Assessing Household Vulnerability to Employment Shocks:
A Simulation Methodology Applied to Bosnia and Herzegovina

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Draft for Comments

October 2004

Abstract

Household vulnerability relates to the incapacity of a household to preserve its welfare because of negative events. In Bosnia and Herzegovina, vulnerability is a central issue in the policy debate: many households are at risk of poverty due to fragile livelihood systems or high exposure to shocks. Since no panel data are available in Bosnia and Herzegovina, a micro-simulation methodology is adopted on the basis of a household consumption model based on quintile regression. Shocks are simulated in the labour market and the methodology consents the identification of the typologies of households which suffer from severe welfare losses or that are plunged into poverty after the shocks. The results show that the vulnerable households identified change when different shocks or a diverse definition of vulnerability are taken into consideration. At the same time, the characteristics of households vulnerable to poverty are shown to be different with respect to those of the poor.

1. Introduction

In general, the concept of vulnerability relates to the occurrence of events which negatively impact on something, such as individuals, households, communities, countries, enterprises. The analysis presented in this paper focuses on households and defines vulnerability as the inability of a household to secure its living standards in the face of a certain negative event. Vulnerability is therefore the combination of two facts: the exposure to a negative event and the capacity of the households to cope with it (Chambers, 1989). Following on this definition, an assessment of vulnerability should examine the nature of the shock (Sinha and Lipton, 1999), how this is transmitted to the household as well as the coping mechanisms available at the household or community level (Holzmann et al., 2001; Moser, 1996, 1998; Shaffer, 2001; Dercon, 2001). At the same time, a methodological criterion is needed for identifying the households unable to secure their living standards in the face of a negative event[1]. The literature proposes two main approaches to household vulnerability.

In the first approach, vulnerability is defined as a downturn in consumption which can be attributed to an "uninsured exposure to risks" (Hoddinott et al. 2003) or, more generally, to the lack of effective coping mechanisms. Glewwe and Hall (1998) provide one of the earliest applied analyses of household vulnerability defined as variability in household consumption. They identify the socio-economic groups experiencing positive or negative changes in their consumption value between 1985 and 1990[2]. The literature has also analysed vulnerability by looking at the covariance between income changes and consumption changes (Amin et al. 2001). Vulnerability is estimated by looking at the response of household consumption to household-specific (*idiosyncratic*) income shocks. Higher covariance means higher vulnerability of consumption to income risk. The application of this methodology to the participants of micro-credit programmes in Bangladesh shows that households below the poverty line have significantly higher average vulnerability than those above the poverty line.

This approach provides evidence of the incapacity of existing risk coping mechanisms to protect household consumption from income fluctuations (Hoddinott and Quisumbing, 2003). However, this literature does not provide information on *what* creates vulnerability. This is the focus of Dercon and Krishnan (2000): consumption fluctuations are linked to shocks experienced by rural households. The authors analyse movements of household consumption along an 18 month dataset in Ethiopia. The authors find that shocks have a negative effect on household welfare: harvest failure is the most frequently quoted cause of hardship; other problems are related to public policy, labour and livestock[3].

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[1] It is important to point out that this paper analyses household living standards by exclusively looking at the value of goods and commodities consumed by the household. This approach can be considered too narrow with respect to the broad and multidimensional nature of household well-being but it is in accordance with most of the literature on poverty and vulnerability (Chaudhuri, 2001; Amin et al., 1999; Prichett et al. 1998).

[2] Morduch and Gamanou (2002) argue that the change in consumption over two observations cannot constitute a reliable measure for vulnerability and few data sets have a long enough time dimension to yield a reliable measure of variability for each household over time.

[3] The authors also found that seasonal effects are highly significant in determining fluctuations in household consumption. In particular, households boost consumption in peak periods and reduce in response to seasonal price movements. This finding is in contrast with the hypothesis of consumption smoothing.

The second approach to vulnerability looks at the decline in living standards below a certain threshold, such as the poverty line[4]. In both approaches, vulnerability manifests itself in terms of downward fluctuation in living standards. However, the second approach exclusively looks at the households whose decline is such that the poverty line is crossed. This definition of vulnerability excludes those households among the non-poor who are well- enough off so that when they experience the decline in welfare provoked by the shock they remain non-poor.

Within this framework, various methodologies have been proposed in literature. Chaudhuri et al. (2001) define vulnerability as the ex-ante risk of facing poverty in the future, conditional on the current observable household characteristics. They estimate the probability that a currently non-poor household will fall below the poverty line and the probability that a currently poor household will remain in poverty even if it does not experience any large adverse welfare shock[5]. Similarly, Christiansen et al. (2000; 2001) define vulnerability as the probability statement regarding failure to attain a certain threshold of well-being in the future. The methodology elaborated in Christiansen et al. (2000; 2001) requires the definition of the time horizon (set by the authors at one period ahead) and of the indicator of well-being (consumption). The household's ex-ante distribution of future consumption is obtained from a flexible heteroskedastic regression specification, which allows the prediction of the ex-ante mean and variance of future consumption for each household based on its current characteristics and assets. The methodology also requires the definition of the poverty line and of a probability threshold such that a person or household is considered vulnerable if its probability of shortfall exceeds the given threshold. Prichett et al. (1998) instead expand the analysis on a multiple time horizon and they define vulnerability as the probability of observing at least one episode of poverty in the future.

However defined, the identification of vulnerable household is a very delicate task. Because of the intrinsic uncertainty that features human life, it is impossible to draw definitive conclusions on the households which are at risk of falling below the poverty line or at risk of experiencing welfare downturns in the future. Nobody can predict what it is going to happen in the future: the typology, the size, the persistency and the severity of the negative event are unknown. Similarly, the household reaction and the capacity to cope with the shock are unpredictable. Most of the methodologies (Chistiaensen et al, 2000; Prichett et al, 1998;

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[4] The attention towards households experiencing decline into poverty is not new in economic and social history. Looking back at the mid-Thirteenth century, the almsgiving confraternities and the assistance institutions included among their concerns the shamefaced poor, at that time called the *vergognosi*, the Italian word for shamefaced (Pullan, 1999). This term encompassed almost all kinds of people in distress (such as decayed gentlefolk, craftsmen, shopkeeper, failed merchants, widows of wealthy husbands, journeymen, etc.) who had scruples about begging, hence defined as *vergognosi*. A similar concern can be found in France during the Second Empire, when the term *déclassé* was used to indicate those previously wealthy individuals who fell into a lower social class (Ricci, 1999). In contrast with the *vergognosi*, who suffered from an individual or household based type of negative happening, the emergence of the *déclassé* was mainly provoked by the rapid revolutionary changes experienced in French society. Both the *vergognosi* and the *déclassé* were incapable of preserving their earning capacity and economic status in front of the changes occurring in their lives or in their society.

[5] It must be specified that Chaudhuri et al (2001) utilise a cross-section survey. The utilisation of a cross-section survey forces the establishment of very stringent hypothesis regarding the process generating household consumption. The authors assume the consumption generation process in which "a mean-zero disturbance term (…) captures idiosyncratic factors (shocks) that contribute to different per capita consumption levels for households that are otherwise observationally equivalent". "The idiosyncratic factors that contribute to different per capita consumption levels are identical and independently distributed over time for each household". And "the uncertainty over future consumption "stems solely from the uncertainty about the idiosyncratic shock, e_h, that a household will experience in the future".

Glewwe et Hall, 1998) proposed for measuring household vulnerability identify vulnerable households when they have already fallen into poverty or when they have already experienced welfare downturns. By doing so, assessing vulnerability does not lead to the identification of today's households at risk of experiencing poverty, but of those who *were* at risk of poverty who *are* currently in a poverty status.

This paper attempts to address these shortcomings by adopting a simulation methodology. In this way the occurrence of shocks can be modelled and their impact on household living standards explored. Micro-simulations are often utilised for evaluating the impact of development policies on poverty (Datt et al., 2000; Mukherije and Benson, 2003; Wodon, 2003) but their application to vulnerability assessment is quite unexplored.

The paper proposes a quintile regression for estimating a household consumption model (Koenker and Bassett, 1978; Buchinsky, 1998). A quintile regression allows hypothesising that the shock might have a diverse impact on household consumption depending on the relative position of the household in the welfare distribution. Two types of shock are simulated: the first concerns employment loss in the formal public sector; the second in the informal dependent one. The outcomes of the shocks are analysed in terms of both downturn in household welfare and poverty increase. Two different facets of vulnerability are examined: "vulnerability to welfare loss" that defines the households experiencing a downward movement by a minimum amount of two deciles and "vulnerability to poverty" which looks at the households which fall into poverty after the shock. This methodology produces relevant policy implications since it allows identifying which households categories should be regarded as in need of targeted social support. At the same time, the first three FGT measures of poverty are analysed in order to take into account the increase in severity and depth of poverty after the occurrence of the shock[6].

The paper is organised as follows: Section 2 presents the general poverty and vulnerability situation in Bosnia and Herzegovina; Section 3 describes the dataset utilised and the methodology adopted for modelling household consumption and estimating vulnerability; Section 4 introduces the variables utilised in the regression model; Section 5 reviews the results of the regression; Section 6 analyses the results of the vulnerability simulations based on a shock which occurred in the formal public sector; Section 7 analyses the impact on vulnerability of a shock occurring in the informal sector; finally, Section 8 concludes.

2. Poverty and Vulnerability in Bosnia and Herzegovina

Bosnia and Herzegovina is one of the poorest countries in Eastern Europe. The country Human Development Index (HDI) is 0.718, 27% lower than the EU average (0.914). In comparison with other Eastern European countries, the Bosnia HDI outperforms only

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[6] The headcount, the poverty gap, and the squared poverty gap are the first three measures of the FGT class of poverty measures. The general formula for this class of poverty measures depends on a parameter α, which takes a value of zero for the headcount, one for the poverty gap, and two for the squared poverty gap in the following expression (Foster, Greer, and Thorbecke 1984):

$$P_\alpha = \frac{1}{N} \sum_{i=1}^{P} \left(\frac{z - c_i}{z} \right)^\alpha$$

Moldova (N°105, 0.699). Until recently, no data were available for poverty analysis. The first quantitative analysis of household poverty in Bosnia and Herzegovina is proposed by Bisogno and Chong (2002). The authors identified a relative poverty line using per capita income as well being indicator[7]. According to this study, in Bosnia and Herzegovina 27.3% of the population live below the general poverty line (set at 60% of the median per capita income) and 11.5% under the extreme poverty line (set at 30%).

