minor role in explaining inequality from these results.

3.3 Comparisons to alternative decomposition methods

As mentioned above there are also some alternative methods to decompose the explained part of income or consumption equations. We now presents results from such alternatives and compare them with the findings reported above. First, we consider the method as proposed by Fields (2003) who suggested to decompose the R^2 by exploiting

$$Var(y) = \sum_{j=1}^{J} Cov(\hat{\beta}_j x_j, y) + Cov(e, y).$$

Dividing the r.h.s. by $Var(y)$ provides the relative contributions.

Israeli (2007) shows that this decomposition can be seen as a special case of a Shapley decomposition of the R^2. In fact, Israeli (2007) proposes two different methods to calculate

the Shapley decomposition. The first is based on a single regression but calculating the various explained parts by using subsamples of variables only. The second method requires to estimate of a number of regressions (depending on the number of potential elimination sequences) which differ by the set of variables included. In both cases the problem that the elimination sequence matters is circumvented by averaging over all possible elimination sequences as suggested by Shorrocks (1999).

In the Appendix Tables C.1 to C.4 we present the results from these three exercises for three countries, respectively. In the columns denoted 'Shapley on Gini' we included the results from the decomposition of the Gini coefficient as reported above. In these tables we however present the explained part of the Gini coefficient and the contributions of the particular factors as share of this explained part. The last two columns provide results from a Shapley value decomposition on the Gini index based on many regressions which can be seen as a direct alternative to the approach taken above.

Figures 3.1 to 3.4 present an overview of the results with respect to the explained part of the variance or the inequality measure, respectively. The first set of bars ('Fields method',

