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NEW TARGETING METHODS FOR BOSNIA HERZEGOVINA

Part I

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1 Introduction

The aim of this report is to analyze the potential of alternative targeting mechanisms for non-contributory civilian benefits in Bosnia and Herzegovina, with the ultimate purpose of improving the targeting performance and poverty reduction impact of these social transfers. Bosnia and Herzegovina is one of the top spenders on social assistance in the Europe and Central Asia region. Between 2006 and 2008, four percent of GDP was dedicated to social transfers. Historically, a large amount of these transfers have been allocated based on acquired rights rather than on present needs. An analysis of the current situation in Bosnia and Herzegovina indicates the need to improve the targeting performance of non-contributory civilian benefits and thus to strengthen their poverty reduction impact.

The present report makes reference to the World Bank's 2009 Policy Note "*Social Assistance Transfers in Bosnia and Herzegovina: Moving Toward a More Sustainable and Better-Targeted Safety Net*". This note was prepared to assess existing non-insurance social protection transfers in Bosnia and Herzegovina and to develop a proxy means testing mechanism based on the 2007 Household Budget Survey (HBS). As a conclusion, it recommended a three-pronged approach with measures to (a) improve and introduce targeting mechanisms to better channel resources to the poor, (b) strengthen benefits administration and beneficiary registry systems, and (c) focus on rationalizing disability-related benefit schemes. This report focuses on the first component of this approach and technically develops improved targeting mechanisms.

This report explores alternative targeting mechanisms for Bosnia and Herzegovina.¹ We improve on the previously calibrated PMT model by using the most recent available data from the 2011 Household Budget Survey (HBS). The analysis does not limit itself to the development of an updated proxy means testing formula, but extends to the exploration of alternative targeting mechanisms, including the inclusion of verifiable income sources in PMT models, the use of additional filters for existing means-testing mechanisms, a mechanism based on utility expenses, and categorical targeting.

The report is furthermore linked to two other studies that have been completed within the project "*Development, testing and implementation of new methodology(ies) for targeting of budgetary benefits in Bosnia and Herzegovina*". On the one hand, the first part of the report "*Non-contributory cash benefits for Social Protection in Bosnia and Herzegovina – What works and what does not*" provides an overview and analysis of the current legislation on non-contributory cash benefits in the Federation of Bosnia and Herzegovina (FBiH) and the Republika Srpska (RS). Moreover, it discusses fiscal aspects and consequences of these transfers. It therefore is a useful reference for a more detailed description of non-contributory cash transfers that are currently in place. The second part elaborates on targeting mechanisms, both from a more theoretical point of view that discusses its rationale, methods, and the assessment of targeting performance, and providing examples from countries in the Europe and Central Asia (ECA) region and beyond. On the other hand, the study "*Poverty in BiH 2011 – Trends and achievements and Indicators of the Targeting Accuracy of Budgets Transfers for Social Protection in BiH in 2011*" presents, based on data from the 2011 HBS, a poverty profile of the two entities, and presents indicators of targeting performance of non-contributory cash transfers.

¹ Please see the report "Targeting of non-contributory cash transfers – Theory and evidence from selected countries" for more theoretical discussion of different targeting mechanisms, the measurement of targeting performance, and examples from other countries in Europe and Central Asia and Latin America.

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2 Methodology

The methodological section first briefly introduces the data set that is used for measuring the targeting performance of existing non-contributory cash transfers and developing alternative targeting mechanisms, followed by a presentation of the main welfare indicator. It furthermore outlines the selection of eligible groups and the way in which results are presented and should be interpreted. Finally, it concludes with an overview of the targeting performance of non-contributory cash benefits in the present system that serves as benchmark for all alternative targeting mechanisms.

2.1 Data

The 2011 Household Budget Survey is the main tool to measure poverty and monitor living standards in Bosnia and Herzegovina. It gathers information on, among others, income and consumption, socio-economic characteristics of household members, housing, ownership of durables, and pensions and social benefits.

The HBS sampling strategy is two-stage systematic sampling. Firstly, a systematic sample of 1.500 enumeration areas was drawn from a total of approximately 20.000 enumeration areas of the census in 1991. This resulted in a list of about 81.000 households. At the second stage, a systematic sample of 9.700 households was drawn from this list. With a non-response rate of 24%, the final number of interviewed households was 7.400 (4.611 in the Federation of Bosnia and Herzegovina (FBiH), 2.437 in the Republika Srpska (RS), and 352 in District Brčko).

The 2011 HBS was implemented between January 1st and December 31st, 2011. The interviews were conducted face-to-face, and each household was visited at least three times: During the first meeting, the household received the consumption diary for 15 days. The second visit took place after three to four days, and the final interview was conducted after a further 15 days.

2.2 Welfare indicator

In line with common practice in Bosnia and Herzegovina, the main welfare indicator is total monthly household consumption. The consumption aggregate in the HBS includes the following items: food and beverages; alcoholic beverages and tobacco; clothing and footwear; housing, electricity, gas, water, and other overhead expenses; furniture, equipment and maintenance; health care; transportation; communication; recreation and culture; education; hotels and restaurants; and other products and services. A drawback arises from the fact that the survey is conducted in the course of a whole year, so that consumption is measured in different months for different households, possibly picking up seasonal effects (World Bank, 2009b, p. 32). The consumption aggregate is expressed in 2011 nominal prices. Since it is not adjusted for regional price differences at the entity level, all models are estimated separately for FBiH and RS.

For the analysis of new targeting mechanisms for non-contributory civilian cash transfers, the actual variable of interest is not the welfare level that is achieved after the transfer of non-contributory civilian cash benefits, but the level of welfare that we would observe if a household did not receive any of those transfers. Evidently, this counterfactual is unobservable in reality. We followed the methodology proposed by Tesliuc (2004) to model the behavioral response of households to public social transfers. The assumption is that households adjust their behavior and replace a certain proportion of social transfers in the

absence of these transfers, for instance by taking a second job, engaging in subsistence farming, or migrating.

For this purpose, several consumption models with per capita (or per adult equivalent using the OECD 1 scale, see below) consumption as the dependent variable were estimated. Independent variables are different household characteristics and as an additional explanatory variable income from social transfers. The coefficient of this variable shows by how many BAM per capita/per adult equivalent consumption increases if the social transfer increases by 1 BAM. Based on a range of models (with and without controls for household composition, location (urban/rural), and characteristics of the household head), it was decided to assume a marginal propensity to consume out of social transfers of 33%.

Furthermore, total household consumption before the transfer of civilian benefits is adjusted using the OECD 1 equivalence scale. In contrast to a per capita approach, the OECD 1 equivalence scale does not give equal weight to each household member, but assigns the following weights: 1 for the head of a household, 0.7 for each additional household member aged 14 or above, and 0.5 for each child below the age of 14. The rationale for the use of equivalence scales is the idea that consumption needs of households grow with each additional household member, but not in a proportional way. Larger households benefit from economies scale as, for example, a three-person household will not need three times as much electricity, or housing space, as a one-person household. (Förster & d'Ercole, n.d.). Common practice within the European Union for poverty comparisons is to use the OECD 2 equivalence scale, whereby the first adult gets a weight equal to 1, each additional adult household member 0.5, and children below the age of 14 are assigned a weight of 0.3. Using the OECD2 scale in the case of Bosnia and Herzegovina, where – especially among poor households – a relatively large share of household consumption is allocated to food, would most likely underestimate the consumption needs of additional household members.

In summary, if not stated differently in the respective section, the analyses are based on monthly per adult equivalent (OECD 1 scale) consumption before the transfer of non-contributory civilian cash benefits, assuming a marginal propensity to consume out of these social transfers by 33%.

2.3 Selection of eligible groups

This report presents a range of mechanisms for selecting eligible beneficiaries. These are:

- Proxy-means testing
- Additional filters for existing means-tests
- Categorical targeting
- Other/hybrid forms of targeting, that is, proxy-means testing with verified income, and targeting based on utility expenses

Proxy-means testing

Proxy means testing is a way to estimate household welfare in countries where economic activities are to a large degree informal and income from formal labor such as wages is likely to reflect household welfare inaccurately. The rationale of proxy means testing is to obtain an alternative indicator of household welfare that is used for identifying beneficiaries. A score for each applying household or individual is calculated based on easily observable characteristics that are associated with household welfare, such as location and quality of

housing, household composition, education and occupation of the household head, or ownership of durable goods.

In order to find the indicators that are mostly strongly associated with household welfare, a stepwise OLS regression model is used. Starting with an extensive list of potential correlates of consumption, after each iteration of the regression model the independent variable with the smallest level of statistical significance (that is, the highest p-value/the smallest t-value) is removed from the model until all remaining variables are significant at the 10%-level. The estimated model can be written as follows:

$$\ln(y_i) = \alpha + \beta X_i + \varepsilon_i,$$

where $\ln(y_i)$ is the natural logarithm of per adult equivalent consumption (OECD 1 scale) before transfers², α is a constant, β is a vector of coefficients, X_i is a vector of household and housing characteristics, and ε_i indicates the error term. The natural logarithm of this indicator is used since its distribution is highly skewed to the right, which could result in biased estimates. Individual level sampling weights are applied to make the sample representative of the complete population.

Despite the normative decision to include variables with significance level of up to 10% most variables included in the estimated models are significant at the 1% level. Thus, choosing a more restrictive cut-off (i.e. 1% significance level) in order to get more parsimonious models would only marginally reduce the number of included indicators.

The list of potential indicators was guided by experience from other countries and the available information in the HBS 2011. In addition to being correlated with household welfare, indicators should be easily observable and verifiable, while at the same time being difficult to manipulate to avoid fraud.

First, a set of *household characteristics* is considered, including *inter alia* the natural logarithm of household size, the number of children, elderly, pensioners, and employed household members, and the highest educational level in the household. This group of variables also includes characteristics of the household head, such as sex, educational attainment, or economic status (employed with permanent contract, employed with other type of contract, unemployed, pensioner, inactive). The example of children illustrates that there are sometimes different ways in which a variable can be specified: for instance, we can consider whether a household has a child that is aged below six (i.e., a dummy variable) or how many children below the age of six live in a household (that means, this information would be included as a continuous variable). We could also consider all children below 18, or distinguish between pre-school (younger than six) and school children (6-17). If applicable, we tried different ways of how variables can be specified in order to find the most appropriate way of including them in the PMT model.

A second group of indicators refers to *dwelling characteristics*. These characteristics include, among others, the type of dwelling and its legal status (rented or owned), the number of persons per room, whether a household has a separate kitchen, bathroom, hot water, electric power, heating, telephone line, etc., or whether the household has a secondary dwelling. Thirdly, we include dummy variables for the *ownership of durables*, e.g. cooker, stove, fridge, washing machine, dishwasher, satellite dish. A final group of variables indicates whether at least one member in the household receives a pension income or a veteran's benefit, has an

² All analyses were also carried out for monthly per capita consumption before transfers. Results can be made available upon request.

official decision on disability, and the logarithm of monthly utility expenditures (electricity, gas, central heating, water/sewage, and waste removal).

Taking into account entity-specific differences in living conditions, the PMT models are estimated separately for FBiH and RS. The obtained model coefficients are used to predict consumption for each household in the sample. Subsequently, these predictions identify eligible individuals using three different eligibility thresholds (the poorest 10, 15 or 20% of the population).

In addition, in each entity we also estimate separate models for urban and rural areas in order to account for different living conditions. The urban/rural models are calculated on the basis of two separate regression models – one model is constructed for the population in rural areas and a separate one for the urban population. In other words, to predict consumption we use two different formulae, one for urban and one for rural areas. In this case, to simulate the targeting performance on the whole population, we combine the consumption predictions for urban and rural populations and then apply the thresholds so that the results in terms of coverage and distribution can be obtained. These models are referred to as “urban/rural PMT models” hereinafter.