The Living Standard Measurement Survey (LSMS) established for the first time a "properly researched and calculated absolute poverty line"(UNDP, 2002, p.49) which amounts to KM (Konvertible Marka) 2,198 per person annually; on the other hand the extreme poverty line in this country amounts to KM 760 per person yearly. Household consumption was chosen as indicator of the household well-being. According to the estimates, no-one is living in extreme poverty in Bosnia and Herzegovina but 19% of the population lives below the general poverty line (LSMS, 2001; PRSP, 2002)[8]. At the same time, significant territorial differences in poverty incidence emerge: the Federation of Bosnia and Herzegovina (FBiH) registers a poverty headcount of 15% compared to 25% of the Republic Srpska (RS)[9].

In Bosnia and Herzegovina, together with the poverty figures, terms like "vulnerability" and "risk of poverty" often recur in the social policy debate. The Poverty Assessment believes that "a sizeable proportion of the population faces the risk of falling into poverty". Therefore "the percentage of population classified as poor on the basis of the current consumption levels is only a fraction of those in Bosnia and Herzegovina who must worry about, and struggle to avoid becoming poor at some point in the relatively near future" (World Bank, 2003, p. 2). There is something more than the official poverty figures to be said on the household exposure to shocks, their weak endowment of productive assets, the uncertainty of income, etc[10].

In the country PRSP, households are defined vulnerable whose per capita consumption is "slightly above the poverty line". A vulnerability line, set at 50% above the general poverty line, is drawn and a household is defined vulnerable if its per capita consumption falls in the interval determined by the two lines. This approach is highly

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[7] This decision poses severe methodological problems since income is not the best indicator for measuring living standard (Deaton and Muellbauer, 1980), especially in Easter Europe, where income volatility and unreliability of income data tend to be very high (Grootaert and Braithwaite, 1998). Moreover, the dataset utilised by Bisogno and Chong scarcely involved remote communities because of transportation problems and security reasons. The exclusion of these areas clearly affects the final results especially in terms of underestimation of poverty levels.

[8] It must be noticed that in the initial LSMS publications (PRSP, 2002 cited also in UNDP, 2002; in Ardeni and Andracchio, 2003 and Cuna and Alasia, 2003) the KM 1843 general poverty line and KM 747 absolute poverty line were utilised. On the basis of these values, 19% of the population in Bosnia and Herzegovina was found below the general poverty line. The successive publications based on the LSMS data (BHAS, 2002; Poverty Assessment, 2003) develop a higher poverty line (set at KM 2189) associated with the same poverty headcount (19%). In order to be consistent with the poverty estimates proposed by international and national authorities, the elaborations conducted in this research are based on the KM 1843 poverty line.

[9] The Federation of Bosnia and Herzegovina (FBiH) and the Republic Srpska (RS) have been created in 1995 after the Dayton Peace Agreement. The RS comprises 49% of the territory of Bosnia and Herzegovina and it reflects the area controlled by Serb during the war; the FBiH constitutes 51% of the overall territory and corresponds to the area controlled by the Muslim-Croat alliance.

[10] A research contribution related to household assets endowment is proposed by Ardeni and Andracchio (2003). Following on the Amartya Sen's capability approach (Sen, 1993), the authors found that the deprivation in Bosnia Herzegovina is higher than consumption poverty.

intuitive: the identification of the vulnerable households is simply made by counting the number of households falling in the pre-determined interval. However, the counting of the households whose living standard is slightly above the poverty line is a measure of the welfare distribution rather than household vulnerability[11]. This way of looking at vulnerability identifies the vulnerable without explaining *why* they are vulnerable. In other words, why should policy-makers look at those households who are slightly above the poverty line? Why does being slightly above the poverty line matter? These questions are of central importance because households defined as vulnerable according to the PRSP approach, might count on a quite secure livelihood system although proximal to the poverty line.

World Bank (2003) integrates the approach described above with the analysis of employment risk, which is considered as "the leading and most significant factor affecting household well being" (World Bank, 2003)[12]. For determining employment risk, unemployment rate is considered the "most direct measure of the risk of employment loss: for someone who is employed now, a high unemployment rate today implies that it would be difficult to find a new employment in case the current one terminates" (World Bank, 2003, p. 21). According to the PRSP figures, the unemployment rate in Bosnia and Herzegovina is 16.4% (16.9% in the FBiH and 15.8% in the RS)[13]; 14% of the households have "at least one unemployed member, suggesting that the risk of unemployment is evenly spread in the society". In particular, "poor households seem to have higher incidence of unemployment, but even non-poor households look susceptible to this threat" (World Bank, 2003, p. 21). However, "contrary to the widespread belief, unemployment risk does not affect the majority of the population" (ibid., p.22). Hence, it cannot be concluded that the unemployment figures raises special vulnerability concerns.

By limiting the analysis of household exposure to shock to employment issues, unemployment risk can reasonably be considered a more complicated issue with respect to the analysis proposed by the Poverty Assessment. Workers from diverse sectors or endowed with diverse skills experience risk of dismissal for various reasons (privatisation, macroeconomic downturns, etc) and at various degrees. Also, in order to assess household vulnerability, the analysis of unemployment risk must be combined with the analysis of the household livelihood sources: the dismissal of an income-earner may severely impact on households made-up of a single earner, whereas it may have a lower impact on multiple income source households.

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[11] For example, one may be interested in understanding the shares of population living within various welfare intervals. Interesting results may also emerge if the proportion of households living in the two intervals (one between zero and the poverty line, the other between the poverty and the vulnerability line) is monitored across various periods.

[12] The survey of risk factors provided by the Poverty Assessment also regards health risk, corruption and political governance risk.

[13] These values are calculated by taking into consideration the individuals without work, willing to work and actively looking for a job and ready to take one. Following on alternative definition, such as taking those registered as unemployed, the unemployment rate rises to 40%. These estimates contrast with the calculations made by UNDP (2000) that put the unemployment rate at 43% in the FBiH and 40% in the RS. Other calculations made by taking into consideration the presence of employed in the informal sector decreases the estimate at 22.2% for Bosnia and Herzegovina, 23.3% in the RS and 21.6% in the FBiH (UNDP, 2002). These values are "broadly in line with those of other Balkan countries such as Bulgaria, Croatia and Yugoslavia" (Poverty Assessment, p. 21); in comparison with OECD standards "these rates are very high, but they are lower than the turbulent history of the country and popular belief suggest" (UNDP, 2003).

3. Data and Methodology

The data utilised in this paper are drawn from the Living Standard Measurement Survey (LSMS). This survey was carried out in Bosnia in the autumn of 2001 and covers a sample of 5,400 households[14]. The sample is constructed following a probabilistic methodology that implies the possibility to attribute a confidence interval to each estimate made on the basis of the sample observations. In general, the sample design for any survey requires information on the universe of the households and the individuals in the country (usually coming from a census or administrative records). In Bosnia and Herzegovina, the most recent census dates back to 1991: the data contained in this census are obsolete due to the simple passage of time but, more importantly, also due to the massive population displacements which occurred during the war. Therefore, at the initial stages of the LSMS, a master sample was constructed. This was based on a selection of municipalities and a full enumeration of the selected municipalities. The 146 municipalities of the country were grouped into three strata, Urban, Rural and Mixed, within each of the two Entities, on the basis of the information contained in the 1991 census[15]. Municipalities were selected with probability proportional to estimated population size within each stratum. Later, households were selected from the municipalities with the same criteria.

The methodology adopted in this paper refers to micro-simulations. This choice is due to the fact that panel data for households are currently not available in Bosnia and Herzegovina. On the other hand, a cross-section dataset does not permit the monitoring of the proportion of households experiencing welfare downturns due to shocks. Micro-simulations are based on multivariate regression techniques which permit the estimation of the importance of various factors to a certain outcome and, consequently, predict the effects of change in selected variables. In other words, "having estimated a consumption model, (…) it is possible to generate simulations to predict the reduction or increases in general poverty levels that results from unit change in selected household or community characteristics" (Mukherjee and Benson, p. 351, 2003). Midhet et al. (1998) and Christiaensen and Alderman (2001) applied micro simulation techniques to the phenomenon of maternal mortality in Pakistan and child malnutrition in Ethiopia. Wodon (2002) recently developed a software based application that examines poverty reduction targets based on micro-level analysis. Micro simulations are utilised for measuring the effects of alternative policies on poverty indicators (Datt et al. 1998; Datt et al., 2000; Mukherjee and Benson, 2003) or to construct spatially-disaggregated poverty maps (Lanjow et al. 2002).

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[14] The information of the dataset is based on LSMS, (2001). "Basic Information Document - Bosnia and Herzegovina.

[15] A municipality was defined as urban when 65 percent or more of the households considered themselves as urban, whereas rural municipalities are those where the proportion of urban households is below 35 percent. The remaining municipalities were classified as "Mixed" Municipalities. Brcko was excluded from the sampling frame.

In formal terms, this methodology is based on a household welfare model that allows us to estimate how a particular characteristic impacts on household welfare conditional on other variables. The model is specified as

$$\ln c_j = \alpha + \beta x_j + \varepsilon_j$$

where $j=1,2,...n$ is the unit of analysis, namely the household, x_j is a vector of exogenous determinants of household welfare, α is the intercept, β is the set of coefficients to be estimated by the regression and ε_j is the random error term.

Ordinary least squares regression is the econometric model generally adopted for computing the regression coefficients (Glewwe, 1991). One of the limitations of this model is that the marginal effect of each variable is constant, equal to the estimated coefficient, along all the household welfare distribution. Hence, the model might be considered inadequate to capture the possibility for a factor to verify diverse values among different groups of population. It might be the case that the elasticity of household welfare to a certain variable differs as one moves along the welfare distribution and that some characteristics can be significant only for some groups of households.

By taking into consideration this shortcoming, the paper adopts a quintile regression (Koenker and Bassett, 1978) that consents to determine "whether a household's position in the expenditure distribution affects differentially the relationship between expenditure and household characteristics" (Anderson and Pomfret, 2000, p. 509). In other words, quantile regression relaxes the constraint imposed by ordinary least square estimation and it allows "the effect of the explanatory variable to vary at different points in the expenditure distribution, permitting the determinants of per capita expenditure to differ between rich and poor households" (Anderson and Pomfret, 2000, p. 510).

In quantile regression, the linear estimation does not describe $E(y_j|X_j)$, as in ordinary least square, but $f(y_j|X_j)$, for a quintile q of the distribution where $0<q<1$. To obtain an estimate for quantile q, the values of $y_j - X_j\beta$ at the estimated value of β are weighted; if a residual is negative, it is weighted $-(1 - q)$, and if residual is positive, it is weighted q. As commented by Anderson and Pomfret, (2000), "whereas an OLS regression provides the best linear estimator of the mean, quantile regression offers the best linear approximation of the effect of explanatory variables at various quantile of the dependent variable" (Anderson and Pomfret, 2000, p. 510).