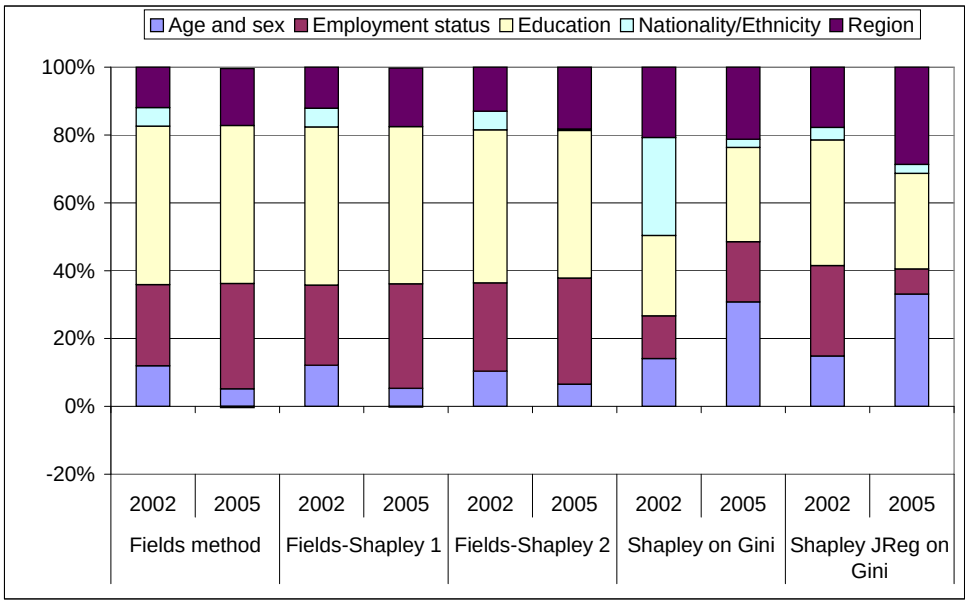

Figure 3.1: Albania

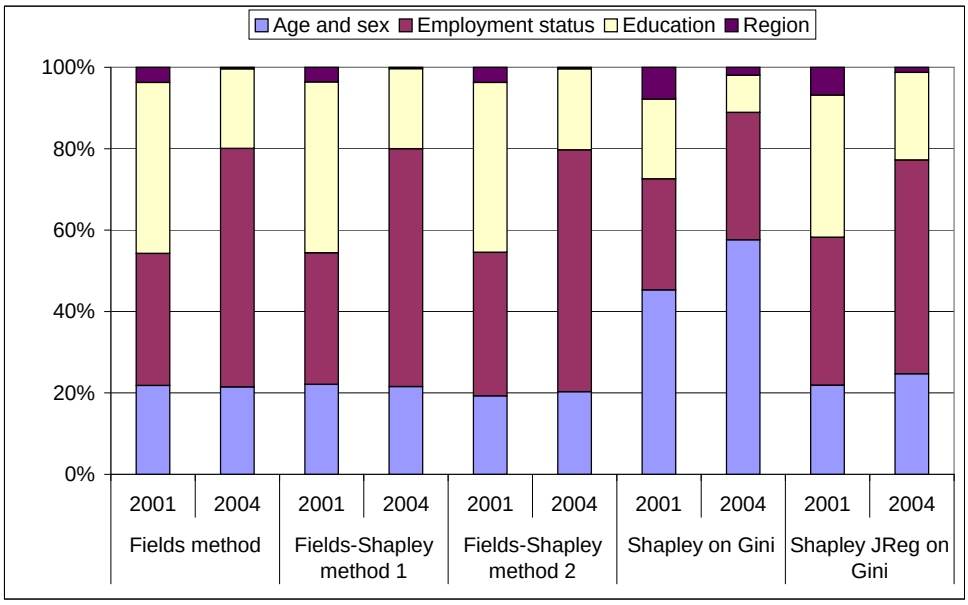

Figure 3.2: Bosnia & Herzegovina

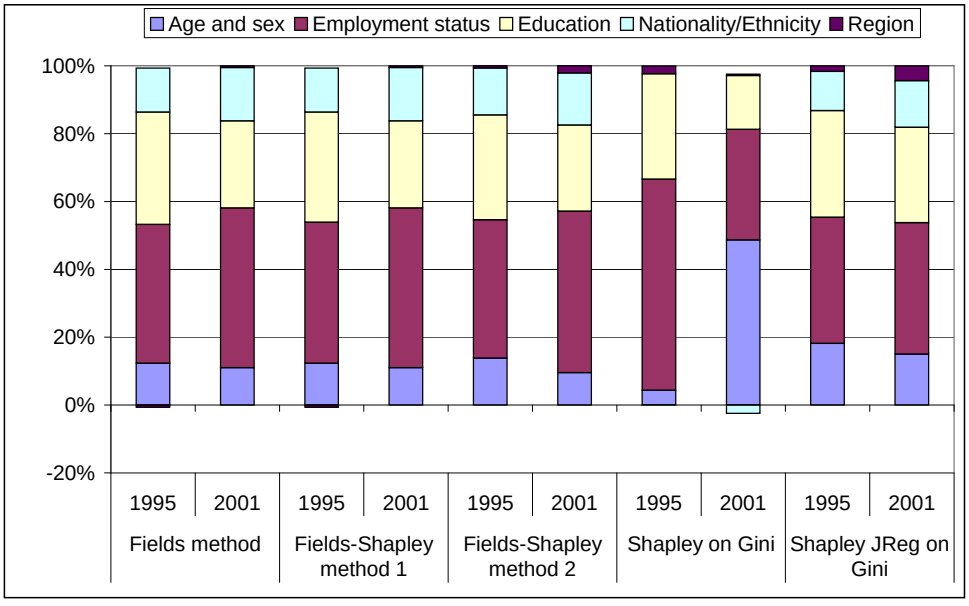

Figure 3.3: Bulgaria

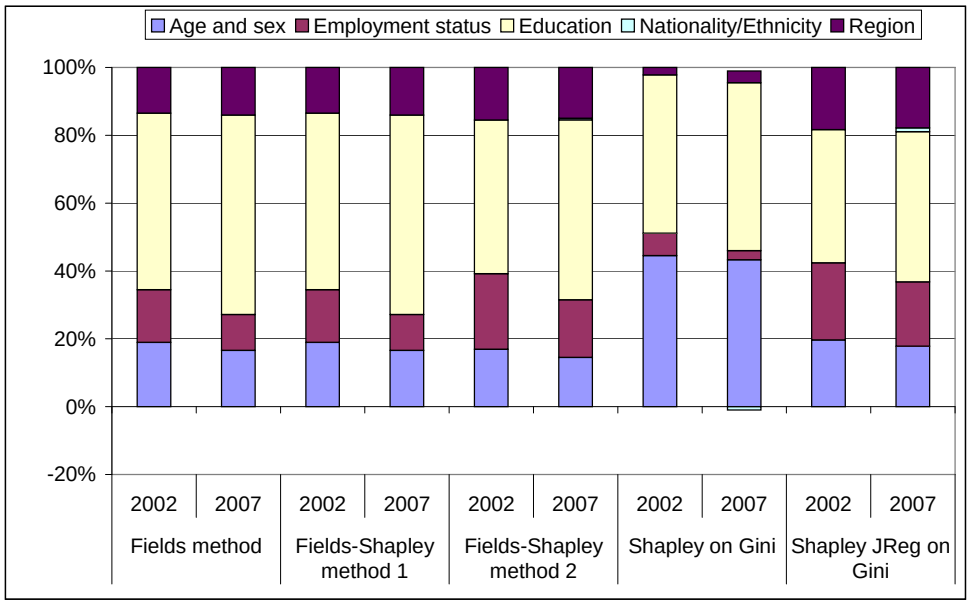

Figure 3.4: Serbia

'Fields-Shapley 1' and Fields-Shapley 2') present the results from the Fields method and the ones suggested by Israeli (2007) mentioned above. In most cases there is only little variation with respect to the parts explained by particular (groups of) variables. This is particularly the case for Albania, Bulgaria and Serbia but less so for Bosnia & Herzegovina. This might not be surprising as it is still a decomposition of the R^2 of the underlying regression rather than a decomposition of the inequality measure. The results for the latter are reported in the last two sets of bars ('Shapley on Gini' and 'Shapley JReg on Gini'). Here the differences are compared to the decomposition of the R^2 is larger; however the decomposition of the Gini using many regressions seems to be more in line with those of the decomposition of the R^2. It might be interesting to note that most of the difference in explanatory power of the Shapley value approach to the Gini based on one regression and the others is mostly due to a higher share of explanatory variables comprising age and sex. Furthermore, the methods decomposing the R^2 and the Shapley decomposition using many regressions are more stable over the years available.

With respect to the question which explanatory variables account for mostly for explaining the inequality however the result is again that education and employment status matter most

across countries though the exact share differ with respect to the method chosen. Age and sex is the third most important characteristics followed by region in all countries except Bulgaria. For this country nationality/ethnicity seems to be more important.

4 Conclusions

In this paper we provide evidence on the determinants of inequality with respect to consumption by households for four Southern and Eastern European countries: Albania, Bulgaria, Bosnia & Herzegovina, and Serbia. For this we used data collected from the LSMS database provided by the World Bank. We used decomposition methods based on regression analysis and Shapley value to consider inequality determinants by household characteristics. The results from the Shapley value approach suggest that mainly three groups of variables - age and sex, employment status and education - are the most important determinants. Somewhat surprisingly regional and nationality/ethnicity aspects play less important role role in most cases. The latter variable is only relatively important in Bulgaria. These broader conclusions are roughly confirmed when using different decomposition methods and procedures; however the exact magnitudes can differs.

To our knowledge this paper is the first attempt to study determinants of inequality in these countries in a comparative manner using recent methodological techniques. Further the paper also provided a comparison of methods with respect to decomposition analysis in applied work. Finally, it also showed that such decomposition methods can fruitfully be applied in cross-country comparisons where similar data and explanatory variables are available.

A Summary tables

Table A.1: Summary statistics I: Albania (consumption per capita)

			2002					2005				
	Category	Group	Nr.	Mean	Median	Minimum	Maximum	Nr.	Mean	Median	Minimum	Maximum
1	All	All	3599	158.7	137.3	27.4	1219.1	3840	177.5	149.5	29.2	1878.0
1	Sex	Male	3140	156.1	134.6	27.4	1219.1	3445	174.2	147.7	29.2	1878.0
2		Female	459	176.4	155.8	35.7	704.3	395	206.0	170.8	34.1	774.4
1	Age	<25	37	149.4	134.0	27.7	333.4	16	185.0	143.1	70.7	475.4
2		25-34	385	141.7	124.4	38.3	704.3	303	173.9	133.5	41.4	1182.1
3		35-44	944	138.8	119.4	30.5	585.9	927	168.7	140.0	30.1	1878.0
4		45-54	865	165.8	139.7	30.2	1219.1	1117	181.9	154.3	41.4	772.8
5		55-64	675	180.0	155.0	27.4	834.1	737	180.8	154.6	29.2	1013.1
6		65-74	501	166.4	154.2	33.2	661.7	517	183.8	156.4	30.8	686.8
7		=>75	192	165.5	150.2	42.3	536.8	223	169.7	146.4	31.9	695.8
1	Education	None	258	147.2	130.3	33.2	622.1	254	149.5	122.4	30.1	649.2
2		Low education	518	149.6	130.0	27.4	727.1	502	144.8	125.8	29.2	567.2
3		Medium education	1373	137.3	118.9	27.7	834.1	1467	148.6	128.9	32.2	747.4
4		Upper Secondary	1047	167.8	149.0	33.0	1219.1	1231	198.4	170.7	36.5	1878.0
5		University & higher	403	227.0	200.0	45.6	830.6	386	279.9	239.1	46.5	1324.5
1	Nationality/Ethnicity	Albanian	3546	157.5	136.2	27.4	1219.1	3711	178.6	150.7	29.2	1878.0
2		Greek	39	264.3	249.0	75.7	834.1	31	193.6	160.2	53.9	951.1
3		Roma	4	109.6	104.8	79.3	149.5	12	111.5	101.4	35.0	346.4
4		Macedonian	1	283.5	283.5	283.5	283.5	10	150.8	138.4	77.6	242.1
5		Montenegrin						1	206.1	206.1	206.1	206.1
6		Vllahe	6	212.0	200.6	132.4	316.6	11	172.2	82.7	45.1	640.2
7		Other	3	114.7	134.1	42.5	167.7	8	155.1	117.7	66.0	518.7
1	Region 1	Tirana	776	182.4	153.6	27.4	830.6	999	183.1	155.2	30.8	1878.0
2		Coastal	968	168.1	147.8	30.5	834.1	999	170.4	147.1	30.1	1006.4
3		Central	1143	150.3	129.8	33.2	1219.1	1000	143.4	125.8	29.2	747.4
4		Mountain	712	133.5	118.2	27.7	478.2	640	233.1	204.5	46.1	1324.5
1	Region 2	Urban	1959	173.3	151.1	27.4	1219.1	1999	202.3	172.6	30.1	1878.0
2		Rural	1640	141.3	120.8	30.2	834.1	1639	147.3	125.7	29.2	1013.1
1	Employment	Employed	1075	166.1	144.7	33.0	704.3	1996	190.8	160.1	30.1	1878.0
2		Employer	17	302.6	283.3	195.0	503.6	52	362.3	290.9	131.5	1324.5
3		Unemployed	260	126.4	110.7	33.1	740.3	157	155.2	131.2	35.0	969.5
4		Retired	807	169.7	150.0	27.4	834.1	918	176.0	150.7	30.8	774.4
5		Others	1440	151.1	128.8	27.7	1219.1	717	136.1	117.3	29.2	603.0

Note: Consumption per capita ($\rho = 1$) per month in euro (at PPP)

Table A.2: Summary statistics: Albania (equivalent consumption per capita)

