Welfare in Bosnia and Herzegovina, 2001: Measurement and Findings

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0. INTRODUCTION

Being able to measure welfare or poverty levels allows governments and their citizens to determine the effectiveness of government economic and social policies in improving the welfare of the population. Also, as many government and non-governmental programs are specifically tailored to meeting the needs of the poor, being able to identify this group in the population is critical to the effectiveness and efficiency of such programs. And, finally, the impact of all social and economic policy on welfare can only be assessed by constant monitoring of welfare levels in a country.

The need in Bosnia and Herzegovina (BiH) to measure and monitor welfare levels has been made more urgent given the events of recent years. The transition from a centrally planned to a market economy has dramatically altered the ways in which the population and the government interact as well as the sources of income of different population groups. As important in affecting welfare was the war in the early 1990s that caused destruction of the stock of productive capital as well as large-scale movements of the population. This, combined with the dislocation of private social safety nets and social capital has affected living standards and the vulnerability of the population to further economic shocks.

To measure welfare levels requires good micro-level or household data. Such data provide information not just on average levels of welfare, as GDP or GDP per capita indicators do, but also on the distribution and levels of equality in the country. Additionally, such data sources provide insights into the key characteristics of the poor and the factors that affect their ability to move out of poverty.

In an attempt to answer the basic questions as to who is poor, what are their characteristics, what is the distribution of wealth, and what are the factors that affect welfare levels, the Government of BiH, through its three statistical organizations (the State Agency for Statistics [BHAS], the Republika Srpska Institute of Statistics [RSIS] and the Federation of BiH Institute of Statistics [FIS], implemented a multi-purpose household level survey throughout the country in the fall of 2001. This survey, the BiH-Living Standards Measurement Study survey [BiH-LSMS] was designed to measure welfare in both monetary and non-monetary terms in BiH and provide information on how welfare levels are correlated with observed social outcomes such as unemployment, health and education. A fundamental use of the data is to inform the Poverty Reduction Strategy that the Government is in the process of developing.

The purpose of this document is to describe the methods used to construct a money-metric welfare measure and poverty lines in Bosnia and Herzegovina, using the BiH-LSMS data set and to present the basic results of the analysis. The first section provides an overview of the general concepts and issues involved in poverty measurement. The data needed for the analysis and the data available in BiH are discussed in Section 2. Sections 3 and 4 contain the information on the welfare measure and poverty lines used in BiH. A summary of the key findings on poverty in the country and the two entities is found in Section 5 and various checks of the robustness of these findings are done in Section 6. Technical comments 1-3 provide a detailed description of the methods used to inform an advanced reader.

PART I: WELFARE MEASUREMENT: CONCEPTS AND ISSUES

1. MEASURING WELFARE

1.1 The Concept of Welfare

To examine poverty and inequality, we need a measure of material well-being. Ideally, this measure should correspond as closely as possible to the way a person experiences his or her standard of living. One can think of a person's standard of living, or material well-being, as a function of all goods consumed by this individual:

Well-being = $U(C_1, C_2, C_3, C_4, C_5, \ , \ , C_N)$

where $U(.)$ is an increasing function of the goods C_1 through C_N consumed in the current period by this individual. Ideally, these goods should include everything that matters for well-being, including items that are not normally thought of as "consumer goods," such as health, education, leisure, social contact, and the ability to participate in the political process.

Economic theory allows us to rank levels of well-being without knowing the function U(.) when: (i) everyone makes decisions that maximize their well-being; (ii) everyone has the same tastes (and needs); (iii) all goods are traded (i.e., have a price); and (iv) everyone faces the same prices. The level of well-being derived from a consumption bundle can be represented by the *cost (monetary value) of the consumption bundle consumed in the current period*. The intuition is simple: the individual could have bought a cheaper bundle of goods, but he or she did not. Hence, he or she must get a higher level of well-being from the current bundle of goods than from any cheaper bundle of goods. The cost of the consumption bundle is therefore a money-metric utility function; it represents well-being expressed in Convertible marks (KM),[1] Euros or any other currency.

1.2 Consumption or Income Aggregates for Measuring Welfare

In theory, any welfare measure should include all of the goods, including health, leisure, social capital *inter alia* that affect welfare. In practice, however, due to measurement and valuation difficulties, the focus in micro-data analysis is only on material well-being using information on consumption or income of households. Even such 'simple' measures as income or consumption are, in practice, quite complicated to measure well and there is debate as to whether income is preferred over consumption or not.

Income is often considered to be the preferred measure. But income suffers from several defects both in theory and in practice. First, income can be highly volatile, whereas consumption can be, and is, more readily smoothed by individuals. This smoothing makes consumption a better indicator of welfare than income as it more closely shows the welfare level of an individual at any given time. In transition

[1] The BiH currency, the Convertible Mark (KM) was, at the time of the survey, pegged to the German Deutsch Mark. This value was approximately US$ 1.9.

economies, such as BiH, people are paid very irregularly, with several months of wage arrears being common. In this context, consumption is smoothed while income is erratic.

Second, regardless of the measure, it is imperative that it be comprehensive, that no aspect of income or consumption be omitted.[2] Omitting components of income or consumption will lead to erroneous conclusions as to who is poor and the characteristics of the poor. If, for example, the value of home-produced food were omitted from an income aggregate (total income measure) than the rural populations would look much poorer than they actually are. Or, if a consumption aggregate is constructed using only expenditures, those who receive in-kind benefits from employment might look poorer than they actually are.

Again, in transition countries, the problems with income are more severe. Income under-reporting is marked because survey respondents are not willing to fully disclose illegal or semi-legal income sources. Experience in BiH showed that households were not willing to provide information on unregistered businesses and informal sector activities. Finally, produce from the household plot has become a mainstay of food consumption and this is not a standard component of money income.

A further concern that must be taken into account when determining whether to use income or consumption as a measure of welfare is the quality of the data that is obtained from households. Here, practical experience has shown that consumption is preferable to income data. At the top end of the income distribution, households tend to under-report their income in surveys. This occurs through a lack of faith in the confidentiality of the survey, concerns about the tax authority, complexity of earnings that would lengthen an interview, and the like. At the other end of the income distribution the problem is less one of willingness to provide accurate data and more of an inability to do so. Households engaged in informal activities and/or with household businesses often cannot separate out what is 'household' income and what is 'business income' thus undermining the reliability of the data collected.

Given the difficulties of a full welfare measure, a money-metric measure such as consumption or income is typically used. And, for both theoretical and practical reasons, using consumption as a welfare measure is preferable to income. The remainder of the discussion of measuring welfare here will focus on consumption as a measure of welfare.

[2] Total income includes: all labor income, all income from home production, all income from self-employment, household enterprises, public and private transfers, rents, the use value of durable goods and housing. Total consumption requires data on food consumption (from purchased, home-produced and gift good), non-food consumption, as well as the use value of durable goods and services.

1.3 Content of Consumption Aggregate and Adjustments

1.3.1 *Conceptual Issues*

There are conceptual issues that must be kept in mind when constructing a money-metric welfare measure based on consumption. Essentially, these relate to the distinction between expenditure and consumption. First, only the part of consumption that is consumed in the current period is measured. Unlike food, consumer durables and housing are consumed over a long period of time. Hence, it would be inaccurate to attribute expenditure on such a good wholly to the current period. Instead, we include the imputed value of the *consumption flow* associated with the possession of a consumer durable, but exclude the expenditure on the purchase of the durable good.

Second, expenditures that reflect differences in need or tastes are excluded. When consumption is used as a measure of well-being, higher consumption should indicate a higher level of well-being. For most consumption items this correspondence is reasonable. However, for some categories, such as health expenditures, this correspondence is questionable.

1.3.2 Spatial Price Adjustments

The main purpose of the measurement of welfare is to be able to compare households to each other. The two key adjustments that must be made to allow valid comparisons of households are for spatial price differences and for household composition. These two adjustments enable a proper ranking of households and individuals to be made.[3]

Consumption or income are only a valid measure of well-being if people who spend more actually consume more, or higher-quality, goods, and not if they merely spend more for the same goods due to higher prices. Hence, we need to adjust for differences in prices over time and across regions. This adjustment for prices ensures that those whose expenditure is higher indeed consume more or better goods.

A small example suffices to demonstrate why an adjustment of prices for spatial differences is needed. A kilogram of carrots might cost 1.5 Euros in a capital city and only 1.1 Euros in a small village. But the benefit of consuming a kilogram of carrots is the same regardless of where they were bought or at what price. Thus, to compare welfare levels of two households or individuals, we need to adjust the prices paid so that the welfare obtained is the same in monetary terms.

Large differences typically exist in the cost of living between urban and rural areas and, often, within each area. In principal one could use the national Consumer Price Index (CPI) to adjust for the spatial differences. The CPI in most countries is, however, not done at the geographic level required for adjusting household survey data. For this reason, it is worthwhile to use the household survey data themselves to construct CPIs at the relevant geographic levels.

[3] Note that, in the case where data are collected over a long period of time, it would also be necessary to adjust for changes in prices over time.

1.3.3 Per Capita or Per Adult Equivalent

Consumption data from household surveys are collected at the level of the household rather than the individual. But, in order to determine the welfare levels of people, total household consumption must be divided among the household members. Consumption cannot, however, be explicitly assigned to individual household members using the data. Instead, an adjustment based on some allocation rule must be imposed to attribute their share of households resources to individuals within the household. One way to estimate consumption levels for individuals is to simply divide total household consumption by the number of household members. This gives us per capita consumption.

This is the most commonly applied "rule" and its implies that all family members receive an equal share of household resources. Although this allocation rule is simple, it is not necessarily appealing, as it seems unlikely that individuals need the same amount of resources to reach the same welfare level. And, even if they do require the same amount, it is unlikely that they in fact receive equal shares. Alternative allocation rules, known as equivalence scales, are often proposed. Although there exists little guidance for choosing among the wide range of possible scales, it is important to examine the sensitivity of poverty comparisons to the particular allocation rule chosen. This issue is particularly important when one is concerned with demographic characteristics of the poor

Two important points that are ignored by simply assigning the same amount of consumption to each person are: adult equivalents and economies of scale. One would, ideally, like to take into account the fact that children and adults do not consume at the same levels and, also, the fact that economies of scale exist in households. To do this one can use the following equation to adjust the actual number of household members to a number of 'equivalent adults'.

$$EA = (A + \alpha K)^{\theta}$$

Where:

EA= number of equivalent adults
A= number of adults
K= number of children
α = parameter for economies of scale
θ = parameter for share of public goods consumed

Adults vs. Children: Typically children consume less than adults in a household. They have lower caloric needs, their clothes are often significantly cheaper and they have a more restricted list of items which they consume. Thus, a four person household made up of all adults would be more costly to run than a four person household comprised of one adult and three children. The parameter *alpha* in the equation reflects the lower cost of children and can take on the value from 0 to 1. Assigning this parameter a value of 1 essentially assumes that children consume the same as adults and is equivalent to the per capita measure.

Economies of scale: There are economies of scale involved in households. For example, a stove is needed for a one-person household. But adding another person to the household does not mean that a second stove is needed. The stove is a 'public' good in the sense that use of it by one person does not decrease its value for use by another person. Larger families may take advantage of significant economies of scale. Simply dividing total consumption by the number of household members may under-estimate welfare levels. The greater the share of 'public' goods in the household the greater the underestimation of welfare levels that would occur if a per capita measure is used. The parameter *theta* adjusts for this share of public and private goods in the household and can take on a value from 0 to 1. If all goods were private goods (such as food which only one person can consume) the parameter would be equal to 1 and again, would be equivalent to a per capita measure.

1.4 Poverty Lines

Once a consumption aggregate is constructed, and adjusted for prices and household composition, it is possible to rank all individuals by their welfare levels. Often, however, it is important to be able to classify individuals into categories of poor and non-poor. For this purpose poverty lines, either relative or absolute are calculated. Individuals' consumption is then compared to these lines: if consumption is below the line, the individual is categorized as poor, if it is above, then she or he is not.

A poverty line is set to a value of consumption (income) below which one would be considered to be poor by the society in which one lives. A poverty line can be set in a variety of manners depending on the purpose and needs. Here we discuss the difference between absolute and relative poverty lines and then two specific types of absolute poverty lines.

1.4.1 Relative Poverty Lines

The value of a relative poverty line is based on how one group in the society compares to the rest. The common practice in the European countries (where relative lines are most used) is to set the poverty line at a fraction of median income. Thus this line incorporates the overall wealth of the country and average standard of living. A person who is considered to have consumption below this line is considered to be poor relative to other people in the country. Clearly, in very wealthy countries, the 'poor' could have a standard of living that would be considered more than adequate in other countries or in another period of time.

1.4.2 Absolute Poverty Lines

An absolute poverty line, as its name implies, does not measure poverty relative to others welfare levels but instead attempts to establish the value of consumption that any person needs, regardless of time and place. Clearly there are difficulties with doing this because welfare always has a relative aspect to it. For example, in a country where average years of schooling is at the primary level, an 8^{th} grade education would be considered more than adequate. Yet, in a country where the majority of the population attends university, a person with only an 8^{th} grade level of schooling might well be considered to be poor.

Extreme or Food Poverty Line: The most commonly used absolute poverty line is that based on food consumption. The most basic requirement of all people is food: a person needs a certain number of calories per day to maintain life and the energy required to work and participate in his or her society. Nutritionists set minimum caloric requirements by taking into account the age, gender and level of effort expended by persons. Using this accepted minimum caloric requirement, the cost of the absolute food poverty line is set at the value of money required to obtain this minimum level of calories.

It is important to note that even an absolute food poverty line has an element of 'relative poverty' in it. In theory, the lowest cost of obtaining the minimum level of calories would be the accurate value of the food poverty line. To calculate the lowest way in which one could obtain these costs, one could do an exercise in linear programming. Although this would be accurate, in all likelihood it would consist of a diet that would be completely unacceptable for people in the country in question. To avoid this, the costs of obtaining the minimum level of calories are based on patterns of consumption observed in the country. This does not imply that everyone must eat a similar diet, and in fact, no one does actually eat the 'average' diet. But it does mean that absolute poverty lines based on food consumption are, actually, quite specific to the each country and would be inaccurate in other countries.

General Poverty Line: A second absolute poverty line is based on the concept that food is not the only good required by an individual. For example, to survive winter, a person needs housing, and to work a person needs to be able to clothe him or herself appropriately. Unlike food consumption, however, where there are objective measures of what is needed (calories), for non-food consumption of goods and services, there are no accepted standards. Ten people would devise ten different lists of 'needs': no criteria exist for determining which list is most appropriate. Any attempt to create a set basket of non-food needs is, essentially, a very subjective effort and would be closer to a relative poverty line concept than an absolute one.

Instead, one can use the data and the patterns of consumption of the population to calculate an allowance for essential non-food spending that is added to the value of the extreme food level. How this is done differs:

> *"… In the poverty line developed by Orshansky for the United States, the basic food poverty line was scaled up by a factor of three, based on the empirical observation that in the United States approximately 75 percent of the average household's budget was spent on non-food items (Orshansky, 1963, 1965). As pointed out by Deaton (1997) the choice of scalar was quite arbitrary and is not terribly intuitive.*
>
> *Ravallion (1994, 2001) proposes two alternatives, both of which differ from the Orshansky approach in that the determination of required non-food expenditures is based on the expenditure patterns of the poorer members of the population. The first, "austere" approach entails finding the amount normally spent on non-food items by those households whose total expenditure […] is just equal to the food poverty line, and adding this amount to the food poverty line. The idea is that because these households*

are sacrificing essential food consumption in order to acquire a certain number of non-food items, they must view these items as essential. The second, "upper-bound' approach is to scale up the food poverty line by the amount spent on non-food by households whose actual food expenditures equal the food poverty line [..]" (Olson Lanjouw and Lanjouw, 2001).

1.5 Poverty and Inequality Measures

1.5.1 Poverty Index

The simplest and most common measure of poverty is the headcount index which simply indicates the percentage of the population in households whose per capita consumption is below the poverty line. This measure, however, says nothing about the how far below the poverty line, or how poor, these individuals are As this is important, several other measures are used: the depth and the severity of poverty.

All three of these measures, or dimensions of poverty are based on the Foster, Greer, and Thorbecke (1984) class of poverty measures. This class is described by:

$$P(\alpha) = \frac{1}{n}\sum_{i=1}^{n}\left[\max\left(\frac{z - c_i}{z}, 0\right)\right]^{\alpha}$$

where α is the parameter (explained below), z is the poverty line, c_i is equivalent consumption of individual i, and n is the total number of individuals. If we set α equal to 0, we obtain P(0), or the poverty headcount index. P(0) simply measures the fraction of individuals below the poverty line. If we set α equal to 1, we obtain P(1), or the poverty gap. This characterizes how many resources are needed to bring the consumption of all of the poor to this poverty line. The poverty shortfall is a poverty measure that takes into account how far the poor, on average, are below the poverty line. One can show that

$P(1) = P(0) \times$ (Average Shortfall)

where the average shortfall is the amount, measured as a percentage of the poverty line, by which the mean consumption of the poor on average falls short of the poverty line. Finally, if we set α equal to 2, we obtain P(2), sometimes also called the severity of poverty or FGT(2). This poverty measure captures difference in the severity of poverty, since it effectively gives more weight to those consumption of the poorest.

1.5.2 Inequality Measures

Inequality matters because, unless a society is highly mobile, the economic distance between the rich and the poor presents an important indicator of differences in values, aspirations, consumption patterns and lifestyles across groups. Inequality has many correlates: social exclusion, declining investment in human capital in low income areas, declining confidence in the government, increased economic insecurity, and impaired functioning of democracy. Simply put, if the rich and the poor share no common economic and social reality, there will be little or no agreement on common social goals or vehicles to achieve these goals.