Additional filters on top of current means-test

The potential for further improving the targeting performance of the current means test is simulated by applying additional filters on top of the currently implemented means-tests. That is, a household is eligible if (1) it receives a non-contributory civilian cash-benefit at present and (2) a certain filter question does not apply to it, e.g., whether or not a household owns a (new) car, has an internet connection, a garage, etc. The choice of appropriate filters is partly guided by insights from the PMT models that indicate which dwelling characteristics or consumer durables are associated with higher household welfare.

Categorical targeting

Categorical or group targeting identifies beneficiaries based on individual or household characteristics that are easy-to-observe, hard to manipulate, and that are correlated with lower levels of household welfare. The choice of categories is guided by insights from the poverty profile as well as the PMT models.

PMT with verified income

Even though a PMT replaces in principle the need to verify household income, some income sources in Bosnia and Herzegovina can possibly be verified in a reliable manner. For instance, a PMT model including income for targeting of social assistance benefits has been successfully introduced in Georgia, where income is equally difficult to verify due to a high degree of informality³. We therefore develop a hybrid model that includes income from verifiable sources in the PMT model and explores whether the predictive power of the PMT model, and subsequently the targeting performance, is improved.

The 2011 HBS includes questions on income from employment, property, etc. for all respondents above the age of 14. Based on interviews that were conducted in three Centers

³ Please refer to the report “Non-contributory cash benefits for Social Protection in Bosnia and Herzegovina – What works and what does not (II) – Targeting of non-contributory cash-transfers – Theory and evidence from selected countries”.

of Social Work (CSW), Novo Sarajevo, Trebinje and Trnovo, the following sources of income were identified that could potentially be verified in both FBiH and RS:

- Salary of employees working for a local employer (A1)
- Salary of employees working for a foreign employer (A2)
- Meal allowance (excludes coupons and meals) (A7)
- Transport allowance to and from work (excludes coupons) (A8)
- Allowance for living in town (A9)
- Fees for management/supervisory board members (A10)
- Other cash income from employment (leave pay, bonuses, severance pay, food for winter, firewood, sick leave payment or single payment in case of death) (A11)
- In-kind income from employment (including meals, transport) (A12)
- Earnings for work done in own company (A13)

The choice of income sources that are included in the PMT model is further guided by the following considerations. First, only income provided in cash is taken into account, that is, in-kind income from employment such as meal and transports (A12) is not included. Second, merely incomes that are received on a regular basis are considered. From this follows that fees from management or supervisory board members (A10) and other cash income from employment (A11) are excluded. Third, since any additional income source that is included causes additional administrative efforts and costs, it is decided not to consider income sources that only apply to a very small group of people. This is the case for allowances for living in town (A9) that are only very rarely granted.

Fourth, the verification of earnings for work done in own company is still judged extremely difficult, and might be subject to serious underreporting. This is why it is not included in the following models. Finally, meal allowances (A7) and transport allowances (A8) are typically only received by people who obtain a salary from a local or foreign employer (A1 or A2). For the relatively little number of people that report these income sources without being employed, it is questionable to what extent the receipt of those incomes could be verified. As a result, the main income sources that are of interest for the hybrid models are salaries for employees that work for local or foreign employers (A1 or A2). In case these employees receive additional meal or transport allowances on top of their salary, this is also taken into account for the calculation of total income from verifiable sources.

A general problem of the income section of the HBS is that a number of respondents refuses to answer the section overall or denies to answer questions on the receipt or the amount of specific incomes sources. In terms of whether or not somebody receives a salary from a local employer, 240 out of 18,183 respondents refuse to answer. Of those 4,330 people who report this type of income source, additional 327 respondents do not indicate the amount of this income (approximately eight percent). With regard to salaries received as an employee of a foreign employer, 236 out of 18,183 respondents refuse to answer whether or not they obtain this type of income, though the number of respondents who subsequently refuse to answer the question on the amount is only small. In general, the share of respondents that do not complete the income section at all is larger in the Republika Sprska, while respondents in the Federation of Bosnia and Herzegovina tend to be more reluctant to reveal actual amounts. Furthermore, it is particularly in the urban areas of RS that non-response to these questions is more likely, while there are no such regional disparities readily identifiable

in FBiH. Overall, these observations warrant a careful balancing of whether or not and to what extent it is desirable to include income from verifiable sources.

For the purpose of this analysis, there are basically two ways in which information on income from verifiable sources can be added to the list of potential correlates of household consumption in the PMT model: First, a dummy variable would indicate whether at least one of the household members reports a salary as employee of a local or foreign employer. Secondly, a continuous variable would indicate the total household income from salaries as employees from local or foreign employers, and if provided on top of the salary, also includes allowances for meal or transport. This variable is further adjusted for household size using the OECD 1 scale, and transformed to its logarithm to avoid biased estimations that stem from the skewed distribution of the variable.

PMT after filters

We look at the effects of applying filters in addition to the estimated proxy-means test formulas on the targeting performance.

The chosen filters are characteristics generally associated with a higher living standard (i.e. household having a car or having bought a car during the last 12 months, household having a garage, household owning a secondary dwelling; household with internet connection; household owning a mobile phone). These characteristics are used as a first cut-off, or filter, for eligibility. For example, a person belonging to a household that owns a car would not be considered for receiving social benefits, thus the PMT model will only be applied to people without cars.

We add the filters to the best performing PMT models in FBiH and RS, and we estimate their effects for program sizes of 10%, 15% and 20%. We compare the performance of adding a particular filter to the performance of the baseline scenario (PMT without filters), considering not only the change in inclusion and exclusion error, but also the change of the program size.

Exploring this hybrid model allows us to estimate whether applying different filters can enhance the targeting performance of the best PMT models, in terms of reducing the inclusion error as well as in terms of pro-poor distribution in general.

Utility expenditure

We explore the performance of a targeting mechanism that is based on utility expenditure, namely expenditure on electricity and water/sewage. A first inspection of utility expenditure reveals that roughly 27% of the population in FBiH and 43% of the population in RS does not report any spending on water or sewage. Consequently, utility expenditure on water and sewage does not discriminate sufficiently among worse and better off households. In contrast, virtually every household is connected to the electricity network and spends money on electricity. Expenditure for electricity is positively associated with total consumption (see Figure A 1 in the annex). Electricity expenditure therefore might be a suitable proxy for household welfare level. Thus it is worthwhile to explore the performance of a targeting models based on electricity expenditures.

Since the HBS survey has been carried out over a period of twelve months, the expenditures for electricity reported by different households correspond to different months (

Figure A 2 in the annex displays the seasonal fluctuations in electricity expenditures). Reported expenditures are thus not comparable unless they are adjusted for seasonal variation. To adjust for seasonality of electricity expenditures we use a technique which estimates average monthly electricity expenditures for 2011 for each household on the basis of the electricity expenses reported in the survey.

The method used for seasonal adjustment consists of several steps. First, we use an OLS regression to estimate the effect of the different months on electricity expenditure. The regression equation can be written as follows:

$$\ln(C_m) = \alpha_m D_m + \beta x' + \varepsilon_m,$$

where $\ln(C_m)$ is the natural logarithm of the reported household electricity expenditures, α_m is the estimated effect of month m on the electricity expenditures, D_m is a binary variable taking value 1 if the expenditure is reported in month m and taking value 0 if the expenditure is reported in any other month, β is a vector of coefficients, x' is a vector of explanatory variables for the household, and ε_m indicates the error term. The natural logarithm of electricity expenditure is used since the distribution is highly skewed to the right, which could result in biased estimates. Individual level sampling weights are applied to make the sample representative of the complete population.

Second, we use the estimated month effects α_m and the actual reported amount C_m (for month m) to calculate household electricity expenditure estimates for the whole year ($\hat{Y}$). We use the following equation:

$$\hat{Y} = e^{\ln(C_m) - \hat{\alpha}_m D_m} \sum_{m=1}^{12} e^{\hat{\alpha}_m D_m}$$

Third, in order to obtain average monthly expenditure for 2011 we simply divide the estimated annual expenditure by 12:

$$\hat{C}_m = \frac{\hat{Y}}{12}$$

Having calculated an estimate for average monthly expenditure for electricity, we simulate the targeting performance of two mechanisms. In the first one, the 10, 15 and 20% poorest individuals are identified based on the estimated monthly per capita expenditure on electricity. In the second one, the same is done based on estimated monthly per capita expenditure for both electricity and water/sewage.

2.4 Presentation and interpretation of results

The performance of all targeting mechanisms is assessed based on the coverage and distribution of the beneficiaries that the respective mechanism identifies as eligible for a social transfer. For that purpose, the complete population is ranked according to their levels of welfare and grouped into five consumption quintiles, ranging from the poorest to the richest 20 percent of the population. These consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before the transfer of non-contributory civilian benefits, assuming a marginal propensity to increase consumption by 33%.

Coverage of beneficiaries refers to the portion of each quintile that is eligible for the transfer and is calculated by dividing the number of individuals that live in a household where at least one member is eligible for a transfer by the total number of individuals in this quintile. *Distribution* of beneficiaries is calculated by dividing the number of individuals in a certain quintile who live in household with at least one beneficiary by the total number of individuals who live in beneficiary households. We assume a take-up rate of 100%, this means, the

presented coverage and distribution rates represent the ideal case of perfect implementation of the targeting mechanism. Note that this does not apply to the model where the current means test is combined with additional filter variables. In the latter case, the simulation is based on the current targeting performance, taking into account existing implementation errors.

The calculation of the *error of exclusion* and *error of inclusion* is based on the assumption that the poorest 20% of the population should receive a benefit. When looking at the analysis of poverty in BiH, the various estimates presented consistently move around this threshold⁴. Consequently, the error of exclusion is calculated by 100% minus the coverage rate of beneficiaries in the poorest quintile, while the error of inclusion equals 100% minus the share of beneficiaries belonging to the poorest quintile.

	Target group (Poorest 20%)	Non-target group (Non-poor 80%)
Individual receives transfer	Success	Inclusion error
Individual does not receive transfer	Exclusion error	Success

Since coverage and distribution of beneficiaries are sensitive to the size of a program, we finally present these indicators for different program sizes. For instance, as the size of a program increases, the error of exclusion decreases, while the error of inclusion typically gets larger. If applicable, we simulate programs that cover the poorest 10, 15, or 20% of the population respectively.

2.5 Benchmark

The benchmark for the assessment of new targeting mechanisms is the targeting performance of existing non-contributory benefits in terms of coverage and distribution of beneficiaries and distribution of benefits. These non-contributory benefits include civilian benefits that are at the focus of this report and veterans' benefits that are only listed for comparative reasons. Non-contributory civilian benefits are further subdivided into the following categories:⁵

- Civilian victims of war
- Non-war invalid's benefits – disability benefits
- Family and child protection allowance
- Social assistance of last resort.

Table 1 to Table 6 show the coverage and distribution of benefits as well as the distribution of benefits for FBiH and RS.

⁴ Please refer to the report "Poverty in BiH 2011 – Trends and achievements and Indicators of the Targeting Accuracy of Budgets Transfers for Social Protection in BiH in 2011".

⁵ Please refer to the first part of the report "*Non-contributory cash benefits for Social Protection in Bosnia and Herzegovina – What works and what does not*" that provides an overview and analysis of the current legislation on non-contributory cash benefits in the Federation of Bosnia and Herzegovina (FBiH) and the Republika Srpska (RS).

Table 1. Benefit coverage of non-contributory cash benefits in FBiH, percentages, 2011

	I	II	III	IV	V	Total
Non-contributory cash transfers (B6-B23, B25-B29)	22.3	19.1	14.4	10.6	9.1	15.1
Veteran's benefits (B6-B10, B25)	9.2	10.0	9.0	6.2	4.4	7.8
Civilian benefits (B11-B23, B26-B29)	13.9	11.0	6.7	5.6	4.9	8.4
Civilian victims of war (B11-B17)*	0.9	1.6	0.8	0.7	1.1	1.0
Non-war invalid's benefits - disability benefit (B18-B20)	3.7	3.1	2.5	1.6	1.2	2.4
Family and child protection allowance (B21-B23)	6.4	6.2	2.8	3.8	2.3	4.3
Social assistance of last resort (B26-B29)	3.5	1.3	1.0	0.3	0.6	1.4

Note: Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before the respective transfer, assuming a marginal propensity to increase consumption by 33 percent. Individual weights are applied. *Not significant at the 10%-level. *Source:* Own calculations based on HBS 2011.