			2002					2005				
	Category	Group	Nr.	Mean	Median	Minimum	Maximum	Nr.	Mean	Median	Minimum	Maximum
1	All	All	3599	302.6	271.7	39.0	1493.4	3840	349.2	299.7	67.3	4199.4
1	Sex	Male	3140	305.7	274.4	61.1	1493.4	3445	353.5	303.8	67.3	4199.4
2		Female	459	281.5	254.1	39.0	1194.0	395	311.6	267.6	74.2	1206.6
1	Age	<25	37	250.3	254.9	64.5	472.1	16	316.4	296.2	158.1	672.3
2		25-34	385	273.1	248.0	76.7	932.4	303	328.1	272.6	101.4	1396.5
3		35-44	944	289.7	260.0	39.0	1310.1	927	355.5	302.6	67.3	4199.4
4		45-54	865	322.9	284.1	67.7	1493.4	1117	375.7	327.0	74.2	2363.4
5		55-64	675	322.4	292.9	72.6	1288.1	737	343.3	295.8	75.8	1679.1
6		65-74	501	295.5	275.4	87.8	868.4	517	325.5	292.8	82.9	1189.6
7		=>75	192	292.9	254.5	70.6	1459.0	223	294.6	257.6	73.2	1206.6
1	Education	None	258	262.6	226.7	70.6	1459.0	254	267.7	226.5	67.3	1206.6
2		Low education	518	277.3	261.1	72.6	866.9	502	278.8	253.8	75.8	896.1
3		Medium education	1373	269.3	248.1	39.0	1288.1	1467	305.0	269.7	73.2	2363.4
4		Upper Secondary	1047	323.5	293.4	84.6	1493.4	1231	391.7	346.8	81.7	4199.4
5		University & higher	403	419.8	389.5	111.6	1438.6	386	524.5	461.4	74.2	2649.1
1	Nationality/Ethnicity	Albanian	3546	301.5	271.1	39.0	1493.4	3711	351.2	302.6	67.3	4199.4
2		Greek	39	402.1	417.8	131.1	834.1	31	384.5	310.5	129.9	1647.4
3		Roma	4	244.1	215.2	158.6	387.1	12	215.1	201.0	85.7	489.9
4		Macedonian	1	567.1	567.1	567.1	567.1	10	284.2	265.7	190.2	454.7
5		Montenegrin						1	504.9	504.9	504.9	504.9
6		Vllahe	6	327.9	345.8	187.2	447.8	11	333.5	178.7	115.0	1280.4
7		Other	3	225.0	290.4	85.0	299.7	8	311.4	231.2	129.2	1037.4
1	Region 1	Tirana	776	333.6	292.6	72.6	1438.6	999	360.4	311.2	73.8	4199.4
2		Coastal	968	317.6	287.0	39.0	1493.4	999	334.9	292.2	67.3	1821.6
3		Central	1143	286.5	259.8	67.7	1459.0	1000	299.7	272.5	83.7	2363.4
4		Mountain	712	274.2	255.6	84.1	888.6	640	431.2	374.5	73.2	2649.1
1	Region 2	Urban	1959	320.4	283.8	70.6	1493.4	1999	383.9	328.7	67.3	4199.4
2		Rural	1640	281.4	258.8	39.0	1459.0	1639	306.8	270.3	73.8	2363.4
1	Employment	Employed	1075	325.1	296.5	87.2	1094.1	1996	386.1	333.7	67.3	4199.4
2		Employer	17	590.3	573.5	398.0	872.2	52	749.6	598.6	204.6	2649.1
3		Unemployed	260	243.8	216.5	84.1	757.1	157	307.7	268.1	83.7	1679.1
4		Retired	807	296.3	271.0	70.6	1459.0	918	314.2	280.5	73.2	1206.6
5		Others	1440	296.5	265.3	39.0	1493.4	717	275.8	250.8	74.2	881.5

Note: Consumption per capita ($\rho = 0.5$) per month in euro (at PPP)

Table A.3: Summary statistics: Bosnia & Herzegovina

			2001					2004				
	Category	Group	Nr.	Mean	Median	Minimum	Maximum	Nr.	Mean	Median	Minimum	Maximum
1	All	All	5402	457.9	396.9	46.5	4470.9	2786	442.7	381.2	58.0	2528.9
1	Sex	Male	4056	430.6	375.5	46.5	4470.9	2045	412.3	354.4	58.0	2347.3
2		Female	1346	540.3	468.0	79.5	3220.5	741	526.7	488.8	90.1	2528.9
1	Age	<25	34	712.4	665.0	150.3	1793.0	35	710.2	592.1	185.0	1902.0
2		25-34	393	434.0	352.8	46.5	2300.5	215	461.9	356.4	102.5	2528.9
3		35-44	1036	398.0	350.1	91.2	2825.4	483	387.3	324.1	100.2	2060.0
4		45-54	1333	458.5	398.0	48.6	4470.9	696	441.0	389.8	58.0	2173.6
5		55-64	1080	492.7	424.0	52.1	3097.4	529	467.2	411.5	71.2	2347.3
6		65-74	1136	476.6	424.3	79.5	3389.4	551	447.7	399.1	87.8	1322.5
7		>=75	390	466.4	414.8	83.8	1904.0	277	438.6	384.2	107.2	1844.5
1	Education	None	1268	409.4	365.5	52.1	1995.8	773	417.3	369.9	71.2	2528.9
2		Low education	957	397.0	347.7	76.7	2058.7	561	393.1	346.4	58.0	2057.7
3		Medium education	2421	458.4	399.4	46.5	2362.9	1182	451.0	382.4	101.8	2173.6
4		Upper Secondary	387	537.2	470.5	98.2	2645.4	146	521.4	450.4	87.8	1551.6
5		University & higher	369	696.7	590.2	178.9	4470.9	124	654.1	570.4	257.3	2347.3
11	Region 1	Banja Luka	1704	424.1	384.9	46.5	1645.9	683	430.5	381.2	87.8	2528.9
12		Doboj	240	461.8	400.2	90.4	1967.0	238	466.8	410.7	71.2	2173.6
14		Vlasenica	252	425.8	374.1	121.0	1758.0	166	427.5	369.9	102.5	1441.4
15		Sarajevo-Romanija	360	591.9	513.7	148.3	2074.0	189	486.3	409.7	129.8	1712.1
16		Foca	120	294.8	266.6	95.1	886.1	121	317.7	278.5	104.9	1188.3
21		Una-Sana	96	583.9	535.8	142.9	2300.5	87	399.9	314.5	158.6	1644.4
23		Tuzla	672	469.9	416.7	76.7	2645.4	261	504.4	427.4	100.2	2347.3
24		Zenica-Doboj	974	365.9	318.0	48.6	3389.4	642	403.5	348.4	58.0	1775.4
26		Central Bosnia	192	480.8	434.9	121.2	1995.8	142	401.1	346.7	127.6	2060.0
29		Sarajevo	792	585.8	505.5	112.1	4470.9	257	562.4	503.2	157.3	1844.5
1	Employment	Employed	2019	454.5	389.3	48.6	4470.9	917	451.9	385.6	100.2	2057.7
2		Employer	268	522.1	451.1	52.1	3389.4	283	502.4	433.5	105.9	2347.3
3		Unemployed	745	363.2	312.2	46.5	2825.4	295	344.2	306.4	58.0	1273.4
4		Retired	1962	479.3	423.3	84.5	2058.7	967	451.5	397.4	87.8	1775.4
5		Others	408	502.9	429.6	79.5	2309.2	324	428.3	365.1	90.1	2528.9

Note: Consumption per capita ($\rho = 1$) per month in euro (at PPP)