Since inequality is not a unique concept, there are many statistics that measure inequality. Some are more sensitive to different parts of the distribution than others and some are more easily interpreted than others. Perhaps the easiest to interpret is the 90/10 percentile (or decile) ratio. It shows how many times the poorest person in the top decile consumes more than the richest person in the bottom decile. The 90/10 ratio is the product of the 90/50 ratio ("rich to middle" ratio)and the 50/10 ratio ("middle to poor").
These ratios, while of interest, are only sensitive to parts of the distribution.

Other common measures of inequality take into account the entire distribution. For example, the population can be divided into equal-sized groups based on the consumption per capita. If we choose to use 5 groups, then for each of these groups, or quintiles, we can show their shares in total consumption. Since in a perfectly egalitarian world all groups would consume 20% of the total, these figures are a measure of consumption inequality.

There are also special indices that summarize the whole distribution in one number Gini, Theil, mean log deviation and standard deviation of logs. The Gini coefficient is perhaps the best-known inequality statistic and is given by:

$$G = \frac{2}{\mu n^2} \sum_{i=1}^{n} \left(r_i - \frac{n+1}{2} \right) c_i$$

where there are n individuals indexed by i, their equivalent consumption is given by c_i, mean equivalent consumption is denoted by μ, and where r_i is household's i rank in the equivalent consumption ranking (i.e. for the household with lowest equivalent consumption r_i equals 1 while for the household with the highest equivalent consumption r_i equals n). The Gini coefficient ranges between 0 (perfect equality) and 1 (complete inequality). The Gini is most sensitive to inequality in the middle of the distribution.

The Theil index is given by:

$$E(1) = \frac{1}{n} \sum_{i=1}^{n} \frac{c_i}{\mu} \ln\left(\frac{c_i}{\mu} \right)$$

The Theil index is most sensitive to inequality in the top of the distribution while the mean log deviation measure, given by:

$$E(0) = \frac{1}{n} \sum_{i=1}^{n} \ln\left(\frac{\mu}{c_i} \right) = \ln\left(\frac{1}{n} \sum_{i=1}^{n} c_i \right) - \frac{1}{n} \sum_{i=1}^{n} \ln(c_i)$$

is most sensitive to inequality in the bottom range of the distribution. Neither the Theil index nor the mean log deviation measure are easy to interpret except in reference to other countries or the same country at different points in time.[4]

[4] Both measures are zero for perfect equality. For complete inequality (one person consumes

2 DATA NEEDS AND DATA SOURCE

2.1 Data Needs

To construct a total consumption measure requires micro-level (household level) data on total consumption as well as the composition of the households. The key components of consumption are:

1. Food consumption
    a. Purchased
    b. Home produced
    c. Gifts
    d. Consumed outside the home
2. Education
3. Services
4. Use value of housing
5. Use value of durable goods
6. Non-food consumption
    a. Purchased
    b. Gifts

In addition to the value of the consumption, data are also needed on the quantities of food consumed in order to construct the food poverty line. Additionally, price or unit value information is needed to construct regional CPIs to adjust for spatial differences in the cost of living. And, finally, data on the composition of households is needed make adjustments for individual consumption.

2.2 Data Source Used in BiH

The data used for the analysis of welfare for BiH is the BiH-Living Standards Measurement Study survey [BiH-LSMS-2001] carried out in the fall of 2001. This survey was designed to measure welfare in BiH and provide information on how welfare levels are correlated with observed social characteristics such as unemployment, health and education. The BiH-LSMS is the first nation-wide survey, representative also at the entity level, to measure welfare in both monetary and non-monetary welfare in Bosnia-Herzegovina. Data were collected on consumption, as well as other aspects of households directly or indirectly affecting their living standards. The household questionnaire included a total of 13 modules covering demographics, housing, education, labor, migration, health, privatization vouchers, credit, social assistance, consumption, non-agricultural business activities and agricultural self-employment activities.

Households were selected for inclusion in the survey using a probability sample. The sample was designed to be representative at the country level, the entity level (excluding Brcko) and for urban, rural and mixed municipalities. The sample was of 5400 households with 2400 being selected in the Republika Srpska (RS) and 3000 in the Federation of BiH (FBiH). The process of designing the sample as well as its implementation was difficult given the massive migration and displacement of

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everything), E(0) goes to infinity while E(1) reaches nln(n).

people since the last census was implemented. For more details on the design of the sample, please see the Basic Information Document of the BiH LSMS Survey.

In the survey, information was collected through direct informants. Specifically, all household members over age 15 were interviewed personally in an oral interview. Parents and guardians of children under 15 provided the information on these children. For household level data (housing, consumption, businesses and agriculture), the informant was the member of the household with the most knowledge of the activity. The quality of the resulting data was maintained through the use of in-depth training of interviewers, high levels of supervision, and concurrent data entry with re-visits to households.

The BiH-LSMS-2001 provides all of the data needed for measuring welfare levels. The remainder of this document lists the procedures used in constructing a consumption aggregate (welfare measure), the assumptions that underlie the procedures as well as the construction of two absolute poverty lines: a food or extreme line and a general poverty line.

PART II: WELFARE IN BOSNIA AND HERZEGOVINA

3. CONSTRUCTING A CONSUMPTION AGGREGATE FOR HOUSEHOLDS IN BiH

Below, we outline the use of the LSMS data to construct total household consumption from the six components specified in Section II. Note that the data were collected for the household as a whole. No attempt was made in the survey data collection to assign consumption to individuals within the household. The assignment of household consumption to individuals is discussed later in this document.

3.1 Food Consumption

3.1.1 Value of Food Consumption

The first step in constructing the consumption aggregate is to value the quantity of food that is consumed. The LSMS collected data on food purchases, home production of food and gifts of food received by the household as well as food consumed outside the home. Basic data were collected on 66 food products, or groups of products consumed by the household. These covered fruits and vegetables, dairy, grains and cereals, meat, poultry and fish, beverages and condiments, and staples such as sugar, oils and the like. Households provided information on the quantity of each item purchased and home produced as well as its value. For all gifts of food, household provided information only on the value of the gift (as if they had had to purchase it).

Data on food consumption was collected for a one month period. Total annual food consumption was calculated as the sum of the value of all purchases, home produced food and all gifts received times twelve.

As in any data set, especially complex ones like the BiH-LSMS, there were some data problems that were found. In cases where there were outliers or missing values, these were replaced with median values to maximize the available information. Outliers were defined as any value greater or less than the median value, plus or minus three standard deviations at the country level. Missing values and outliers were replaced by the median value at the smallest geographic area possible[5] (group of enumeration areas, or municipality, or entity, or country).

In addition to food consumed in the home, data were collected on food expenditures outside the home: meals eaten outside the home (breakfast, lunch and dinner) as well as snacks and other food consumption. Data were collected for a seven day period and annualized by multiplying by the number of weeks in the year.

3.2 Non-Food Consumption

The components of consumption included here are housing , education, utilities, durables, and weekly and monthly purchases of personal care and household items, small appliances, transport and recreation. For most of these items, the value of consumption is equal to the expenditure for the item or the monetary value of a gift. For two of these items, housing and durable goods, the actual expenditures does not represent consumption. A value of the flow of services from using these items is calculated instead.

3.2.1 Education

Education can be seen as both a consumption item and an investment for future earnings. We have included expenditures on education as part of consumption. Data were collected for all members of the household. For pre-school and kindergarten age children, households provided information on formal and informal payments related to this care and schooling. For school-age populations data were provided on: annual and special tuition, membership fees for parent associations, school uniforms and clothing, textbooks and school supplies, food and lodging as well as other expenditures for tutorials and the like. Households also provided information on informal payments to the schools for repairs, maintenance, and classroom equipment. Although information was also collected on the transportation costs associated with schooling this was not included here as it was assumed that this cost was captured in the consumption module of the questionnaire and to include it here would be double counting.

The information was collected for the school year prior to the implementation of the survey, in other words for the school year 2000-2001. In calculating the annual expenditures for pre-school education, checks were made of outliers (as in the other sections) and outliers and missing values were replaced by median values at the entity level. For primary and secondary school, outliers and missing values were replaced using municipal level medians. For tertiary, outliers and missing values were replaced using the entity level medians. Total household education expenditures are simply the sum of the annualized individual educational expenditures.

[5] If there were less than five prices available to calculate the median price at any given geographic level, the median for the next higher (larger) geographic area was substituted.

3.2.2 Utilities

Households provided information on their monthly expenditures on utilities and housing related services: electricity, district heating, piped gas, gas in containers, oil (liquid fuels), coal, firewood, water and sewerage, central hot water, garbage disposal, land occupation fees, common area fees, radio and TV subscriptions and telephones. Data was collected from households for the month preceding the survey (interview).

To calculate annual expenditures we needed to take into account the fact that household expenditures on utilities are higher in winter months than in summer months. Thus, additional questions were asked about expenditures levels for oil, coal, firewood, water and sewerage, electricity and piped gas for winter months. The annual expenditures for each to these items were constructed using six months of summer expenditures and six months of winter expenditures.

3.2.3 Housing

Calculating the value of housing to include in the consumption aggregate is more complicated than for other consumption items. One consumes housing over a long period of time. Thus the value of housing to include in an annual consumption aggregate must reflect the value of the housing that one receives during the year: not the total value of the housing. A simple example shows the logic of this:

Imagine three households that are exactly alike in their composition and total consumption. The first household rents its flat, the second household owns its flat and the third household lives in a temporary shelter. The consumption aggregate would include the rental payment of the first household. If no value is calculated for the second household's housing, the second household would look poorer than the first, when we know that they are exactly the same. Additionally, the second and third household would have the same consumption level but we know that the welfare of the third household is actually lower than that of the second household as they live in a temporary shelter. To avoid this type of miss-ranking of households, we need to estimate a value for the housing of the second and third types of households: the non-renters.

For households that rent housing, it is assumed that the monthly (annual) rental payment is equal to the amount of housing 'consumed' in that year. The difficulty arises for households that own their housing. These household are not paying anything for housing, but, clearly their welfare level is improved by having housing. To ensure that the comparison of welfare levels between households is accurate the value of the housing consumed by the owner must be calculated.[6]

A two-stage process was used to calculate the value of housing for owned housing. First, we use the reported monthly rent payment for all households that rent their housing units. A rent regression to identify the determinants of rent based on a

[6] This is typically what is done in National Accounts, although BiH does not yet incorporate such calculations for lack of data.

vector of housing characteristics is run for the group of renting households.[7] Separate regressions were estimated for each of the two Entities. In addition, in both regressions, variables identifying location (municipality) were also included. The characteristics of housing that were found to be significant in determining rental (housing) values were: the number of rooms, areas (sq. meters), having central heating system, having a telephone, urban or rural area, overall assessment of housing quality, type of housing, extra rooms (such as garage, separate bathrooms, cellars etc.). The two estimated equations are as follows:

For the Republika Srpska:

Logarithm of Monthly Rent = 5.147 + .00308*(square meter) + .09928*(flat) + .130*(housing quality) - .205*(extra rooms) + .174* (have phone) - .860* (rural) - .241* (municipal heat) - .407*(Prijedor) - .0701*(Samac) - 1.789* (Cajnice) + .096* (Knezevo) +.517* (Srbac) - 1.385* (Visegrad).

For the Federation of BiH:

Logarithm of Monthly Rent = 4.435 + .009*(square meters) + .317* (flat) - .424* (Breza) - .651* (Gradacac) - .729* (Kakanj) + .168* (Posusje) - .745*(Travnik) -.532* (Zenica) + .07052* (housing quality) - .322*(extra rooms) + .119* (have public water) + .155* (have telephone) + .164* (have municipal heat) + .376* (Sarajevo) -.0874* (Tuzla).

In the second stage, once the parameters of the two regressions were estimated, the information on housing characteristics of the non-rental households were put into the equations and an imputed value of housing was estimated. This was done separately for the FBiH and the RS.

3.2.4 *Durable Goods*

All consumption expenditures on durable items are excluded from the consumption aggregate. Instead we include the rental value of consumer durables for which we have ownership information. This value can be called a consumption flow from a durable good. It is estimated by the cost of owning a durable good, which consists of two parts:

(i) Depreciation: the drop in value of the good during the course of the year;
(ii) (Forgone) real interest: the interest one could have earned if one had invested the money in a financial asset instead of a consumer good, or the interest one has to pay on a loan taken out to finance the consumer good

Expressed mathematically:

$$\text{Consumption flow} = \delta V + r V = (\delta + r) V,$$

[7] This type of regression, where the rent is related to characteristics of housing (such as location, basic amenities etc.) is called "hedonic". It assumes that consumers value positively, and pay more for, an attractive dwelling, and value negatively, and pay less for, a dwelling with unattractive characteristics.

where δ is the depreciation rate, r is the interest rate, V is the current value of the good. Hence, to be able to estimate the consumption flow of a consumer durable, we need four pieces of information:

(i) whether the household owns the consumer durable;
(ii) the value of the durable;
(iii) the depreciation rate of the durable; and
(iv) the interest rate

The BiH-LSMS asks information about possession of, estimated current value, and the age of 23 categories of consumer durables. This information is used to calculate the consumption flow of each of these 23 categories. The calculation consists of the three steps as listed below.

Step 1: Estimation of depreciation rate and median new value

We know the value and age of a consumer durable for a subset of households who (i) report owning each consumer durable, (ii) report the estimated market value of that consumer durable (reported as the value that the respondent think they can sell the durable for), and (iii) report its age (time since the purchase or acquisition of each durable). For this subset of households, we run a regression of the form (excluding the outliers are described below):

$$\ln(value_{k,i}) = v_{0,k} - \delta_k \, age_{k,i} + \varepsilon_{k,i}$$

where $value_{k,i}$ is the expenditure of household i on durable k, $v_{0,k}$ is the log of the value of durable of type k at acquisition, $age_{k,i}$ is the age of durable k of household i and $\varepsilon_{k,i}$ is an error term. Table 1 gives estimated values which are all in the plausible range. Some of the surprisingly low values of durables at the time of acquisition (cars or refrigerators, for example) can be explained by a prevalence of second hand goods on the BiH market for these durables.

Step 2: Calculate for each household the current value of their durables

We can infer the value of the consumer durable for households who report the possession of a durable. For the households which report both the age and the value we use the reported value if it falls within a factor of 6 standard deviations of the median value of durables of the same type in the country as a whole. For other households, which either do not report the value or whose reported value falls outside the range, we estimate the value of the consumer durables using the estimated depreciation schedule:

$$\hat{V}_{i,k} \equiv (estimated\ value)_{i,k} = \exp(\hat{v}_{0,k} - \hat{\delta}_k age_{i,k})$$

where $\hat{v}_{0,k}$ and $\hat{\delta}_k$ are the estimated log of value at acquisition and depreciation rate from the median regressions and $\hat{V}_{i,k}$ is the estimated current value of consumer durable k for household i.

Step 3: Calculate the consumption flow from the durables

Finally, we calculate the consumption flow from the possession of durable *k* in household *i* as:

$$(Consumption\ flow)_{i,k} = (\hat{\delta}_k + r)\ \hat{V}_{i,k},$$

The real interest rate, *r*, is assumed to be constant at 10 p.a.%.

Table 1: Regressions of Depreciation Rates for Consumer Durables

Durable	Value At Acquisition (KM) ($v_{0,k}$)	Depreciation Rate (% p.a.), δ_k
Stove	173	4.6
Washer	264	6.0
Dryer	327	5.7
Dishwasher	386	5.7
Refrigerator	160	4.7
Freezer	231	5.0
Microwave	188	6.0
Vacuum cleaner	85	4.8
Sewing machine	142	2.4
Ironing roller	45	8.9
Satellite dish	120	3.0
TV	243	6.0
Video player	195	5.2
Video camera	629	4.4
Stereo, CD play.	251	6.7
Radio cassette	58	3.6
PC	1,245	9.1
Accordion	242	1.8
Piano	2,703	2.5
Bicycle	100	4.1
Motorcycle	401	4.9
Car	3,081	4.6
Van, jeep	4,205	2.4

Notes: Results of regression of ln(value) on a constant and age. The value at acquisition is the estimated value of a durable where the age is less than one year.

3.2.5 Other Non-Food Consumption

Detailed information on other non-food expenditures were also collected from households in the following areas: daily expenditures (tobacco, newspapers, etc.), transportation (fares, fuel, maintenance and parking), household cleaning products and personal hygiene products, clothing and footwear, household furnishings and services, electronic and photographic equipment and small consumer appliances, recreation and leisure activities and equipment, financial services, and special events.

Households were asked to provide data on expenditures in each of these categories. Different reference periods were used to help the household correctly recall expenditures. For items purchased on a daily basis such as newspapers and cigarettes, a seven day reference period was used. The rarer or less common the expenditure the longer the reference period with a year-long reference period being

the longest. Each expenditure is annualized and the sum of these values is included in the consumption aggregate as well as the value of any gifts to the households.

3.3 Adjusted Total Consumption

3.3.1 Total Household Consumption

The total consumption of the household is the sum of all food and non-food consumption (including the value of services of housing and durable goods). Table 2 gives an overview of the components included in the consumption aggregate and their relative importance in household consumption.

Note that two critical imputations affect the level and the distribution of this total consumption aggregate: (i) the use of self- reported prices (respondents' estimates of the cost of buying of the corresponding item) to compute the value of consumption in-kind from own agricultural production and gifts received; and (ii) the use of imputed (based on reported market rents and housing characteristics) values for owner-occupied housing, instead of declared implicit rents for the housing units occupied by the owners.