Table 2. Distribution of beneficiaries of non-contributory cash benefits in FBiH, percentages, 2011

	I	II	III	IV	V	Total
Non-contributory cash transfers (B6-B23, B25-B29)	29.5	25.4	19.0	14.1	12.0	100.0
Veteran's benefits (B6-B10, B25)	23.7	25.8	23.2	16.0	11.4	100.0
Civilian benefits (B11-B23, B26-B29)	33.2	26.1	15.9	13.2	11.6	100.0
Civilian victims of war (B11-B17)*	18.4	31.5	15.5	13.1	21.6	100.0
Non-war invalid's benefits - disability benefit (B18-B20)	30.3	25.3	20.5	13.6	10.3	100.0
Family and child protection allowance (B21-B23)	29.8	29.1	12.9	17.5	10.7	100.0
Social assistance of last resort (B26-B29)	52.1	18.8	15.4	4.2	9.5	100.0

Note: Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before the respective transfer, assuming a marginal propensity to increase consumption by 33 percent. Individual weights are applied. *Not significant at the 10%-level. *Source:* Own calculations based on HBS 2011.

Table 3. Distribution of benefits of non-contributory cash benefits in FBiH, percentages, 2011

	I	II	III	IV	V	Total
Non-contributory cash transfers (B6-B23, B25-B29)	21.3	22.6	20.1	17.1	19.0	100.0
Veteran's benefits (B6-B10, B25)	19.1	22.0	21.8	20.7	16.4	100.0
Civilian benefits (B11-B23, B26-B29)	24.5	23.5	16.3	13.6	22.2	100.0
Civilian victims of war (B11-B17)	13.3	25.8	17.1	10.0	33.9	100.0
Non-war invalid's benefits - disability benefit (B18-B20)	22.3	25.9	21.5	17.2	13.1	100.0
Family and child protection allowance (B21-B23)	21.5	24.6	8.1	20.8	25.1	100.0
Social assistance of last resort (B26-B29)	41.2	15.8	11.2	5.9	26.0	100.0

Note: Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before the respective transfer, assuming a marginal propensity to increase consumption by 33 percent. Individual weights are applied. *Source:* Own calculations based on HBS 2011.

Table 4. Benefit coverage of non-contributory cash benefits in RS, percentages, 2011

	I	II	III	IV	V	Total
Non-contributory cash transfers (B6-B23, B26-B29)	31.6	25.8	19.9	18.1	16.4	22.4
Veteran's benefits (B6-B10)*	15.5	13.4	14.2	11.6	11.5	13.2
Civilian benefits (B11-B23, B26-B29)	20.5	15.6	8.0	7.0	6.4	11.5
Civilian victims of war (B11-B17)	1.0	2.4	0.9	0.9	0.1	1.1
Non-war invalid's benefits - disability benefit (B18-B19)*	1.3	1.4	1.6	2.1	0.5	1.4
Family and child protection allowance (B21-B23)	15.8	10.5	5.1	4.2	5.8	8.3
Social assistance of last resort (B26-B29)	4.0	1.7	0.9	0.4	0.0	1.4

Note: Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before the respective transfer, assuming a marginal propensity to increase consumption by 33 percent. Individual weights are applied. *Not significant at the 10%-level. *Source:* Own calculations based on HBS 2011.

Table 5. Distribution of beneficiaries of non-contributory cash benefits in RS, percentages, 2011

	I	II	III	IV	V	Total
Non-contributory cash transfers (B6-B23, B26-B29)	28.3	23.0	17.8	16.2	14.7	100.0
Veteran's benefits (B6-B10)*	23.5	20.2	21.5	17.5	17.3	100.0
Civilian benefits (B11-B23, B26-B29)	35.7	27.1	13.9	12.2	11.1	100.0
Civilian victims of war (B11-B17)	19.1	44.1	17.6	16.4	2.8	100.0
Non-war invalid's benefits - disability benefit (B18-B19)*	19.2	20.3	22.9	30.7	6.9	100.0
Family and child protection allowance (B21-B23)	38.4	25.2	12.3	10.1	14.0	100.0
Social assistance of last resort (B26-B29)	56.4	24.8	12.5	6.3	0.0	100.0

Note: Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before the respective transfer, assuming a marginal propensity to increase consumption by 33 percent. Individual weights are applied. *Not significant at the 10%-level. *Source:* Own calculations based on HBS 2011.

Table 6. Distribution of benefits of non-contributory cash benefits in RS, percentages, 2011

	I	II	III	IV	V	Total
Non-contributory cash transfers (B6-B23, B26-B29)	28.5	21.4	18.3	15.7	16.1	100.0
Veteran's benefits (B6-B10)	21.5	20.4	18.9	17.6	21.6	100.0
Civilian benefits (B11-B23, B26-B29)	39.4	27.7	14.6	12.2	6.2	100.0
Civilian victims of war (B11-B17)	28.5	42.5	10.4	14.3	4.3	100.0
Non-war invalid's benefits - disability benefit (B18-B19)	13.3	13.1	39.8	31.3	2.6	100.0
Family and child protection allowance (B21-B23)	41.3	24.6	12.7	10.1	11.4	100.0
Social assistance of last resort (B26-B29)	65.4	21.6	10.2	2.9	0.0	100.0

Note: Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before the respective transfer, assuming a marginal propensity to increase consumption by 33 percent. Individual weights are applied. *Source:* Own calculations based on HBS 2011.

3 *Proxy-means testing models*

3.1 *Replication of 2007 model*

The proxy means testing mechanism that was developed in 2009 on basis of the 2007 HBS serves as a benchmark for the performance of the targeting mechanisms that are presented in this report. As a first step, the model is replicated with data from the 2011 HBS. Since the 2011 regionally adjusted consumption aggregate has not been made available yet, the replication is limited to the two separate entity models for the Federation of Bosnia and Herzegovina and the Republika Srpska, while the 2009 report also presents models for complete Bosnia and Herzegovina, urban/rural areas, and the poorest 50 percent of the population of the complete country.

In order to make results comparable to the analysis that was carried out in 2009, while also assuring internal consistency of the present study, we proceed as follows. First, we follow the 2009 methodology as closely as possible and estimate the PMT with the natural logarithm of monthly per capita consumption after transfers as dependent variable. This welfare indicator is subsequently also used for the calculation of coverage and distribution of beneficiaries. Nevertheless, the extent to which results are comparable is limited by the fact that the 2009 World Bank report only shows the results of the PMT model for each entity separately, while coverage and distribution of beneficiaries of the 2007 PMT are only presented for BiH as a whole. Second, we estimate the PMT model for the natural logarithm of monthly per adult equivalent consumption (OECD 1 scale) before the transfer of non-contributory civilian benefits (assuming a marginal propensity to increase consumption by 33%) as dependent variable, as this is the main welfare indicator used throughout the remainder of this report. Coverage and distribution of beneficiaries is equally presented for quintiles of the latter indicator in line with the approach of this report.

The predictors that enter the PMT scoring formula are chosen following the 2009 model. With regard to the independent variables of the PMT model, the following limitations apply: Firstly, the 2011 HBS does not clearly ask whether or not a household owns a PC, but the question also refers to printers and calculators. While we include it as an independent variable in the replication, we abstain from using this question in the following analyses, as it is not sufficiently clear. Secondly, we assume that “dwelling has sanitary connection” refers to the question whether or not the dwelling has a sewage system. With regard to utility expenses, we choose to include spending on the following items, always referring to the last month: electricity, gas from the city network, central heating, water and sewage system, and waste removal. The results of the consumption models are listed in Table A 1 in the appendix.

In the Federation of Bosnia and Herzegovina, the explanatory power of the consumption model (with monthly per capita consumption after transfers as dependent variable) is slightly smaller than in 2007 (R-squared amounts to 0.51 compared to 0.52 with 2007 HBS data). Except for the indicator “household has an indoor toilet and bathroom”, all predictors are significant at the 10%-level. Notably, the sign of “dwelling has a sewage system” is negative and therefore reversed as compared to the 2007 model, in which “dwelling has a sanitary connection” enters the model with a positive coefficient.

In the Republika Srpska, the R-squared of the PMT model (with monthly per capita consumption after transfers as dependent variable) amounts to 0.45, as compared to 0.50 with 2007 data. A range of predictors is not significant at the 10%-level in the replication, including the number of children below 14 and employment status of the household head,

and some housing characteristics (having a heating source, having a balcony, having a single equipment heating, and ownership of a HIFI system). In general, this reflects that welfare evolves dynamically, and illustrates the need to update the PMT formula regularly.

Overall, the PMT models with monthly per adult equivalent consumption (OECD 1 scale) before transfers yield very similar results both in FBiH and RS, though the explanatory power of these models is slightly worse.

The Ordinary Least Squares (OLS) parameter estimates of the PMT model yield predictions of a household's monthly per capita consumption after transfers/monthly per adult equivalent consumption (OECD 1 scale) before transfers. These predictions are used to determine which individuals should be eligible for a benefit using three different thresholds (poorest 10, 15 and 20%), and to assess the performance of the scoring formula. Table 7 – Table 10 (pp. 20-21) show simulated coverage and distribution of beneficiaries for FBiH and RS. In line with the dependent variable, consumption quintiles are either based on households' monthly per capita consumption after transfers, or monthly per adult equivalent consumption (OECD 1 scale) before transfers.

Three observations emerge from a comparison of these tables. First, coverage and distribution of beneficiaries of the 2007 PMT with 2011 data (see Table 7 and Table 9) seem to be largely comparable to the results achieved with 2007 data, though comparisons hinge as entity-wise tables are not presented in the 2009 World Bank report (cf. WB, 2009, p. 34). Second, in line with the somewhat better fit of the PMT models for FBiH, coverage of the poorest quintile is higher in FBiH than in RS, that is, the error of exclusion is smaller in FBiH. Similarly, the simulated distribution of beneficiaries shows that the error of inclusion is smaller in FBiH than in RS. Finally, one already saw that the predictors of the 2007 PMT formula are slightly better suited to predict per capita consumption after transfers than per adult equivalent consumption (OECD 1 scale) before transfers. As a consequence, the models also perform slightly worse in identifying beneficiaries.

Table 7. Coverage and distribution of beneficiaries of the 2007 PMT model (with 2011 data), different program sizes, by quintiles of per capita consumption after transfers, FBiH

	I	II	III	IV	V	Total	
<i>Coverage (in %)</i>							<i>Error of exclusion</i>
Size of the program: 10%	36.0	8.9	4.1	0.5	0.7	10.0	64.0
Size of the program: 15%	47.4	16.5	7.7	2.2	1.3	15.0	52.6
Size of the program: 20%	58.6	22.7	12.7	4.5	1.8	20.0	41.5
<i>Distribution (in %)</i>							<i>Error of inclusion</i>
Size of the program: 10%	71.6	17.8	8.2	1.0	1.5	100.0	28.4
Size of the program: 15%	63.0	22.0	10.3	3.0	1.7	100.0	37.0
Size of the program: 20%	58.4	22.7	12.7	4.5	1.8	100.0	41.6

Notes: The dependent variable of the PMT model is log of monthly per capita consumption after transfers. The same predictors as in WB (2009, pp. 71-72) are used. Consumption quintiles are based on monthly per capita consumption after transfers (approach in WB (2009)). Individual-level sampling weights are applied.