			2001				2004				
	Category	Group	Nr.	Mean	Median	Minimum	Maximum	Nr.	Mean	Median	Minimum	Maximum
1	All	All	5402	730.1	667.7	84.1	4793.3	2786	684.9	622.2	129.7	3319.6
1	Sex	Male	4056	739.9	673.2	84.1	4793.3	2045	697.1	629.8	129.7	3319.6
2		Female	1346	700.4	641.8	112.4	3761.2	741	651.1	592.5	142.1	2528.9
1	Age	<25	34	884.2	827.5	232.2	1793.0	35	868.9	767.6	374.8	2008.9
2		25-34	393	749.4	676.9	93.1	3761.2	215	721.5	641.0	209.9	2528.9
3		35-44	1036	734.4	689.7	159.7	3458.1	483	690.5	633.7	206.9	2318.5
4		45-54	1333	803.4	742.6	84.1	4470.9	696	769.3	706.1	129.7	2574.4
5		55-64	1080	753.1	691.7	114.1	3097.4	529	703.7	649.5	174.5	3319.6
6		65-74	1136	652.5	607.9	112.4	4793.3	551	599.9	558.1	152.1	1996.1
7		>=75	390	597.1	537.8	123.2	1904.0	277	544.2	507.2	142.1	1844.5
1	Education	None	1268	575.2	529.5	112.4	2822.5	773	570.4	527.3	142.1	2528.9
2		Low education	957	642.2	599.1	125.6	2058.7	561	613.2	577.1	129.7	2057.7
3		Medium education	2421	764.6	710.3	84.1	2897.6	1182	733.4	667.4	206.9	2580.6
4		Upper Secondary	387	868.9	814.2	195.9	3761.2	146	843.0	764.8	152.1	2273.5
5		University & higher	369	1117.5	1000.1	283.1	4793.3	124	1073.6	1024.4	408.6	3319.6
11	Region	Banja Luka	1704	700.5	659.5	93.1	2520.4	683	670.1	623.7	142.1	2528.9
12		Doboj	240	695.4	664.7	221.5	2296.7	238	686.8	635.0	174.5	2173.6
14		Vlasenica	252	704.7	646.4	203.5	2376.4	166	660.8	616.4	211.8	1856.9
15		Sarajevo-Romanija	360	882.9	823.1	209.7	2524.3	189	716.3	672.5	189.2	2024.9
16		Foca	120	475.4	434.8	160.3	1062.0	121	484.0	467.0	165.0	1188.3
21		Una-Sana	96	1007.4	1025.5	229.8	2300.5	87	683.1	623.0	268.4	1762.3
23		Tuzla	672	742.5	679.0	123.2	2897.6	261	794.7	720.5	205.8	3319.6
24		Zenica-Doboj	974	587.9	536.1	84.1	4793.3	642	641.0	578.3	129.7	2574.4
26		Central Bosnia	192	777.9	713.9	207.0	2822.5	142	625.0	570.4	187.3	2060.0
29		Sarajevo	792	900.4	830.0	219.1	4470.9	257	841.0	755.7	272.5	2580.6
1	Employment	Employed	2019	800.3	740.8	84.1	4470.9	917	767.0	709.9	159.6	2580.6
2		Employer	268	922.3	826.9	137.8	4793.3	283	861.7	762.4	205.8	3319.6
3		Unemployed	745	639.3	573.1	93.1	2897.6	295	592.5	563.8	129.7	1947.2
4		Retired	1962	683.6	637.9	114.1	2822.5	967	617.3	579.0	152.1	1996.1
5		Others	408	645.6	583.6	112.4	2309.2	324	583.6	517.5	142.1	2528.9

Note: Consumption per capita ($\rho = 0.5$) per month in euro (at PPP)

Table A.4: Summary statistics: Bosnia & Herzegovina (equivalence scale)

Table A.5: Summary statistics: Bulgaria

			1995					2001				
	Category	Group	Nr.	Mean	Median	Minimum	Maximum	Nr.	Mean	Median	Minimum	Maximum
1	All	All	2471	203.6	179.5	0.0	1157.9	2500	245.7	214.6	16.5	3881.8
1	Sex	Male	1951	204.5	179.9	0.0	1157.9	1880	245.0	213.6	16.5	3881.8
2		Female	518	200.1	177.0	0.0	870.3	620	247.6	218.3	29.3	1203.2
1	Age	<25	47	200.3	175.1	44.4	465.9	55	366.6	296.3	44.8	1147.3
2		25-34	196	214.5	178.1	38.5	1157.9	218	286.1	208.2	43.5	3881.8
3		35-44	435	220.4	194.7	25.0	860.7	451	251.0	226.0	16.5	1118.0
4		45-54	529	224.8	198.0	27.4	1016.9	534	256.6	225.8	25.5	1024.2
5		55-64	500	209.1	189.3	14.5	1007.9	498	250.7	223.7	26.8	1203.2
6		65-74	514	179.9	166.1	14.7	573.8	453	221.3	202.8	29.3	845.7
7		>=75	250	158.6	145.3	0.0	661.9	291	193.6	179.8	29.1	946.5
1	Education	None	51	134.5	120.3	14.5	559.2	40	132.6	113.2	25.5	549.4
2		Low education	328	162.9	152.6	0.0	562.9	188	173.9	162.1	16.5	693.4
3		Medium education	737	177.2	163.0	0.0	508.2	712	197.9	181.1	23.4	974.5
4		Upper Secondary	910	223.5	194.2	45.1	1016.9	1095	262.6	230.0	41.0	3881.8
5		University & higher	432	244.9	208.5	60.7	1157.9	465	317.7	273.1	80.9	1147.3
1	Nationality/Ethnicity	Bulgarian	2201	210.5	186.1	0.0	1157.9	2182	258.9	224.1	28.4	3881.8
2		Turk	158	164.9	148.7	0.0	559.2	145	166.1	153.6	40.7	647.3
3		Roma/Gypsy	82	98.2	84.3	14.5	321.7	133	117.9	85.7	16.5	550.7
4		Other	28	186.7	162.4	51.1	485.3	40	236.5	169.3	81.6	1085.2
1	Region 1	Sofia city	385	212.9	185.5	31.1	702.6	400	283.2	234.1	49.6	3881.8
2		Bourgass	242	213.2	185.4	15.0	1157.9	250	247.2	217.1	24.6	1024.2
3		Varna	261	200.1	180.6	0.0	661.6	275	241.5	211.5	39.4	1074.0
4		Lovetch	296	180.8	157.9	0.0	1007.9	300	248.5	229.4	45.3	1053.1
5		Montana	182	183.8	166.6	33.9	779.7	185	245.3	224.7	39.8	880.5
6		Plovdiv	340	205.8	181.2	25.5	1016.9	344	237.9	201.0	16.5	1178.7
7		Rousse	209	202.4	178.7	30.7	562.9	210	237.8	214.7	28.4	852.4
8		Sofia region	299	209.0	188.8	25.0	870.3	296	228.8	201.5	24.9	1130.4
9		Haskovo	257	216.0	196.2	14.5	763.4	240	221.7	197.6	29.3	1203.2
1	Region 2	Urban	1647	209.6	182.8	0.0	1157.9	1701	262.9	226.3	23.4	1203.2
2		Rural	824	191.6	172.5	0.0	901.4	799	208.9	185.2	16.5	3881.8
1	Employment	Employed	15	234.7	218.5	78.3	419.3	790	277.6	240.2	25.5	1178.7
2		Employer						122	389.0	297.6	26.8	3881.8
3		Unemployed	25	176.6	168.5	25.5	334.1					
4		Retired	1140	183.2	167.6	0.0	1007.9	1198	223.4	202.1	28.4	1203.2
5		Others	1291	221.6	193.1	14.5	1157.9	390	204.4	176.3	16.5	1147.3

Note: Consumption per capita ($\rho = 1$) per month in euro (at PPP)

Table A.6: Summary statistics: Bulgaria (equivalence scale)