Both of these imputations reflect the known best practice approach to evaluate consumption.[8] The first takes into account the difference between producer prices and consumer prices for food-producing households (most of the in-kind consumption). The second is designed to avoid the, typically. unrealistically high self-assessment of the implicit housing rents by their owners.

Table 2: Composition of Household Consumption

Consumption Categories	**Composition of Household Consumption**	
	Annual Household Consumption, KM	Percent of total consumption
Food consumed at home	**3,766**	**32.5**
of which: own-production	911	7.9
of which: received as gift	118	1.0
Food consumed outside the dwelling	**552**	**4.8**
Housing	**3,920**	**35.6**
of which: paid rent	68	0.6
of which: imputed rent	2,316	20.0
of which: utilities	1,536	13.3
Imputed consumption flow from durables	**330**	**2.9**
Other non-food	**3,002**	**25.9**
of which: goods and services purchased	2,066	17.9
of which: expenditures on education	246	2.1
of which: daily non-food expenditures	544	4.7
of which: gifts of non-food goods and services	145	1.3
Total	**11,571**	**100.0**

Note: Amounts are expressed in KM. No adjustment has been made for regional price differences. The means are weighted by sample weights. The unit of observation is the household.

[8] Angus Deaton and Salmon Zaidi " Guidelines for Constructing Consumption Aggregate", LSMS Working Paper Series, World Bank, 2002.

On average, consumption is 11,571 KM per household per year. Food and housing are the largest budget items, with 37 and 36 percent of the total (e.g. compare to Croatia HBS data, where according to same data processing methods the corresponding shares are very close to BiH, 36% and 32% of the total). The imputed consumption flow from consumer durables constitutes 3% of consumption aggregate. Expenditures on purchases of these types of durables is excluded from the consumption aggregate but would also amount to 3% if included (331.91 KM). Health expenditures, which are excluded for reasons explained above, would have amounted to 5% of the total (555.29 KM).

Using the LSMS data one could construct an aggregate which is closer to regular total personal consumption **expenditure** as measured by in the System of National Accounts (SNA). Such an aggregate would include health expenditures and all types of expenditures on goods and services, but exclude imputed rents and the imputation of the flow of services from durables. It would also use the market prices (rather than self-reported prices) for food consumption from own production. Note that such a measure would be inappropriate for welfare measurement as explained before. It is, however, appropriate for comparison with macroeconomic data in the country. Such an aggregate would amount for a total of 9,616 KM per household per year – a slightly lower value than our consumption aggregate, but still very much in the same range. But it is important to keep in mind this, approximately, 17 percent difference when comparing all results obtained from consumption-based figures to other sources of information or other surveys.

3.3.2 Spatial Price Adjustments

As noted above, to enable comparability of the consumption measure for each household in the survey, several adjustments need to be made. The first would be to take into account changes in prices over time. In the case of the LSMS, however, the reference period was similar across all households, and the households were interviewed during a short time period, so we do not need to correct for inflation (changes of prices over time).

The second adjustment is to take into account geographic differences in the cost of living. Regional price differences can cause the same bundle of goods to be more expensive in one region than in another. However, the differences in expenditures caused by these regional price differences do not reflect differences in material well-being. Hence, we need to correct these regional price differences.

We used the Paasche price index to deflate for regional price differences, which is theoretically better than Laspeyres[9] but it requires knowledge about the quantities of all goods consumed by each household. The Paasche index for a household living in area *r* is given by:

$$P_r = \sum_{k=1}^{K} \left(\frac{Q_{k,r}\, p_{k,r}}{Q_{k,r}\, p_{k,0}} \right)$$

[9] See Grosh, Margaret and Paul Glewwe, eds, (2000). Designing Household Survey Questionnaires for Developing Countries: Lessons from 15 Years of the Living Standards Measurement Study Surveys, The World Bank, Washington, D.C.

where P_r is the price index for area r, $Q_{k,r}$ is the quantity purchased of good k in area r, $p_{k,r}$ is the price of good k in area r, and $p_{k,0}$ is the reference price of good k. To implement this formula we need to make a number of choices:

(i) what price data to use and how to define the reference prices,
(ii) how to define the regions r, and,
(iii) what to do when price data is missing.

We calculated the quantities using the LSMS for 66 food categories and we based our price deflator only on these food price data.[10] This assumes that regional variation in the non-food prices is similar to the regional variation in the observed food prices. As no information on unit prices for non-food items was available at the regionally disaggregated level at the time of calculation this is the only feasible method. The regional (group of enumeration areas) food price index is the arithmetic weighted mean of the food price indices of all households in the area. The municipalities' food price index, P_r^{Food}, is the arithmetic weighted mean of the food price indices of the enumeration areas in the given municipality. (See Table 3 for details of this price index by municipality.) Therefore this food price index adjusts for urban/rural price differentials to the extent possible.

While the LSMS does not report prices, it does report expenditures and quantities for purchased food items. This allows us to calculate unit values for each food item as the ratio of the expenditure to the quantity bought. Though unit values are not as accurate as prices because they may also capture differences in the quality of the item bought, it is the only data source for regional price differences. We use the unit values from the LSMS to calculate a separate food price index for each household. The reference price, $p_{k,0}$, is found by taking the national median unit value for item k. This assures that the median unit value are based on large number of observations and is likely to accurately reflect the true price.

As Table 3 shows, the regional price differences seem to be substantial. The most expensive areas are municipalities around Sarajevo while the cheapest area is the rural part of Republika Srpska. The cost of living difference between these extremes is 30%. As a result, the analysis of inequality and poverty has to take into account these regional price adjustments.

[10] We have chosen not to use a special price questionnaire files in each enumeration area, but to use the actual purchase prices reported by households in the survey, and aggregate it to the level of groups of enumeration area.

Table 3: Municipal Price Indices

Municipality	Price index $\sum_{k=1,h=1}^{KHH}(Q_{k,h}\,p_{k,r}) \sum_{k=1,h=1}^{KHH}(Q_{k,r}\,p_0)$
Banja Luka	1.034387
Novi Grad	.959391
Samac	.837426
Breza	.968828
Cajnice	.939077
Gradacac	.986082
Grude	1.102180
Kakanj	.951176
Modrica	1.033291
Posulje	1.171534
Prijedor	1.083033
Centar Sarajevo	1.059595
Srpska Ilidza	.990024
Novi Grad	1.037884
Novi Sarajevo	1.108279
Vogosca	1.098517
Knezevo	.937637
Srbac	.875046
Travnik	1.067698
Tuzla	1.004252
Visoko	.927554
Visegrad	1.028907
Zavidavici	.937829
Zenica	.939921
Zvornik	.979718

Source: BiH-LSMS-2001, authors' calculations

3.3.3 Per Capita or Per Adult Equivalent

Consumption data in the BiH-LSMS were collected at the level of the household rather than the individual as mentioned previously. This means that to attribute to individuals within the household their share of household resources an adjustment based on some allocation rule must be imposed. This is an important task: as Lanjouw et al [2000] have shown, varying the economy of scale parameter may change the relative poverty risks of different demographic subgroups of the population, notably the elderly and children.

There are, however, no set rules for calculating the exact adjustment for children and economies of scale (Deaton and Paxson 1998, Deaton 1997). A series of tests using BiH-LSMS data is described in the Technical Comment 1 on page (). The results reported clearly indicate that we do not have, on scientific grounds, any clear reason for selecting one equivalence scale over another.

Given this problem, it is important that the chosen equivalence scale seems plausible to people familiar with the structure of spending in the country. One way to

judge the plausibility of equivalence scale, is to consider the implications of the chosen equivalence scale on the monthly expenditures that make households of different compositions equally well-off. A final consideration for the choice of equivalence scale is comparability and ease of communication. To the general public, it is easier to explain the per capita scale that OECD scale ("the first adult counts as one, the other adults count as 0.7, and children count as 0.5"), which in turn is much easier than it is to explain the scales involving αs and θs.

Combining the results of the tests, the best judgment of the BiH statistics team on the plausibility of various scales, and considerations of comparability and ease of communication, we decided to use the per capita scale as our baseline and to use some of the other scales as robustness checks.

4 Construction of Poverty Lines in BiH

4.1 Extreme or Food Poverty Line

The food, or extreme poverty line for Bosnia and Herzegovina was constructed in the following way using the 2001 LSMS Survey data.

The first step for constructing a poverty line is to have an individual level welfare measure. The welfare measure used here is per capita annual consumption (see previous sections for how this was constructed). Individuals are then ranked by consumption level from lowest to highest. Once individuals are ranked, the next step is to determine the average food consumption patterns. Because our interest is in the lower end of the distribution, we focus on the consumption patterns of these people only, excluding the richer population. Here we select the bottom 30 percent of the population from which to obtain average consumption patterns. In actual fact, we do not use the lowest 10 percent as (i) these people may be so poor that their consumption patterns could be quite skewed from any normal pattern and, (ii) the observed low levels of consumption may reflect measurement error. To avoid the problems that might arise, we use the data for individuals in the10-30 percent consumption levels. This part of the sample is called "reference" group.

Once the basic food consumption patterns (average quantities of all food items purchased, received as gifts or consumed from own production) are calculated from this reference group of people, these foods were converted to calories. This basket reflects the patterns of consumption of the population and, hence, is the basis for the food poverty line.

The required level of calories per person, per day is set at 2100 kilocalories (kcal). For the reference individuals, on average, caloric consumption was well above 2100 kcal (amounting to 3431 kcal per day per capita on average), so the reference group average amounts were adjusted downward to create a 'food basket' that provides 2100 kcal with the proportion of calories from each food being the same as for the reference individuals. The final step was to convert these food quantities into a monetary value. This is done by multiplying the quantity by the observed prices. (See Table 4 for an example of how this was done.)

Table 4: Converting Food Consumption Patterns into a Food Poverty Line
(per person per day)

Goods	Average Quantity (grams)	KCalories per kilogram	KCalories obtained	Adjusted KCalories	Adjusted quantities (grams/day)	Average Price per Kilogram, KM	Cost Per day (KM)	Cost per year (KM)
Rice	11.6	4150	48	29	7	1.63	0.01	4.2
Bread	189.0	2410	455	275	114	0.87	0.10	36.2
Poultry	27.0	820	22	13	16	4.77	0.08	27.9
…	…	…	…	…	…	…		…
Sour Cream	16.3	1300	21	13	10	3.97	0.04	14.5
TOTAL			**3431**	**2100**				**759.86**

Note : Only partial list for illustrative purposes. See Technical comment 2 for detailed description.

Table 4 also shows the outcome of the final step in constructing a food or extreme poverty line. This consists of converting the food quantities into a monetary value. This is done by multiplying the quantity by the observed prices. The value of the food poverty or extreme poverty line is found to be 760 KM per person, per year.

The Technical Comment 2 reports detailed results of nutritional analysis of the basket derived with this simple method. It shows that in itself this basket does not meet detailed nutritional norm relevant for the population with the demographic structure of BiH. But it also shows that one can propose a basket with different quantities by items that would cost exactly 760 KM and would meet the most critical requirements at least at 100%.

This comparison illustrates a general point that a specific basket composition may and should differ across assumptions and methods. Setting a minimum food basket is not an exact science: all minima are based on certain assumptions about the activity level of individuals, the cooking methods and dieting habits of the population. However, what is important is that the minimum set in some approximate way allows a purchase of a basket of food that provides consumption of basic nutrients at least at the level of minimum norms, or better. The exact composition of such a basket may differ depending on the methods and assumptions, but is reasonable and consistent approximation of the extreme poverty line.

4.2 Construction of the General Poverty Line

As mentioned previously, individuals have non-food needs in addition to food ones. Taking into account the need for non-food consumption requires adding an allowance for non-food goods and services to the food poverty line. The 'upper-bound' method was used here to determine the value of the general poverty line.[11]

To determine the allowance for non-food consumption, using the data itself, first those individuals whose food consumption is equal (plus or minus 5 percent) to

[11] For details see: Martin Ravallion (1994), *Poverty Comparisons* Chur Switzerland, Harwood Academic Press.

the value of the food poverty line are selected. Now this part of the sample will constitute the reference group for the derivation of the general poverty line. The *share* of total consumption that goes to **non-food** consumption is calculated for this group. This share is the 'allowance' for non food consumption that is added to the value of the extreme poverty line to get the general poverty line.

In BiH, the share of non-food consumption among those whose food consumption equals the value of the food poverty line is 65.5 percent: food consumption represents 34.5 percent. The value of the general poverty line is thus:

General Poverty Line= Value of food consumption + Value of Non-Food Consumption

Where:

Food Consumption = Value of Food Poverty Line = 760 KM = 34.5 % of GPL
Non-food Consumption = 65.5 % of GPL

General Poverty Line = 760/0.345 = 2198 KM= 760 + 1438.

Such method of deriving the general poverty line is the simplest way to assess the value of the minimum consistent with the consumption pattern of the population. Other, more complicated methods are described in the Technical Comment 3. An application of these methods yields a wide array of choices to set the absolute poverty line based on LSMS data. This wide spectrum again highlights the basic point that we repeat throughout this analysis: setting a poverty line is not an exact science. At each stage it has to include considerable room for value judgments and expert opinions. Setting the non-food component is no exception to that rule. We have chosen the simplest method described above, as it is the most transparent, most easily replicable and most intuitive. It could be argued that other lines would be more accurate. For example the annex shows that a poverty line of KM 1840 might be considered to be a more robust alternative to this poverty line. But if a certain way to set the line it is not commonly understood, its use will not help the national poverty diagnostics. Given the fact that any poverty line is a matter of compromise, convention and includes in itself a policy judgment, the team considered the poverty line of around KM 2,200 per capita as the most accurate for the use with a LSMS BiH dataset, and for the analysis of poverty in the country.

5 POVERTY AND THE CHARACTERISTICS OF THE POOR IN BiH

The key finding in BiH is that, in 2001, there was no extreme or food poverty, but almost one-fifth of the population had consumption levels below the general food poverty line and, thus, are classified as poor. Inequality is low in the country. This section presents detailed information about poverty, the poor and inequality.

5.1 Poverty

The first estimate of poverty is based on the headcount index, or the percentage of the population in households whose per capita consumption is below the extreme or general poverty lines. In BiH, there is **no** measurable extreme poverty: all

households in the BiH-LSMS had per capita consumption levels above 760 KM per year. This does not mean that no household anywhere in the country suffers from food poverty: only that such cases are so rare that they are not captured in a sample survey. It is also important to note that 18.9 percent of the population spends on food less than the value of the minimum food basket. While not all of these people can be called food poor (as some may have lower physiological needs than implied by average norms or have deliberately selected low food consumption, -i.e. those on restrictive diets), it shows that there is definitely a measurable extent of deprivation in the country.

As shown in Table 9, 19.5 percent of the population is classified as poor. Urban municipalities have the lowest levels of poverty (13.8 percent) while the mixed (urban and rural) municipalities have the highest: 23.6 percent.

To highlight the complex distributional aspects of poverty, we estimate the depth (measured as poverty shortfall or as poverty gap) and severity of poverty (see section 1.5.1 for details on these measures). The **poverty gap** is equal to 4.6 percent.[12] A corresponding measure, of an average **shortfall** of 24 percent means that the average consumption of the poor falls 24 percent short of the poverty line. The poverty **severity** is a measure closely related to the poverty gap but giving those further away from the poverty line—the poorest—a higher 'weight' in aggregation than those closer to the poverty line. Its level in BiH is found to be 1.6 percent.

Table 5: Absolute Poverty Indices (Percent)

Poverty Measures	BiH	Urban	Mixed	Rural
Head Count	19.5	13.8	23.6	19.9
95% confidence interval ± p.p.	±3.6	±2.8	±6.7	±6.7
Poverty Gap	4.6	2.8	5.7	4.9
Severity of Poverty	1.6	0.9	2.1	1.6
Shortfall	23.5	20.5	24.1	24.4

Source: BiH-LSMS 2001. Per capita consumption and absolute poverty line. The type of location is defined according to the 1991 Census classification. Standard errors computed with the stratified sampling design (Kish effect) correction.

These data suggest that the depth and severity of poverty are not extreme, consistent with the moderate level of inequality observed in BiH. They also suggest that both distributionally sensitive measures and poverty incidence move closely in tandem: locations with high poverty incidence are also characterized by high poverty gap and severity. One can rely therefore on the simplest measure of poverty to derive conclusions.

Statistical estimates obtained on the basis of any sample survey have only a certain degree of precision. Surveys are designed to reveal the characteristics of the "universe" (or all households in the country) by studying only a limited number of cases. As the selection of such cases - respondents to be surveyed - is a random process, each result obtained in a survey has a certain probability of matching the

[12] A poverty gap of 4.6 percent means that if a country could mobilize resources equal to 4.6 percent of the poverty line for every individual and distribute these resources to the poor in the amounts exactly needed to bring each poor individual up to the poverty line, then, in theory, poverty could be eliminated at the moment the transfer was made.

corresponding value for the "universe". Previous surveys conducted in BiH by other agencies used non-probability sampling and, thus, estimates of the precision could not be calculated. The BiH-LSMS sample allows us to calculate the level of precision of our estimates: Table 5 reports the 95% confidence intervals for each point estimate.[13]

The confidence interval around the poverty point estimates is quite broad as is illustrated in Figure 1. Thus caution is required when comparing groups within the country in terms of poverty. Wide and intersecting confidence intervals for groups for which a comparison is carried out means that one cannot reject the null hypothesis that their poverty rates are the same. It does not, however, mean that we have to "accept" that the two rates are the same. What we learn from failing to reject a zero difference when the point estimate of the difference is large is that the BiH-LSMS sample is not large enough to be able to discern a substantively large difference in rates. And, if other sources of information also suggest that large difference in point estimates between Entities exist, then the observed pattern is evidence of real differences. Thus this example underscores the need for using other data sources along with the BiH-LSMS data when drawing conclusions.