This paper present three models: they refer to the 25th, 50th and 75th quantile. In each regression, a vector of parameters $\hat{\beta}$ is estimated for the set of explanatory variables x_1, $x_2,...,x_n$. In order to take into account the difference in poverty and determinants of living standards across the Bosnia and Herzegovina territory, the analysis separately refers to the RS and the FBiH.

The predicted per capita consumption level $\hat{c}_j$ for any household j can be expressed as:

$$\hat{c}_j = e^{(\hat{\beta}' x_j)}$$

Since three regressions are developed, three estimates of consumption can be calculated for each household. A criterion is therefore needed for developing a unique vector of estimated household consumption level. The analysis takes into consideration the distribution of natural logarithm of household consumption at Entity level. Two cut-off points are

identified for dividing the population in three deciles. The 25th quantile regression estimates are utilised for the population falling below the first cut-off point, the 50th quantile regression for the population falling between the first and the second cut-off point, the 75th quantile regression for the population having household consumption above the second cut-off point[16]. The predicted consumption level of household j is used as benchmark value for attributing the "before the shock" poverty status[17]. A household is therefore classified as poor if $\hat{c}_j < z$ (where z is the poverty line).

As commented above, micro-simulations are based on the idea that changes in regression independent variables can be interpreted as outcome of development policies (Datt et al., 1998; Datt et al. 2000) or of negative events. In this paper, the micro-simulations are based on shocks occurring in the household employment characteristics. The effect of the shock on household consumption (predicted) after changes occurred in the x_i variable depends on the estimated value of $\hat{\beta}_i$. For households below the first cut-off point, the elasticity of $\hat{c}_j$ to x_i is calculated on the basis of the 25th percentile model; for households between the first and the second cut-off point, the 50th percentile regression model is used; for households above the second cut-off point, the 75th regression estimates are utilised[18].

The after-shock predicted consumption $\widetilde{c}$ is used for attributing the welfare status of household j after the occurrence of the shock; if $\widetilde{c}_j < z$, the household is defined as poor. Confronting the poverty status before and after the simulation, three typologies of households can be distinguished: the "always poor" households that record $\hat{c} < z$ and $\widetilde{c} < z$, the "vulnerable to poverty" households having $\hat{c} > z$ and $\widetilde{c}_j < z$ (hence, they become poor after the occurrence of the shock) and the never-poor households ($\hat{c} > z$ and $\widetilde{c}_j > z$).

In addition, the "before the shock" and "after the shock" welfare distribution can be compared. This is made by employing transition matrices. Transition matrices show how households living in a certain population decile in a given period move to other deciles in the subsequent period (Baulch and McCulloch, 1998). In this paper the before-the-shock welfare distribution (based on predicted value of household consumption) and the simulated after-the-shock one are compared. On the basis of the transition matrix, "vulnerable to welfare losses" are defined those households which lose more than two deciles in the welfare ranking after the shock (Haughton et al.; 2001).

Before presenting the results of the paper, two important caveats must be pointed out. As already mentioned, the shock model hypothesises employment losses among Bosnia and Herzegovina household. It should be considered that when an individual loses his job, the household will undertake actions that are not modelled in the regression. This is the case for example of other household members that may decide to work, or to work additional hours;

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[16] The values of the cut-off point correspond to 7.62 and 8.03 for the RS and 7.78 and 8.14 in the FBiH.

[17] Needless to say, *predicted* household consumption may differ from the *real* household consumption. Using predicted consumption for assessing household poverty may therefore lead to error of inclusion (households who are non-poor are counted as poor) and exclusion (household who are poor are counted as non-poor). On this issue, the literature considers "incorrect (...) to compare the actual consumption and poverty levels derived through the poverty analysis of the survey with the predicted levels derived using the determinants of poverty model" (Mukherjee and Benson, p. 351, 2003).

[18] When an OLS regression is used, the impact of the shock on household consumption is equal for all the households in the welfare distribution. This implies that loss of employment has the same impact (measured in terms of loss in welfare) for both poor and rich households. The adoption of a quintile regression consents to overcome this shortcoming.

similarly, the households may have access to informal support from neighbours or families living abroad, etc. In the model, no coping mechanisms are hypothesised to occur. Also, "(some of the) unobservable or unmeasured variables may also be key driving factors (of the modelled variable); (therefore) their omission may result in a bias of the estimated coefficients and the related policy simulations" (Christiaensen et al. 2002, p.145)[19]. A related shortcoming concerns the fact that the simulations assume that changes in the determinant variable do not affect model parameters and that other variables in the model are not affected although feedback mechanisms may operate in the reality.

The second caveat relates to the attempt to measure a dynamic phenomenon, such as welfare downturns, from a "static" regression. It is common opinion among economists that elasticity computed from cross-section data is different from those of time-series. Alasia and Soregaroli (2002) review the econometric debate around this shortcoming in their work on determinants of food demand in Mozambique. Based on Khu (1959) and Houthakker (1965), the authors remind us that cross section estimates could not be a good proxy of the dynamic relation between the independent and the dependent variables. By looking at the response of consumption to income changes, Gardes et al. (1996) conclude that "elasticity computed using cross-section data cannot be used to predict change in consumption over time".

A final issue regards the presence of incomplete observations. Datt et al. (2000) and also Mukherjee and Benson (2003) include the observations with missing data by developing a set of dummy variables that records the value of one if the household is missing data for a certain variable. According to the authors, this method consents not to exclude the households recording missing values for some variables but non-missing responses for other. However, for the parts of the LSMS utilised in the regression, missing values are not numerous. It is therefore decided to adopt a very simple treatment in which households verifying a missing value in any of the variables are excluded from the regression. The exclusion of households with missing values produces an aggregate loss of less than 2% of total observations.

4. The Variables[20]

Household Consumption. The value of per capita household consumption is the dependent variable of the regression model[21]. Per capita household consumption includes food and non-food items, as well as own production, durable goods and housing expenditures. The adoption of a per-capita basis is motivated by willingness to keep the research coherent

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[19] In the Bosnia and Herzegovina LSMS, several potential determinants of household welfare are not included or poorly explored. For example, the remittances received from families living abroad is not examined; also, in case of agricultural households, the Bosnia LSMS is inadequate to capture issues related to land productivity and harvest losses.

[20] The descriptive statistics are reported in appendix.

[21] Datt (2000) identifies four considerations in favour of using consumption instead of income as indicator of household welfare. First, income can be interpreted as a measure of welfare *opportunity* while consumption is interpretable as a measure of welfare *achievement* (Atkinson, 1989). The second relates to the permanent income hypothesis which suggests that consumption typically fluctuates less than income. The third consideration concerns the difficulties in measuring income (Deaton, 1997). The final consideration is based on the idea that income is not an insightful measure of welfare for households whose income comes from self-employment activities (Deaton, 1997; Datt et al., 2000). These concerns are very relevant in Bosnia and Herzegovina, where many people are paid very irregularly, with several months of wage arrears being common.

with the practices adopted both in the Bosnia and Herzegovina PRSP and in econometric poverty analysis, where per capita consumption is preferred to adult-equivalent measures (Mukherjee and Benson, 2003; Datt et al., 2000; Datt & Joliffe, 1999). Choosing per capita consumption as welfare indicator instead of adjusting per adult equivalent implies that "(i) everyone in the household receives an equal allocation of items consumed irrespective or age and gender; (ii) everyone in the household has the same needs irrespective of age and gender; (iii) the cost of two or three or more people living together is the same as if they lived separately" (Skoufias et al., 1999, p. 77).

For the independent variables, special care was given to select variables which are not affected by the current level of household welfare. In other words, the model includes variable "whose values were determined outside the current economic system of the household, but which determine the current level of welfare" (Judge et al., 1985).

Demographic characteristics. This set of variables includes the characteristics of the household in terms of size, composition and displacement status. Three categories are identified according to the age of the household members: below 8 years old, 8-14 years old, 15-59 years old. For individuals aged between 15 and 59, a gender distinction is applied. The household size is introduced in a log form. The regression also explores the connection between household welfare and the gender of household head. A dummy variable is introduced to indicate whether the household head is a temporary resident (e.g. a displaced person)[22].

Education. The regression includes eight variables indicating different education attainments of household members older than 15 years old (called adults for simplicity). This is because the investment in education made by household adults cannot be influenced by the current household living standards because it dates back to years ago. The first education variable in the regression considers the number of adult members over total household size who never attended school and unable "to read and write with understanding, short, and simple sentence during everyday life" (LSMS, 2001). The second variable identifies the adult members who never attended school or never attained qualifications but that are capable of reading and writing. The investment in human capital and education is analysed by looking at the number of adults with primary, secondary and higher level of education[23]. In line with the most recent econometric analysis of household welfare (such as Datt et al., 2000), the education variables are differentiated by gender.

Employment. This set of variables refers to household employment and livelihood characteristics. The presence of unemployed is represented by the number of unemployed over total adults in the household. The case of individuals occupied in informal labour is represented by two variables. The first includes members who are small scale farmers on own farm, unpaid individuals who support other members in their work and those who perform other activities such as sale of agricultural goods and other unspecified services. These are defined as generic informal occupation. Following on Vodopivec (2002), an additional category of informal labourers is included. These are defined "informal dependent

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[22] The displaced persons are "considerably more susceptible to poverty than the population that was not forced to move" (PRSP, 2002, p.10): they face in fact "greater difficulties in finding a job and often forced to accept jobs that other groups were not interested in" (ibid., p.11). The choice to exclusively look at the displacement of household head is due to the high number of missing values in the LSMS module for migration.
[23] The latter includes high school, university, master or doctorate.

employees" and are constituted by persons working for private enterprises but who are not fully registered, namely do not receive pension contributions. This categorisation is in accordance with Bernabè (2002) which proposes a distinction between unregulated and unregistered activities whose main purpose is to meet basic needs and activities which are concealed to avoid taxes and regulations. These two aspects are very relevant in a country such as Bosnia and Herzegovina, where enterprises attempt to escape registration and legislation procedures while households and individuals turn to small scale income activities to generate livelihoods in absence of formal employment opportunities (World Bank, 2003). Formal labour is described through three variables: the first identifies household members working in public enterprise, institutions and organisations. The second identifies those working for employers in the private sector but who regularly receive pension contributions. The last variable represents the owners or co-owners of enterprises or small-businesses. A variable is derived to represent the number of pensioners over total household size. Finally, a variable represents the size of land cultivated by the household, regardless of the property status. This variable captures both the fact that the household is engaged in agricultural activity and the scale of this activity.

Location. In the literature, the location dimension is usually captured by introducing a distinction between rural and urban areas. Following on Cuna and Alasia (2003), in Bosnia and Herzegovina, the use of territorial dummies based on the classification of municipalities by regional types (rural/mixed/urban) as proposed by the LSMS does not adequately capture the territorial variation in poverty across the country. The set of location variables is therefore represented by 25 dummies, corresponding to each of the municipalities covered in the survey[24]. In the regression, the excluded variables refer to Banja Luka in the RS, and to Centar municipality in the FBiH[25].