			1995					2001				
	Category	Group	Nr.	Mean	Median	Minimum	Maximum	Nr.	Mean	Median	Minimum	Maximum
1	All	All	2471	321.9	285.0	0.0	1761.4	2500	389.7	340.7	29.1	3881.8
1	Sex	Male	1951	341.7	303.6	0.0	1761.4	1880	410.2	365.6	29.1	3881.8
2		Female	518	246.4	212.9	0.0	1507.4	620	327.4	282.2	29.3	2041.5
1	Age	<25	47	259.5	221.6	99.2	798.6	55	472.3	406.1	81.4	1220.8
2		25-34	196	373.9	321.6	76.9	1637.5	218	461.3	384.8	87.9	3881.8
3		35-44	435	392.1	358.9	62.5	1158.5	451	450.6	415.9	36.9	1824.1
4		45-54	529	384.2	343.5	42.7	1761.4	534	439.9	402.6	52.9	1609.4
5		55-64	500	315.9	286.4	32.4	1031.9	498	387.2	340.1	80.3	1687.9
6		65-74	514	247.9	222.3	14.7	928.2	453	316.1	281.5	29.3	1288.9
7		>=75	250	200.6	179.6	0.0	693.5	291	252.5	227.8	29.1	946.5
1	Education	None	51	180.3	174.3	14.7	559.2	40	192.4	164.2	61.0	549.4
2		Low education	328	227.8	204.7	0.0	739.3	188	251.3	212.0	36.9	1101.3
3		Medium education	737	280.7	261.3	0.0	1130.1	712	311.2	285.5	29.1	1687.9
4		Upper Secondary	910	368.4	330.3	47.4	1761.4	1095	426.8	382.1	59.1	3881.8
5		University & higher	432	380.2	321.1	81.7	1637.5	465	495.2	442.2	133.4	1824.1
1	Nationality/Ethnicity	Bulgarian	2201	329.3	290.7	0.0	1761.4	2182	405.4	355.3	29.1	3881.8
2		Turk	158	290.1	275.6	0.0	965.6	145	296.5	277.2	70.5	989.3
3		Roma/Gypsy	82	186.0	174.2	32.4	643.5	133	236.1	173.7	36.9	1101.3
4		Other	28	313.6	263.5	114.2	970.6	40	381.9	307.0	131.6	1095.8
1	Region 1	Sofia city	385	321.1	271.3	31.1	1226.8	400	430.5	372.7	66.0	3881.8
2		Bourgass	242	345.2	293.3	21.3	1637.5	250	407.1	356.2	67.6	1687.9
3		Varna	261	327.7	289.7	0.0	997.4	275	387.7	329.4	70.5	1385.9
4		Lovetch	296	279.6	242.9	0.0	1125.7	300	383.3	354.4	61.0	1824.1
5		Montana	182	271.6	255.7	33.9	782.4	185	380.7	332.1	81.1	1525.0
6		Plovdiv	340	338.5	296.6	47.4	1761.4	344	390.0	328.2	36.9	2041.5
7		Rousse	209	304.2	283.3	43.8	741.1	210	369.0	338.2	68.6	1476.4
8		Sofia region	299	333.0	304.3	66.1	1507.4	296	376.2	336.0	29.1	1598.6
9		Haskovo	257	358.2	321.7	32.4	1012.7	240	354.8	305.2	29.3	1273.2
1	Region 2	Urban	1647	334.5	292.2	0.0	1761.4	1701	419.6	372.9	29.3	1824.1
2		Rural	824	296.4	270.4	0.0	1130.1	799	326.0	284.8	29.1	3881.8
1	Employment	Employed	15	360.4	326.4	156.6	726.2	790	470.9	425.7	67.6	2041.5
2		Employer						122	654.8	573.1	80.3	3881.8
3		Unemployed	25	326.3	318.1	62.5	551.6					
4		Retired	1140	258.2	229.8	0.0	1031.9	1198	324.9	288.4	29.1	1687.9
5		Others	1291	377.2	341.1	14.7	1761.4	390	341.1	303.5	36.9	1277.8

Note: Consumption per capita ($\rho = 0.5$) per month in euro (at PPP)

Table A.7: Summary statistics: Serbia

			2002					2007				
	Category	Group	Nr.	Mean	Median	Minimum	Maximum	Nr.	Mean	Median	Minimum	Maximum
1	All	All	6386	340.1	282.2	23.3	5768.9	5557	440.6	365.7	41.2	5528.7
1	Sex	Male	4853	331.3	276.4	37.8	5768.9	4033	428.2	356.3	41.2	5528.7
2		Female	1533	367.8	300.8	23.3	3384.4	1524	473.4	387.0	46.5	3520.2
1	Age	<25	44	548.5	436.5	136.8	1720.7	44	924.8	757.7	209.5	3213.7
2		25-34	412	424.9	327.3	46.0	3384.4	282	552.5	436.7	56.2	5528.7
3		35-44	917	355.1	297.2	37.8	2702.2	723	455.4	373.5	53.0	3924.3
4		45-54	1481	364.5	308.2	49.0	5768.9	1316	465.6	391.4	56.1	3693.5
5		55-64	1373	334.0	281.3	23.3	3203.7	1274	451.4	378.1	76.1	3520.2
6		65-74	1493	309.1	264.6	31.7	2470.3	1202	398.5	341.1	46.5	2718.6
7		>=75	666	280.6	231.3	43.6	2123.5	716	357.5	307.8	41.2	2043.1
1	Education	Low education	1430	261.1	224.8	23.3	2586.9	1087	319.7	283.4	41.2	1707.3
2		Medium education	1286	281.5	241.2	37.8	2409.5	1164	347.8	304.0	56.1	1999.9
3		Upper Secondary	1223	330.3	278.7	55.7	3384.4	964	431.5	369.0	80.8	3693.5
4		University & higher	1573	394.0	337.2	75.7	3203.7	1516	489.0	406.2	92.7	3543.0
5		None	874	471.9	396.7	92.5	5768.9	826	652.4	564.2	90.5	5528.7
1	Nationality/Ethnicity	Serbian						4779	444.2	370.9	41.2	5528.7
2		Montenegrin						50	601.0	446.9	235.5	3213.7
3		Bosnian						80	364.1	303.5	122.0	1891.6
4		Albanian						32	389.0	338.0	135.1	1017.7
5		Hungarian						228	416.9	343.1	115.5	2005.1
6		Bulgarian						23	337.5	307.9	163.0	759.6
7		Croatian						78	460.2	371.0	133.0	2176.3
8		Romanian						29	433.6	353.9	229.6	896.3
9		Roma						96	217.8	182.9	53.0	677.5
10		Slovakian						51	389.2	306.2	128.8	2770.1
11		Others						111	559.7	460.4	84.9	3924.3
1	Region 1	Belgrade	1214	418.7	352.6	49.0	5768.9	921	569.4	465.0	56.1	3924.3
2		Vojvodina	1673	350.6	291.2	43.6	2280.7	1388	449.2	372.9	53.0	3693.5
3		West Serbia	707	300.2	255.7	37.8	2470.3	734	372.8	324.9	76.1	5528.7
4		Sumadija	1156	320.4	273.9	53.0	2702.2	1032	436.1	371.6	101.7	3543.0
5		East Serbia	671	341.7	278.7	23.3	3384.4	655	416.9	348.6	46.5	1999.2
6		South-east Serbia	965	274.4	228.6	31.7	2971.3	827	367.4	317.7	41.2	3520.2
1	Region 2	Urban	3525	379.6	322.0	46.0	5768.9	2960	496.8	410.6	53.0	3924.3
2		Rural	2861	291.4	239.6	23.3	3384.4	2597	376.6	316.4	41.2	5528.7
1	Employment	Employed	2249	373.1	312.4	45.5	5768.9	1811	487.1	407.0	53.0	3924.3
2		Employer	678	356.4	279.7	45.1	2702.2	885	440.2	354.1	90.0	5528.7
3		Unemployed	381	277.8	239.6	58.2	1689.1	328	359.2	331.4	56.1	1676.5
4		Retired	2739	321.6	271.2	23.3	3203.7	2227	420.6	351.7	41.2	3520.2
5		Others	339	306.9	227.4	37.8	2971.3	306	399.3	324.1	46.5	2565.8

Note: Consumption per capita ($\rho = 1$) per month in euro (at PPP)

Table A.8: Summary statistics: Serbia (equivalence scale)