Figure 1: Poverty Incidence by Location in the RS and FBiH, 95 Percent Confidence Intervals

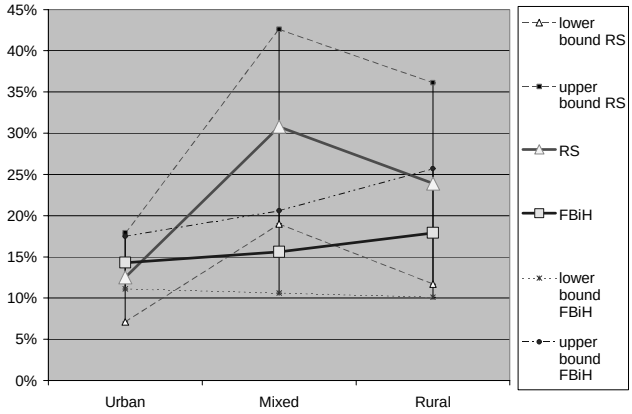


Figure 1. How to read this graph? For the baseline poverty definition, it shows percentage of population by type of strata and entities (solid lines). Broken lines show upper and lower bands for 95 percent confidence intervals for poverty rates (poverty rate is within upper and lower bound with 95 percent confidence).

5.2 Inequality

We use a range of measures of inequality to address its various facets. The results of this are shown in Table 6. The decile ratio (90/10 percentile ratio) shows what multiple of the consumption of the richest person in the bottom decile is consumed by the poorest person in the top decile. The 90/10 ratio is the product of the 90/50 ratio ("rich to middle" ratio)and the 50/10 ratio ("middle to poor"). The distance between the middle and the poor in the RS is noticeably wider than in FBiH, while the rich are

[13] Reported survey results should be accompanied by the standard errors for each value. With almost perfect (95%) certainty (called 95 percent confidence in the text) the true value lies within two standard errors of the mean estimate from the survey. This is the format in which Table 9 reports the LSMS data. For example, a poverty rate of 19.5% for the country has a standard error of 0.018, therefore the Table reports the statistical range for the poverty rate as 19.5% ± 3.6 percentage points (=0.018·2), meaning that, with 95% probability, the actual value for this variable in BiH lies between 15.9% and 23.1%.

above the middle by similar ratio in the two Entities. Another way of comparing groups is to look the share of total consumption going to the top and bottom quintiles. In BiH, the poorest 20% of the population (in terms of consumption) commanded about 9.1% of total equivalent consumption, while the richest 20% used about 36.3%.

The Gini coefficient, Theil and log mean deviation show inequality to be relatively low in the country. We also report the Gini index adjusted for scale economies according to the OECD methodology which gives a slightly lower inequality level. As can be seen in Table 6, {} the distribution of consumption in the two Entities is similar. Inequality is not completely absent, however, as there are significant differences both among the rich and among the poor.

Table 6: Inequality indices for BiH and Entities

Inequality Index	BiH	RS	FBiH
Decile ratios of the consumption per capita (ratio of consumption of the rich to the poor)			
90/10 percentile ratio	3.29	3.49	3.13
Middle to poor (50/10)	1.82	2.00	1.74
Rich to middle (90/50)	1.81	1.74	1.80
Quintile shares of total national (entity) consumption , percent			
Poorest 20% of the population	9.5	9.2	9.9
Lower middle 20%	14.2	14.3	14.2
Middle 20%	17.9	18.3	17.7
Upper middle 20%	22.7	23.1	22.5
Richest 20% of the population	35.8	35.1	35.8
Other inequality indices			
Gini index	0.26	0.26	0.26
Mean log deviation (Theil)	0.11	0.11	0.11
Entropy index	0.12	0.11	0.12
Gini index: using OECD scale	0.24	0.24	0.23

Source: LSMS 2001 primary data.
Note: Unless otherwise stated, all measures use the general poverty line and per capita consumption.

5.3 Poverty Risk

By examining the poverty risk for different groups of the population, one can gain insights into which factors are associated with poverty and which population groups are most at risk. Such information is essential for the development of an efficient poverty reduction strategy.

The key findings on poverty risk are shown in Table 7. The BiH-LSMS reveals several groups whose risk of poverty is above the national average. First, children (especially in the RS) are at a particular disadvantage. Second, IDPs and refugees have a significantly higher poverty risk than other groups. It is interesting, that returnees have a very high poverty risk in RS, but that their poverty risk is significantly below average in the Federation, highlighting different conditions for return and perhaps explaining the observed return patterns. A final point differentiating the RS from the FBiH is that living in mixed (semi-urban) locations in the RS doubles the risk of being in poverty.

Another group with a higher than average risk of poverty are the unemployed and discouraged workers. The unemployed have at least double the poverty risk

compared to the employed. And, finally, education, or the lack of it, is also associated with a higher risk of poverty as those individuals living in households with a head of household with only a primary education or less are about three times more likely to live in poverty.

Table 7: Poverty Profile: Poverty Rates by Groups

Characteristics (personal and household)	Poverty Incidence, BiH	Standard Error[1]	Poverty Incidence RS	Standard Error[1]	Poverty Incidence, FBiH	Standard Error[1]
Location						
Urban	13.8%	0.014	12.5%	0.027	14.3%	0.016
Mixed	23.6%	0.034	30.8%	0.059	15.6%	0.025
Rural	19.9%	0.034	23.9%	0.061	17.9%	0.039
War displacement status[2]						
Place of residence unaffected by war	19.4%	0.026	23.2%	0.050	17.5%	0.028
Moved during the war	12.1%	0.016	14.5%	0.035	10.8%	0.015
Returnees (DPs and refugees)	16.7%	0.033	28.4%	0.061	11.0%	0.037
Remain DPs or refugees	34.3%	0.041	38.0%	0.063	29.2%	0.037
Age of a person						
Children (18 and below)	27.2%	0.025	32.2%	0.042	24.6%	0.030
Youth (19-24)	18.1%	0.026	23.9%	0.053	14.4%	0.025
Prime working age (25-49)	19.8%	0.020	25.0%	0.040	16.8%	0.019
Pre-retirement age (50-55F/60M)	14.4%	0.023	21.8%	0.052	9.2%	0.014
Retirement (>55 women, >60 men)	13.0%	0.015	19.1%	0.030	8.6%	0.014
Education of the household head						
None	28.4%	0.052	34.5%	0.092	21.5%	0.049
Primary	25.6%	0.030	31.1%	0.057	21.6%	0.028
Secondary	9.9%	0.017	11.2%	0.026	9.4%	0.022
Secondary Vocational	18.4%	0.023	21.8%	0.040	16.6%	0.027
Junior College	9.8%	0.024	12.2%	0.043	7.8%	0.028
University	2.2%	0.008	2.7%	0.014	2.0%	0.009
General employment status of the household head						
Elderly[3] not working	18.7%	0.022	27.8%	0.042	12.6%	0.022
Working age, not employed	28.1%	0.031	36.7%	0.054	24.7%	0.037
Employed	16.0%	0.021	19.7%	0.043	13.5%	0.020
Detailed employment status of adults[4]						
Economically inactive (ILO)	20.5%	0.021	25.7%	0.042	17.9%	0.024
Student	8.0%	0.024	12.6%	0.062	5.8%	0.018
Unemployed (ILO)	29.1%	0.043	39.0%	0.082	22.0%	0.033
Employed in the informal sector	16.7%	0.028	19.0%	0.044	14.3%	0.037
Employed in the formal sector	12.4%	0.023	18.4%	0.051	8.2%	0.011
Registered labor market status of adults						
Dependent family member[5]	21.6%	0.028	27.8%	0.054	17.8%	0.027
Pensioner, disabled, student	13.4%	0.013	17.3%	0.026	10.8%	0.013
Registered unemployed	24.0%	0.022	29.1%	0.038	20.8%	0.027
Registered employed	12.4%	0.024	18.7%	0.054	8.2%	0.011
Size of the household						
1 Person	2.8%	0.009	2.9%	0.010	2.7%	0.013
2 Persons	6.3%	0.010	9.4%	0.019	4.6%	0.011
3 Persons	10.6%	0.020	15.9%	0.044	7.2%	0.014
4 Persons	17.4%	0.023	21.2%	0.049	15.2%	0.021
5 and more	33.8%	0.036	40.7%	0.063	29.1%	0.040
Total	19.5%	0.018	24.8%	0.038	16.3%	0.018

Source: BiH-LSMS 2001. Poverty is based on consumption aggregate per capita with adjustment for spatial price variation, and general national poverty line.
Note: DPs stand for Internally Displaced Persons.
[1] Standard errors corrected for stratified sample design. 95 percent confidence interval is approx. ± 2 st. errors around the mean.
[2] Based on migration module, for children below 15 based on household head status
[3] Pension age
[4] The employment status is defined according to the ILO criteria (see Annex for details of the definition). The upper bound for working/retirement age are defined at the age of 55 for females and 60 for males, lower bound is 15. The informal sector is defined based on health and pension insurance coverage, individuals reporting working without such coverage are classified as informal sector workers.
[5] Not working, not a pensioner or disabled, and not registered as unemployed

The BiH-LSMS also reveals groups that, contrary to common belief, are **not** among the poorest, and actually do not fare much worse than average. The first of

these is the elderly. In fact, elderly individuals of pension age are less likely to be poor than an average person in the country. The other group is those employed in the formal sector, especially in the formal sector. Actually, no group is doing better, on average, than formal sector workers. Working in the informal sector, while not quite as beneficial, also carries with it a below average poverty risk.

It is important to note, when discussing which groups have greater or lesser poverty risks, that some groups which are perceived by the public as especially vulnerable and requiring specific, well-targeted help (Roma women, for example, or IDP in collective centers) are not covered adequately by LSMS sample. The groups are either too small, or do not fall into the household sample frame. Qualitative data or additional targeted sampling of such individuals will be needed to assess their situation.

5.4 Composition of Poverty

Who then, are the poor in BiH? Knowledge about the composition of the poor will help us understand which policies have the best chance of reaching, and assisting, a large fraction of the poor. The poor are a heterogeneous group: poverty affects very different groups in BiH and is not limited to a narrow subset of individuals.

Table 8 lists the composition of the population by main categories, and the share of each category among the poor. Five important features of the poor in BiH emerge from the analysis. First, poverty in Bosnia and Herzegovina tends to have a young face: around a third of all poor are below 18, and two-thirds of the poor live in families with children. Therefore issues related to labor markets, child welfare and education will be central for developing a strategy to reduce poverty in the long-term.

The importance of education is reinforced by the finding that just under 60% of the poor live in households where the household head has only primary education or less. Thus, an emphasis on education--education reform to help the young who are still acquiring their human capital to acquire better education, and improvement of opportunities for older people with little education-- can be important policy areas to help a large share of the poor.

A third important finding is that the BiH-LSMS data reject a common perception that in BiH poverty is fundamentally the result of unemployment. Unemployed (actively searching for work) and discouraged workers (those who would like to work but who have given up searching) represent only one-third of all poor people. If we look at a household as an economic unit, the conclusions are even stronger. Less than 20 percent of the poor live in households where the head is unemployed or is a discouraged worker. The group of poor living in households with a **working** household head is much larger: 40 percent of the poor live in such households. Overall, 60 percent of the poor live in households where someone is employed, therefore falling into a broad category of **working poor**. Thus, contrary to current thinking, policies aimed at promoting efficiency and raising the productivity of employment will have a greater effect on poverty than employment promotion *per se*. It should be noted, however, in terms of poverty risk, that the unemployed do face a higher risk than the employed or inactive persons. But, because this group is not

large relative to others, simply because the unemployed have a higher risk of poverty does not mean that they represent a large fraction of the poor.

Table 8: Poverty Profile: Composition of the Poor Population by Groups (percent)

Characteristics (personal and household)	Share in Population, BiH	Share among the Poor, BiH	Share in Population, RS	Share among the Poor, RS	Share in Population, FBiH	Share among the Poor, FBiH
Location						
Urban	25.6	18.2	18.6	9.4	29.9	26.3
Mixed	31.6	38.2	43.6	54.2	24.3	23.3
Rural	42.8	43.7	37.8	36.4	45.9	50.5
War displacement status[1]						
Place of residence unaffected by war	46.2	45.9	40.1	37.6	49.9	53.6
Moved during the war	29.6	18.4	28.4	16.6	30.3	20.2
Returnees (DPs and refugees)	7.6	6.5	6.6	7.5	8.3	5.6
Remain DPs and refugees	16.6	29.2	24.9	38.3	11.5	20.7
Age of a person						
Children (18 and below)	24.7	34.4	22.2	28.9	26.2	39.6
Youth (19-24)	9.1	8.5	9.2	8.9	9.0	8.0
Prime working age (25-49)	35.1	35.7	34.4	34.7	35.6	36.6
Pre-retirement age (50-55F/60M)	9.9	7.3	10.9	9.5	9.3	5.2
Retirement (>55 women, >60 men)	21.3	14.2	23.4	18.0	19.9	10.5
Education of the household head						
None	7.9	11.5	11.0	15.3	6.0	7.9
Primary	35.7	46.9	39.4	49.5	33.4	44.6
Secondary	13.0	6.6	9.5	4.3	15.1	8.7
Secondary Vocational	34.1	32.2	31.7	28.0	35.5	36.2
Junior College	4.6	2.3	5.3	2.6	4.1	2.0
University	4.8	0.5	3.0	0.3	5.9	0.7
General employment status of the household head						
Elderly[2] not working	25.5	24.5	27.2	30.6	24.4	18.9
Working age, not employed	23.0	33.2	16.9	25.1	26.8	40.8
Employed	51.5	42.3	55.8	44.3	48.8	40.4
Detailed employment status of adults[3]						
Economically inactive (ILO)	47.3	53.8	40.9	45.5	51.3	62.0
Student	3.6	1.6	3.0	1.6	4.0	1.6
Unemployed (ILO)	7.9	12.7	8.5	14.3	7.5	11.1
Employed in the informal sector	15.0	13.9	19.9	16.4	11.9	11.4
Employed in the formal sector	26.3	18.0	27.8	22.1	25.4	14.0
Registered labor market status of adults						
Dependent family member[4]	31.5	39.0	30.5	37.4	32.1	40.5
Pensioner, disabled, student	30.9	23.7	31.5	24.0	30.6	23.3
Registered unemployed	16.0	21.9	15.5	19.9	16.3	23.9
Registered employed	21.6	15.4	22.6	18.6	21.0	12.1
Size of the household						
1 person	4.9	0.7	5.2	0.6	4.8	0.8
2 persons	13.6	4.3	12.5	4.7	14.2	4.0
3 persons	18.1	9.8	18.7	12.0	17.7	7.8
4 persons	29.5	26.3	28.0	24.0	30.4	28.4
5 persons and more	34.0	58.8	35.7	58.6	32.9	59.0
Total	100	100	100	100	100	100

Source: BiH-LSMS 2001. Poverty is based on consumption aggregate per capita with adjustment for spatial price variation, and general national poverty line.

[1] Based on migration module, for children below 15, information imputed from the migration status of the household head

[2] Of pension age

[3] The employment status is defined according to the ILO criteria (see Annex for details of the definition). The upper bound for working/retirement age are defined at the age of 55 for females and 60 for males, lower bound is 15.

[4] Not working, not a pensioner or disabled, and not registered as unemployed

A sizeable share of the poor is elderly. As many as 20 percent of the poor are retired or incapable of working. If we add the disabled to this group, then close to a quarter of the poor in the country are not able to work. Thus labor market programs will affect them only indirectly (through increased incomes of other household members).

Finally, the poor are not regionally concentrated. While poverty rates do vary across regions, poor individuals can be found throughout BiH. Half of the poor in BiH are located in the RS, half in the FBiH. Only 20 percent of the poor live in predominantly urban municipalities, thus poverty is spread in small communities-- villages and towns-- across the country.

6 CHECKS OF ROBUSTNESS OF POVERTY FINDINGS

As should be clear from the previous sections of this paper, the measurement of welfare using household data is based on a range of decisions and assumptions. Given this, it is important to test the results of the analysis against other assumptions to determine how robust the findings are. In the case that a change of assumptions would drastically alter the findings, then one would need to be extremely cautious in using the results.

From the poverty profile we have found that municipality type, entity, education, residential status, labor status and the composition of the household are highly correlated with poverty. Thus we run tests of robustness of these findings to changes in assumptions about economies of scale and alternative poverty lines to determine whether they remain the same. Any changes in the relationship of these characteristics with poverty rates would be indicative of a need to exercise care in interpreting the findings of the previous section.

6.1 Alternative Measure of Welfare

In theory, one potential test that could be used to test the robustness of our findings would be to compare the poverty rate obtained using total consumption and one that would be obtained using a measure of total income. As explained in Section 1.2 above, however, income in household surveys is often measured with a large degree of error. And, in the BiH case, the experience of both the pilot survey and the actual survey showed a large degree of under-reporting of self0employement or informal labor. Thus the total income aggregate is probably not a good measure to use for a comparison: it would be impossible to discern what differences are due to measurement error and what to the slightly different concepts embodied in income and consumption.

6.2 Robustness Checks with Respect to Equivalence Scales

We start by looking at whether or not including economies of scale in the analysis would change the basic profile of the poor in the country. One key decision made in the welfare analysis is the choice of equivalence scales. We have used a per capita measure of consumption, assigning household consumption evenly among all household members. We need to check for the robustness of our results to this choice of an equivalence scale. The use of a per capita measure of individual welfare assumes that there exist no economies of size in household consumption, in the sense that the per capita cost of reaching a specific welfare level does not fall as household size increases. If these assumptions are relaxed, this could affect comparisons of poverty between large and small households, and in turn could affect rankings of different household groups: households comprising the elderly are relatively small, while households with many children tend to be relatively large.