5. Regression Results

Since the dependent variable is in natural logarithm form, the estimated regression coefficients measure the percentage change in per capita consumption within the household resulting from a unit change in the independent variable. The values of the "pseudo" R-square index are encouraging: for the RS, the 25th quantile regression has 0.26 pseudo R-Square; 0.27 for the 50th quantile and 0.28 for the 70th quantile. For the FBiH, the pseudo R-Square are 0.30, 0.32 and 0.34 respectively. All the sets of variables are jointly significant at the 1% confidence level in the two equations in both Entities. The regression is developed through a simultaneous quantile regression model. Standard errors are obtained using bootstrapping re-sampling (Efron and Tibshirani, 1993; Wu, 1986), setting the random seed number at 100.

Demographic Characteristics. The F-test demonstrates that the demographic variables are jointly significant at 1% confidence level in both Entities. The regression evidences the strong and negative relationship existing between household size and value of per capita

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[24] A similar approach was adopted by Ravaillon, M., and Wodon, Q., (1997). "Poor areas or Poor People", World Bank.
[25] Unfortunately, the Bosnia and Herzegovina LSMS does not include a community questionnaire. The availability of this dataset would allow inserting in the regression variables referring to infrastructure endowment and other relevant characteristics of the municipality in which the household lives.

consumption: the more numerous is the family, the lower its welfare. This finding confirms the PRSP concern for the high exposure to poverty of children living in large households.

- Table 1 -
Quantile Regression Results

Variable Name	Republic Srpska			Federation		
	25th Quantile	50th Quantile	75th Quantile	25th Quantile	50th Quantile	75th Quantile
Constant	8.079**	8.560**	9.062**	7.917**	8.415**	8.792**
Persons 0- 7 years old	-.008	.003	.033	.029	0.004	-.001
Persons 8 -14 years old	.028	.049	.066	-.012	-.008	-.009
Females 15-59 years old	-.001	.025	.061**	.065**	.055**	.056*
Males 15-59 years old	-.000	.026	.019	.043	.044**	.061**
Log of household size	-.369**	-.470**	-.571**	-.581**	-.615**	-.671**
Dummy, 1 if hh head is temp. resident	-.134**	-.116**	-.079**	.067	-.084**	-.099**
Dummy, 1 if hh head is a women	.030	-.024	-.024	.040	.018	-.011
Age of household head	-.003	-.011	-.018**	.012	.008	.006
Square of age of household head	-.000	.000	.000*	-.000	-.000	-.000
Adults unable to read/write on hh size	-.259*	-.278**	-.122	-.242**	-.221**	-.271**
Ad. with no qualifications on hh size	.245	.212	.260	.051	.064	.028
Male ad. with primary school on hh size	.331	.328	.423*	.147	.093	-.006
Fem. ad. with primary school on hh size	.285	.247	.226	.050	.032	-.039
Male ad. with secondary school. on hh size	.483	.470*	.577**	.357	.368*	.245
Fem. ad. with secondary school on hh size	.600*	.470*	.471*	.316	.271	.146
Male ad. with higher education on hh size	.789**	.768**	.854**	.708**	.671**	.627**
Fem. ad. with higher education on hh size	.747*	.627**	.653*	.466*	.427**	.461*
N° of pensioners on hh size	.085	.107*	.033	-.055	-.071	-.088**
N° of unemployed on hh adults	-.125**	-.117	-.145*	-.218**	-.206**	-.128*
N° of entrepreneurs on hh adults	.706**	.626**	.592**	.690**	.691**	.787**
N° of inf. dep. employees on hh adults	.075	.145*	.107	.160	.090	.120*
N° of inf. gen. employees on hh adults	.041	.092	-.082	-.049	-.002	-.010
N° of formal public employees on hh adults	.227**	.205**	.119*	.311**	.286**	.297**
N° of formal private employees on hh ad.	.296*	.379**	.119*	.283**	.318**	.434**
Size of the land used	0.035	.034*	.067**	.000	-.000	-.001
Dummy, 1 if living in Banja Luka	Omitted	Omitted	Omitted			
Dummy, 1 if living in Srpska Ilidza	-.152**	-.261**	-.258**			
Dummy, 1 if living in Cajnice	-.139	-.210**	-.185			
Dummy, 1 if living in Novi Grad (RS)	-.119*	-.119*	-.161			
Dummy, 1 if living in Prijedor	-.383**	-.348**	-.333**			
Dummy, 1 if living in Modrica	.054	-.016	-.038			
Dummy, 1 if living in Vicegrad	-.429	-.546**	-.520**			
Dummy, 1 if living in Knedzevo	.383**	-.246**	-.344**			
Dummy, 1 if living in Samac	-.001	-.009	-.022			
Dummy, 1 if living in Zvornik	.062	.010	-.025			
Dummy, 1 if living in Srbac	-.018	.065	.136**			
Dummy, 1 if living in Centar				Omitted	Omitted	Omitted
Dummy, 1 if living in Novigrad (Fed)				-151**	-.142**	-.178**
Dummy, 1 if living in Novi Sarajevo				-.070	.124**	-.182**
Dummy, 1 if living in Zenica				.425**	-.487**	-.504**
Dummy, 1 if living in Tuzla				-.240**	.266**	-.263**
Dummy, 1 if living in Vogosca				-.051	.111**	-.153*
Dummy, 1 if living in Travnik				-.078	-.108**	-.134*
Dummy, 1 if living in Visoko				-.245**	-.304**	-.337**
Dummy, 1 if living in Breza				-.258**	-.404**	-.400**
Dummy, 1 if living in Zavidovici				-.119**	-.213**	-.246**
Dummy, 1 if living in Gradacac				-.008	-.046	.017
Dummy, 1 if living in Posusje				.162**	.119*	.042
Dummy, 1 if living in Kakanj				-.194	-.243**	-.156*
Dummy, 1 if living in Grude				.077	.205**	.089

Dependent Variable: Natural Logarithm of Per Capita Household Consumption.*** p<0.05; ** p<0.01.**

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In both Entities, the value of the coefficient for the 75th quantile is higher than for the 50th quantile, which is lower than the coefficient calculated on the 25th quantile. In the RS, the Wald test shows that the hypothesis of equality among the two coefficients can be rejected at 1% confidence level. In the FBiH, the coefficients of the 25th and 50th quantile regression can be regarded as statistically equal. The coefficient of the 75th quantile regression is instead statistically different than the one calculated on the 50th quantile. In the RS, the presence of a household head who is a temporary resident negatively impacts on the household consumption and the coefficient for poorer households is higher than the one of the richer percentile. However, on the basis of the Wald test, the hypothesis of equality between the coefficients of the three regressions cannot be rejected. In the FBiH, the coefficient is statistically significant in both the 50th and the 75th quantile.

At the same time, the values of the coefficients are lower compared to the RS. This finding suggests a very different situation of temporary residents in the two Entities. The coefficients for the gender of household head are not significant. It cannot therefore be concluded that female headed households (FHH) are poorer than male headed households (MHH). Rather, in substantial accordance with the literature on gender and poverty in Bosnia and Herzegovina, being a FHH can turn out to be a source of concern only when combined with other factors[26].

Education. The only education variable that negatively affects household well-being relates to individuals who do not know how to read and write. The coefficient is significant at the 1% confidence level in both the FBiH and RS[27]. In the RS, the coefficient of this variable for the 25th quantile regression equation is almost twice lower than the coefficient estimated for the 70th quantile. This suggests that illiteracy is a concern especially for poorer population strata. However, the two coefficients are not statistically different. Looking at the other education variables, in the RS the only statistically significant coefficients are those related to higher education and those for female adults with secondary school qualifications. In the RS, the presence of individuals having a higher education diploma has a bigger impact on welfare compared to the FBiH for all the regression equations.

Employment. In the RS, the presence of pensioners in the household positively contributes to welfare only when the 50th quantile estimates are taken into consideration. Instead, in the FBiH it is negatively significant (at 5% confidence level) for the 75th quantile. This can be due to the fact that in a poorer environment (such as the Republic Srpka), the income source coming from pension is highly relevant. On the other hand, in a relatively more-developed location (such as the FBiH), the presence of pensioners has no impact on household consumption and, when the richest quantile is considered, the presence of pensioners is negatively associated with level of household welfare[28].

In both the RS and the FBiH, the number of unemployed over household labour force negatively and significantly affects household welfare. This finding contrasts with the

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[26] Rukanesen (2003) identifies the following traits as determinants of poverty for FHH: the heads are elderly of pensioners, they are headed by widows living alone, the household is made up of refugees or displaced persons, they are based in the RS.

[27] Somewhat surprisingly, adult illiteracy is not regarded as a key problem for Bosnia and Herzegovina (PRSP, 2002) despite that recent researches available on human development show that the country records a general backwardness in terms of adult literacy compared to the other Easter European and Stability Pact countries (UNDP, 2002).

[28] However, further research would be needed to explore the situation of elderly and pensioners in the country.

conclusion of the Country Poverty Profile that does not consider unemployment a primary cause of poverty. In the FBiH, the presence of unemployed is more relevant for the poorest strata of population. However, no statistically significant difference is found between the coefficients of the 25th and 50th equation, whereas the coefficient of the 50th and 75th model should be regarded as statistically different.

By looking at household members involved in income generating activities, in both the FBiH and the RS, the highest coefficient refers to enterprise ownership. The presence of public employees positively influences household consumption. In both Entities, the value of the coefficient in the bottom quantile model is higher compared to the other models. The coefficients are regarded as statistically different only in the RS when the coefficients for the 50th and the 75th model are considered. On the basis of the regression results, loss of employment among public sector employees and the increase in unemployment is expected to have a major negative impact on the poorest households. At the same time, since in the FBiH, the value of the coefficient of public sector employees is higher than in the RS, it is reasonable to suppose that a larger welfare loss will be experienced by the households hit by the shock. The regression results for the variable referring to informal dependent labour are of more complex interpretation. For the RS, the estimated value of the coefficient is significant at the 10% confidence level only in the 75th quantile regression and at 5% for the 50th quantile model In the FBiH, the variable is significant only for the highest quintile model. This result suggests that territorial issues have a key role in determining the importance of household livelihoods. For the poorest percentiles, it is reasonable to attribute the non-significance of the coefficient to the low skills endowment of individuals belonging to low population strata which imply scarce access to well-paid informal jobs. Whereas for richer households, the variable becomes a relevant livelihood source.