			2002					2007				
	Category	Group	Nr.	Mean	Median	Minimum	Maximum	Nr.	Mean	Median	Minimum	Maximum
1	All	All	6386	554.3	467.0	23.3	5768.9	5557	717.5	614.7	58.2	6397.3
1	Sex	Male	4853	577.0	492.2	61.6	5768.9	4033	741.6	634.5	58.2	6397.3
2		Female	1533	482.7	391.4	23.3	4819.0	1524	653.7	547.9	80.5	4471.9
1	Age	<25	44	706.0	575.0	193.5	1886.2	44	1203.9	1027.7	337.6	4137.1
2		25-34	412	689.5	593.1	114.3	3384.4	282	865.8	767.6	112.4	5528.7
3		35-44	917	641.5	555.2	75.5	4819.0	723	806.7	694.5	142.3	4450.0
4		45-54	1481	643.3	558.7	69.2	5768.9	1316	816.6	703.6	103.8	6397.3
5		55-64	1373	541.2	461.1	23.3	3658.4	1274	742.4	641.3	108.1	4386.1
6		65-74	1493	463.6	389.7	54.8	3249.3	1202	602.4	502.5	80.5	3844.7
7		>=75	666	373.3	312.8	46.4	2210.6	716	506.0	426.0	58.2	4471.9
1	Education	Low education	1430	391.7	329.4	23.3	3658.4	1087	471.7	406.0	58.2	2728.6
2		Medium education	1286	459.7	392.3	75.5	4819.0	1164	578.4	509.4	129.2	4471.9
3		Upper Secondary	1223	562.8	480.8	73.4	3963.6	964	731.5	631.1	103.8	6397.3
4		University & higher	1573	651.4	572.6	141.9	3283.1	1516	805.0	708.1	140.2	4450.0
5		None	874	773.2	675.0	156.2	5768.9	826	1060.1	936.7	90.5	5540.3
1	Nationality/Ethnicity	Serbian						4779	726.8	626.3	58.2	6397.3
2		Montenegrin						50	962.2	800.1	287.7	3479.3
3		Bosnian						80	608.6	532.3	211.3	2675.1
4		Albanian						32	801.2	706.4	310.3	1762.7
5		Hungarian						228	615.3	555.1	156.5	3472.9
6		Bulgarian						23	537.1	402.5	182.9	1519.1
7		Croatian						78	685.7	597.9	172.4	2176.3
8		Romanian						29	671.2	549.5	229.6	1792.6
9		Roma						96	416.4	379.5	103.8	1052.3
10		Slovakian						51	656.4	486.2	223.1	5540.3
11		Others						111	831.7	669.9	84.9	3924.3
1	Region 1	Belgrade	1214	669.0	582.2	69.2	5768.9	921	912.1	765.0	140.2	4955.4
2		Vojvodina	1673	556.3	469.4	46.4	3836.0	1388	717.5	613.1	84.9	6397.3
3		West Serbia	707	487.2	419.6	75.5	2470.3	734	613.6	540.8	108.1	5528.7
4		Sumadija	1156	553.3	478.8	78.7	3821.5	1032	716.1	618.8	119.2	3720.7
5		East Serbia	671	561.4	472.1	23.3	4819.0	655	676.3	581.6	80.5	4450.0
6		South-east Serbia	965	452.2	385.1	54.8	2971.3	827	627.6	563.1	58.2	3520.2
1	Region 2	Urban	3525	611.3	528.7	86.7	5768.9	2960	801.3	686.7	84.9	5540.3
2		Rural	2861	484.1	401.9	23.3	4819.0	2597	622.0	535.9	58.2	6397.3
1	Employment	Employed	2249	655.0	570.7	65.0	5768.9	1811	839.4	741.7	112.4	6397.3
2		Employer	678	626.9	506.2	81.1	4819.0	885	760.5	629.3	103.8	5528.7
3		Unemployed	381	490.1	423.4	89.9	2648.9	328	621.6	559.4	140.2	2763.6
4		Retired	2739	477.7	401.9	23.3	3658.4	2227	631.7	532.9	58.2	4471.9
5		Others	339	433.5	327.9	46.4	2971.3	306	599.4	498.7	80.5	4137.1

Note: Consumption per capita ($\rho = 0.5$) per month in euro (at PPP)

B Regression results

		Equivalence scale $\rho = 1.0$		Equivalence scale: $\rho = 0.5$	
		2002	2005	2002	2005
Socio-demographic	Age	0.682	-1.711*	2.497**	1.553
		(0.334)	(0.076)	(0.029)	(0.387)
	Age^2/100	0.075	2.200**	-1.614	-0.806
		(0.913)	(0.018)	(0.143)	(0.641)
	Male	-29.258***	-51.979***	2.046	-1.973
		(0.000)	(0.000)	(0.775)	(0.855)
Employment status	Employment share (in %)	0.642***	0.759***	0.998***	0.919***
		(0.000)	(0.000)	(0.000)	(0.000)
	Employer	124.839***	144.566***	248.048***	319.385***
		(0.000)	(0.000)	(0.000)	(0.000)
	Unemployed	-0.488	0.948	-16.333*	-24.172
		(0.936)	(0.915)	(0.099)	(0.144)
	Retired	18.245***	0.791	18.112*	-27.039**
		(0.002)	(0.908)	(0.053)	(0.034)
	Other	3.798	-26.778***	7.327	-58.075***
		(0.294)	(0.000)	(0.210)	(0.000)
Education	Low	15.358**	-5.071	15.132	-8.498
		(0.022)	(0.561)	(0.161)	(0.601)
	Medium	24.536***	11.714	28.188***	16.534
		(0.000)	(0.170)	(0.009)	(0.299)
	Upper	55.707***	51.889***	81.728***	79.615***
		(0.000)	(0.000)	(0.000)	(0.000)
	Tertiary	103.417***	114.535***	162.239***	186.303***
		(0.000)	(0.000)	(0.000)	(0.000)
Nationality/Ethnicity	Albanian	-72.377***	-8.276	-70.061***	-6.756
		(0.000)	(0.413)	(0.000)	(0.719)
Region	Coastal	-2.716	-13.092***	2.189	-25.130***
		(0.508)	(0.004)	(0.741)	(0.003)
	Central	-18.739***	-32.428***	-28.024***	-48.219***
		(0.000)	(0.000)	(0.000)	(0.000)
	Mountain	-28.841***	19.504***	-31.141***	21.668**
		(0.000)	(0.000)	(0.000)	(0.029)
Constant	Constant	163.133***	212.172***	205.393***	250.000***
		(0.000)	(0.000)	(0.000)	(0.000)
	F	50.552	67.438	48.823	56.159
	R^2	0.184	0.230	0.179	0.199
	Obs.	3599	3638	3599	3638

Excluded variables: Employment status - Employed, Education - None, Region - Tirana

Table B.1: Regression results: Albania

		No equivalence scale		Equivalence scale ($\rho = 0.5$)	
		2001	2004	2001	2004
Age and sex	Age	-3.916**	-8.854***	4.927**	3.198
		(0.026)	(0.000)	(0.023)	(0.178)
	Age^2	0.049***	0.082***	-0.056***	-0.048**
		(0.002)	(0.000)	(0.004)	(0.027)
	Male=1	-136.042***	-142.84***	-44.759***	-42.337***
		(0.000)	(0.000)	(0.000)	(0.001)
Employment status	EmpSh	268.479***	391.422***	373.519***	435.08***
		(0.000)	(0.000)	(0.000)	(0.000)
	Employed	-102.729***	-106.098***	-90.766***	-89.46***
		(0.000)	(0.000)	(0.000)	(0.000)
	Employer	-9.764	-24.562	70.384***	62.428**
		(0.660)	(0.218)	(0.010)	(0.012)
	Unemployed	-61.132***	-44.448**	-68.166***	-61.753***
		(0.001)	(0.020)	(0.002)	(0.009)
	Retired	-0.108	51.334***	-8.531	34.63*
		(0.994)	(0.001)	(0.647)	(0.061)
Education	Low	35.954***	18.729	44.739***	15.348
		(0.002)	(0.151)	(0.002)	(0.344)
	Medium	108.008***	83.753***	151.009***	117.769***
		(0.000)	(0.000)	(0.000)	(0.000)
	Upper	175.001***	142.565***	252.859***	232.156***
		(0.000)	(0.000)	(0.000)	(0.000)
	Tertiary	328.356***	267.84***	474.414***	431.995***
		(0.000)	(0.000)	(0.000)	(0.000)
Region	Banhja Lukay = 1	-48.301***	-19.575**	-46.837***	-19.378
		(0.000)	(0.041)	(0.000)	(0.104)
Constant	Constant	530.638***	632.192***	518.643***	514.741***
		(0.000)	(0.000)	(0.000)	(0.000)
	F	95.510	75.421	128.705	88.653
	R^2	0.187	0.261	0.237	0.294
	Obs.	5402	2785	5402	2785