In the case of LSMS data for BiH we have not discovered any evidence of significant statistically measurable economies of scale. Given our inability to precisely observe the degree of economies of size in consumption for a household, the question then boils down to how sensitive conclusions regarding the poverty profile, are to the presence of economies of scale. If we find that deviations from the zero economies of size assumption result in sharp re-rankings between groups, then there is clearly reason for caution in interpreting baseline poverty profile results. Thus we need to check whether some groups get systematically shifted in this way by running a poverty profile with a different assumption. If we do not find this evidence, we can be sure that our poverty profile is robust to the choice of the welfare measure.

To simplify the test we construct a set of poverty measures using the OECD I (old) equivalence scale[14] and the OECD II (new) equivalence scale[15]. The OECD II equivalence scale implies far greater scale economies than the OECD I scale. As any assumption about scale economies affects the level of welfare at the household level for all households with more than 1 member, we should not apply the poverty line derived for per capita values to the per equivalent welfare indices to get poverty status. Instead, we choose the poverty line so that the overall poverty incidence remains the same but allows the economies of scale to re-rank households That gives us results which are easily comparable.

The goal of this comparison is to determine the extent to which taking into account economies of scale would affect the overall profile of poverty that we have constructed. Therefore, we test the key poverty profile results for the measurement assumptions, looking at the changes in incidence by location, displacement status, labor market status, education and household size.

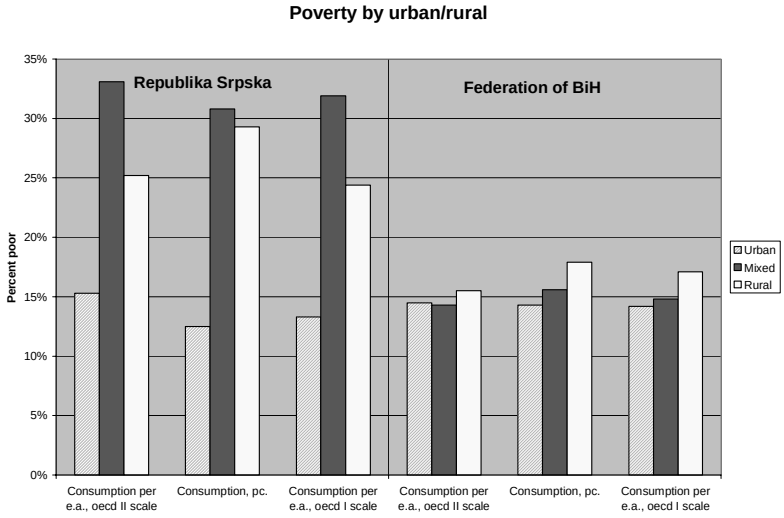
6.2.1 Location and poverty

Figure 2 shows poverty rates by type of municipalities. Though there is some slight change in the poverty incidence by type of municipality, with the OECD II scale leading to a slightly higher poverty incidence in urban areas, overall results and relative ranking are very consistent across all scale assumptions, and therefore are robust to these adjustments.

[14] First adult is 1, every subsequent is .7, every child is 0.5 of an "equivalent adult". In terms of theta and alpha, and with the demographic data that we have in LSMS, it can be approximated by theta of 0.84.

[15] First adult is 1, every subsequent is .5, every child is 0.3 of an "equivalent adult". In terms of theta and alpha, and with the demographic data that we have in LSMS, it can be approximated by theta of 0.62.

Figure 2: Poverty by Municipality Type, Comparison of Equivalence Scales



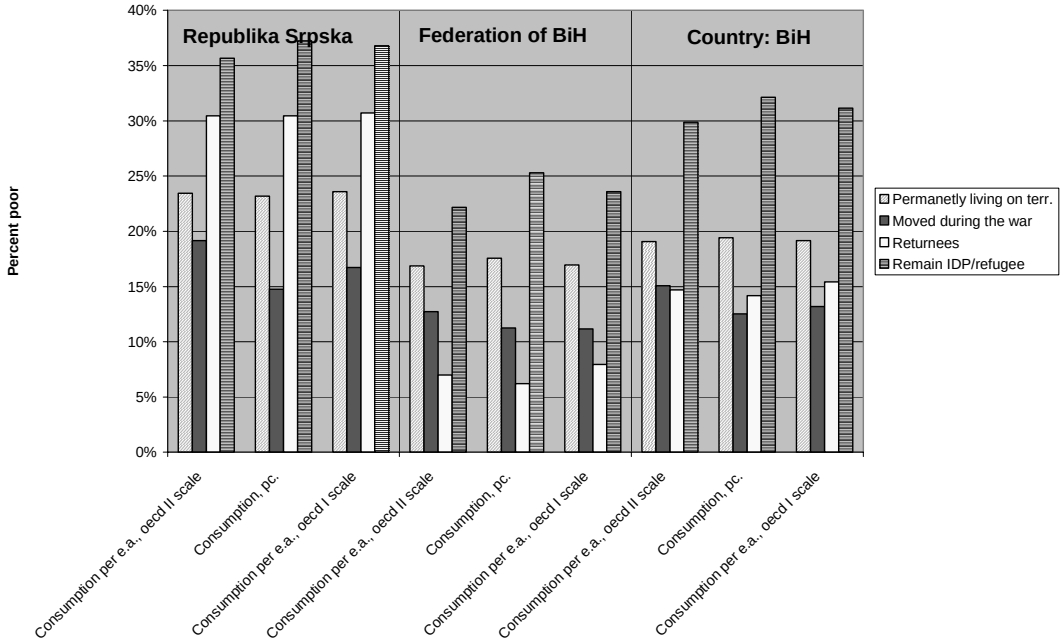
Note**:** The two panels from left to right show results for RS and FBiH. Each vertical bar represents the level of poverty risk for a type of municipality (see legend on the right). On the horizontal axis are the methodologies used to measure poverty: per capita is in the centre of each panel, the OECD II scale is to the left and the OECD I to the right. Comparing the height of the bars inside each panel, we can see to what extent the poverty risks are robust to economies of scale adjustments.

Note that the mixed municipalities keep their rank as poorest in RS and the least poor in the Federation regardless of the measurement assumption. Thus the poverty profile results are reasonably robust to changes in the methodology regarding the scale economies and the equivalence scale, in a sense that poorest and richest regions do preserve their rank across methods.

6.2.2 Poverty by Displacement Status.

In Figure 3 is a comparison across residence status (returnee, displaced, refugee, etc.) using the different equivalence scales. The figure shows how remarkably robust the conclusion about the poverty of IDPs and refugees and returnees are to measurement assumptions. This the most robust and consistent finding that holds across the approaches applied.

Figure 3: Poverty by Displacement Status, Comparison of Equivalence Scales

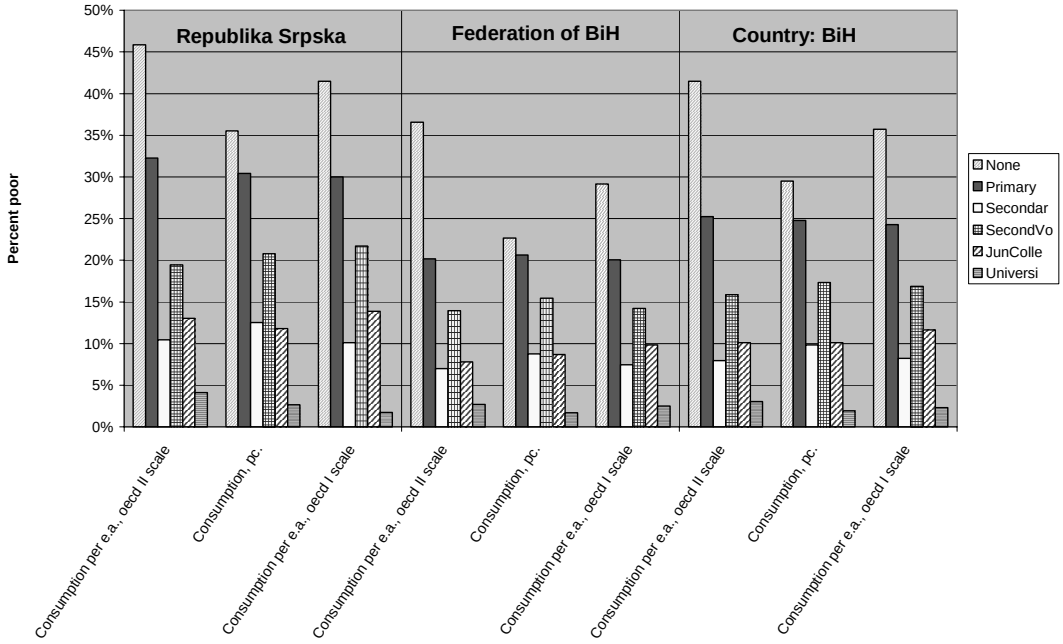


Note: The three panels from left to right show results for RS, FBiH and BiH. Each vertical bar represents the level of poverty risk for a group (see legend on the right). On the horizontal axis are the methodologies used to measure poverty: per capita is in the centre of each panel, the OECD II scale to the left and the OECD I scale to the right. Comparing the height of bars inside each panel, we can see whether the poverty risk is robust to economies of scale adjustments and comparing the same type of bar across panels one sees whether risks for a group are the same between Entities.

6.2.3 Education of the Household Head

Figure 4 shows that education levels, which are a key determinants of poverty risk, maintains its importance regardless of the assumptions on economies of scale. The use of the per capita scale (in the center of each panel) makes the profile "flatter" (i.e. diminishes differences between education categories) compared to some adjustment for scale economies, suggesting a systematic relationship between the level of education of the household head and the household size, but the ranking is always preserved. It is also remarkably stable with respect to equivalence scale assumptions.

Figure 4: Poverty of Education of Household Head,
Comparison of Equivalence Scales



Note: The three panels from left to right show results for RS, FBiH and BiH. Each vertical bar represents the level of poverty risk for a group (see legend on the right). On the horizontal axis are the methodologies used to measure poverty: per capita is in the centre of each panel, the OECD II scale to the left and OECD I to the right. Comparing the height of bars inside each panel, we can see the extent to which the poverty risk is robust to economies of scale adjustments. Comparing the same type of bar across panels one sees whether risks for a group are the same between Entities.

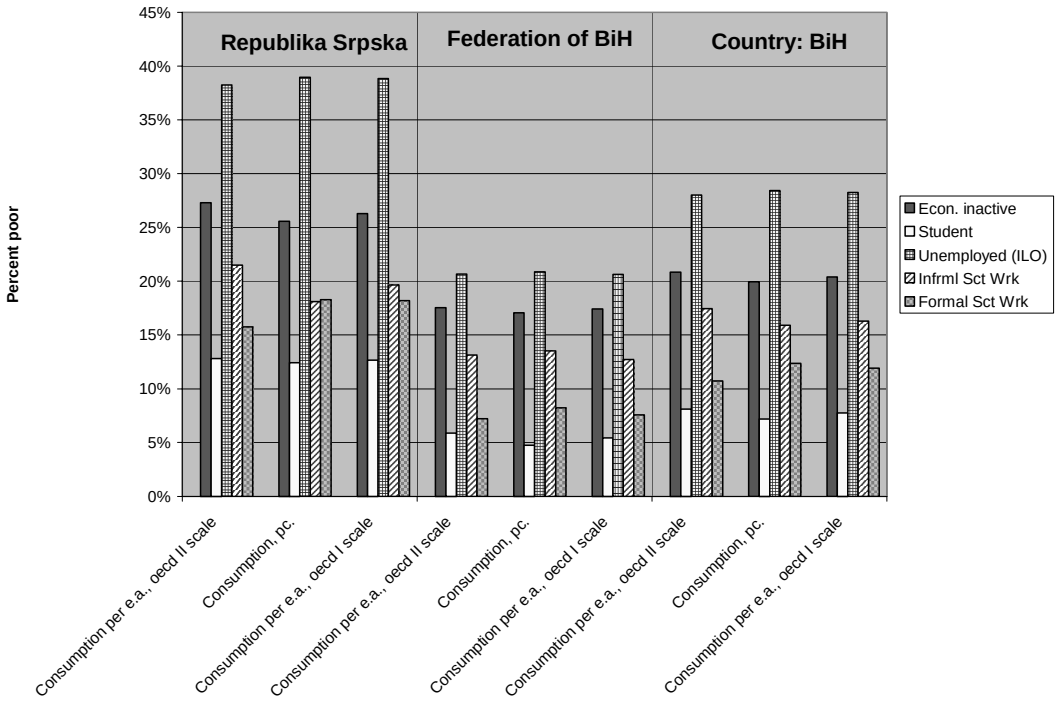
6.2.4 Employment Status

We use three different measures of employment status to address the effects of including economies of scale in the poverty numbers: standard definitions of labor force status based on the International Labor Organization's (ILO) definitions, administrative definitions of labor force status using the BiH administrative classification and, status of the household head, using the ILO definitions. The standard, or ILO definitions classify a person as employed if they are presently working or on leave from a job. The unemployed are all those who do not presently have a job, are actively searching for employment and are able to take a job today if it were offered to them. All others of working age are classified as inactive. The BiH administrative classifications affect those not working of working age and considers those who are registered at the Employment Service Office as unemployed, regardless of whether they are actually inactive or, even in many cases, employed.

If we look at Figure 5, which compares the relative risk of poverty by employment status across methodologies using the standard definitions, we see quite a robust picture: the unemployed have much higher risk of poverty regardless of the method used to measure poverty. There is a remarkable stability and robustness of conclusions regarding the relative risk by employment status. In all variants the

unemployed clearly stand out, while employment in all cases is clearly working against poverty risks. There is also a very clear ranking between the entities by the type of employment which is preserved under the variations in the equivalence scales used.

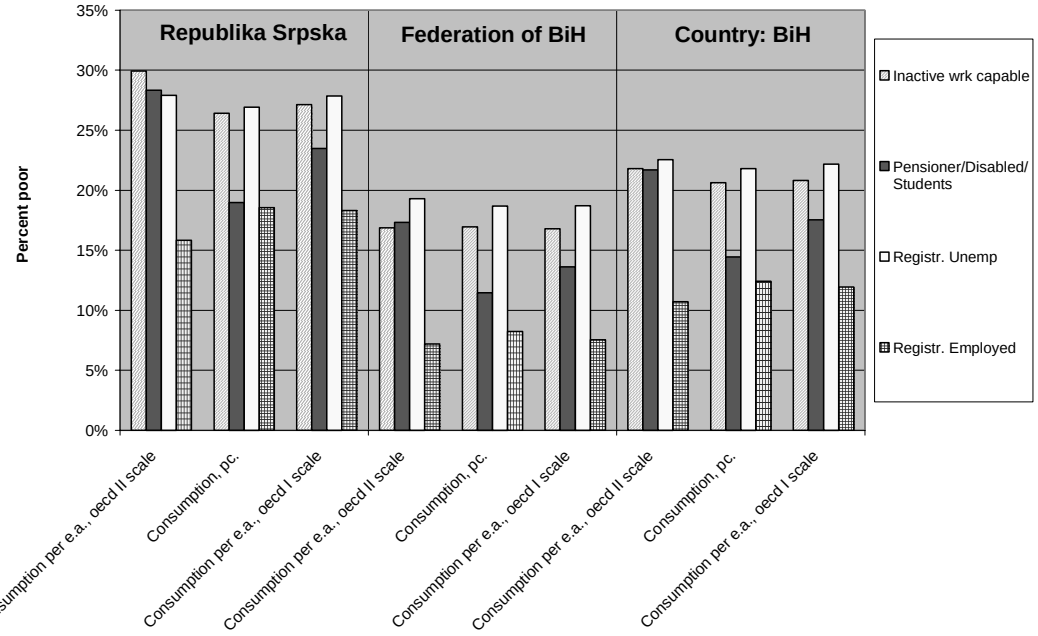
Figure 5: Poverty by Employment Status, Comparison of Equivalence Scales



Note: Definitions of the labor market status: see the Annex 1

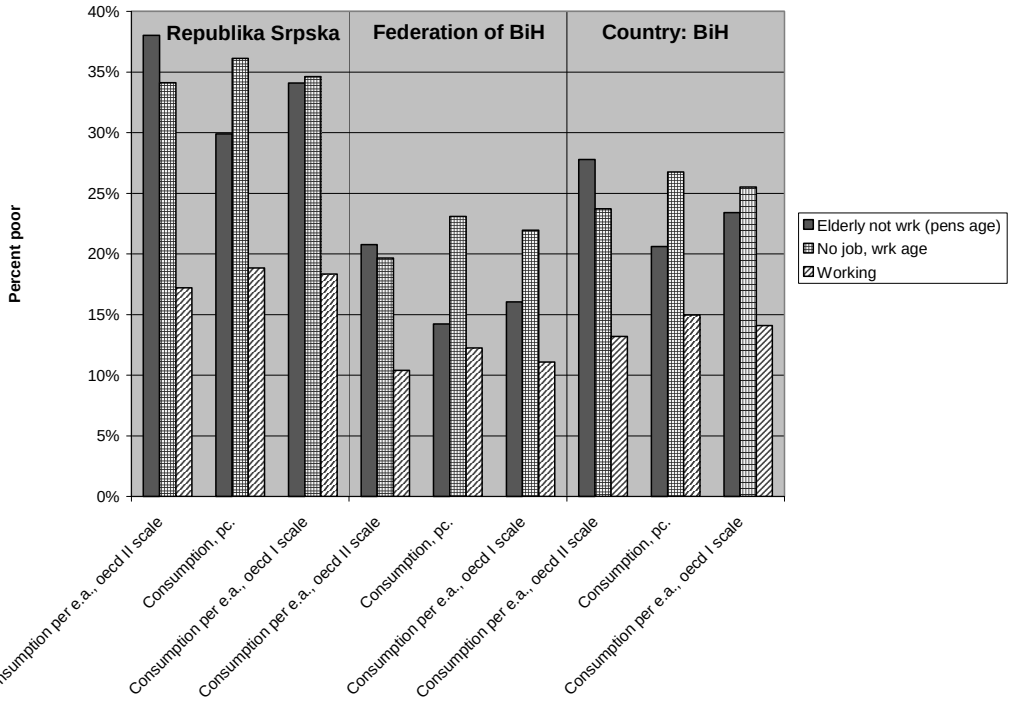
Figure 6 is the same as Figure 5, only the employment status variables are administratively defined. This comparison highlights the robustness of poverty by economic (labor market) characteristic. It also shows that poverty is much more clearly correlated with economically-based categories, such as the ILO definitions, rather than formal status (registered unemployed for example).