Location. The F-test proves that the location variables are jointly significant in both Entities at the 5% confidence level. In the RS, the analysis of the coefficients shows the high negative impact on household welfare associated to Visegrad, compared to the benchmark constituted by Banja Luka. At a lower level of severity, also Prijedor, Srpska Ilidza, Knedzevo and Canjce show negative significant coefficients. In the FBiH, the result for Zenica and Breza are particularly severe if compared to the reference municipality of Central Sarajevo. To explain the negative coefficients of these variables, the economic history of the Bosnian municipalities, their diverse resource and infrastructure endowment should be discussed. The economic history of Bosnia Herzegovina has been in fact remarkably dissimilar across the territory; during the conflict of the 1990s, Bosnian municipalities experienced a very uneven pattern of destruction, as well as different experiences and difficulties in recovering (Bisogno and Chong, 2002; Cuna and Alasia, 2003).

6. Vulnerability Analysis – Shock on Formal Public Sector

The Shock. The first shock involves the households having at least one individual employed in the formal public sector. This sector refers to public enterprises, institutions and organisations regardless of occupation characteristics and sector of activity. The sector involves approximately 47% of the households in the RS and 39% in the FBiH. The shock consists in the employment loss of one household member compensated by an increase in

unemployment. No other changes are hypothesised in household livelihoods. The workers involved in the formal public sector can be considered at risk of losing employment for two main reasons. The first regards the necessity for Bosnia and Herzegovina to undergo a radical reform in the public sector. This is one of the recommendations contained in the "Public Expenditures and Institutional Review", developed by the Bosnia and Herzegovina World Bank in 2002. The amount spent to pay public employees in Bosnia and Herzegovina "is almost three-times the average of Central and Eastern Europe transition economies and higher than the most of the more developed EU economies" (World Bank, 2002, p.35)[29]. The second issue relates to privatisations. The risk of dismissal is particularly high for individuals employed in public enterprises that are planned to be privatised in next few years. This is because, despite the legal obligations, newly privatised enterprises might require a drastic cutback in employment in the search for economic and productive efficiency (Vodopivec, 2002; PRSP, 2002).

Vulnerability Figures. Table 2 shows the initial (before the shock) poverty incidence and the vulnerability to poverty headcount which gives the number of households estimated to fall below the poverty line because of the shock.

- Table 2 -
Formal Public Sector Households - Vulnerability and Poverty Figures[1]

	Republic Srpska	Federation
Benchmark Poverty Incidence	22.92%	9.96%
Vulnerability to Poverty Headcount	7.15%	17.98%
Benchmark Poverty Gap	0.092	0.057
After Shock Poverty Gap	0.108	0.084
Benchmark Poverty Severity	0.028	0.013
After Shock Poverty Severity	0.034	0.021
Number of Observations	950	1122
Percentage of Households[2]	47%	40%

1 – All the figures refer to the group of households having at least one household member involved in public sector occupations.
2 – All the indexes are calculated using analytical weights.

The figures exclusively refer to the group of households hit by the shock, hence those having at least one member employed in the public sector. The poverty estimates for the group of households are in accordance with the overall country figures that show a higher poverty incidence in the RS than the FBiH. However, poverty incidence among the group hit by the shock is lower than the estimated Entity poverty incidence[30]. Looking at the "vulnerability to poverty" headcount, in accordance with expectations, the FBiH registers a higher vulnerability to poverty. As commented above, this is a direct consequence of the

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[29] The report is very careful in saying that the Bosnia public sector is overstaffed. On one side the report states that "the high public wages spending is more the result of relatively high wage and salaries levels in Bosnia and Herzegovina public sector vis-à-vis the rest of the economy" (ibid, p.26). On the other, it clarifies that, in drawing the above conclusions, the level of employment in the defence sector is not taken into account. Since the employment level of the defence sector in Bosnia and Herzegovina is very large, it is reasonable to argue that public sector employment must be reviewed.
[30] According to the estimated value of household consumption, in the RS, poverty incidence is 27% before and 31% after the shock; poverty gap 0.035 and 0.041; poverty severity 0.011 and 0.013. In the FBiH, the poverty incidence is 15% and 22%.; poverty gap 0.026 and 0.038; poverty severity 0.006 and 0.009.

regression estimates, where the coefficients referring to unemployment and public sector employees have a higher value in the FBiH compared to the RS.

The analysis of the poverty gap and the squared poverty gap indexes shows that the RS has higher depth and severity of poverty both before and after the shock. However, the shock provokes a higher increase of these indicators in the FBiH. Poverty gap increases of 47% in the FBiH compared to 17% in the RS; squared poverty gap increases of 61% in the FBiH and of 21% in the RS. These results suggest that the two Entities present considerable differences in terms of welfare mobility provoked by the shock.

This finding is confirmed by the analysis of transition matrices. Unfortunately, the whole information contained in transition matrices cannot be summarised in a unique synthetic indicator of welfare mobility. If the number of households losing more than two welfare deciles is taken into consideration, it can be concluded that 37% of the RS households hit by the shock experience "severe" welfare downturns, amounting to more than two deciles.

- Table 3 -
Formal Public Sector– Transition Matrices RS[1]

						Simulated-After Shock Population Deciles						
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total**
	1	100										100.00
	2	59.29	40.71									100.00
	3	2.43	61.08	36.50								100.00
	4		0.31	84.17	15.52							100.00
	5		6.22	31.91	61.87							100.00
Benchmark Population Deciles	**6**			5.34	47.70	24.74	22.21					100.00
	7			18.97	28.55	14.38	36.14	1.97				100.00
	8			0.22	4.86	28.23	47.23	15.79	3.68			100.00
	9					0.21	35.26	54.30	16.28	3.95		100.00
	10						0.96	17.15	27.13	32.06	22.70	100.00
	Total	16.40	10.80	17.62	16.21	6.76	13.00	8.75	4.65	3.57	2.25	

1 – The transition matrix is calculated by taking into consideration the household population hit by the shock. The cut-off points are established on the basis of the estimated log of household consumption per capita and have the following values: 7.31, 7.47 7.64, 7.76, 7.83, 7.98, 8.10, 8.22, 8.41. Analytical weights are applied.

Regardless of this indicator, the analysis of Table 3 evidences that, in the RS, upper deciles register the highest shares of households losing more than two welfare deciles. For example, only 2% of households remain the 7th decile. Very similar is the case of the 8th and 9th decile. In many cases, considerable shares of households lose two or more deciles. Particularly severe is the downward welfare mobility experienced by households previously ranked in the 8th and 9th deciles, where more than 80% of the households experience welfare loss amounting to at least two deciles. Welfare losses decrease as one moves towards lower decile. In the 6th decile, the share of population losing more than two deciles is approximately 60% and decreases to marginal shares in the 3rd and 4th decile. This is a consequence of the regression coefficients but it also depends on the characteristics of the population involved in the formal public sector. These figures should not be confused with the overall poverty situation in the RS, which show high poverty gap and severity indexes. On this argument, it is important to notice that after the shock, approximately 45% of the population of households involved in the formal public sector is categorised in the bottom three deciles (which approximately corresponds to the poverty line).

Vulnerability to poverty especially involves households ranked immediately above the poverty line, namely those categorised in the 4th decile. Only 15% of these households remain on a non-poor status after the shock. Vulnerability to poverty is also experienced by groups of households from the 5th and 7th quantile, whereas it is rather limited from the 6th quantile.

The results for the FBiH are significantly different (table 4). Even the visual structure of the table suggests a higher downward welfare dynamism provoked by the shock. According to the estimates, 47% of the households hit by the shock experience welfare losses amounting to at least two deciles. Similarly to the RS, in the FBiH upper deciles register the highest downward welfare mobility. At the same time, it is important to notice that in all the deciles, very few households are capable of preserving their welfare ranking[31]. If the population classified in the upper part of the distribution is considered, in the FBiH, approximately 28% of the population is classified in the top group. This share increases to 32% in the RS.

Table 4 shows that the 8th and 9th deciles are the ones recording the highest number of households losing more two welfare deciles after the shock (72% and 83%). This share decreases to 69% in the 7th and decreases until 44% in the 5th decile. However, contrarily to what evidenced in the RS, also lower deciles record considerable number of households vulnerable to severe welfare losses. This is the case of 29% of households from 4th and 61% from the 3rd decile losing more than two deciles. At the same time, it is important to notice that the movement of households below the poverty line in the FBiH is higher compared to the RS: all the households previously categorised in the 2nd decile fall to the bottom decile. This explains the higher increase in poverty gap in the FBiH compared to the RS summarised in Table 2.

- Table 4 -
Formal Public Sector – Transition Matrices FBiH[1]

		Simulated-After Shock Population Deciles FED										
		1	2	3	4	5	6	7	8	9	10	Total
Benchmark Population Deciles	1	100.										100.0
	2	100	0.00									100.0
	3	61.49	35.3	3.14								100.0
	4	11.20	18.0	70.8	0.00							100.0
	5	1.82	3.61	38.8	52.5	3.26						100.0
	6	4.22	0.00	7.49	43.3	45.0	0.00					100.0
	7		5.05	5.50	25.8	33.1	29.2	1.35				100.0
	8			0.56	6.93	29.2	35.9	24.7	2.74			100.0
	9				3.34	5.64	28.5	45.6	15.5	1.44		100.0
	10				1.20	0.00	0.35	19.7	36.9	34.0	7.77	100.0
	Total	27.94	6.22	12.7	13.3	11.6	9.43	9.03	5.43	3.52	0.77	

1 – The transition matrix is calculated by taking into consideration the population of households hit by the shock. The cut-off points are established on the basis of the estimated log of household consumption per capita and have the following values: 7.51,7.60, 7.72, 7.84, 7.96, 8.06, 8.21, 8.39, 8.59. Analytical weights are applied.

Vulnerability to poverty mainly involves households from the 3rd and 4th decile. In particular, 93% of the households living immediately above the poverty line (3rd decile) fall into poverty after the shock. In the RS, "only" 85% of the households immediately above the

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[31] This information is given by looking at the diagonal in the matrices in which the population decile before the shock is equal to the one after the shock.

poverty line are estimated to be plunged in poverty[32]. These figures help to explain the different "vulnerability headcount" presented in Table 2.

Although it might sound anomalous, a possible explanation of the higher welfare mobility of the FBiH can be found in the higher living standards of this Entity compared to the RS. An environment characterised by higher industrial and economic growth, better infrastructure endowment, etc., encourages households to rely on their income sources. This could be one of the reasons for the higher coefficients associated with the presence of public sector workers in the household. Consequently, when the income-generating activity is subtracted, households are more exposed to welfare losses. In contrast, the worse economic condition of the RS forces households to rely on multiple or alternative livelihood sources such as un-registered occupations, consumption of goods obtained from direct agricultural activity, remittances from relatives living abroad, etc. Following this rationale, disappearance of income source has a lower impact on welfare mobility[33].