Table B.2: Regression output: Bosnia & Herzegovina

		No equivalence scale		Equivalence scale ($\rho = 0.5$)	
		1995	2001	1995	2001
Age and sex	Age	2.496***	-4.813***	7.093***	-0.449
		(0.008)	(0.000)	(0.000)	(0.788)
	Age^2	-0.028***	0.032***	-0.081***	-0.022
		(0.001)	(0.004)	(0.000)	(0.150)
	Male=1	-14.258***	-13.939**	47.725***	50.290***
		(0.008)	(0.049)	(0.000)	(0.000)
Employment status	EmpSh	91.662***	135.170***	109.459***	158.876***
		(0.000)	(0.000)	(0.000)	(0.000)
	Employed		-55.627***		-33.365**
			(0.000)		'(0.031)
	Employer	-66.709	64.335***	-27.309	154.276***
		(0.231)	(0.000)	(0.751)	(0.000)
	Unemployed	-45.603		-37.627	
		(0.378)		(0.637)	
	Retired	-69.623	-36.784***	-37.612	-42.852***
		(0.180)	(0.001)	(0.639)	(0.007)
Education	Low	0.381	11.759	1.928	10.863
		(0.957)	(0.313)	(0.858)	(0.500)
	Medium	29.445***	40.049***	46.935***	50.742***
		(0.000)	(0.001)	(0.000)	(0.003)
	Upper	56.969***	84.222***	75.495***	111.097***
		(0.000)	(0.000)	(0.000)	(0.000)
Nationality/Ethnicity	Bulgarian=1	41.015***	67.695***	50.987***	90.546***
		(0.000)	(0.000)	(0.000)	(0.000)
Region	Sofia	-11.099*	3.400	-26.057***	1.209
		(0.065)	(0.684)	(0.005)	(0.916)
Constant	Constant	142.280**	299.193***	87.518	285.554***
		(0.014)	(0.000)	(0.326)	(0.000)
	F	36.323	48.670	58.469	71.942
	R^2	0.152	0.190	0.224	0.258
	Obs.	2448	2500	2448	2500

Table B.3: Regression output: Bulgaria

		No equivalence scale		Equivalence scale ($\rho = 0.5$)	
		2002	2007	2002	2007
Age and sex	Age	-6.634***	-10.793***	-0.528	-4.143
		(0.000)	(0.000)	(0.799)	(0.115)
	Age^2	0.039***	0.067***	-0.038**	-0.015
		(0.003)	(0.000)	(0.040)	(0.519)
	Male=1	-64.957***	-67.660***	25.379**	27.543**
		(0.000)	(0.000)	(0.016)	(0.032)
Employment status	EmpSh	146.174***	201.766***	196.721***	259.684***
		(0.000)	(0.000)	(0.000)	(0.000)
	Employed	-66.269***	-98.201***	-51.626**	-85.301***
		(0.000)	(0.000)	(0.021)	(0.002)
	Employer	3.272	-40.524**	58.643**	3.230
		(0.844)	(0.042)	(0.016)	(0.911)
	Unemployed	-80.500***	-101.983***	-97.634***	-127.374***
		(0.000)	(0.000)	(0.000)	(0.000)
	Retired	20.395	32.334*	23.405	39.262
		(0.134)	(0.061)	(0.238)	(0.119)
Education	Low	-197.051***	-305.842***	-286.813***	-470.608***
		(0.000)	(0.000)	(0.000)	(0.000)
	Medium	-180.369***	-287.947***	-274.336***	-436.134***
		(0.000)	(0.000)	(0.000)	(0.000)
	Upper	-126.080***	-197.181***	-190.039***	-305.381***
		(0.000)	(0.000)	(0.000)	(0.000)
	Tertiary	-84.365***	-160.239***	-122.149***	-254.623***
		(0.000)	(0.000)	(0.000)	(0.000)
Nationality/Ethnicity	Serbian = 1		14.862		51.664***
			(0.207)		(0.003)
Region	Belgrade	89.278***	123.613***	149.958***	185.931***
		(0.000)	(0.000)	(0.000)	(0.000)
	Vojvodina	61.765***	70.311***	88.697***	86.689***
		(0.000)	(0.000)	(0.000)	(0.000)
	West Serbia	30.023***	1.945	39.776**	-21.329
		(0.008)	(0.890)	(0.016)	(0.297)
	Sumadija	45.263***	62.098***	101.091***	86.375***
		(0.000)	(0.000)	(0.000)	(0.000)
	East Serbia	70.156***	47.485***	127.581***	58.487***
		(0.000)	(0.001)	(0.000)	(0.006)
Constant	Constant	678.687***	959.536***	737.464***	1098.405***
		(0.000)	(0.000)	(0.000)	(0.000)
	F	65.363	76.469	91.440	95.537
	R^2	0.149	0.199	0.196	0.237
	Obs.	6386	5557	6386	5557

Table B.4: Regression output: Serbia

C Alternative decomposition methods

Table C.1: Results from alternative decompositions: Albania

	Fields				Fields-Shapley 1				Fields-Shapley 2				Shapley on Gini 1				Shapley on Gini 2			
	2002		2005		2002		2005		2002		2005		2002		2005		2002		2005	
Variable	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %
									Equivalence scale: $\rho = 1$											
Age and sex	2.2	12.1	1.2	5.3	2.2	12.1	1.2	5.3	1.9	10.6	1.5	6.5	1.9	13.9	5.2	31.0	2.0	15.1	1.4	8.4
Employment status	4.4	23.6	7.2	31.3	4.4	23.6	7.1	31.0	4.8	25.9	7.2	31.3	1.7	12.7	3.0	17.5	3.6	26.4	4.9	29.0
Education	8.6	46.6	10.8	46.9	8.6	46.6	10.7	46.6	8.3	45.3	10.0	43.5	3.2	23.6	4.7	27.8	5.0	37.2	6.4	37.8
Nationality/Ethnicity	1.0	5.5	-0.1	-0.3	1.0	5.5	-0.1	-0.3	1.0	5.4	0.1	0.4	3.9	29.0	0.4	2.4	0.5	3.3	0.2	1.0
Region	2.2	12.1	3.9	16.9	2.2	12.1	4.0	17.4	2.4	12.8	4.2	18.3	2.8	20.8	3.6	21.4	2.4	17.9	4.0	23.8
R2 / Explained Gini	18.4	100.0	23.0	100.0	18.4	100.0	23.0	100.0	18.4	100.0	23.0	100.0	13.5	100.0	16.9	100.0	13.5	100.0	16.9	100.0
									Equivalence scale: $\rho = 0.5$											
Age and sex	1.8	3.2	7.2	16.7	1.8	3.2	7.2	16.7	12.4	22.8	10.6	24.6	-0.2	-0.9	3.6	16.5	4.7	23.0	5.3	24.1
Employment status	18.6	34.1	9.5	22.2	18.6	34.1	9.5	22.2	16.9	31.0	10.3	23.8	6.1	29.8	4.0	18.1	6.2	30.4	4.6	21.0
Education	8.2	15.0	8.1	18.7	8.2	15.0	8.1	18.7	9.0	16.6	8.9	20.6	2.6	12.6	3.8	17.2	3.8	18.8	5.0	22.6
Nationality/Ethnicity	25.3	46.4	16.5	38.5	25.3	46.4	16.5	38.5	15.3	28.0	11.6	26.9	11.1	54.4	8.5	38.8	4.6	22.7	5.2	23.4
Region	0.7	1.3	1.7	3.9	0.7	1.3	1.7	3.9	0.8	1.5	1.7	4.1	0.8	4.1	2.1	9.4	1.1	5.2	2.0	8.9
R2 / Explained Gini	54.5	100.0	43.0	100.0	54.5	100.0	43.0	100.0	54.5	100.0	43.0	100.0	20.4	100.0	22.0	100.0	20.4	100.0	22.0	100.0