Figure 6: Poverty by Official Labor Status, Comparison of Equivalence Scales



Finally, Figure 7 shows the status of the household head in the labor market using the ILO definitions. Here, we start to see some differences across groups, as demographic factors influence this set of outcomes more than any of the previously listed results. Notice that for any economies of scale different from per capita we do not see significant differences between poverty risks for households headed by the elderly and households headed by jobless, working age adults. Clearly, this result is a reflection of differences in the household size, and not deep underlying labor market determinants. Thus the poverty profile results are more robust in the part concerning the individual labor market status, especially its ILO-consistent characteristics.

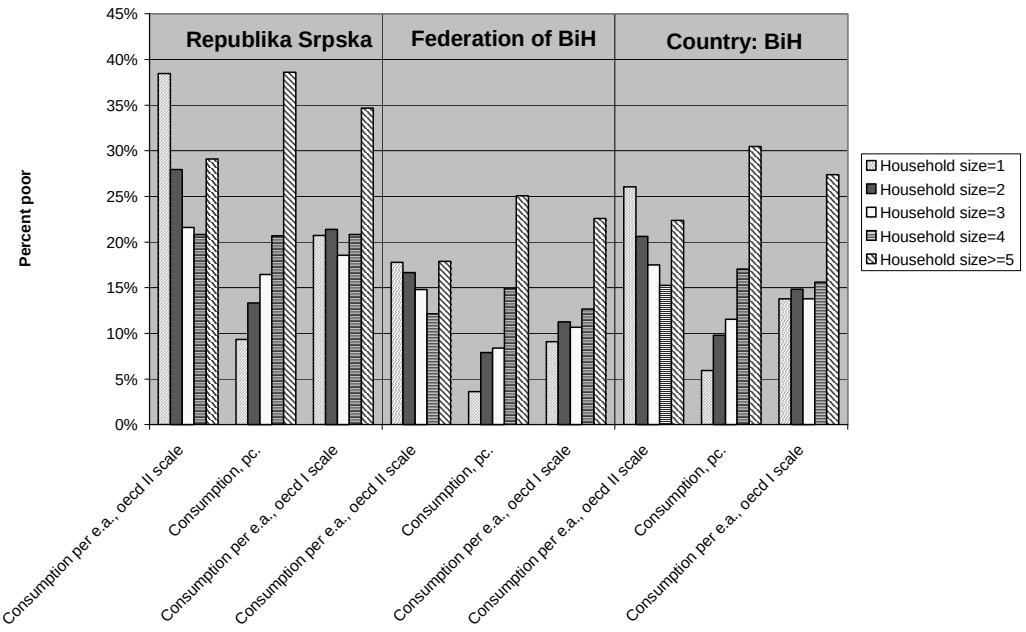
Figure 7: Poverty by Labor Status of Head of Household, Comparison of Equivalence Scales



6.2.5 Household Size

Poverty by household size is the demographic variable that is expected to be most sensitive to economies of scale assumptions. And this is indeed what we find (see Figure 8). The poverty profile has a very clear stepwise shape if we use the per capita scale: larger households are poorer than smaller ones. As soon as we control for economies of scale and the differential cost of children, however, the differences in poverty risks by size disappear, and the profile becomes much flatter. Note, however, that large households remain the poorest even controlling for scale economies with OECD I scale. OECD II scale produces a profile that reverses the relative position of the one-member households, become members of the poorest group. Thus all groups that are more likely to be found in this group (i.e. elderly) suddenly become characterized as the poor. But the elevated poverty risk for largest households (5 and more members) are preserved even with this extreme scale of adjustments.

Figure 8: Poverty by Household Size, Comparison of Equivalence Scales



In conclusion, the key determinants of poverty and economic vulnerability are essentially the same regardless of the equivalence scale used here. Demographic and location factors are less robust to changes in measurement assumptions. But the key conclusions, even for demographic correlates of poverty are not altered with different variants of measuring poverty.

6.3 Alternative Poverty Lines

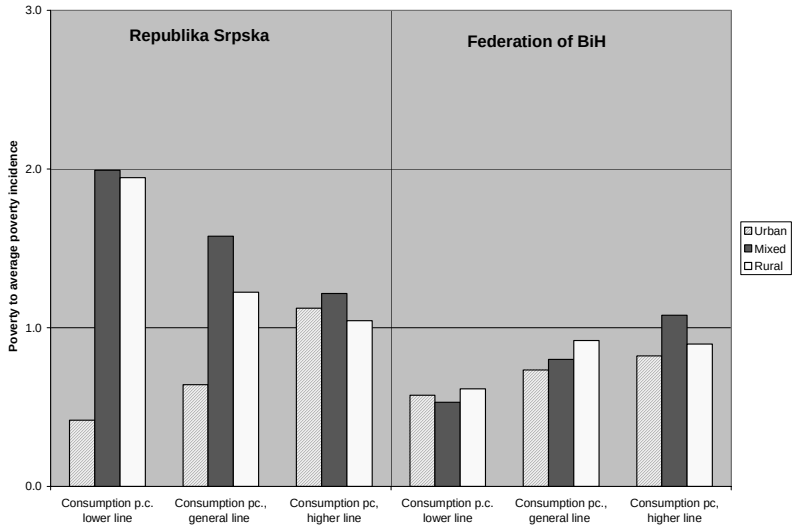
We now look at what impact changing the value or level of the poverty line itself has on the key characteristics of the poor that we obtain from the data. We construct two alternative poverty lines to test whether the profile of those just above our general poverty line and those well below the baseline poverty line differ significantly from the characteristics of the baseline poor. The first alternative line is one that is 50% higher. This produces an overall poverty incidence of 53.1 percent. The second alternative line is lower, as is the line that is often used in BiH to trace the evolution of poverty over time: KM 200 per month per family of four. Applying per capita conversion to this line, we get a value that is one third of the general poverty line that we have calculated. This lower line applied to per capita consumption measure gives a poverty incidence of just 5.4 percent. Obviously, changing the value of the poverty line changes the incidence of poverty. But what we are concerned about is whether it re-ranks households in such a way as to change the profile of poverty. To focus on this and to make results across such different poverty numbers comparable, the incidence of poverty for each group is expressed as a relative risk, i.e. divided by the national poverty rate for each line.

We test to what extent key poverty profile results are sensitive to the level of poverty line defined based on consumption patterns of the poor, looking at the changes in incidence by location, displacement status, labor market status, education and household size.

6.3.1 Location and poverty

In Figure 9 we look at the poverty by type of municipality. There are significant changes in the poverty incidence by type of municipality, with the lower alternative line leading to a much sharper poverty profile in the RS (mixed municipalities have twice the average poverty risk with lower line, compared to "just" 60 percent above the average in the baseline). With the higher alternative poverty line differences in the risks by groups get blurred, but overall the profile is preserved with mixed municipalities having a higher risk. In the Federation, as the lower alternative poverty line produces overall a poverty incidence significantly below the average for all groups, differences by group are only slightly more pronounced than for the baseline picture in the center.

Figure 9: Poverty by Location Comparing Alternative Poverty Lines



Note: The two panels from left to right show results for RS and FBiH. Each vertical bar represents the relative poverty risk for a group (see legend on the right). On the horizontal axis are the methodologies used to measure poverty: baseline approach in the center, 33% lower poverty line to the left and 50% higher line to the right. Comparing the height of bars inside each panel, we can see whether the poverty risk is robust to the poverty line level.

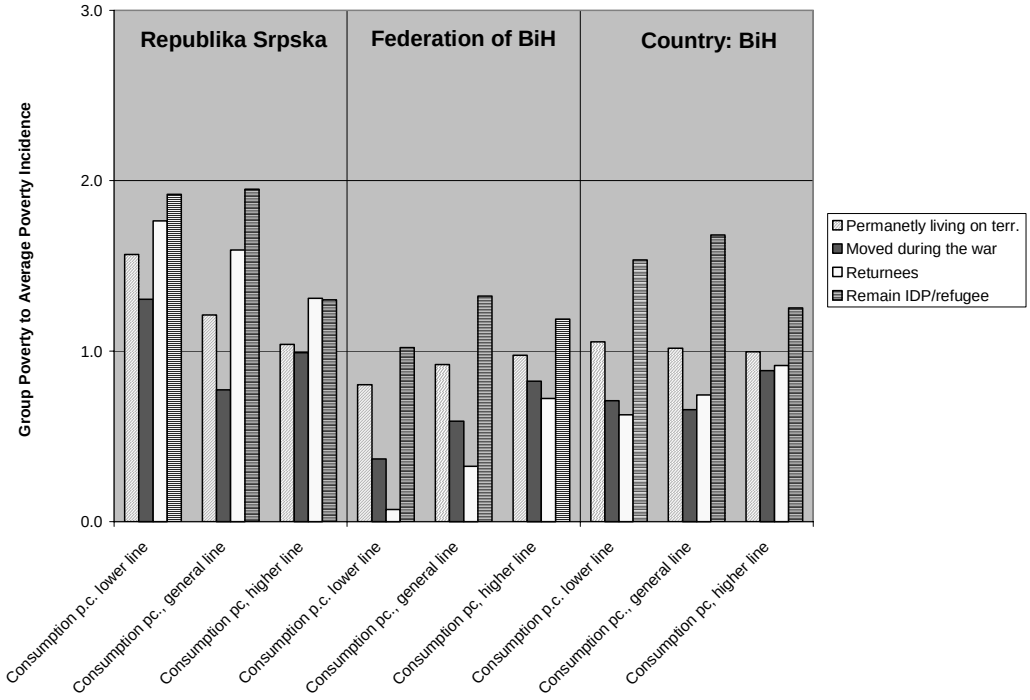
Poverty profile results are thus quite sensitive to changes in the methodology regarding the exact location of the poverty line, in the sense that the poorest and the richest regions do not always preserve their rank across sets of lines and Entities.

6.3.2 Poverty by displacement status.

In Figure 10 is a comparison by the status of displacement with different poverty lines. The Figure shows how remarkably robust is the conclusion about the

poverty of IDPs and refugees and returnees to measurement assumptions. This is the most robust and consistent finding that holds across all methodologies and approaches applied.

Figure 10: Poverty by Displacement Status Comparing Alternative Poverty Lines

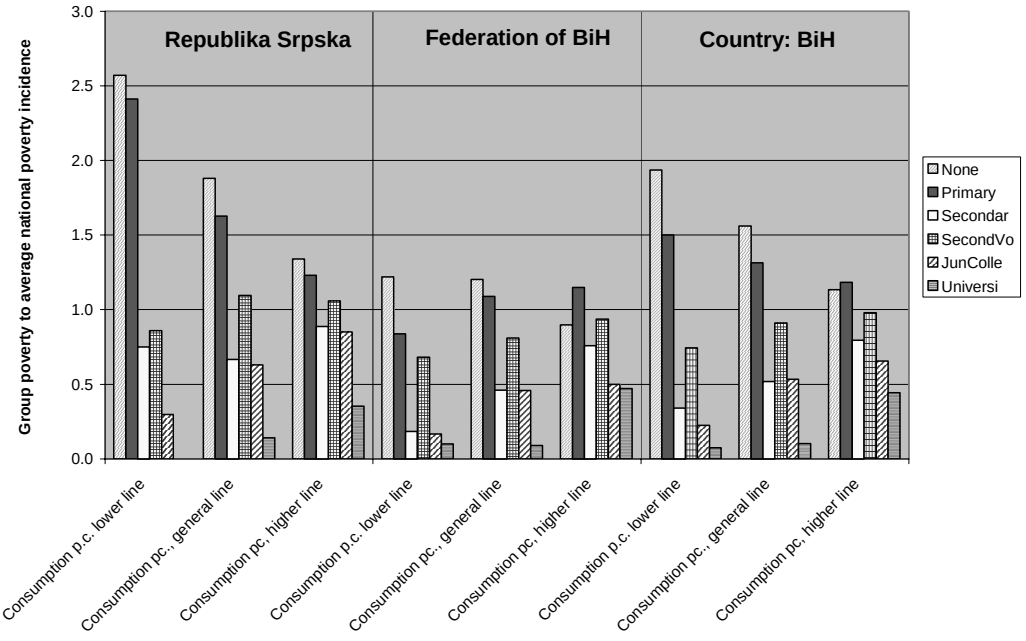


Note: The three panels from left to right show results for RS, FBiH and BiH. Each vertical bar represents the level of poverty risk for a group (see legend on the right). On the horizontal axis are the methodologies used to measure poverty: baseline approach is in the center, 33% lower poverty line to the left and 50% higher line to the right. Comparing the height of bars inside each panel, we see to what extent the poverty risks are robust to the poverty line level. Comparing the same type of bar across panels one sees whether risks for one group are the same between Entities.

6.3.3 Education of the Household Head

Figure 11 shows the head of household's education level to be related to the risk of poverty, regardless of the line used The use of lower poverty line (in the left of each panel) makes the profile "sharper" (i.e. increasing differences between education categories) compared to baseline approach, suggesting concentration of household headed by persons with low education at the bottom, especially in the RS, but the ranking is always preserved.

Figure 11: Poverty by the Level of Education of Household Head Comparing Alternative Poverty Lines



Note: The three panels from left to right show results for RS, FBiH and BiH. Each vertical bar represents the level of poverty risk for a group (see legend on the right). On the horizontal axis are the methodologies used to measure poverty: baseline approach in the center, 33% lower poverty line to the left and 50% higher line to the right. Comparing the height of bars inside each panel, we can see to what extent the poverty risks are robust to the poverty line level. Comparing the same type of bar across panels one sees whether risks for one group are the same between Entities.

6.3.4 Employment status of adults

Again, using the three choices of labor market status, ILO definitions, administrative definitions and just looking at the head of household's labor status (ILO definitions again) the results are quite robust to the choice of poverty line. The unemployed have much higher risk with any line. There is a remarkable stability and robustness of conclusions regarding the relative risk by employment status. In all variants, the unemployed stand out clearly, while employment in all cases lowers the risk of poverty. There is also a very clear ranking between the entities by the type of employment: this is maintained regardless of the poverty line.

Figure 12: Poverty by the Employment Status of a Person
Comparing Alternative Poverty Lines

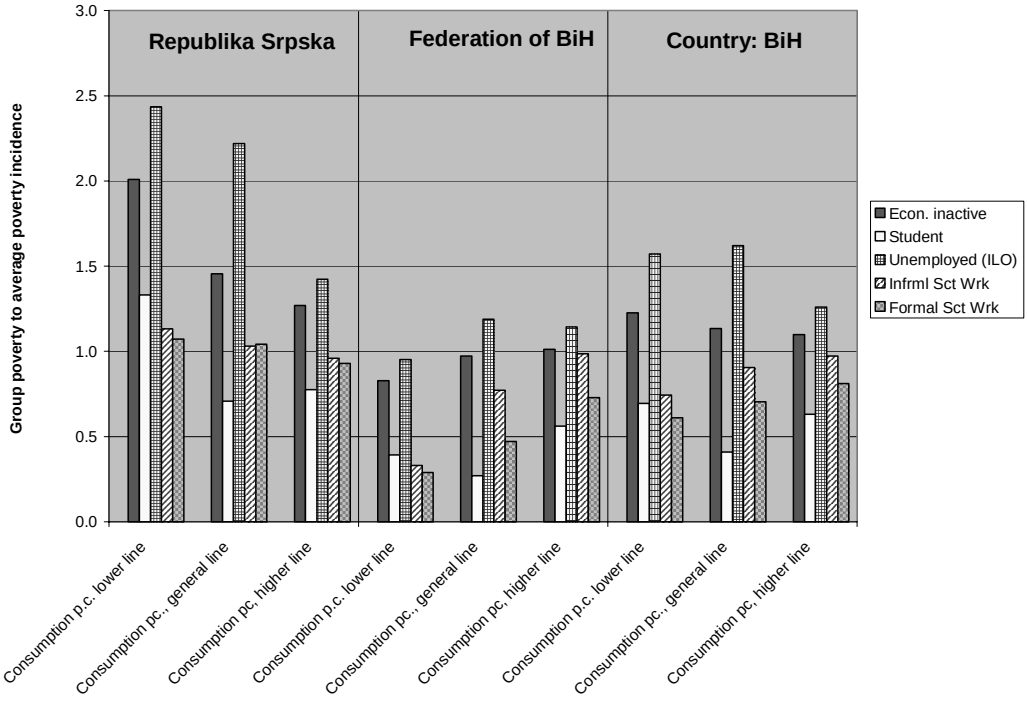
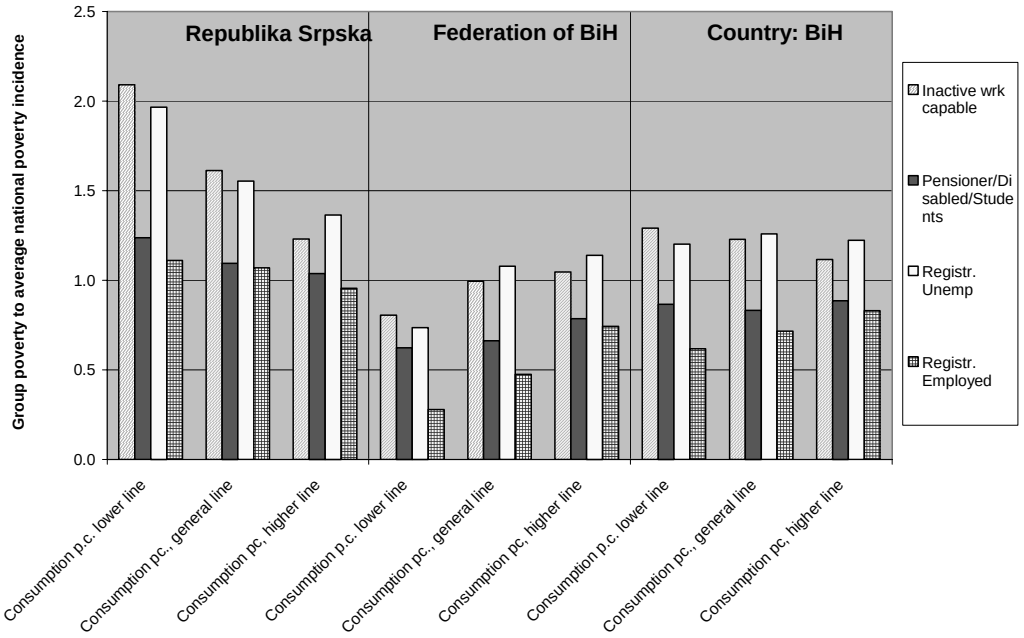