Another interpretation relates to the distribution of employees across the formal public sector. In the RS, 17% of the individuals employed in the public sector perform "simple occupations"[34]. The share decreases to 13% in the FBiH[35]. For the RS, the major concentration of public sector workers in simple occupations, and consequently their lower wages, decreases the average return to this type of employment. The removal of such low-wages income sources does not create relevant welfare loss as is the case of more remunerative jobs. This interpretation must be treated very carefully. Saying that households involved in the public sector in the RS are less vulnerable to welfare losses than those in the FBiH because the former are more concentrated in low-wage activities sounds very unrealistic. Workers engaged in simple occupations may in fact be considered at a higher risk of dismissal compared to other typologies of workers (Sinha and Lipton, 1999). If this hypothesis holds true, although the RS records overall lower welfare mobility, it is reasonable to suppose that the risk of employment loss among households involved in public sector occupations is higher in the RS.

Despite the higher mobility verified in the FBiH, the after-shock Entity poverty headcount in the RS is still higher than in the FBiH (31% vs. 22%). It must be considered that the benchmark poverty incidence in the RS is almost twice that of the FBiH. However, the picture in terms of vulnerability to poverty level would significantly change if, in order to draw the poverty line, a relative approach is adopted on the basis of the Entity-specific welfare distribution. By utilising a relative poverty line corresponding to the cut-off point of the second decile with respect to the before-the- shock distribution, the poverty incidence after the shock would be higher in the FBiH than the in the RS (26% vs. 23%) [36].

<u>Vulnerability Profile</u>. The shock pushes some households into poverty; others are hit by the shock but were already in a poverty status, others remain on a non-poor welfare level

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[32] In the transition matrix elaborated for the FBiH, the poverty line can be approximated to the cut-off point of the 2nd to the 3rd decile.

[33] For the FBiH, the estimated coefficient is 0.197 versus 0.140 in the RS. Similarly the presence of unemployment is not statistically relevant in the RS whereas it is significantly negative in the FBiH.

[34] Simple occupations include the following categories: workers in services and commerce; agriculture, forestry and fishing; mining, civil engineering, processing and transport workers; other undefined simple occupations.

[35] Detailed results available under request.

[36] Needless-to-say, if this "relative" definition of poverty is adopted, the benchmark poverty headcount is 20% in both Entities, since 10% of the household population live in each decile.

but experience downward movements in the welfare ranking. The vulnerability profile in table 5 evidences the household characteristics that are associated with vulnerability to poverty and to what extent they differ from households who are hit by the shock but were already in a poverty status and from those who, although hit by the shock, remain on a non-poor status.

By first looking at the results of the RS, households whose heads are illiterate or have no diploma are more at risk of being plunged into poverty. They are also more likely to be hit by the shock when they are already poor. The percentage of households who fall into poverty because of the shock decreases when education of the household head increases. In the FBiH on the other hand, illiterate or no-diploma headed households are not the category at higher risk of poverty. Rather, vulnerability to poverty is experienced by primary or secondary school qualified headed households.

- Table 5 -
Formal Public Sector– Poverty and Vulnerability Profile

| Household Characteristics | Poverty Dynamics | | | | | | Welfare Dynamics | | | | Share of Population | |
| | Republic Srpska | | | Federation of Bosnia and Herzegovina | | | Republic Srpska | | Federation of Bosnia and Herzegovina | | | |
	Poor	Vuln. To Pov.	Non Poor	Poor	Vuln. To Pov.	Non Poor	< 2 Dec.	> 2 Dec.	< 2 Dec.	> 2 Dec.	RS	Fed.
MHH	24.4	7.8	67.7	10.6	19.4	69.2	71.4	28.6	55.4	44.6	90.0	88.3
FHH	9.3	8.3	82.6	5.2	7.5	87.2	55.7	44.3	49.0	51.0	9.9	11.7
Ill. /No Dip.	31.3	18.4	50.4	15.2	11.6	73.2	81.6	18.4	69.3	30.7	11.6	9.7
Prim. Dip.	29.6	4.7	65.7	15.8	20.3	63.9	74.1	25.9	75.2	24.8	22.5	15.3
Second. Dip.	18.3	7.4	74.3	9.5	21.1	69.4	65.1	34.9	49.7	50.3	53.7	59.6
Higher. Dip.	10.6	6.7	82.6	1.0	7.4	91.6	62.6	37.4	42.6	57.3	12.2	15.4
<=2 Mem.	0.00	1.7	98.3	0.0	0.0	100.0	53.6	46.4	40.6	59.4	6.16	6.9
3 Mem.	6.0	5.4	88.6	0.6	5.3	94.1	56.6	43.4	37.0	63.0	17.6	18.8
4 Mem.	16.1	11.6	72.2	5.0	20.7	74.2	73.6	26.4	40.3	59.7	35.2	39.6
5 Mem.	24.7	5.0	70.2	18.1	32.8	49.1	66.4	33.6	73.7	26.3	22.7	20.2
6+ Mem.	57.5	8.5	34.0	29.0	14.7	56.3	84.8	15.2	97.1	2.8	18.4	14.5

In the FBiH, MHH have the highest incidence of vulnerability to poverty. This confirms the finding that being a FHH is not *per-se* a cause of poverty. In the RS, the percentage of FHH that fall into poverty after the shock is slightly higher compared to MHH; however, FHH are less likely to be found already in poverty when the shock occurs. Looking at the results for household size, the results show that in both Entities, when the shock involves large households, a significant share of them is already in a poverty status. This confirms the concern of the Poverty Profile for the condition of children living in large households in the country. This is particularly the case for RS, where 57% of the households having 6 or more members, are already in a poverty status before the shock. On the other hand, vulnerability to poverty is almost non-existent among single or two-member households.

When vulnerability is analysed by considering the welfare losses amounting to more than two deciles, the scenario drastically changes. FHH are the category more exposed to severe welfare losses: in the RS, out of 100 FHH hit by the shock 44% of them experiences welfare losses amounting to more than two deciles. This share increases to 51% in the FBiH. This result contrasts with the conclusion of the "vulnerability to poverty" approach. Welfare losses especially involve households whose head has a diploma: this is due to the fact that in educated-headed households, loss of employment is likely to correspond to the loss of a

relatively higher wage. Contrarily to that previously discussed welfare losses are not influenced by household size: rather, in both Entities, households made up of few members register the highest share of households losing ranking positions. This can be due to the scarce diversification of the livelihood sources for small-size households. Hence, the subtraction of an income source provokes welfare losses regardless of poverty considerations.

7. Vulnerability Analysis – Shock on Informal Dependent Sector

The Shock. This shock involves the households whose members are employed in the informal dependent sector. According to LSMS estimates, 17.5% of the total households living in Bosnia and Herzegovina have at least one individual engaged in an informal dependent occupation (19.2% in the RS and 14.7% in the FBiH). Similar to the shock analysed above, this second shock is modelled by hypothesising that in all the households involved in the informal dependent sector, one member loses his/her work and becomes unemployed. As specified above, this category encompasses all the employees in private enterprise who do not receive pension contributions. This category is exposed to peculiar typologies of risk and insecurity. Employees hired without fully respecting the registration procedures enjoy less protection or labour rights and the risk of dismissal is very high. This is confirmed by the individual data from the LSMS which show the low duration of informal employment compared to others. Informal dependent employees are also exposed to the consequence of policies aimed at regulating informal labour which might provoke contractions in the labour demand and consequent loss of employment. These issues emerge in various researches conducted in Bosnia and Herzegovina (Djipa et al., 2002, UNDP, 2002).

Vulnerability Figures. According to the estimates, in the RS 40% of the households engaged in this sector is already poor before the shock. In the FBiH, the incidence is considerably lower (12.89%). However, this figure is higher compared to the group of households involved in formal public occupations.

- Table 6 -
Informal Dependent Sector - Vulnerability Headcount[1]

	Republic Srpska	Federation
Benchmark Poverty Incidence	40.32%	12.89%
Vulnerability to Poverty Headcount	4.32%	7.26%
Benchmark Poverty Gap	0.236	0.245
After Shock Poverty Gap	0.252	0.264
Benchmark Poverty Severity	0.073	0.059
After Shock Poverty Severity	0.079	0.065
Number of Observations	403	282
Percentage of Households[2]	19.2%	14.7%

1 – All the figures refer to the group of households having at least one household member involved in public sector occupations.
2 – Percentage of households is calculated using analytical weight from the LSMS.

For the households involved in the informal dependent sector, the FBiH has deeper poverty but lower severity compared to the RS. The households living in the FBiH experience higher vulnerability to poverty compared to their analogous households in the RS (7.6% vs. 4.3%). It has to be noticed that the vulnerability to poverty figures associated to this

shock are lower compared to the case of a shock occurring in the formal public sector. Poverty gap increases of approximately 7% in the two Entities (6.78% in the RS and 7.76 in the FBiH). The increase in poverty severity is instead considerably higher in the FBiH than in the RS (10.17% vs. 8.22%). However, the RS has still the highest poverty severity index among the households hit by the shock.

A shock involving informal dependent labourers has also a relatively lower impact in terms of welfare dynamics. From transition matrices, it is noticeable that in the RS, the categories experiencing the most severe welfare losses belong to high deciles. In the 10th decile, the population losing more than two deciles after the shock is approximately 49% and increases to 59% in the 9th decile. Approximately 13% of the total population living in the top three deciles before the shock remain on that level after the simulation. The percentage of households losing more than two deciles decreases if lower deciles are taken into consideration. By considering the entire population hit by the shock, the ratio of households experiencing a welfare loss amounting to two deciles or more is 14.6%, which is considerably lower with respect to the estimates made for formal public sector employees.

In the transition matrix elaborated in Table 7, the poverty line can be drawn approximately between the 4th and the 5th decile. Vulnerability to poverty involves slightly less than 40% of the households categorised in the 5th decile before the shock. For other deciles, the percentage of households falling into poverty is marginal. At the same time, it is important to notice that also households living below the poverty line experience downward welfare mobility. This means that for more than 40% of the households already in poverty before the occurrence of the shock, loss of employment implies more severe poverty and destitution.

- Table 7 -
Informal Dependent Sector– Transition Matrices RS

| | | Simulated-After Shock Population Deciles | | | | | | | | | |
		1	2	3	4	5	6	7	8	9	10	Total
	1	100.00										100.00
	2	31.19	68.81									100.00
	3		53.71	46.29								100.00
	4			26.50	73.50							100.00
Benchmark Population Deciles	**5**			0.00	39.49	60.51						100.00
	6			4.05	0.00	40.47	55.48					100.00
	7				0.75	11.51	47.16	40.57				100.00
	8						40.83	53.38	5.79			100.00
	9							59.15	29.87	3.42		100.00
	10							2.71	27.43	33.43	36.42	100.00
	Total	14.84	11.18	7.34	11.29	11.32	14.92	15.67	6.26	3.62	3.57	

1 – The transition matrix is calculated by taking into consideration the population of households hit by the shock. The cut-off points are established on the basis of the estimated log of household consumption per capita and have the following values: 6.93, 7.21, 7.33, 7.51, 7.67, 7.87, 8.05, 8.16, and 8.41. Analytical weights have been applied.