Table 8. Coverage and distribution of beneficiaries of the 2007 PMT model (with 2011 data), different program sizes, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, FBiH

	I	II	III	IV	V	Total	
<i>Coverage (in %)</i>							<i>Error of exclusion</i>
Size of the program: 10%	33.3	9.7	3.6	2.1	1.3	10.0	66.7
Size of the program: 15%	46.4	16.7	6.8	3.7	1.6	15.0	53.6
Size of the program: 20%	56.9	25.1	10.1	5.7	2.3	20.0	43.1
<i>Distribution (in %)</i>							<i>Error of inclusion</i>
Size of the program: 10%	66.5	19.5	7.1	4.2	2.6	100.0	33.5
Size of the program: 15%	61.6	22.3	9.0	4.9	2.2	100.0	38.4
Size of the program: 20%	56.7	25.2	10.1	5.7	2.3	100.0	43.3

Notes: The dependent variable of the PMT model is log of monthly per adult equivalent consumption (OECD 1 scale) before the transfer of non-contributory civilian benefits, assuming a marginal propensity to increase consumption by 33%. The same predictors as in WB (2009, pp. 71-72) are used. Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. Individual-level sampling weights are applied.

Table 9. Coverage and distribution of beneficiaries of the 2007 PMT model (with 2011 data), different program sizes, by quintiles of per capita consumption after transfers, RS

	I	II	III	IV	V	Total	
<i>Coverage (in %)</i>							<i>Error of exclusion</i>
Size of the program: 10%	33.2	11.0	3.8	2.2	0.0	10.0	66.8
Size of the program: 15%	43.8	20.5	7.2	3.9	0.0	15.0	56.2
Size of the program: 20%	54.8	28.1	11.0	5.4	0.9	20.0	45.2
<i>Distribution (in %)</i>							<i>Error of inclusion</i>
Size of the program: 10%	65.8	22.0	7.7	4.5	0.0	100.0	34.2
Size of the program: 15%	57.8	27.3	9.7	5.2	0.0	100.0	42.2
Size of the program: 20%	54.5	28.2	11.0	5.4	0.9	100.0	45.6

Notes: The dependent variable of the PMT model is log of monthly per capita consumption after transfers. The same predictors as in WB (2009, pp. 71-72) are used. Consumption quintiles are based on monthly per capita consumption after transfers (approach in WB (2009)). Individual-level sampling weights are applied.

Table 10. Coverage and distribution of beneficiaries of the 2007 PMT model (with 2011 data), different program sizes, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, RS

	I	II	III	IV	V	Total	
<i>Coverage (in %)</i>							<i>Error of exclusion</i>
Size of the program: 10%	31.2	12.1	5.2	1.9	1.0	10.2	68.8
Size of the program: 15%	41.9	19.3	9.1	4.3	1.9	15.2	58.1
Size of the program: 20%	51.3	27.2	13.0	7.2	3.0	20.3	48.8
<i>Distribution (in %)</i>							<i>Error of inclusion</i>
Size of the program: 10%	60.4	23.8	10.2	3.7	1.9	100.0	39.6
Size of the program: 15%	54.5	25.4	12.0	5.6	2.5	100.0	45.5
Size of the program: 20%	50.1	26.9	12.9	7.1	3.0	100.0	49.9

Notes: The dependent variable of the PMT model is log of monthly per adult equivalent consumption (OECD 1 scale) before the transfer of non-contributory civilian benefits, assuming a marginal propensity to increase consumption by 33%. The same predictors as in WB (2009, pp. 71-72) are used. Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. Individual-level sampling weights are applied.

3.2 New PMT models

The new consumption models are estimated separately for the Federation of Bosnia and Herzegovina and the Republika Srpska. In addition to the models based on the complete population in the respective entity, we estimate separate models for urban and rural regions in order to reflect and more accurately capture differences in living conditions.⁶

The results from the consumption models indicate that the head of household being employed and/or having completed secondary or higher education is strongly and positively correlated with household welfare. Other characteristics that are typically positively associated with higher levels of consumption include the ownership of a secondary dwelling; having bought a new or second hand car in the last twelve months; owning a dishwasher; owning a mobile phone; and using some kind of communication package. Strong negative correlates of household welfare are the size of a household and the number of persons per room. Although the separate models differ with respect to some of the included characteristics, these variables are statistically significant in all estimated PMT models, for FBiH and RS as well as for rural and urban regions within the two entities.

Nevertheless, there are some cases in which the coefficients of dwelling characteristics enter the consumption models with counterintuitive signs. Most notably, whether or not the dwelling is connected to the sewage system or has drinking water are negatively correlated with consumption. While being well aware of the fact that these coefficients cannot be interpreted in a causal sense, it was decided to exclude these variables from the initial set of characteristics due to possible issues in terms of the public acceptance of the formula. In addition, one may note that the number of children in a household is positively related with household welfare. In this case, it needs to be kept in mind that the models control for household size, and that the overall number of household members is negatively correlated with the level of consumption.

From the estimated PMT models it is visible that the explanatory power of the regressions for FBiH is higher, that is, the included variables are slightly better suited to proxy consumption in that entity. Hence the errors of inclusion and exclusion are smaller when applying the formulas for targeting beneficiaries in FBiH. For both entities the R-squared of the model for rural areas is lower than the R-squared of the model considering the complete population. However, in the case of RS, the explanatory power of the urban model (R-squared=0.51) is much higher than the explanatory power of the model based on the complete population (R-squared=0.48), thus contributing to a considerably higher precision of the combined rural/urban formula in RS.

Table 11 – Table 14 (pp. 24-25) show the simulated coverage and distribution of beneficiaries as they would be identified by the new PMT models, either based on one formula for the complete entity or taking into account urban/rural differences.

Irrespective of whether the simulations for FBiH are based on the model for the complete population or urban/rural populations separately, predicted coverage of the poorest population quintile for a program targeted at the poorest 10% of the population amounts to approximately 37%. For such a program about 75% of all the beneficiaries are expected to belong to the poorest fifth of population. As the size of the simulated program increases, it becomes apparent that the model that takes into account the differences between urban and rural populations achieves more accurate results. For a program size that targets the poorest

⁶ All models can be found in the appendix.

15% of the population, the errors of inclusion and exclusion amount to 50% and 33% for the complete model, while they slightly reduce to 49% and 32% for the model that distinguishes between urban and rural areas.

For Republika Sprska, it is consistently the case that the urban/rural model outperforms the model based on the complete population. For instance, for a program that is designed to cover the poorest 10% of the population, taking into account urban/rural differences reduces the exclusion error from 67% to 62%, and the inclusion error from 35% to 25% (cf. Table 13 and Table 14).

The following conclusions arise from an inspection of the results. First, the targeting performance is improved by basing the identification of beneficiaries on separate PMT formulae for urban and rural areas. This is related to the fact that the separate consumption models for urban and rural areas more closely capture varying living conditions in urban and rural parts of the entities. In particular in RS, beneficiaries are more accurately identified by the urban/rural formula.

Secondly, the targeting performance is better in FBiH than in RS when the models are based on the complete population (see Table 11 and Table 13). This observation is in line with the finding that the R-squared of the consumption models is higher in FBiH than in RS. Nevertheless, a comparison of Table 12 and Table 14 shows that the achieved targeting performance is more similar in FBiH and RS as soon as urban and rural areas are taken into account separately. Consequently, this additionally calls for different PMT formula for urban and rural households respectively.

As outlined above, the comparability of these models to the one proposed in 2007 is limited. However, from the replication of the 2007 model we can see that the newly calibrated models show a better targeting performance; a result that is obviously based on the fact that welfare develops, and that changing patterns of household welfare are better reflected with the new models.

Table 11. Coverage and distribution of beneficiaries of the newly calibrated PMT model based on the total population (with 2011 data), different program sizes, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, FBiH

	I	II	III	IV	V	Total	
<i>Coverage (in %)</i>							<i>Error of exclusion</i>
Size of the program: 10%	37.6	8.8	2.3	1.0	0.3	10.0	62.4
Size of the program: 15%	50.0	16.4	4.9	3.0	0.7	15.0	50.0
Size of the program: 20%	59.7	25.5	9.0	4.3	1.6	20.0	40.3
<i>Distribution (in %)</i>							<i>Error of inclusion</i>
Size of the program: 10%	75.3	17.5	4.5	2.0	0.7	100.0	24.7
Size of the program: 15%	66.7	21.9	6.5	4.0	0.9	100.0	33.3
Size of the program: 20%	59.7	25.5	9.0	4.3	1.6	100.0	40.3

Notes: The dependent variable of the PMT model is log of monthly per adult equivalent consumption (OECD 1 scale) before the transfer of non-contributory civilian benefits, assuming a marginal propensity to increase consumption by 33%. Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. Individual-level sampling weights are applied.

Table 12. Coverage and distribution of beneficiaries of the newly calibrated PMT model based on rural/urban areas separately (with 2011 data), different program sizes, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, FBiH

	I	II	III	IV	V	Total	
<i>Coverage (in %)</i>							<i>Error of exclusion</i>
Size of the program: 10%	37.9	8.7	2.7	0.7	0.3	10.0	62.1
Size of the program: 15%	51.4	15.4	4.9	2.9	0.9	15.0	48.7
Size of the program: 20%	61.6	24.1	8.6	4.4	1.5	20.0	38.4
<i>Distribution (in %)</i>							<i>Error of inclusion</i>
Size of the program: 10%	75.2	17.3	5.5	1.4	0.7	100.0	24.8
Size of the program: 15%	68.0	20.6	6.5	3.8	1.1	100.0	32.0
Size of the program: 20%	61.3	24.2	8.6	4.4	1.5	100.0	38.7

Notes: The dependent variable of the PMT model is log of monthly per adult equivalent consumption (OECD 1 scale) before the transfer of non-contributory civilian benefits, assuming a marginal propensity to increase consumption by 33%. Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. Individual-level sampling weights are applied.

Table 13. Coverage and distribution of beneficiaries of the newly calibrated PMT model based on the total population (with 2011 data), different program sizes, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, RS

	I	II	III	IV	V	Total	
<i>Coverage (in %)</i>							<i>Error of exclusion</i>
Size of the program: 10%	33.4	12.7	3.9	0.4	0.5	10.2	66.7
Size of the program: 15%	45.7	19.8	7.2	2.2	1.5	15.3	54.3
Size of the program: 20%	55.2	28.3	12.1	4.4	2.0	20.3	44.8
<i>Distribution (in %)</i>							<i>Error of inclusion</i>
Size of the program: 10%	65.4	25.2	7.7	0.7	1.0	100.0	34.6
Size of the program: 15%	59.6	26.0	9.5	2.9	2.0	100.0	40.4
Size of the program: 20%	54.0	27.9	11.9	4.3	1.9	100.0	46.0

Notes: The dependent variable of the PMT model is log of monthly per adult equivalent consumption (OECD 1 scale) before the transfer of non-contributory civilian benefits, assuming a marginal propensity to increase consumption by 33%. Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. Individual-level sampling weights are applied.

Table 14. Coverage and distribution of beneficiaries of the newly calibrated PMT model based on rural/urban areas separately (with 2011 data), different program sizes, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, RS

	I	II	III	IV	V	Total	
<i>Coverage (in %)</i>							<i>Error of exclusion</i>
Size of the program: 10%	38.1	7.0	3.7	1.6	0.5	10.1	61.9
Size of the program: 15%	47.8	18.0	7.3	2.6	0.9	15.3	52.2
Size of the program: 20%	56.5	27.3	11.5	5.4	1.5	20.4	43.5
<i>Distribution (in %)</i>							<i>Error of inclusion</i>
Size of the program: 10%	74.8	13.7	7.3	3.2	1.0	100.0	25.2
Size of the program: 15%	62.3	23.6	9.6	3.4	1.2	100.0	37.7
Size of the program: 20%	55.1	26.8	11.3	5.3	1.5	100.0	44.9

Notes: The dependent variable of the PMT model is log of monthly per adult equivalent consumption (OECD 1 scale) before the transfer of non-contributory civilian benefits, assuming a marginal propensity to increase consumption by 33%. Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. Individual-level sampling weights are applied.

3.3 Current Means Test with additional Filters

In order to test whether the targeting performance of existing means-tested non-contributory civilian benefits improves if additional filters on top of the currently implemented means-test are applied, we simulate targeting performance in the case that a household is only eligible if (1) it receives a non-contributory civilian cash-benefit at present and (2) a certain filter question does not apply to it.