Table C.2: Results from alternative decompositions: Bosnia and Herzegovina

	Fields				Fields-Shapley 1				Fields-Shapley 2				Shapley on Gini 1				Shapley on Gini 2			
	2002		2005		2002		2005		2002		2005		2002		2005		2002		2005	
Variable	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %
									No equivalence scale											
Age and sex	4.1	21.9	5.6	21.5	4.1	22.1	5.6	21.5	3.6	19.3	5.3	20.3	6.6	22.5	9.1	32.1	3.2	22.0	3.9	24.5
Employment status	6.1	32.6	15.3	58.6	6.1	32.3	15.3	58.4	6.6	35.3	15.5	59.4	3.9	13.6	4.9	17.4	5.3	36.3	8.3	52.4
Education	7.9	42.2	5.1	19.5	7.9	42.0	5.1	19.7	7.8	41.7	5.2	19.9	2.8	9.8	1.4	5.1	5.1	35.0	3.4	21.6
Ethnicity	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Region	0.7	3.7	0.1	0.4	0.7	3.6	0.1	0.4	0.7	3.7	0.1	0.4	1.1	3.9	0.3	1.1	1.0	6.6	0.2	1.5
R2 / Explained Gini	18.7		26.1		18.7		26.1		18.7		26.1		14.5	49.8	15.8	55.7	14.5		15.8	
									Equivalence scale ($\rho = 0.5$)											
Age and sex	0.7	4.1	1.7	10.0	0.7	4.2	1.7	10.1	1.4	8.2	2.1	12.4	0.4	1.5	1.9	7.8	1.5	11.9	2.0	14.5
Employment status	9.0	52.9	16.1	94.7	9.0	53.0	16.1	94.8	9.3	54.7	16.5	97.1	5.5	22.0	6.8	28.4	5.1	39.5	7.0	50.6
Education	13.6	80.0	11.5	67.6	13.6	80.1	11.5	67.5	12.7	74.7	10.6	62.4	6.1	24.5	4.8	19.8	5.7	44.8	4.6	33.7
Ethnicity	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Region	0.4	2.4	0.1	0.6	0.4	2.1	0.1	0.4	0.4	2.4	0.1	0.6	0.9	3.6	0.3	1.3	0.5	3.7	0.2	1.2
R2 / Explained Gini	23.7		29.4		23.7		29.4		23.7		29.4		12.8	51.7	13.8	57.3	12.8		13.8	

Table C.3: Results from alternative decompositions: Bulgaria

	Fields				Fields-Shapley 1				Fields-Shapley 2				Shapley on Gini 1				Shapley on Gini 2			
	2002		2005		2002		2005		2002		2005		2002		2005		2002		2005	
Variable	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %
									No equivalence scale											
Age and sex	1.9	12.7	2.1	11.0	1.9	12.6	2.1	11.0	2.1	13.9	1.8	9.6	0.5	1.9	8.1	27.6	2.2	18.4	2.4	15.2
Employment status	6.3	42.4	9.0	47.1	6.4	42.0	9.0	47.1	6.2	41.0	9.0	47.6	7.6	27.8	5.5	18.5	4.5	37.1	6.2	38.9
Education	5.1	33.9	4.9	25.6	5.0	32.8	4.9	25.6	4.7	30.7	4.8	25.4	3.8	13.9	2.7	9.0	3.8	31.4	4.5	28.1
Nationality/Ethnicity	2.0	13.7	3.0	15.8	2.0	13.4	3.0	15.8	2.1	13.7	2.9	15.5	0.0	0.0	-0.4	-1.4	1.4	11.4	2.2	13.6
Region	-0.1	-0.9	0.1	0.4	-0.1	-0.8	0.1	0.4	0.1	0.7	0.4	1.9	0.3	1.0	0.1	0.2	0.2	1.7	0.7	4.2
R2 / Explained Gini	15.2		19.0		15.2		19.0		15.2		19.0		12.2	55.3	15.9	46.0	12.1		15.9	
									Equivalence scale ($\rho = 0.5$)											
Age and sex	9.1	41.0	7.2	27.8	9.2	40.9	7.2	27.8	8.0	35.8	5.6	21.6	-1.0	-3.6	8.5	28.8	4.9	32.2	4.3	25.4
Employment status	7.3	33.1	11.2	43.4	7.3	32.7	11.2	43.4	7.9	35.4	12.0	46.6	11.1	38.8	6.6	22.3	5.4	35.7	6.5	38.2
Education	4.9	21.9	5.1	19.8	4.9	21.7	5.1	19.8	5.2	23.3	5.8	22.4	4.9	17.2	2.8	9.4	3.9	25.7	4.3	25.0
Ethnicity	1.1	4.7	2.3	8.9	1.0	4.7	2.3	8.9	1.1	4.7	2.2	8.6	-1.1	-3.8	-0.8	-2.6	0.8	5.5	1.5	8.9
Region	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.2	0.8	0.2	0.8	1.2	4.3	0.0	0.1	0.1	0.9	0.4	2.5
R2 / Explained Gini	22.2		25.8		22.4		25.8		22.4		25.8		15.1	47.1	17.1	42.0	15.1		17.0	

Table C.4: Results from alternative decompositions: Serbia

	Fields				Fields-Shapley 1				Fields-Shapley 2				Shapley on Gini 1				Shapley on Gini 2			
	2002		2005		2002		2005		2002		2005		2002		2005		2002		2005	
Variable	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %	Total	in %
									No equivalence scale											
Age and sex	2.8	18.9	3.3	16.4	2.8	18.9	3.3	16.4	2.5	14.7	2.9	17.1	7.1	22.0	7.7	24.6	3.1	19.4	3.1	17.7
Employment status	2.3	15.6	2.1	10.5	2.3	15.6	2.1	10.5	3.3	16.8	3.4	22.2	1.0	3.3	0.5	1.5	3.6	22.8	3.3	18.8
Education	7.7	52.0	11.7	59.0	7.7	52.0	11.7	59.0	6.7	53.0	10.6	45.4	7.4	23.1	8.8	28.2	6.2	39.3	7.7	44.3
Nationality/Ethnicity	n.a.	n.a.	0.0	0.2	n.a.	n.a.	0.0	0.2	n.a.	n.a.	0.1	0.0	n.a.	n.a.	-0.2	-0.6	n.a.	n.a.	0.2	1.1
Region	2.0	13.5	2.8	13.8	2.0	13.5	2.8	13.8	2.3	15.1	3.0	15.3	0.4	1.1	0.6	2.0	2.9	18.6	3.1	18.1
R2 / Explained Gini	14.9		19.9		14.9		19.9		14.9		19.9		15.9	50.5	17.4	44.3	15.8		17.4	
									Equivalence scale ($\rho = 0.5$)											
Age and sex	5.3	27.1	4.9	20.8	5.3	27.1	4.9	20.8	4.0	16.4	3.9	20.6	6.2	19.5	6.3	20.3	3.9	23.1	3.5	20.1
Employment status	3.0	15.2	2.1	8.9	3.0	15.2	2.1	8.9	4.9	17.4	4.1	25.2	1.4	4.4	0.5	1.8	4.3	25.6	3.5	20.0
Education	9.1	46.2	13.6	57.4	9.1	46.2	13.6	57.4	8.2	52.6	12.5	41.6	8.9	27.9	10.4	33.6	6.2	36.6	7.6	43.1
Nationality/Ethnicity	n.a.	n.a.	0.2	0.8	n.a.	n.a.	0.2	0.8	n.a.	n.a.	0.2	0.0	n.a.	n.a.	-0.4	-1.3	n.a.	n.a.	0.3	1.9
Region	2.3	11.5	2.9	12.0	2.3	11.5	2.9	12.0	2.5	12.7	3.0	12.6	0.3	1.0	0.9	2.8	2.5	14.7	2.6	14.9
R2 / Explained Gini	19.6		23.7		19.6		23.7		19.6		23.7		16.9	47.1	17.6	42.9	16.9		17.5	

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