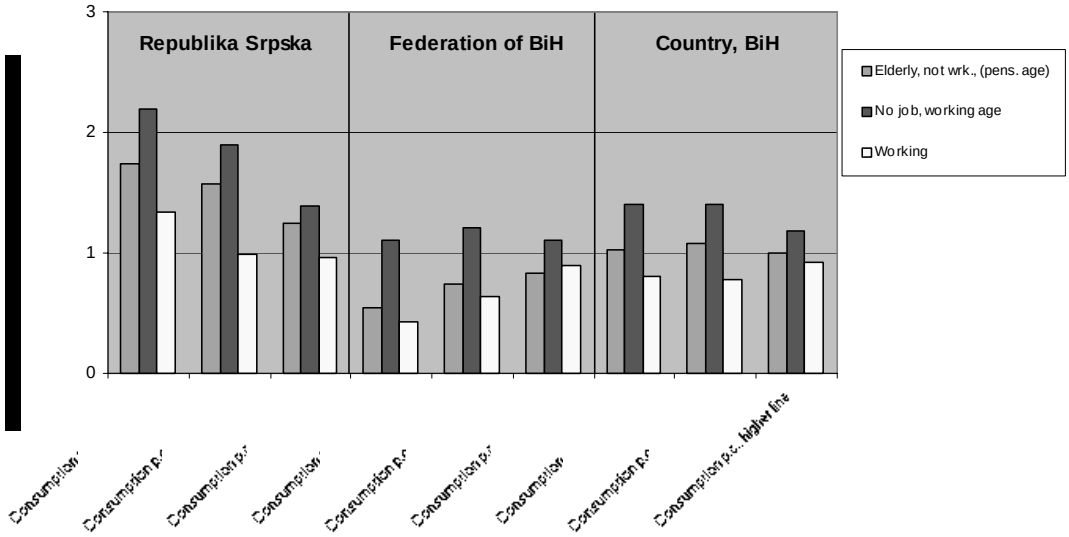
Figure 13 shows the same graph but this time using the administrative definitions of labor market status. This comparison, the same as when different equivalence scales were used, emphasizes the robustness of poverty by labor market characteristic and, again, shows poverty to be more correlated to economically based categories, rather than formal, administrative ones.

Figure 13: Poverty by Registered (Official) Labor Force Status of Adults Comparing Alternative Poverty Lines



Finally Figure 14 shows the status of the household head on the labor market. Unlike in the case of robustness checks for economies of scale, here we do not see any differences across groups.

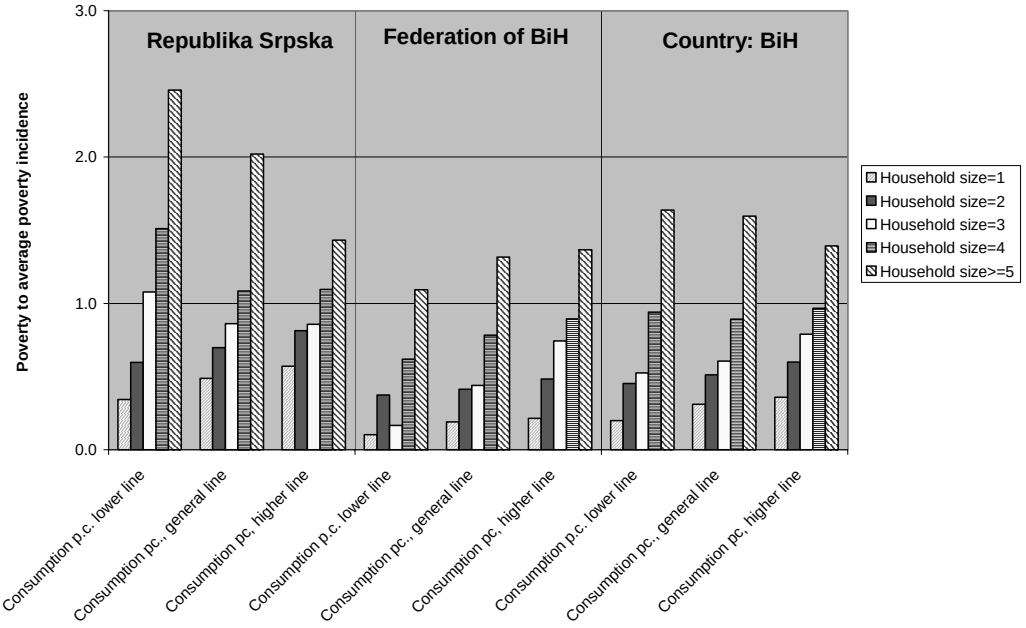
Figure 14: Poverty by the Employment Status of the Household Head Comparing Alternative Poverty Lines



6.3.5 Household size.

Poverty by household size is the demographic variable that was shown to be the most sensitive to economies of scale assumptions. It is absolutely not the case for the tests on sensitivity with respect to the poverty line. Indeed, as Figure 15 shows, there is absolute stability of results for the different poverty lines tested here. The poverty profile has a very clear stepwise shape for all poverty lines tested. Thus this variable as poverty correlate is robust to changes in the level of poverty line, but not – to the economies of scale adjustment.

Figure 15: Poverty by Household Size Comparing Alternative Poverty Lines



7 Conclusions

Using the BiH-LSMS has allowed us to measure poverty in BiH with a reasonable level of precision. The applied methodology uses most of the best practice approaches to poverty measurement. It is based on using a comprehensive consumption measure as the welfare indicator, and on using survey-generated prices to value the poverty basket. There are no apparent grounds to take into account economies of scale, but even if one does, the profile of poverty, especially with respect to economic factors, is robust across the variety of methodologies used. This allows us to move to the next phase and examine the causes of poverty and economic vulnerability in a consistent fashion.

We can summarize the findings of the robustness analysis in the following table.

Table 9. Key characteristics of poverty and its robustness to measurement assumptions.

Characteristics of poverty	Baseline, per capita	OECD I methodology	OECD II methodology	Higher poverty line	Lower poverty line
Mixed (semi-urban) municipalities in RS	yes	yes	yes	yes	yes
Urban municipalities in RS and FBiH	yes	yes	no	no	yes
IDPs and Refugees	yes	yes	yes	yes	yes
Households headed by persons with low education (primary or less)	yes	yes	yes	yes	yes
Households headed by persons with education above secondary	no	no	no	no	no
Unemployed (ILO) and inactive adults	yes	yes	yes	yes	yes
Employed in formal and informal sector	no	no	no	no	no
Households headed by elderly	no	no	No	no	no
Larger households	yes	yes	no	yes	yes

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Technical Comment 1
Tests for Economies of Scale in Household Consumption

To determine an appropriate equivalence scale for households in BiH, we start with the equation:

$$PAE=(A+\alpha K)^{\theta}$$

discussed in Section 1.3.2 above. By comparing the results using a reasonable range of values for the two parameters we test the robustness of the data. Some commonly used scales do not fall in the category of equivalence scales described by that formula, however. The OECD, for example, has used the following equivalence scale:

Equivalent size = 0.3 + (0.7 * *adults)* +(0.5 * *children*)

A number of methods are used to set equivalence scales, but each has drawbacks. As a result, a wide variety of equivalence scales is used in various countries. The literature suggests that a one-parameter scale (based on household size) gives fairly similar results to two-parameter equivalence scales, however. Results based on the OECD scales show similar results to two-parameter equivalence scales with a value of θ around 0.5–0.6 (Figini 1998).

Estimates using Engel's Method : The crucial assumption of the Engel method is that there is an inverse and monotonic relationship between a household's well-being and the share of expenditure spent on food. Hence, this assumption implies that two households are equally well-off if and only if the food share in their expenditure is equal. This assumption is questionable, and consequently, experts have advised against using this method.[16] Hence, any estimates by this method should not be taken as definitive, but rather as one piece of information that can aid in the selection of an equivalence scale.

We estimate a semi-log formulation for Engel's relationship using non-linear least squares:

$$FoodShare_i = \beta_0 + \beta_1 \ln\left(\frac{Expenditure_i}{(Adults_i + \alpha\ Kids_i)^{\theta}}\right) + \varepsilon_i ,$$

where $Foodshare_i$ is the foodshare of household i, $Expenditure_i$ its total household consumption expenditure, and $Adults_i$ and $Kids_i$ the number of adults and children in the household. The error term is denoted by ε_i while β_0, β_1, α and θ are parameters to be estimated.

This equation is estimated using non-linear least squares for the full sample of households in the LSMS as well as separately for both Entities. The estimates are shown in Table 10.[17]

[16] See Deaton, Angus, 1997, *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy*, Baltimore, MD: Johns Hopkins University Press.

[17] We also regressed the food share on a quadratic polynomial in equivalent household expenditure. Adding the

Table 10: Estimates for Equivalence Scale Using Engel's Method

	Whole sample	RS	FBiH
α	**.768**	**.326**	**1.433**
	(.029450)	(.0528318)	(.0590385)
θ	**.986**	**1.841**	**.862**
	(.019808)	(.1779523)	(.0207698)
β_0	**1.080**	**.730**	**1.053**
	(.0314201)	(.0430747)	(..0380474)
β_1	**-.083**	**-.039**	**-.083**
	(.0037963)	(.005211)	(.0045443)
Adjusted R^2	0.0878	0.0413	0.1087
No. of Observations	5189	2294	2895

Note: Standard errors in parentheses

The estimates for the BiH as a whole and both entities are quite consistent. The magnitude and sign of all coefficients also fit expectations: parameters θ and α are close to one, and the food share is monotonically falling as welfare increases. The value of the intercept (close to one) is also what one would expect as the poorest families will spend everything on food. However, the explanatory power of the regression is very weak, indicating significant "noise" in the data which makes it difficult to calibrate the exact relationship.

Results for the RS are particularly "noisy", with the point estimate of θ being 1.84, but the 90% confidence interval comprises 1. The point estimates of α in both samples are strikingly different indicating that children require somewhat less resources than adults in RS, but more than adults in the FBiH. All else being equal, the cost of a child in FBiH is double that of the "cost" in the RS. This effect is so large as to drive the cost of children above that of adults for the entire country. But in both estimates the standard errors large, large enough that we cannot reject the null hypothesis that both θ and α are equal to one. This supports what the estimate using the whole sample suggests: a simplest linear per capita equivalence scale is our *preferred estimate.*

The estimates in the previous table tell us the *preferred* equivalence scales for Engel methodology, but as we saw, the confidence intervals were relatively large. Hence, other equivalence scales may also be consistent with the Engel assumption. The extent to which an equivalence scale is acceptable to the Engel assumption can be tested by running the following auxiliary regression:

$$FoodShare_i = \beta_0 + \beta_1 \ln(\frac{Consumption_i}{EqScale_{k,i}}) + \gamma \ln(Size_i) + \delta \frac{Kids_i}{Size_i} + \varepsilon_i$$

where $EqScale_{k,i}$ is the equivalent size of household *i* using equivalence scale *k*, $Size_i$ is the number of members of household *i* and the other variables are as defined above. If equivalence scale *k* is correct (and the Engel assumption holds), then the food share

quadratic term hardly improved the fit and yielded essentially the same estimates for α and θ.

should be fully explained by equivalent consumption. In this case, the coefficient on household size (γ) and the coefficient on the share of children in the household (δ) should both be indistinguishable from zero in a statistical sense. This is implemented by performing an F-test on the joint hypothesis that γ=0 and δ=0. The result of this test is a p-value indicating the likelihood of obtaining the current estimates if the true value of γ and δ are zero. A higher p-value for equivalence scale *k* indicates that equivalence scale *k* is more consistent with the Engel assumption (or a different assumption, like subjective welfare data).

Such tests were carried out using BiH-LSMS data. The p-values of these tests for a number of equivalence scales are reported in Table 11 . Unfortunately the results were rather discouraging, as the table below illustrates.

Table 11: Tests of Equivalence Scales

			Engel Methodology P-value on test of γ =0 and δ =0	
Equivalence Scale	α	θ	RS (n=2294)	FBiH (n=2895)
Engel (whole sample)	0.8	1.0	0.0607	0.2540
OECD-I (current)	0.5	0.84*	0.0003	0.0741
ECA poverty	1.00	0.75	0.0002	0.1879
Per Capita (PC)	1.00	1.00	0.0007	0.4261
Luxembourg Income Study (LIS)	1.00	0.50	0.0003	0.0022

Note: The equivalence scales are defined above. The LIS scale is the square root of the household size.

The test statistics shown in Table 11 do not accept *any* of the five equivalence scales when we define acceptance at p-values above .90 (for both the RS and the FBiH). Therefore we do not have, on scientific grounds, any clear reason for selecting one equivalence scale over another.

Technical Comment 2
Constructing Food Poverty Line: Detailed Nutritional Assessment

The method described in the text (section 4.1.) is focused on a certain target value of caloric intake, which is set at 2100 kcal per day per capita. However, the composition of the basket obtained this way may be such that several key nutrient requirements are not properly met. We thus did a further step to check the results against more detailed set of nutritional requirements, in addition to calories.

First, to determine the caloric and nutritional needs of an average person in BiH, we divided the population (using the BiH - LSMS data) the population into 18 different demographic groups. Then, using the key recommended nutritional norms by demographic group, as recommended by the World Health Organization (WHO) and the Food and Agricultural Organization (FAO) and the share of each demographic group in the population, the minimal amounts by nutrients needed for an average person in BiH were calculated (see Table 12). For example, given the demographic composition of the population in BiH, the minimum food basket is 2240 kcal per day not 2100 kcal, as was assumed in the basic derivation.

Table 12: Derivation of Minimum Food Requirements for BiH

Sex and Age		**Energy**	**Protein (c)**	**Fat Min**	**Fat Max**	**Iron**	**Iodine**	**Vitamin A**	**Ribo-flavin**	**Niacin**	**Folate a,b**	**Vitamin C**	**Thiam-ine**	**Demo-graphic shares**
		(kcal)	*(g)*	*(g)*	*(g)*	*(mg)*	**(µg)**	***(µg retinol)***	*(mg)*	*(mg)*	*(µg)*	*(mg)*	*(mg)*	*%*
	below 1 yr	950	14			11	50	350	0.5	5.4	32	20	0.2	2.73
	1-3 years	1350	22	23	52	7	70	400	0.8	9	50	20	0.3	3.65
	3-5 years	1600	26	27	62	7	90	400	1	10.5	50	20	0.5	3.26
	5-7 years	1820	30	30	71	10	90	400	1.1	12.1	76	20	0.6	3.98
Boys	7-10 years	1900	34	32	74	12	120	400	1.3	14.5	102	20	0.9	4.21
Boys	10 12 years	2120	48	35	82	12	150	500	1.6	17.2	102	20	1.2	2.36
Boys	12-14years	2250	59	38	88	18	150	600	1.7	19.1	170	30	1.2	1.89
Boys	14-16years	2650	70	44	103	18	150	600	1.8	19.7	170	30	1.2	1.53
Boys	16-18 years	2770	81	46	108	11	150	600	1.8	20.3	200	30	1.2	1.64
Girls	10-12 years	1905	49	32	74	11	150	500	1.4	15.5	102	20	0.9	1.92
Girls	12-14years	1955	59	33	76	20	150	600	1.5	16.4	170	30	1	1.85
Girls	14-16years	2030	64	34	79	20	150	550	1.5	15.8	170	30	1	1.68
Girls	16-18years	2060	63	34	80	24	150	500	1.4	15.2	170	30	1	1.64
Male	18-60 years	2895	55	48	113	11	150	600	1.8	19.8	200	30	1.2	26.47
Male	>60 years	2020	55	34	79	11	150	600	1.8	19.8	200	30	1.2	6.72
Female	Not pregnant or lactating	2210	49	37	86	13	150	500	1.3	14.5	170	30	1.1	24.53
Female	>60 years	1835	49	31	71	9	150	500	1.3	14.5	170	30	1.1	8.36
Female	Lactating	2710	69	45	105	38	200	850	1.7	18.2	270	30	1.4	1.59
	Average BiH	2239	48.9	36.9	86.19	12.27	139.5	527.3	1.4	16.0	160.4	27.7	1.0	100%

Source: For energy figures: : FAO, 1990b. For protein figures: WHO, 1985. For iron figures: FAO, 1988. For iodine, vitamin A and folate figures: FAO, 1988. For riboflavin, niacin and vitamin C figures: FAO, 1982 Food and Nutrition Series - No. 29

Given that the caloric needs will not be met with a baseline basket, it is legitimate to ask a question whether the food poverty line of KM 760 is adequate. This is indeed highlighted by analysis of nutritional value of such a basket reported in Table 13. A linear optimization program was applied to find a composition of the

food basket that could be achieved at the total cost equal to the one obtained in baseline approach given the national prices and the key nutritional requirements for an average person in BiH. Table 13 contains the assessment of the constructed basket versus the primary baseline obtained by a simple arithmetical rule; it is clearly a basket which meets nutritional standards.