The transition matrix elaborated for the FBiH confirms the overall higher vulnerability to welfare losses of households living in this Entity. However, the welfare losses are not as dramatic as in the case of formal public employees. The ratio of households losing more than two welfare deciles out of the total population hit by the shock is 24% which is almost half the value estimated for shocks occurring in the formal public sector. Examining the indicators of welfare mobility for upper deciles, according to the simulation

results, 14% of the households previously categorised in the top three deciles are still on the same welfare level after the shock. The transition matrix of the FBiH shows that the shock especially involves households categorised in the 6th decile. Only 3% of the households classified in this decile are capable of preserving their living standards after the loss of the livelihood source associated to informal dependent occupations.

Vulnerability to poverty is particularly relevant for households classified in the deciles immediately above the poverty line: almost all the households previously in the 3rd decile fall in poverty after the shock[37]. Poverty is also experienced by 15.5% of households from the 4th and by a 6.8% from the 5th decile. These figures are coherent with the vulnerability to poverty headcount presented in Table 6 which shows that in the FBiH a bigger number of households are vulnerable to poverty compared to the RS. Again, vulnerability to poverty is a consequence of the higher exposure to downward welfare movements registered in the FBiH. As commented above in note to regression results, the overall better economic condition of informal employees living in the FBiH should be taken into consideration. At the same time, the wage figures show that the average wage of informal dependent employees in the RS is KM 292 per month whereas in the FBiH it is KM 464 per month. As already mentioned, when a well-paid income source is subtracted, welfare losses tend to be higher. This is the case of households involved in the informal dependent sector in the FBiH. On the other hand, the low remuneration of informal dependent employees is associated to poverty, as confirmed by the RS poverty figures in Table 6 but decreases the household vulnerability to welfare downturns.

- Table 8 -
Informal Dependent Sector– Transition Matrices FBiH

		Simulated-After Shock Population Deciles FED										
		1	2	3	4	5	6	7	8	9	10	Total
	1	100.0										100.0
	2	69.00	31.00									100.0
	3	17.19	80.52	2.29								100.0
	4		15.50	54.37	30.13							100.0
	5		6.85	48.66	15.15	29.3						100.0
	6				0.81	49.2	50.03					100.0
Benchmark Population Deciles	7				5.77	18.1	72.99	3.15				100.0
	8				1.56	13.1	11.64	60.39	13.30			100.0
	9					1.53	9.12	49.11	27.53	12.71		100.0
	10							8.48	40.40	39.10	12.02	100.0
	Total	18.76	13.48	10.52	5.39	11.0	14.45	12.23	7.99	5.02	1.15	

1 – The transition matrix is calculated by taking into consideration the population of households hit by the shock. The cut-off points are established on the basis of the estimated log of household consumption per capita and have the following values: 7.49, 7.64, 7.72, 7.78, 7.90, 8.01, 8.17, 8.32, and 8.50. Analytical weights have been applied.

Vulnerability Profiles. In the RS, the analysis of the effects of the shock amongst the various population categories evidences that female and illiterate headed, together with large households, are already in a poor status before the shock. Looking at gender characteristics, out of 100 female headed households hit by the shock 50 of them are already in a poverty status before the shock. This share increases to 60% for households headed by someone having no diploma or incapable to read and write. At the same time, 77% of the households having more than 6 members are instead in poverty before the shock occurrence. These

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[37] With a certain degree of approximation, the cut-off point of the second and the third decile can be considered as the poverty line.

categories should be regarded as highly in need of social protection due to the high insecurity associated to informal dependent labour.

The profile for households vulnerable to poverty presents various dissimilarities with respect to the one of the "always poor". First of all, female headed households involved in informal dependent occupations seem not to experience any risk of being plunged into poverty. It must be said that almost the majority of them are already in a poor status, but the remaining families are kept on a non-poor welfare status after the disappearance of the informal income source. In contrast, male headed households are vulnerable to poverty but the percentage is rather small since the Entity poverty figures are small too. In terms of education characteristics (proxied by the household head education attainment), the households more at risk of being plunged into poverty are those whose head has no diploma or are illiterate. The incidence of vulnerability to poverty among household-size categories suggests that large households involved in informal dependent occupation are in general already poor before the shock occurrence. Vulnerability to poverty is higher among three-member households but no specific reason can be found for explaining this result.

In the FBiH, the profile of households vulnerable to poverty in terms of gender of household head is very similar to the RS. Male head households are the category more likely to be plunged in poverty after the shock. Differently from the RS, FHH are not found among the poor population before the shock. At the same time, the simulation shows that the FHH involved in informal dependent occupations count on a quite secure livelihood system that allows them to remain on a non-poor status after the shock. The households headed by a well-educated head present the highest vulnerability to poverty whereas almost 25% of the illiterate/no diploma headed households are hit by the shock when already in a poverty status. The figures of household size show that small-size households are non-poor and not-vulnerable. Incidence of poverty and vulnerability increase when bigger size households are taken into consideration: it must be noticed that the category recording the highest vulnerability to poverty is the 4-members households.

- Table 9 -
Informal Dependent Sector – Poverty and Vulnerability Profile

Household Characteristics	Poverty Dynamics						Welfare Dynamics				Share of Population	
	Republic Srpska			FBiH			RS		FBiH			
	Poor	Vuln. to Poverty	Non Poor	Poor	Vuln. to Poverty	Non Poor	< 2 Dec.	> 2 Dec.	< 2 Dec.	> 2 Dec.	RS	Fed.
MHH	38.8	4.9	56.2	14.2	8.0	77.8	77.9	22.1	79.5	20.5	87.6	89.9
FHH	50.8	0.0	49.2	1.3	0.8	97.9	83.0	17.0	84.1	15.8	12.4	10.1
Illiterate/ No Dip.	60.3	8.4	31.3	23.3	4.4	72.2	80.7	19.3	83.4	16.6	25.3	27.6
Prim. Dip.	38.6	0.8	60.6	11.6	12.2	76.2	81.1	18.9	84.9	15.1	32.5	20.1
Second. Dip.	20.9	5.1	74.0	8.5	4.8	86.7	74.9	25.1	76.4	23.6	36.2	49.9
High Edu. Dip.	24.7	6.9	68.4	0.0	35.0	65.0	53.6	46.3	65.4	34.6	6.0	2.4
<=2 Mem.	9.2	1.8	88.9	0.0	0.0	100.0	54.7	45.3	49.21	50.8	5.5	3.4
3 Mem.	11.5	10.8	77.7	1.0	1.5	97.5	58.6	41.4	49.0	51.0	15.6	15.8
4 Mem.	10.8	0.6	88.7	5.9	11.2	82.8	69.8	30.2	79.5	20.5	30.2	27.3
5 Mem.	60.2	6.3	33.4	14.2	5.8	80.0	88.5	11.5	78.5	21.5	16.3	18.6
6+ Mem.	77.1	4.1	18.7	24.6	8.4	67.0	95.3	4.7	98.8	1.2	32.3	34.5

The profile of welfare dynamics shows that FHH are not exposed to welfare losses as they are in the case of shock occurring in the formal public sector. This holds both in the RS and in the FBiH. Considering the qualifications of the household head, well-educated headed

households are the category more exposed to severe welfare downturns. It is possible to argue that this is related to the higher remuneration of informal employment for well-educated households. It should be specified that the shock does not hypothesise which member of the household will lose the job. However, it is reasonable to suppose that well-educated headed households can have access to better-paid occupations. Finally, as in the previous shock model, welfare losses are negatively related to household size: in both Entities, households composed by few members register the highest share of households losing ranking positions. It can be supposed that small-size households have scarcer possibilities of income diversification and therefore the deletion of an income source provokes welfare losses.

8. Conclusive Remarks

In this paper, a simulation methodology was adopted to assess at what extent selected employment shocks are likely to create poverty and welfare downturns in Bosnia and Herzegovina households. According to the findings of this paper, the outcomes of a shock in the formal public sector are considerably diverse with respect to the case of a shock in the informal dependent sector. At the same time, the characteristics of the households vulnerable to poverty confirm that already stated by numerous researches, such as Baulch and McCulloch (1998); Prichett et al. (2000): the profile of the vulnerable does not necessarily coincide with one of poverty. Also, the definition of vulnerability is important for detecting which categories are in need of social protection.

On a methodological point of view, the adoption of a quintile regression has allowed us to overcome one of the most recurrent limitations of micro-simulation literature: a variable can have diverse effect on household welfare depending on the relative position of the household in the welfare distribution. Further research would be needed to integrate micro-simulation with probability statement regarding the occurrence of a negative event. Also, the availability of panel data can help evaluate the reliability of the estimates made on the basis of micro-simulations.