Appropriate filters are mainly chosen based on insights from the PMT models that indicate which dwelling characteristics or consumer durables are associated with higher household welfare. The following filters are considered one at a time: whether or not a household has an internet connection, a mobile phone, a secondary dwelling, a garage, a car, a car bought within the last 12 months, or a new or second-hand car bought in the last 12 months. As usual, simulations are carried out separately for FBiH and RS. The results are summarized in Table 15 and Table 16. In each table, the first line indicates the performance of the current means-tested civilian benefits and serves as a baseline.

Overall, the comparison of the coverage and distribution of beneficiaries before and after the use of additional filters on top of the current means-tests illustrates the well-known trade-off between errors of inclusion and exclusion. Relative to the baseline, the application of additional filters logically increases errors of exclusion, while contributing to smaller errors of inclusion. As such, it is obviously possible to reduce the errors of inclusion strongly, but at the cost of excluding a considerable part of the population in need.

For instance, if all owners of a mobile phone in FBiH were *per se* not eligible for any means-tested non-contributory civilian cash transfers, the error of inclusion would be reduced from 62% to 38% and leakage of social benefits to non-eligible households would also be contained. Simultaneously, however, the error of exclusion would rise sharply from 91% to 99%. In contrast, taking into consideration whether or not a household has a secondary dwelling or bought a new car within the last twelve months does not increase the error of exclusion, but is also not very efficient in reducing errors of inclusion.

At least two options emerge from the simulations. First, one could consider excluding all households that have an internet connection. In FBiH, for instance, this would decrease the total program from 5% to 3%, while coverage of the poorest quintile would remain around 9% (see Table 15). Simultaneously, the distribution of beneficiaries would be more favorable as it would be more concentrated in the lowest quintile. The same effect is observed in RS (see Table 16).

A second option emerges in FBiH, where ownership of a car could be considered as an additional criterion for the means-test. While the size of the program would be reduced considerably (from 4.9% to 2.7%), coverage would still amount to 7.0% as compared to 9.0% at present. At the same time, the distribution of beneficiaries would be more “pro-poor”. In contrast, this does not appear to be a feasible option in RS, where the coverage of the poorest quintile would drop sharply from 18.6% to 10.5%.

Table 15. Coverage and distribution of beneficiaries, as well as distribution of benefits, using additional filters on top of currently implemented means-test, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, FBiH

	I	II	III	IV	V	Total	
<i>Coverage of beneficiaries (in %)</i>							<i>Error of exclusion</i>
Baseline	9.4	6.7	3.3	3.4	1.9	4.9	90.6
Household has internet connection	8.6	3.8	2.0	2.0	0.8	3.4	91.4
Household has a mobile phone	1.4	0.4	0.1	0.3	0.1	0.5	98.6
Household has secondary dwelling	9.1	6.6	3.3	3.4	1.4	4.8	90.9
Household has a garage	7.0	3.9	2.6	2.0	0.9	3.3	93.0
Household has a car	7.0	2.9	1.1	1.7	0.5	2.7	93.1
Household bought new car within last 12 months	9.4	6.7	3.3	3.4	1.8	4.9	90.6
Household bought new or second hand car within last 12 months	9.4	6.5	3.0	3.1	1.7	4.7	90.6
<i>Distribution of beneficiaries (in %)</i>							<i>Error of inclusion</i>
Baseline	38.1	27.3	13.4	13.6	7.6	100.0	61.9
Household has internet connection	50.1	21.9	11.8	11.5	4.7	100.0	49.9
Household has a mobile phone	61.8	15.5	2.3	14.7	5.7	100.0	38.2
Household has secondary dwelling	38.3	27.8	13.9	14.2	5.8	100.0	61.7
Household has a garage	42.9	23.7	16.1	12.1	5.2	100.0	57.1
Household has a car	52.6	22.2	8.5	12.9	3.9	100.0	47.5
Household bought new car within last 12 months	38.3	27.4	13.5	13.7	7.2	100.0	61.7
Household bought new or second hand car within last 12 months	39.8	27.5	12.5	13.2	7.0	100.0	60.2
<i>Distribution of benefits (in %)</i>							<i>Leakage</i>
Baseline	35.4	23.0	11.6	10.7	19.3	100.0	64.6
Household has internet connection	41.9	20.0	9.1	8.6	20.3	100.0	58.1
Household has a mobile phone	55.2	22.5	1.6	11.6	9.1	100.0	44.8
Household has secondary dwelling	40.7	25.6	13.6	12.4	7.8	100.0	59.3
Household has a garage	36.4	18.4	12.6	10.2	22.4	100.0	63.6
Household has a car	45.1	20.3	8.4	10.8	15.3	100.0	54.9
Household bought new car within last 12 months	35.4	23.0	11.6	10.7	19.3	100.0	64.6
Household bought new or second hand car within last 12 months	36.7	23.0	10.8	10.4	19.1	100.0	63.3

Notes: A household is eligible if (1) it receives a non-contributory civilian cash-benefit at present and (2) a certain filter question does not apply to it, e.g. whether it owns a car. Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. Individual-level sampling weights are applied.

Table 16. Coverage and distribution of beneficiaries, as well as distribution of benefits, using additional filters on top of currently implemented means-test, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, RS

	I	II	III	IV	V	Total	
<i>Coverage of beneficiaries (in %)</i>							<i>Error of exclusion</i>
Baseline	18.6	12.8	5.5	4.6	5.8	9.5	81.5
Household has internet connection	15.2	10.4	2.7	3.0	3.2	6.9	84.8
Household has a mobile phone	1.7	0.9	0.2	0.2	0.0	0.6	98.3
Household has secondary dwelling	18.6	12.8	5.5	3.6	5.2	9.1	81.5
Household has a garage	12.7	5.5	3.7	2.0	2.7	5.3	87.3
Household has a car	10.5	4.6	1.8	1.3	1.1	3.9	89.6
Household bought new car within last 12 months	18.6	12.8	5.5	4.6	5.5	9.4	81.5
Household bought new or second hand car within last 12 months	17.7	11.0	4.4	4.1	5.3	8.5	82.3
<i>Distribution of beneficiaries (in %)</i>							<i>Error of inclusion</i>
Baseline	39.3	27.0	11.7	9.8	12.2	100.0	60.7
Household has internet connection	44.1	30.0	7.8	8.8	9.3	100.0	55.9
Household has a mobile phone	56.7	28.8	7.2	7.3	0.0	100.0	43.3
Household has secondary dwelling	40.7	28.0	12.1	7.9	11.3	100.0	59.3
Household has a garage	47.6	20.8	13.9	7.6	10.1	100.0	52.4
Household has a car	54.4	23.9	9.5	6.8	5.5	100.0	45.6
Household bought new car within last 12 months	39.5	27.2	11.8	9.8	11.7	100.0	60.5
Household bought new or second hand car within last 12 months	41.8	25.9	10.4	9.6	12.4	100.0	58.2
<i>Distribution of benefits (in %)</i>							<i>Leakage</i>
Baseline	47.4	24.4	12.2	8.0	7.9	100.0	52.6
Household has internet connection	47.2	27.9	12.0	7.3	5.7	100.0	52.8
Household has a mobile phone	58.1	29.0	5.1	7.9	0.0	100.0	41.9
Household has secondary dwelling	48.4	24.9	12.5	6.9	7.3	100.0	51.6
Household has a garage	44.8	24.3	16.5	7.3	7.0	100.0	55.2
Household has a car	58.4	24.2	7.2	5.9	4.4	100.0	41.6
Household bought new car within last 12 months	47.5	24.5	12.3	8.0	7.7	100.0	52.5
Household bought new or second hand car within last 12 months	49.7	24.5	9.4	8.4	8.1	100.0	50.3

Notes: A household is eligible if (1) it receives a non-contributory civilian cash-benefit at present and (2) a certain filter question does not apply to it, e.g. whether it owns a car. Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. Individual-level sampling weights are applied.

4 *Categorical targeting*

Individual or household characteristics that are easy-to-observe, hard to manipulate, and that are correlated with lower levels of household welfare may also serve as a targeting mechanisms for non-contributory civilian benefits. For instance, households with many (young) children, unemployed household members, or disabled household members, are typically more likely to be poor. With categorical targeting, a household is automatically eligible to a certain benefits as soon as a certain characteristic applies to it.

Based on insights from the poverty profile as well as the PMT models, the following household characteristics are selected for the simulation of the targeting performance of categorical targeting:

- Having at least one child below the age of 18;
- Having at least one child below the age of 6;
- Having two or more children below the age of 18;
- Having two or more children below the age of 6;
- Having three or more children below the age of 18;
- Five or more household members;
- Six or more household members;
- Household head is unable to work;
- Household head has a decision on disability;
- At least one household member has a decision on disability;
- Dependency ratio (household size over number of employed) larger than 4.

The results of our simulations are summarized in Table 17 and Table 18 (pp. 30-31). The first issue to consider is the size of the identified groups as can be seen from the tables on coverage. As for instance 57.0% and 49.0% of the population lives in households with children below the age of 18 in FBiH and RS, the size of this group is still too large to be targeted in a meaningful way. It is furthermore important to keep in mind that errors of exclusion and inclusion are sensitive to the size of the program when interpreting the tables. If we assume that the program size should not exceed 20% of the population, the following household characteristics can be considered: two or more children below the age of 6; three or more children below the age of 18; six or more household members; household head is unable to work; household head has an official decision on disability; or at least one household member has an official decision on disability, or household has a dependency ratio larger than 4.

Additionally taking into account the coverage and distribution of beneficiaries, it appears that having two or more children below the age of 6 or three or more children below the age of 18, having six or more household members, and having a household head who is unable to work could be useful categories for targeting. In these cases, the coverage of the poorest quintile is higher than among the complete population, and the distribution of beneficiaries would be concentrated in the lowest quintile.

Table 17. Coverage and distribution of beneficiaries using categorical targeting, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, FBiH

	I	II	III	IV	V	Total	
Coverage (in %)							<i>Error of exclusion</i>
Household has...							
...children below the age of 18	68.7	60.4	57.4	54.4	44.0	57.0	31.3
...children below the age of 6	28.2	23.6	21.0	20.4	15.7	21.8	71.9
...two or more children below the age of 18	44.1	34.9	33.1	29.5	21.5	32.6	55.9
...two more children below the age of 6	9.4	6.1	4.8	4.2	3.6	5.6	90.6
...three or more children below the age of 18	14.3	11.1	8.7	8.2	3.2	9.1	85.7
...five or more household members	42.3	36.0	30.4	25.6	13.8	29.6	57.7
...six or more household members	24.8	17.7	10.8	11.6	5.5	14.1	75.2
...head that is unable to work	4.6	1.8	2.0	1.1	0.8	2.1	95.4
...head with a decision on disability	14.0	13.6	14.9	10.9	11.9	13.0	86.1
...at least one member with a decision on	21.4	22.0	19.2	17.1	16.7	19.3	78.7
...a dependency ratio larger than 4	19.3	16.6	15.0	12.3	4.4	13.5	80.7
Distribution of beneficiaries (in %)							<i>Error of inclusion</i>
Household has...							
...children below the age of 18	24.1	21.2	20.1	19.1	15.4	100.0	75.9
...children below the age of 6	25.9	21.7	19.3	18.8	14.4	100.0	74.2
...two or more children below the age of 18	27.1	21.4	20.3	18.1	13.2	100.0	72.9
...two more children below the age of 6	33.5	21.7	17.1	15.0	12.7	100.0	66.5
...three or more children below the age of 18	31.6	24.3	19.1	18.0	7.0	100.0	68.4
...five or more household members	28.6	24.3	20.5	17.3	9.3	100.0	71.4
...six or more household members	35.3	25.2	15.4	16.5	7.7	100.0	64.8
...head that is unable to work	44.7	17.4	19.1	10.8	8.0	100.0	55.3
...head with a decision on disability	21.4	20.8	22.8	16.7	18.3	100.0	78.6
...at least one member with a decision on	22.2	22.8	19.9	17.8	17.4	100.0	77.8
...a dependency ratio larger than 4	28.6	24.6	22.2	18.2	6.5	100.0	71.4
Notes: Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. Individual-level sampling weights are applied.							