Table 13: Nutritional Assessment of Minimum Baskets

Nutrition Item	Unit of Measurement	Initial Minimum Food basket	Percent of Requirement	Optimized Minimum Food Basket	Percent of Requirement
Energy	Kilocalorie	2100	95	2240	100
Protein	Gram	56	115	65	134
Fat (maximum safe intake)	Gram	76	205	61	71
Iron	milligram	9	70	12	101
Vitamin A	µg retinol	437	83	528	100
Vitamin C	milligram	44	159	73	262
Thiamine	milligram	1	113	1.3	126
Riboflavin	milligram	1	58	1.09	75
Niacin	milligram	9	58	13	78
Folate	(µg)	138	86	263	164

Source: Calculations based on food requirements (FAO/WHO) and demographic composition of households in BiH from the BiH LSMS.

To avoid unrealistic solutions in this linear programming exercise (in other words, constructing a diet that while nutritionally sound, is contrary to the consumption patterns of the population), the actual reference group values of consumption for most food items were taken as lower bounds. The final composition of this optimized food basket that meets nutritional standards is shown in Table 14. Thus our simplest method yields a total cost that as we can ascertain, can purchase a basket at BiH prices which meet strict nutritional tests.

Table 14: Actual Reference and Minimum Food Basket, Per Person, Kg/Lt/KM/ Month

Code	Product	Unit	INITIAL MINIMUM Basket	Optimized MIN BASKET	KCAL Composition	Price, KM	Cost, KM/Month
01	Rice	KG	0.214	0.154	0.8%	1.63	0.25
02	Other cereals (maize, wheat, rye, barley,	KG	0.930	1.230	6.2%	1.40	1.72
03	Wheat flour (all types)	KG	4.950	5.002	23.8%	0.64	3.20
04	Other types of flour (maize, rye, etc.)	KG	0.270	0.304	1.6%	1.13	0.34
05	Bread	KG	3.625	5.932	22.7%	0.87	5.16
06	Pasta	KG	0.355	0.427	2.1%	1.94	0.83
07	Biscuits, pastries, pizza, etc	KG	0.100	0.100	0.5%	4.84	0.48
8/10	Beef, baby-beef, veal	KG	0.410	1.569	2.3%	7.00	10.99
11	Poultry (fresh, chilled, frozen)	KG	0.483	0.820	1.1%	4.77	3.91
12	Other products of animal origin	KG	0.050	0.050	0.2%	6.73	0.34
13.	Fresh water and sea fish (fresh, chilled,	KG	0.146	0.163	0.1%	5.46	0.89
14.	Other fish-based products	KG	0.050	0.050	0.0%	6.50	0.33
15.	Fresh milk	LT	3.825	4.884	4.4%	1.00	4.88
16.	Yogurt, sour milk, kefir	LT	0.771	0.771	0.7%	1.38	1.06
17.	Sour cream	LT	0.227	0.227	0.7%	3.97	0.90
18.	Cream cheese	KG	0.287	0.299	1.5%	2.63	0.79
19.	White cheese	KG	0.226	0.185	1.0%	5.75	1.06
20.	Eggs	KG	0.240	0.247	0.3%	5.00	1.24
21.	Butter	KG	0.090	0.090	1.0%	5.77	0.52
22.	Margarine, melt. butter	KG	0.099	0.100	1.1%	4.00	0.40
23.	Edible oil	LT	0.700	0.500	6.5%	1.64	0.82
24.	Other animal origin fat	KG	0.317	0.318	4.2%	2.43	0.77
25	Sugar	KG	0.771	0.546	3.2%	1.05	0.57
26	Jam, marmalade, preserves, jelly,	KG	0.141	0.352	1.2%	3.12	1.10
30	Other confect.(ice-cream..)		0.050	0.339	2.1%	7.71	2.61
32	Vinegar	LT	0.077	0.092	0.4%	1.59	0.15
33	Salt	KG	0.180	0.247	0.0%	0.89	0.22
36	Coffee	KG	0.163	0.177	0.0%	7.32	1.29
41	Fruit syrups, juices	LT	0.291	0.291	0.5%	1.98	0.58
44	Beer	LT	0.827	0.900	0.5%	1.23	1.11
45	Fresh citrus fruit	KG	0.141	0.146	0.1%	1.92	0.28
46	Banana	KG	0.150	0.150	0.1%	1.71	0.26
47	Apple	KG	0.294	0.212	0.2%	1.37	0.29
48	Pear	KG	0.116	0.081	0.0%	1.81	0.15
49	Grape	KG	0.104	0.075	0.0%	2.19	0.16
50	Stone fruit (peach, apricot,....)	KG	0.090	0.090	0.0%	1.46	0.13
51	Other fruit (strawberry, raspberry, melon)	KG	0.188	0.225	0.1%	0.93	0.21
52	Nuts, almonds..	KG	0.000	0.000	0.0%	7.40	0.00
53	Dry fruit	KG	0.047	0.826	4.9%	3.00	2.48
54	Fresh leaf vegetable	KG	0.099	0.099	0.0%	1.64	0.16
55	Cabbage-like vegetable	KG	0.490	2.906	0.6%	0.69	2.00
56	Tomato	KG	0.333	0.253	0.1%	1.51	0.38
57	Green pepper	KG	0.263	0.382	0.1%	1.65	0.63
58	Cucumber, kg	KG	0.208	0.150	0.0%	1.12	0.17
59	Peas, green beans, kg	KG	0.064	0.539	0.3%	1.96	1.06
60	Dried beans, kg	KG	0.188	0.282	0.1%	3.00	0.85
61	Carrot, kg	KG	0.090	0.097	0.0%	1.25	0.12
62	Onions, kg	KG	0.218	0.245	0.1%	1.08	0.26
63	Garlic, kg	KG	0.090	0.124	0.0%	2.80	0.35
64	Potatoes, kg	KG	2.356	1.649	1.7%	0.59	0.97
65	Other types of fresh vegetable	KG	0.043	0.507	0.1%	3.89	1.97
66	Processed, preserved, dried vegetable and	KG	0.150	0.420	0.5%	2.22	0.93
	TOTAL MONTHLY				**100%**		**63.33**
	ANNUAL TOTAL PER PERSON						**760.00**

Note: Calculated from the BiH-LSMS, using as a reference group those individuals in the 10th to 30th percentiles.

One should be clear about the role of data on nutritional or other capabilities in these various versions of the cost-of-basic-needs methods. That role is essentially to provide an anchor for setting the reference utility level. Nutritional status is not itself the welfare indicator. One should not be surprised to find that someone at the poverty line does not reach the nutritional requirement. The human body requires an absolute minimum food-energy intake to maintain bodily functions at rest. These needs must take precedence over all else if one is to survive for more than a relatively short period. Beyond that, food-energy intakes will determine what activity levels can be sustained biologically; the greater the intake, the greater the energy expenditure which is possible i.e., the greater one's activity level. Setting the food component of a poverty line is then a matter of the normative judgment one makes about what activity levels should be attainable. What is important is that the method chosen provides a total estimate that has an adequate nutritional value; its specific composition is much less important issue.

Technical Comment 3
Constructing a General Poverty Line

There is clearly a notion of absolute need in setting the minimum non-food requirement. Good health is essential, and being healthy requires spending on clothing, shelter and health care. Also, many activities one would readily deem essential to escaping poverty cannot be performed without participation in society; for example, this is true of employment, education, and health care. This appears to be the reason why even people who are well short of meeting food energy requirements spend on non-food goods.

As noted in the recent overview by M. Ravallion[18] "*Of all the data that go into measuring poverty, setting the non-food component of the poverty line is probably the most contentious*". But the basis for choosing a non-food share is rarely transparent, and very different poverty lines can result, depending on the choice made. Questions that have to be answered to make this choice more transparent are:

- Whose food share should be used?
- In what sense does the resulting line assure "basic non-food needs"?

Ravallion demonstrates that there are objectively defined bounds on poverty lines. Namely, he proves that under realistic assumptions, the **poverty line cannot exceed the total spending of those whose actual food spending achieves basic food needs.** This group is therefore key ***reference population*** group for defining the absolute poverty line. As explained in section 4.2. it is unlikely to find in the data a substantial number of households whose actual food spending is equal to the food poverty line, therefore one has to set an interval around the food poverty line to define this reference group.

We have chosen a bound of ± 5 percent around the extreme (food) poverty line, and obtain an average food share of 35 percent. But we observe a very large variation of the food share in this interval: the median, which is a plausible estimate given the amount of variation, is 34 percent. (Of course, changing the interval around the extreme poverty line would also shift the estimate of the food share).

One can use non-parametric methods which to impose the interval or the statistics to be estimated. To give a simple example for the, one can calculate the mean total expenditure of the sampled households whose food spending lies within a small interval (± 1 percent) around the food poverty line, then do it for larger interval (± 2 percent), then for even larger (± 3 percent), etc. Then one takes an average of all these mean total expenditures and derives the food share). This gives a weighted non-parametric estimate with the highest weight on the sample points closest to the food or extreme poverty line (with weights declining linearly around this point). Applying this approach with BiH LSMS data produces a result that is different from the simple calculation of a median: 32 percent with a very large 95 percent confidence interval between 22 and 42 percent.

[18] Ravallion M. Setting Poverty Lines: Economic Foundations of Current Practices. World Bank. 2001.

Will imposing a specific form for the relationship between food consumption and welfare help? As suggested by Ravallion (1994), the food share can be estimated using a food-share Engel curve of the form:

$$f(y_i)/y_i = \alpha + \beta_1 \log(y_i/b^f) + \beta_2 [\log(y_i/b^f)]^2 + \gamma'(d_i - \bar{d}) + residual_i$$

for sampled household *i*, where d_i is a vector of demographic variables, y_i is the level of consumption, , $f(y_i)$ is the food consumption of a household *i*, b^f is the cost of the minimum food basket (extreme poverty line) and α , β_1, β_2, γ are parameters to be estimated. The value of estimate α obtained from the regression gives the average food share of those households who can just afford basic food needs. The poverty line is then given by b^f/α^*, where α^* is:

$$\alpha^* = \alpha + \beta_1 \log(1/\alpha^*) + \beta_2 [\log(1/\alpha^*)]^2$$

This can be readily solved numerically. The application of this method with the full sample of the BiH-LSMS results in none of the parameters being statistically different from zero. To obtain any precision we need to clean the data, removing all observations with zero food share and those with food share 3 standard deviations below the national average. Once this cleaning is done, we obtain an estimate of the food share for the poverty line of 38 percent (see Table 14).

This method of estimating the Engel curve produces the result which is inherently dependent on the choice of per capita equivalence scale. As proposed by Luttmer (2000), this approach can be extended and generalized to any equivalence scale. It aims at directly estimating what level of equivalent consumption corresponds to a sufficient food intake.

We specify the following key variables: variable *RelFood* is the ratio of household food consumption to the cost of the minimum food basket for the household. Hence, if *RelFood* equals one, the household spends exactly as much on food as is required to purchase the minimum food basket for the household. The variable *EqCons* is equivalent consumption for all modifications (as described in Technical Comment 1). Our baseline poverty line is estimated using our baseline equivalence scale, per capita, but we will also use alternative equivalence scales to test the sensitivity of the results.

We specify a log quadratic relationship between *RelFood* and *EqCons*, and estimate this relationship by non-linear least squares:

$$\ln(RelFood_i) = \alpha_0 + \alpha_1 \ln(EqCons_i) + \alpha_2 \ln(EqCons_i)^2 + \varepsilon_i$$

where *i* indexes households, αs are coefficients to be estimated, and ε_i denotes the error term. After estimating this equation, we solve it for the level of equivalent consumption at which the household just attains the minimum food intake (i.e. *RelFood*=1):

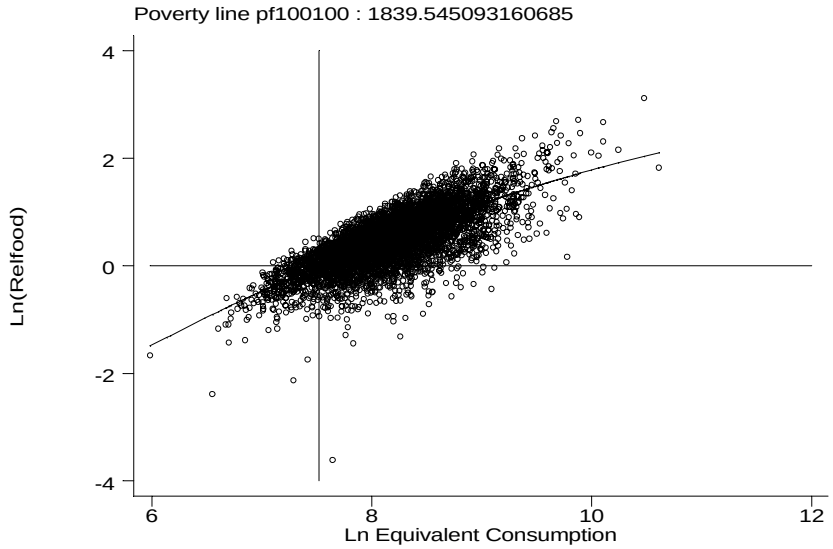
$$\ln(1) = 0 = \hat{\alpha}_0 + \hat{\alpha}_1 \ln(Povline) + \hat{\alpha}_2 \ln(Povline)^2$$

where the carets on the αs indicate the regression estimates, and *Povline* is the our estimate for the poverty line. Solving this equation yields:

$$Povline = \exp\left(\frac{-\hat{\alpha}_1 \pm \sqrt{\hat{\alpha}_1^2 - 4\hat{\alpha}_0\hat{\alpha}_2}}{2\hat{\alpha}_2}\right)$$

The advantage of this method is that it is inherently more robust to outliers, and we do not need to throw away as many observations, as we did for the direct fitted Engel curve regression, to obtain statistically significant results. This approach is becoming more intuitive as presented on the graph. The vertical axis on Figure 16 gives actual food consumption of a household relative to cost of the minimum basket (in logs): it is equal to zero when the HH spends exactly as much as needed. Horizontal axis is the consumption per equivalent unit (in our case – per capita). Each dot on a graph is a household in LSMS. The upward sloping curve is the estimated relationship between food consumption (expressed as the number of minimum food bundles consumed) and total consumption. Intersections of this line Engel curve with the horizontal line representing minimum food requirements gives the level of consumption at which basic food needs are met, i.e. the poverty line (vertical line).

Figure 16: Actual relative food consumption, fitted relative food consumption line, and derivation of the Poverty Line for per capita scale.



Source: BiH LSMS and regression results

Table 15 shows the estimates for the poverty lines obtained using all listed methods for various equivalence scales. We start with our baseline approach, and show what differences emerge when one applies median food share approach, or a set of parametric approximations, and we then show the results of applying alternative equivalence scales. As the table shows, the estimates of the poverty rate are very sensitive to the exact choice of estimating the food share, but once set, relatively

insensitive to the choices of equivalence scale. Our baseline case, using the per capita equivalence scale, which estimate the poverty rate at 19.5% of the population, lies toward the upper bound of estimates presented.

Table 15. Poverty Lines Based on Various Method of Estimating the Food Share and Various Equivalence Scales

Methods to derive food share and equivalence scales			**Poverty Rate**	**Characteristics of the Poverty Line** (% or KM per household per year)				
Method and scale	α	θ		Food/ Non Food **	Value for Single Adult	Value for Single Parent	Value Couple w/o children	Value Couple with 2 children
Per capita, average reference	**1.00**	**1.00**	**19.5**	**35/65**	**2198**	**4396**	**4396**	**8792**
Per capita, median reference	1.00	1.00	20.7	34/66	2243	4485	4485	8970
Per capita, fitted Engel curve	1.00	1.00	15.4	38/62	2010	4020	4020	8040
Per capita, fitted relative food	1.00	1.00	12.3	41/59	1840	3679	3679	7358
OECD-I, median reference	0.5	0.84*	22.5	37/63	3850	5005	5775	8084
OECD-II, median reference	0.3	0.68*	22.8	36/64	3081	4622	5238	8320
ECA poverty, median reference	1.00	0.75	21.5	33/67	3205	5390	5390	9065

Notes: The equivalence scales are defined in Part I, Section 4.2 of the text. The ECA poverty report is a forthcoming World Bank report entitled "Making Transition Work for Everyone: Poverty and Inequality in Europe and Central Asia." * Implied value, estimate on BiH demographic structure; ** Percentage on average

It is important to note that each of the methods presented here is defendable on technical grounds. The least 'sophisticated' and simplest approach gives results that are as plausible and defendable as much more demanding methods. And each of these methods is producing estimates with a wide margin of precision. Thus, setting the poverty line is ultimately a matter of choice.