Table §.1
Descriptive Statistics of Regression Variables – RS

Variable Name	All Households	<10 %Tile	10-25 %Tile	25-50 %Tile	50-75 %Tile	75-100 %Tile
Natural Logarithm of Household Consumption	7.960	7.091	7.572	7.845	8.090	8.533
	(0.520)	(0.301)	(0.081)	(0.072)	(0.073)	(0.275)
Persons 0- 7 years old	0.274	0.495	0.460	0.267	0.197	0.137
	(0.607)	(0.835)	(0.756)	(0.555)	(0.516)	(0.406)
Persons 8 -14 years old	0.257	0.386	0.296	0.327	0.243	0.141
	(0.533)	(0.679)	(0.602)	(0.621)	(0.525)	(0.389)
Females 15-59 years old	1.013	1.185	1.021	1.089	1.058	0.854
	(0.855)	(0.943)	(0.864)	(0.886)	(0.842)	(0.768)
Males 15-59 years old	0.993	1.278	1.050	0.977	1.018	0.832
	(0.900)	(0.979)	(0.903)	(0.877)	(0.920)	(0.829)
Log of household size	1.036	1.312	1.173	1.114	1.043	0.788
	(0.556)	(0.531)	(0.530)	(0.497)	(0.503)	(0.553)
Dummy, 1 if hh head is temp. resident	0.243	0.357	0.320	0.248	0.207	0.171
	(0.428)	(0.479)	(0.467)	(0.432)	(0.406)	(0.377)
Dummy, 1 if hh head is a women	0.218	0.148	0.208	0.196	0.234	0.258
	(0.413)	(0.356)	(0.407)	(0.397)	(0.424)	(0.438)
Age of household head	55.004	56.569	55.664	55.136	54.858	54.008
	(13.852)	(13.757)	(14.685)	(13.870)	(13.117)	(13.857)
Square of age of household head	3217.31	338.817	3313.59	3232.05	3181.191	3108.65
	(1531.49)	(1552.25)	(1660.6)	(1528.73)	(1461.27)	(1493.21)
Adults unable to read/write on hh size	0.067	0.128	0.084	0.069	0.056	0.036
	(0.209)	(0.269)	(0.230)	(0.215)	(0.192)	(0.163)
Ad. with no qualifications on hh size	0.255	0.289	0.275	0.263	0.260	0.221
	(0.363)	(0.322)	(0.363)	(0.365)	(0.368)	(0.375)
Male ad. with primary school. on hh size	0.086	0.115	0.090	0.093	0.078	0.072
	(0.169)	(0.175)	(0.159)	(0.169)	(0.160)	(0.176)
Fem. ad. with primary school. on hh size	0.105	0.110	0.104	0.112	0.095	0.105
	(0.187)	(0.150)	(0.166)	(0.173)	(0.173)	(0.227)
Male ad. with secondary school on hh size	0.189	0.166	0.187	0.173	0.201	0.202
	(0.227)	(0.198)	(0.217)	(0.200)	(0.216)	(0.264)
Fem. ad. with secondary school on hh size	0.160	0.102	0.136	0.160	0.178	0.187
	(0.219)	(0.148)	(0.186)	(0.199)	(0.225)	(0.262)
Male adults with higher education on hh size	0.046	0.014	0.023	0.034	0.047	0.081
	(0.131)	(0.059)	(0.082)	(0.101)	(0.116)	(0.185)
Fem. adults with higher education on hh size	0.026	0.007	0.011	0.015	0.029	0.049
	(0.102)	(0.046)	(0.057)	(0.067)	(0.097)	(0.147)
N° of pensioners on hh size	0.189	0.131	0.167	0.169	0.197	0.233
	(0.227)	(0.223)	(0.267)	(0.287)	(0.322)	(0.036)
N° of unemployed on hh adults	0.141	0.234	0.180	0.159	0.122	0.080
	(0.236)	(0.267)	(0.251)	(0.248)	(0.207)	(0.202)
N° of entrepreneurs on hh adults	0.026	0.008	0.010	0.013	0.030	0.049
	(0.102)	(0.057)	(0.071)	(0.077)	(0.106)	(0.151)
N° of inf. dep. employees on hh adults	0.061	0.068	0.068	0.064	0.058	0.055
	(0.165)	(0.149)	(0.171)	(0.172)	(0.153)	(0.170)
N° of inf. gen. employees on hh adults	0.055	0.053	0.041	0.059	0.057	0.060
	(0.192)	(0.183)	(0.158)	(0.188)	(0.197)	(0.210)
N° of formal public employees on hh ad.	0.188	0.126	0.168	0.184	0.203	0.219
	(0.279)	(0.219)	(0.255)	(0.273)	(0.270)	(0.317)
N° of formal private employees on hh ad.	0.031	0.012	0.028	0.025	0.035	0.041
	(0.110)	(0.063)	(0.102)	(0.098)	(0.117)	(0.131)
Size of the land used	0.401	0.420	0.284	0.445	0.309	0.432
	(1.251)	(1.006)	(0.756)	(1.590)	(0.987)	(1.439)
Dummy, 1 if living in Banja Luka	0.390	0.235	0.251	0.378	0.438	0.504
Dummy, 1 if living in Srpska Ilidza	0.035	0.012	0.066	0.068	0.022	0.014
Dummy, 1 if living in Cajnice	0.015	0.018	0.018	0.008	0.024	0.009
Dummy, 1 if living in Novi Grad (RS)	0.065	0.061	0.066	0.078	0.068	0.054
Dummy, 1 if living in Prijedor	0.180	0.371	0.269	0.167	0.126	0.092
Dummy, 1 if living in Modrica	0.055	0.034	0.039	0.053	0.064	0.066
Dummy, 1 if living in Vicegrad	0.035	0.089	0.079	0.026	0.018	0.004
Dummy, 1 if living in Knedzevo	0.025	0.058	0.029	0.020	0.020	0.013
Dummy, 1 if living in Samac	0.045	0.021	0.034	0.035	0.056	0.059
Dummy, 1 if living in Zvornik	0.105	0.049	0.121	0.118	0.103	0.113
Dummy, 1 if living in Srbac	0.050	0.046	0.023	0.043	0.054	0.066

Table §.2

Descriptive Statistics of Regression Variables – FBiH of Bosnia and Herzegovina

Variable Name	All Households	<10 %Tile	10-25 %Tile	25-50 %Tile	50-75 %Tile	75-100 %Tile
Natural Logarithm of Household Consumption	8.068 (0.530)	7.308 (0.277)	7.729 (0.070)	7.966 (0.066)	8.213 (0.082)	8.701 (0.308)
Persons 0- 7 years old	0.272 (0.583)	0.500 (0.751)	0.392 (0.660)	0.283 (0.596)	0.195 (0.504)	0.111 (0.360)
Persons 8 -14 years old	0.283 (0.578)	0.548 (0.747)	0.366 (0.642)	0.321 (0.593)	0.199 (0.483)	0.103 (0.356)
Females 15-59 years old	0.989 (0.828)	1.227 (0.849)	1.138 (0.867)	1.061 (0.815)	0.951 (0.801)	0.734 (0.745)
Males 15-59 years old	0.939 (0.860)	1.188 (0.858)	1.111 (0.860)	0.978 (0.860)	0.891 (0.846)	0.694 (0.803)
Log of household size	0.988 (0.547)	1.306 (0.433)	1.195 (0.455)	1.079 (0.475)	0.933 (0.489)	0.649 (0.551)
Dummy, 1 if hh head is temp. resident	0.123 (0.329)	0.212 (0.409)	0.127 (0.333)	0.122 (0.328)	0.097 (0.296)	0.084 (0.278)
Dummy, 1 if hh head is a women	0.273 (0.445)	0.162 (0.369)	0.201 (0.401)	0.259 (0.438)	0.283 (0.450)	0.385 (0.487)
Age of household head	53.957 (14.171)	49.925 (14.555)	53.114 (14.038)	53.916 (14.272)	55.260 (13.599)	56.069 (13.794)
Square of age of household head	3112.13 (1551-75)	2704.01 (1561.42)	3017.75 (1531.17)	3110.38 (1586.63)	3238.37 (1517.75)	3333.83 (1506.26)
Adults incapable to read/write on hh size	0.050 (0.185)	0.068 (0.201)	0.054 (0.187)	0.052 (0.181)	0.052 (0.192)	0.032 (0.168)
Ad. with no diploma on hh size	0.196 (0.320)	0.216 (0.296)	0.206 (0.301)	0.201 (0.309)	0.196 (0.326)	0.175 (0.348)
Male ad. with primary school on hh size	0.073 (0.163)	0.113 (0.171)	0.089 (0.158)	0.080 (0.169)	0.064 (0.164)	0.042 (0.147)
Fem. ad. with primary school on hh size	0.113 (0.202)	0.133 (0.170)	0.119 (0.170)	0.119 (0.191)	0.111 (0.202)	0.096 (0.241)
Male ad. with secondary school on hh size	0.212 (0.239)	0.172 (0.178)	0.221 (0.208)	0.233 (0.219)	0.232 (0.243)	0.203 (0.291)
Fem. ad. with secondary school on hh size	0.174 (0.244)	0.105 (0.161)	0.143 (0.174)	0.166 (0.203)	0.196 (0.248)	0.225 (0.318)
Male adults with high diploma on hh size	0.055 (0.153)	0.015 (0.067)	0.029 (0.096)	0.034 (0.112)	0.061 (0.146)	0.105 (0.221)
Fem. adults with high diploma on hh size	0.037 (0.139)	0.004 (0.033)	0.011 (0.059)	0.019 (0.086)	0.032 (0.116)	0.089 (0.221)
N° of pensioners on hh size	0.248 (0.352)	0.142 (0.235)	0.199 (0.290)	0.217 (0.306)	0.286 (0.375)	0.338 (0.425)
N° of unemployed on hh adults	0.147 (0.247)	0.242 (0.287)	0.186 (0.246)	0.147 (0.230)	0.127 (0.234)	0.080 (0.213)
N° of entrepreneurs on hh adults	0.016 (0.088)	0.004 (0.045)	0.006 (0.048)	0.011 (0.068)	0.023 (0.100)	0.027 (0.120)
N° of inf. dep. employees on hh adults	0.034 (0.125)	0.037 (0.119)	0.034 (0.117)	0.039 (0.126)	0.039 (0.134)	0.027 (0.125)
N° of inf. gen. employees on hh adults	0.024 (0.116)	0.036 (0.140)	0.031 (0.128)	0.026 (0.114)	0.016 (0.098)	0.017 (0.105)
N° of formal public employees on hh adults	0.176 (0.266)	0.135 (0.213)	0.151 (0.223)	0.187 (0.260)	0.181 (0.268)	0.206 (0.313)
N° of formal private employees on hh adults	0.042 (0.139)	0.024 (0.092)	0.042 (0.141)	0.037 (0.122)	0.046 (0.137)	0.056 (0.171)
Size of the land used	0.298 (5.979)	0.860 (12.84)	0.340 (4.696)	0.261 (3.881)	0.086 (0.546)	0.098 (0.570)
Dummy, 1 if living in Centar	0.087	0.022	0.041	0.070	0.082	0.170
Dummy, 1 if living in Novigrad (Fed)	0.147	0.110	0.114	0.157	0.168	0.169
Dummy, 1 if living in Nsarajevo	0.091	0.024	0.067	0.077	0.100	0.151
Dummy, 1 if living in Zenica	0.156	0.304	0.234	0.162	0.101	0.054
Dummy, 1 if living in Tuzla	0.175	0.186	0.162	0.171	0.199	0.162
Dummy, 1 if living in Vogosca	0.027	0.020	0.021	0.041	0.029	0.026
Dummy, 1 if living in Travnik	0.063	0.057	0.070	0.068	0.067	0.058
Dummy, 1 if living in Visoko	0.051	0.080	0.050	0.057	0.055	0.028
Dummy, 1 if living in Breza	0.019	0.016	0.046	0.028	0.016	0.004
Dummy, 1 if living in Zavidovici	0.048	0.046	0.065	0.052	0.043	0.0397.
Dummy, 1 if living in Gradacac	0.047	0.048	0.037	0.030	0.055	0.059
Dummy, 1 if living in Posusje	0.015	0.005	0.024	0.014	0.016	0.019
Dummy, 1 if living in Kakanj	0.047	0.069	0.050	0.054	0.046	0.029
Dummy, 1 if living in Grude	0.015	0.007	0.013	0.012	0.017	0.023

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