Table 18. Coverage and distribution of beneficiaries using categorical targeting, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, RS

	I	II	III	IV	V	Total	
Coverage (in %)							<i>Error of exclusion</i>
Household has...							
...children below the age of 18	60.0	50.7	48.0	47.6	38.6	49.0	40.1
...children below the age of 6	26.3	20.5	20.8	19.1	14.2	20.2	73.7
...two or more children below the age of 18	41.9	31.9	30.2	30.8	21.3	31.2	58.1
...two more children below the age of 6	10.5	4.7	5.4	5.5	2.8	5.8	89.5
...three or more children below the age of 18	18.5	11.1	7.6	6.5	4.3	9.6	81.5
...five or more household members	45.5	43.3	32.8	29.2	14.9	33.1	54.5
...six or more household members	27.9	20.4	17.1	13.5	8.3	17.5	72.1
...head that is unable to work	7.3	4.8	2.0	3.1	1.6	3.8	92.7
...head with a decision on disability	9.0	9.0	12.0	10.7	7.0	9.5	91.1
...at least one member with a decision on	13.9	12.9	17.2	17.9	10.1	14.4	86.2
...a dependency ratio larger than 4	17.9	18.0	14.5	6.9	4.4	12.3	82.1
Distribution of beneficiaries (in %)							<i>Error of inclusion</i>
Household has...							
...children below the age of 18	24.5	20.7	19.6	19.4	15.8	100.0	75.5
...children below the age of 6	26.1	20.4	20.5	18.9	14.1	100.0	73.9
...two or more children below the age of 18	26.9	20.5	19.3	19.7	13.6	100.0	73.1
...two more children below the age of 6	36.2	16.4	18.7	19.1	9.7	100.0	63.8
...three or more children below the age of 18	38.6	23.1	15.9	13.6	8.9	100.0	61.4
...five or more household members	27.5	26.2	19.7	17.6	9.0	100.0	72.5
...six or more household members	32.0	23.4	19.6	15.5	9.5	100.0	68.0
...head that is unable to work	39.0	25.5	10.7	16.4	8.4	100.0	61.0
...head with a decision on disability	18.7	19.0	25.3	22.4	14.7	100.0	81.4
...at least one member with a decision on	19.2	17.9	23.9	25.0	14.0	100.0	80.8
...a dependency ratio larger than 4	29.0	29.3	23.5	11.1	7.1	100.0	71.0
Notes: Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. Individual-level sampling weights are applied.							

5 Hybrid and other targeting models

5.1 PMT with income

As outlined in the methodology (see 2.3), the section on income in the HBS suffers from a relatively high number of missing information, in particular with regard to the actual amounts of income from a specific source. It is therefore opted to include income from verifiable sources as a binary variable that indicates whether or not at least one household member receives a salary from a local or foreign employer. This dummy variable is added to the initial set of variables of the PMT model and it is explored to what extent this additional variable increases the explanatory power of the consumption model, that is, to what extent it is associated with the level of household welfare. It is found that this variable only enters the final set of predictors in one case, namely in the PMT model for rural areas in FBiH. In all other models the variable is not statistically significant at the 10% level and does therefore not add to the explanatory power of the models. For the consumption models for rural areas in FBiH, the R-squared of the model slightly increase from 49.76 to 49.86, thus still only adding little.

Subsequently, adding information on income from verifiable sources does not result in a better targeting performance in FBiH. Table 19 shows coverage and distribution of beneficiaries as they would be identified by the PMT formula that distinguishes between rural and urban areas and includes income as a predictor for the rural model. Compared to the respective PMT-without-income rural/urban model (please see

Table 12 for reference), the 'PMT plus income' formula achieves a slightly smaller exclusion error if the poorest 20% of the population are targeted. In contrast, if the aim is to identify the poorest 10% of the population, the exclusion error is even higher. Consequently, it appears that the inclusion of income from verifiable sources as an additional criterion in the formula would complicate the assessment process in an unnecessary way, as it apparently would not help to achieve better targeting outcomes.

Table 19. Coverage and distribution of beneficiaries of the newly calibrated PMT model including income from verifiable sources, based on rural/urban areas separately (with 2011 data), different program sizes, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, FBiH

	I	II	III	IV	V	Total	
<i>Coverage (in %)</i>							<i>Error of exclusion</i>
Size of the program: 10%	37.7	8.2	3.0	1.1	0.3	10.0	62.3
Size of the program: 15%	52.0	15.4	4.5	2.6	0.9	15.0	48.0
Size of the program: 20%	61.8	23.6	8.7	4.5	1.8	20.0	38.2
<i>Distribution (in %)</i>							<i>Error of inclusion</i>
Size of the program: 10%	75.0	16.3	5.9	2.1	0.7	100.0	25.0
Size of the program: 15%	68.9	20.4	5.9	3.5	1.2	100.0	31.1
Size of the program: 20%	61.5	23.6	8.6	4.5	1.8	100.0	38.5

Notes: The dependent variable of the PMT model is log of monthly per adult equivalent consumption (OECD 1 scale) before the transfer of non-contributory civilian benefits, assuming a marginal propensity to increase consumption by 33%. Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. Individual-level sampling weights are applied.

5.2 PMT after filter

The aim of applying filters before the PMT formula is to reduce the error of inclusion and to further shift the distribution of benefits towards the lower quintiles. Consequently, introducing filters generally reduces the size of the program. Filters based on characteristics with higher incidence among the population (e.g. owning a mobile phone) logically tend to reduce the size of the program more drastically than those that use rarely observed characteristics (e.g. owning a secondary dwelling).

To explore the performance of this method, we apply various filters in addition to the proposed urban/rural PMT formulas (see Table 20 - Table 25). The decision to use the urban/rural PMT models for this exercise is based on the better performance these models showed in capturing differences in lifestyle between rural and urban areas (see section 3.2).

In all cases it is visible that using a filter that is based on whether the household has a mobile phone considerably reduces the size of the program, without improving the targeting performance. Using internet as a filter results in slight reduction of the program size leading to a very limited decrease in inclusion errors, but does not seem to have the desired effect on the distribution in general. When not owning a garage or a car is used as a criterion for eligibility, the size of the program reduces to a larger extent; accordingly, the distribution of beneficiaries in the upper three quintiles decreases and the error of inclusion drops more drastically. However, in this case, since there is always a trade-off between the inclusion and exclusion error, the error of exclusion increases.

Households owning secondary dwelling are a very small proportion of total population generally have a higher economic status. Therefore, everyone belonging to a household owning a secondary dwelling are considered non-eligible for receiving social benefits, the program size would only reduce by less than half a percentage point (this change is therefore hardly visible in the tables below). In spite of this minor change in the program size, in FBiH the distribution of beneficiaries in the highest population quintile visibly decreases and in RS the beneficiaries belonging to the fourth quintile are reduced. Therefore, while the error of inclusion stays virtually the same as in the baseline scenario, applying this filter would have the desired effect, making less people belonging to the top quintiles eligible for benefits.

The observations of households that bought a car in the last year are strongly associated with a higher consumption level. Hence, this variable is included in all PMT models with a large coefficient already. Using this variable as a filter, therefore, does not change the performance of the PMT.

The analysis illustrates once again the trade-off between the exclusion and inclusion error. Adding filters to the PMT models leads to a reduction of inclusion error, which generally is accompanied by a respective reduction in the program size as a result of an increase of exclusion error. Nevertheless, the filter that is based on whether or not a household owns a secondary dwelling seems to contribute to targeting efficiency while only marginally decreasing its effectiveness. Applying this filter would exclude people belonging to the very top of the consumption distribution, while only slightly reducing the program size.

Table 20. Coverage and distribution of beneficiaries of the rural/urban PMT model after applying various filters, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, FBiH, program size of 10%

	I	II	III	IV	V	Total	
<i>Coverage of beneficiaries (in %)</i>							<i>Error of exclusion</i>
Baseline: PMT without filters	37.9	8.7	2.7	0.7	0.3	10.0	62.1
Household has internet connection	35.7	7.9	2.6	0.7	0.3	9.4	64.3
Household has a mobile phone	7.2	2.0	0.4	0.1	0.0	1.9	92.8
Household has secondary dwelling	37.9	8.7	2.7	0.7	0.1	10.0	62.1
Household has a garage	33.3	7.1	1.7	0.6	0.3	8.6	66.7
Household has a car	31.1	6.7	1.6	0.5	0.1	8.0	68.9
Household bought new or second hand car within last 12 months	37.9	8.7	2.7	0.7	0.3	10.0	62.1
<i>Distribution of beneficiaries (in %)</i>							<i>Error of inclusion</i>
Baseline: PMT without filters	75.2	17.3	5.5	1.4	0.7	100.0	24.8
Household has internet connection	75.5	16.8	5.5	1.4	0.7	100.0	24.5
Household has a mobile phone	74.4	20.4	4.4	0.7	0.0	100.0	25.6
Household has secondary dwelling	75.6	17.4	5.5	1.4	0.2	100.0	24.4
Household has a garage	77.5	16.6	3.9	1.3	0.8	100.0	22.6
Household has a car	77.8	16.8	4.0	1.2	0.2	100.0	22.2
Household bought new or second hand car within last 12 months	75.2	17.3	5.5	1.4	0.7	100.0	24.8

Source: Authors' calculations based on HBS 2011. *Notes:* A household is eligible if (1) a certain filter question does not apply to it, e.g. whether it owns a car and (2) the score from the PMT formula is under a certain threshold. Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. Individual-level sampling weights are applied.

Table 21. Coverage and distribution of beneficiaries of the rural/urban PMT model after applying various filters, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, FBiH, program size of 15%

	I	II	III	IV	V	Total	
<i>Coverage of beneficiaries (in %)</i>							<i>Error of exclusion</i>
Baseline: PMT without filters	51.4	15.4	4.9	2.9	0.9	15.0	48.7
Household has internet connection	46.7	13.7	4.6	2.7	0.8	13.7	53.3
Household has a mobile phone	8.8	2.6	0.6	0.6	0.2	2.5	91.2
Household has secondary dwelling	51.4	15.4	4.9	2.9	0.6	15.0	48.7
Household has a garage	41.5	11.7	2.7	1.9	0.7	11.7	58.5
Household has a car	38.6	11.5	3.0	1.8	0.6	11.1	61.4
Household bought new or second hand car within last 12 months	51.4	15.4	4.9	2.9	0.9	15.0	48.7
<i>Distribution of beneficiaries (in %)</i>							<i>Error of inclusion</i>
Baseline: PMT without filters	68.0	20.6	6.5	3.8	1.1	100.0	32.0
Household has internet connection	68.1	20.1	6.7	4.0	1.1	100.0	31.9
Household has a mobile phone	69.3	20.2	4.9	4.3	1.2	100.0	30.7
Household has secondary dwelling	68.3	20.6	6.5	3.8	0.8	100.0	31.8
Household has a garage	70.9	20.1	4.6	3.3	1.1	100.0	29.1
Household has a car	69.6	20.7	5.4	3.2	1.1	100.0	30.4
Household bought new or second hand car within last 12 months	68.0	20.6	6.5	3.8	1.1	100.0	32.0

Source: Authors' calculations based on HBS 2011. *Notes:* A household is eligible if (1) a certain filter question does not apply to it, e.g. whether it owns a car and (2) the score from the PMT formula is under a certain threshold. Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. Individual-level sampling weights are applied.

Table 22. Coverage and distribution of beneficiaries of the rural/urban PMT model after applying various filters, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, FBIH, program size of 20%

	I	II	III	IV	V	Total	
<i>Coverage of beneficiaries (in %)</i>							<i>Error of exclusion</i>
Baseline: PMT without filters	61.6	24.1	8.6	4.4	1.5	20.0	38.4
Household has internet connection	55.8	20.9	7.4	4.3	1.2	17.9	44.2
Household has a mobile phone	10.6	3.8	1.1	0.6	0.2	3.3	89.5
Household has secondary dwelling	61.6	24.1	8.6	4.4	1.3	20.0	38.4
Household has a garage	48.1	17.0	5.7	2.7	1.1	14.9	51.9
Household has a car	44.7	16.1	5.8	2.9	0.9	14.1	55.3
Household bought new or second hand car within last 12 months	61.6	24.1	8.6	4.4	1.5	20.0	38.4
<i>Distribution of beneficiaries (in %)</i>							<i>Error of inclusion</i>
Baseline: PMT without filters	61.3	24.2	8.6	4.4	1.5	100.0	38.7
Household has internet connection	62.2	23.4	8.3	4.8	1.3	100.0	37.8
Household has a mobile phone	64.9	23.3	6.5	3.9	1.4	100.0	35.1
Household has secondary dwelling	61.4	24.2	8.6	4.4	1.3	100.0	38.6
Household has a garage	64.4	22.9	7.6	3.7	1.4	100.0	35.6
Household has a car	63.4	23.0	8.3	4.1	1.3	100.0	36.6
Household bought new or second hand car within last 12 months	61.3	24.2	8.6	4.4	1.5	100.0	38.7

Source: Authors' calculations based on HBS 2011. *Notes:* A household is eligible if (1) a certain filter question does not apply to it, e.g. whether it owns a car and (2) the score from the PMT formula is under a certain threshold. Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. Individual-level sampling weights are applied.

Table 23. Coverage and distribution of beneficiaries of the rural/urban PMT model after applying various filters, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, RS, program size of 10%

	I	II	III	IV	V	Total	
<i>Coverage of beneficiaries (in %)</i>							<i>Error of exclusion</i>
Baseline: PMT without filters	38.1	7.0	3.7	1.6	0.5	10.1	61.9
Household has internet connection	36.1	6.1	3.7	1.6	0.5	9.6	63.9
Household has a mobile phone	7.7	1.6	0.1	0.3	0.0	1.9	92.4
Household has secondary dwelling	38.1	7.0	3.7	0.9	0.5	10.0	61.9
Household has a garage	31.3	5.1	2.7	1.0	0.2	8.0	68.7
Household has a car	30.8	5.2	3.0	1.6	0.5	8.2	69.2
Household bought new or second hand car within last 12 months	37.1	7.0	3.7	1.6	0.5	9.9	62.9
<i>Distribution of beneficiaries (in %)</i>							<i>Error of inclusion</i>
Baseline: PMT without filters	74.8	13.7	7.3	3.2	1.0	100.0	25.2
Household has internet connection	75.1	12.7	7.7	3.3	1.1	100.0	24.9
Household has a mobile phone	79.7	16.5	0.7	3.1	0.0	100.0	20.3
Household has secondary dwelling	75.9	13.9	7.4	1.7	1.0	100.0	24.1
Household has a garage	77.5	12.6	6.8	2.5	0.6	100.0	22.5
Household has a car	74.8	12.8	7.4	3.9	1.2	100.0	25.2
Household bought new or second hand car within last 12 months	74.3	14.0	7.4	3.2	1.0	100.0	25.7

Source: Authors' calculations based on HBS 2011. *Notes:* A household is eligible if (1) a certain filter question does not apply to it, e.g. whether it owns a car and (2) the score from the PMT formula is under a certain threshold. Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. Individual-level sampling weights are applied.

Table 24. Coverage and distribution of beneficiaries of the rural/urban PMT model after applying various filters, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, RS, program size of 15%

	I	II	III	IV	V	Total	
<i>Coverage of beneficiaries (in %)</i>							<i>Error of exclusion</i>
Baseline: PMT without filters	47.8	18.0	7.3	2.6	0.9	15.3	52.2
Household has internet connection	44.9	16.7	6.7	2.3	0.5	14.2	55.1
Household has a mobile phone	9.4	4.1	1.0	0.5	0.0	3.0	90.6
Household has secondary dwelling	47.4	18.0	6.9	1.9	0.9	15.0	52.7
Household has a garage	39.3	11.1	5.4	1.8	0.6	11.6	60.7
Household has a car	35.8	11.9	5.8	2.6	0.5	11.3	64.2
Household bought new or second hand car within last 12 months	46.4	18.0	7.3	2.6	0.9	15.0	53.7
<i>Distribution of beneficiaries (in %)</i>							<i>Error of inclusion</i>
Baseline: PMT without filters	62.3	23.6	9.6	3.4	1.2	100.0	37.7
Household has internet connection	62.9	23.6	9.5	3.3	0.7	100.0	37.1
Household has a mobile phone	62.3	27.6	6.7	3.4	0.0	100.0	37.7
Household has secondary dwelling	63.0	24.1	9.2	2.5	1.2	100.0	37.0
Household has a garage	67.4	19.1	9.3	3.1	1.0	100.0	32.6
Household has a car	63.2	21.1	10.2	4.6	0.9	100.0	36.8
Household bought new or second hand car within last 12 months	61.5	24.1	9.8	3.5	1.2	100.0	38.5

Source: Authors' calculations based on HBS 2011. *Notes:* A household is eligible if (1) a certain filter question does not apply to it, e.g. whether it owns a car and (2) the score from the PMT formula is under a certain threshold. Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. Individual-level sampling weights are applied.

Table 25. Coverage and distribution of beneficiaries of the rural/urban PMT model after applying various filters, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, RS, program size of 20%

	I	II	III	IV	V	Total	
<i>Coverage of beneficiaries (in %)</i>							<i>Error of exclusion</i>
Baseline: PMT without filters	56.5	27.3	11.5	5.4	1.5	20.4	43.5
Household has internet connection	53.0	24.6	8.7	4.3	1.2	18.3	47.0
Household has a mobile phone	11.9	6.2	2.3	1.2	0.1	4.4	88.1
Household has secondary dwelling	56.1	27.3	10.8	4.6	1.5	20.0	43.9
Household has a garage	46.1	18.1	7.5	4.2	1.2	15.4	53.9
Household has a car	40.9	17.6	8.3	4.4	1.2	14.4	59.1
Household bought new or second hand car within last 12 months	55.1	26.6	11.5	5.4	1.5	20.0	45.0
<i>Distribution of beneficiaries (in %)</i>							<i>Error of inclusion</i>
Baseline: PMT without filters	55.1	26.8	11.3	5.3	1.5	100.0	44.9
Household has internet connection	57.6	27.0	9.5	4.7	1.3	100.0	42.4
Household has a mobile phone	54.4	28.7	10.5	5.7	0.7	100.0	45.6
Household has secondary dwelling	55.8	27.4	10.7	4.6	1.5	100.0	44.3
Household has a garage	59.6	23.6	9.7	5.5	1.6	100.0	40.4
Household has a car	56.4	24.5	11.4	6.1	1.6	100.0	43.6
Household bought new or second hand car within last 12 months	54.9	26.7	11.5	5.4	1.5	100.0	45.1

Source: Authors' calculations based on HBS 2011. *Notes:* A household is eligible if (1) a certain filter question does not apply to it, e.g. whether it owns a car and (2) the score from the PMT formula is under a certain threshold. Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. Individual-level sampling weights are applied.

5.3 Utility expenditures

A final way of targeting non-contributory means-tested benefits towards poor households is to use utility expenditures as a proxy for a household's level of welfare. Two targeting mechanisms are simulated: First, we identify the 10, 15 and 20% poorest individuals based on monthly per capita expenditure on electricity. Secondly, the simulation is carried out based on monthly per capita expenditure on both electricity and water/sewage. Cut-off values for the different program sizes are displayed in Table 26.

Table 26. Cut-off values (in KM) based on estimated average monthly electricity expenditures for 2011, different program sizes, FBiH and RS

<i>Size of the program\Cut-off amount</i>	FBiH	RS
Size of the program: 10%	7.62	8.06
Size of the program: 15%	8.62	9.16
Size of the program: 20%	9.65	9.95

Table 27 and Table 28 demonstrate coverage and distribution of beneficiaries for three different program sizes, where beneficiaries are solely selected according to their per capita expenditure on monthly electricity bills. The results of the performance of a targeting mechanism that is based on per capita expenditure on electricity and water/sewage are not presented here, as this mechanism consistently achieved worse results than the simpler method that is solely based on per capita electricity expenditure. Instead, they can be found in the annex (see Table A 5 and Table A 6).

Table 27. Coverage and distribution for targeting based on estimated average monthly electricity expenditure, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, FBiH

	I	II	III	IV	V	Total	
<i>Coverage (in %)</i>							<i>Error of exclusion</i>
Size of the program: 10%	26.9	13.1	5.5	2.3	2.2	10.0*	73.1
Size of the program: 15%	34.7	20.5	10.4	5.9	3.5	15.0*	65.3
Size of the program: 20%	43.7	26.1	14.7	10.0	5.5	20.0*	56.3
<i>Distribution (in %)</i>							<i>Error of inclusion</i>
Size of the program: 10%	53.8	26.2	11.0	4.6	4.4	100.0	46.2
Size of the program: 15%	46.3	27.3	13.8	7.9	4.7	100.0	53.7
Size of the program: 20%	43.7	26.1	14.7	10.0	5.5	100.0	56.3

Source: Authors' calculations based on HBS 2011. *Notes:* Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. * Program sizes may deviate from 10, 15 or 20% due to using household-level data on which individual-level sampling weights are applied.

Table 28. Coverage and distribution in RS for targeting based on estimated average monthly electricity expenditure, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, RS

	I	II	III	IV	V	Total	
<i>Coverage (in %)</i>							<i>Error of exclusion</i>
Size of the program: 10%	26.6	14.4	6.1	3.8	0.8	10.3*	73.4
Size of the program: 15%	37.5	21.5	10.3	4.8	3.0	15.4*	62.5
Size of the program: 20%	45.6	30.0	14.7	5.9	4.9	20.2*	54.4
<i>Distribution (in %)</i>							<i>Error of inclusion</i>
Size of the program: 10%	51.4	27.9	11.8	7.4	1.5	100.0	48.6
Size of the program: 15%	48.5	28.0	13.4	6.3	3.9	100.0	51.5
Size of the program: 20%	44.9	29.8	14.6	5.9	4.8	100.0	55.1

Source: Authors' calculations based on HBS 2011. *Notes:* Consumption quintiles are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. * Program sizes may deviate from 10, 15 or 20% due to using household-level data on which individual-level sampling weights are applied.

Assuming a program size of 10%, 27% of the poorest quintile in FBiH and RS would be covered. This compares to coverage of 38% of the poorest quintile in FBiH and RS that would be achieved by the best performing PMT models. In terms of distribution of beneficiaries, the simulations show that 54% of beneficiaries identified in FBiH and 51% of beneficiaries identified in RS would belong to the poorest quintile, while this figures amount to more than 75% for the best PMT models. For a program size of 20%, coverage would amount to 44% in FBiH and even 45% in RS if the targeting mechanism based on utility expenditure was applied. Once again, this compares to 62% in FBiH and 57% in RS for the best PMT models.

In general, the targeting mechanism works slightly better in RS than in FBiH, where beneficiaries would be more concentrated in the lowest quintile of the welfare distribution and more people in the poorest quintile would be covered. In comparison to the PMT models for RS and FBiH that are considerably more complex, this simple mechanism works very well. In addition, the implementation of this mechanism might be fairly easy and cost-efficient if we can assume that every household should have bills documenting their expenditure on electricity.

6 Overview of results and selection of models for further simulations

This report presents several different methods for targeting of non-contributory civilian benefits and compares their performance in terms of coverage and distribution of beneficiaries. Table 29 and Table 30 and Figure 1 – Figure 4 provide a synthesis of the targeting performance of all targeting mechanisms that have been discussed. For the ease of exposition, the comparative overview concentrates on the size of the program and the errors of exclusion and inclusion respectively for each targeting mechanism.

The estimated proxy-means testing formulas, based on separate models for urban and rural regions within the two entities, FBiH and RS, yield the most promising results in terms of coverage and distribution of beneficiaries (see Table 29 and Table 30). Namely, according to the simulations, both in FBiH and RS, a program size of 10% would cover approximately 37% of the poorest fifth of the population, while only 25% of all beneficiaries would be wrongfully included. For comparison, the current non-contributory civilian benefits program in FBiH, which is of a slightly smaller size (8.4%), covers only 14% of the poorest quintile while its beneficiaries not belonging to the poorest fifth of population amount to 67% (see Table 1 and Table 2, pp. 11). In RS the current proportion of total population receiving non-contributory civilian benefits is 12%, the coverage of the poorest quintile is 21% and the percentage of wrongfully included among the beneficiaries is as high as 64% (see Table 4 and Table 5 pp. 12).

Adding information on whether or not the household receives income from a verifiable source to the PMT models does not improve the performance of the models hence is considered unnecessary. More specific information on income is difficult to verify, thus regarded as unreliable. When additional filters are applied to the PMT models, targeting performance does not notably improve. The only filter that can be considered as an enhancement to the PMT formulas is whether or not a household owns a secondary dwelling. It contributes to targeting efficiency while only marginally decreasing its effectiveness. Applying this filter would exclude people belonging to the very top of the consumption distribution, while only slightly reducing the program size.

The proposed rural/urban PMT models capture a set of easy-to-observe characteristics associated with household welfare, taking into account the differences in lifestyle between the two entities and between rural and urban areas within each entity. As illustrated in the tables below, doing so makes them by far the most accurate method for targeting those in need.

The model based solely on electricity expenditure also shows significant accuracy, considering its simplicity. The estimations indicate that a program with a size of 10% of the total population would cover 27% of the first quintile in both entities, bringing the inclusion error down to approximately 46% in FBiH and 49% in RS. The advantage of this method is that, although it is not as precise as the PMT models, it allows for an easy eligibility test. The applicants would only have to show their electricity bill in order to be considered for receiving the benefits.

The analysis indicates that adding filters to the existing means-test cannot improve the targeting sufficiently. While lowering the inclusion error, the filters are increasing the error of exclusion, which is quite high already in the current setting of the programs (approximately 90%).

Figure 1 and Figure 2 illustrate clearly the trade-off between the error of inclusion and exclusion. What is also demonstrated by the figures below is that, logically, reducing the size of the program leads to a decrease of inclusion error and an increase in exclusion error. The only options that may be used to improve the targeting of current means-tested benefits, albeit slightly, are considering households that have an internet connection or households that own a car not eligible for the benefits.

In addition, introducing different categories for targeting does not result in 'pro-poor' distribution of benefits due to lacking or very weak correlation between the categories and the level of consumption. Hence, the inclusion and exclusion error estimated for the different targeting categories are considerably large (see Figure 3 and Figure 4).

Even though the simulated outcomes of the proposed targeting methods tend to be overestimated as all simulations in this analysis assume perfect implementation, the results suggest that applying in practice the rural/urban PMT model or the energy-expenditure model would considerably improve the targeting of non-contributory civilian benefits in Bosnia and Herzegovina. Consequently, this more effective targeting of the programs is expected to lead to gains in poverty reduction and financial sustainability of social assistance in the country.

Table 29. Overview of the targeting performance of simulated models, FBiH

<i>Simulated models</i>	<i>Size of the program (in %)</i>	<i>Error of exclusion (in %)</i>	<i>Error of inclusion (in %)</i>
<i>PMT models</i>			
2007 PMT model (with 2011 data), different program sizes	10	66.7	33.5
	15	53.6	38.4
	20	43.1	43.3
Newly calibrated PMT model based on the total population (with 2011 data), different program sizes	10	62.4	24.7
	15	50.0	33.3
	20	40.3	40.3
Newly calibrated PMT model based on rural/urban areas separately (with 2011 data), different program sizes	10	62.1	24.8
	15	48.7	32.0
	20	38.4	38.7
Newly calibrated PMT model with income based on rural/urban areas separately (with 2011 data), different program sizes	10	62.3	25.0
	15	48.0	31.1
	20	38.2	38.5
<i>Utility expenditure model</i>			
Targeting based on electricity expenditure, different program sizes	10	72.6	45.2
	15	63.3	53.5
	20	55.7	55.6

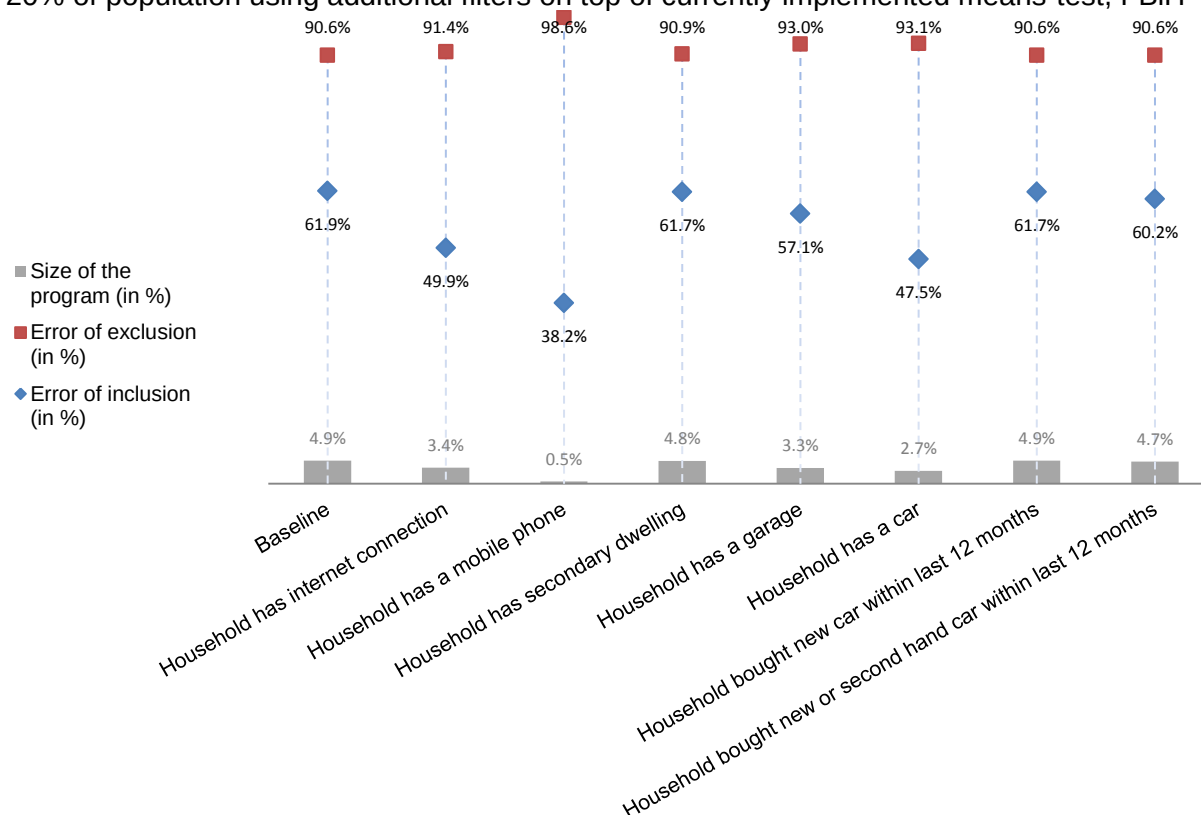
Source: Authors' calculations based on HBS 2011. *Notes:* Consumption quintiles that are used for the calculation of the errors of exclusion and inclusion respectively are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. Individual-level sampling weights are applied.

Table 30. Overview of the targeting performance of simulated models, RS

<i>Simulated models</i>	<i>Size of the program (in %)</i>	<i>Error of exclusion (in %)</i>	<i>Error of inclusion (in %)</i>
<i>PMT models</i>			
2007 PMT model (with 2011 data), different program sizes	10	68.8	39.6
	15	58.1	45.5
	20	48.8	49.9
Newly calibrated PMT model based on the total population (with 2011 data), different program sizes	10	66.7	34.6
	15	54.3	40.4
	20	44.8	46.0
Newly calibrated PMT model based on rural/urban areas separately (with 2011 data), different program sizes	10	61.9	25.2
	15	52.2	37.7
	20	43.5	44.9
<i>Utility expenditures model</i>			
Targeting based on electricity expenditure, different program sizes	10	70.2	44.9
	15	61.4	50.0
	20	49.3	54.9

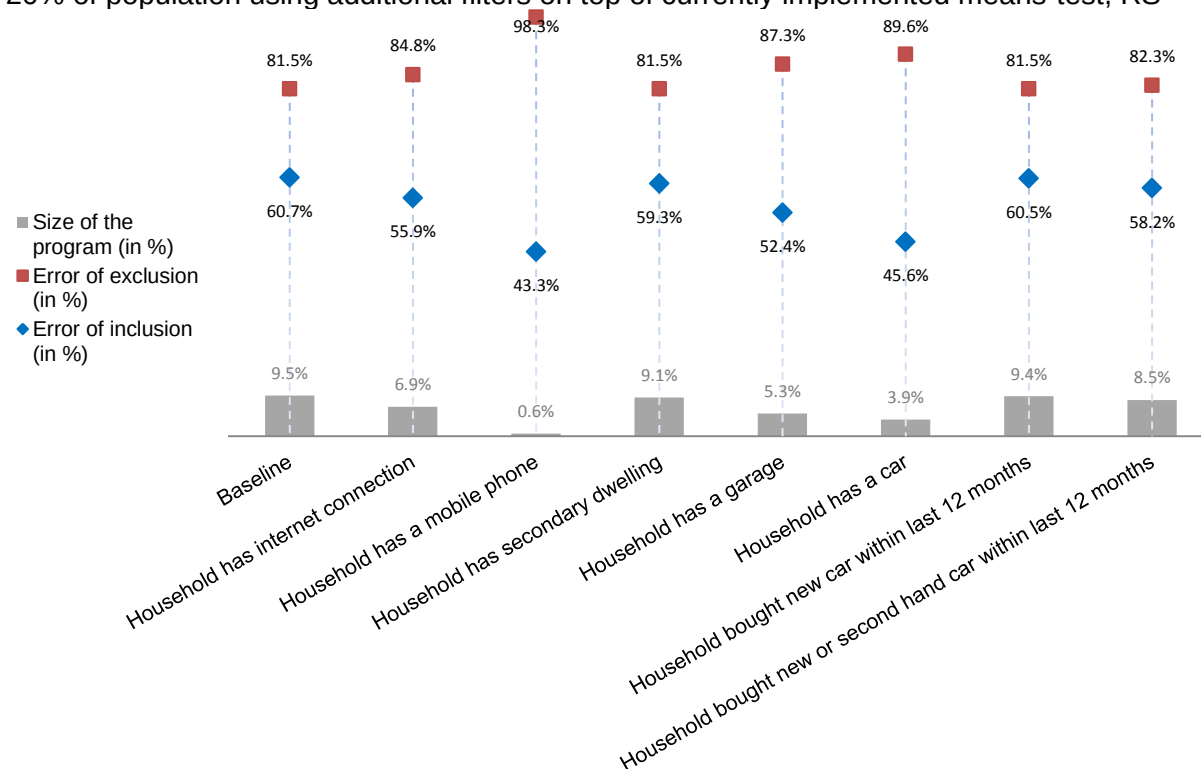
Source: Authors' calculations based on HBS 2011. *Notes:* Consumption quintiles that are used for the calculation of the errors of exclusion and inclusion respectively are based on monthly per adult equivalent consumption (OECD 1 scale) before non-contributory civilian cash transfers, assuming a marginal propensity to increase consumption by 33%. Individual-level sampling weights are applied.

Figure 1. The trade-off between exclusion and inclusion error when targeting the poorest 20% of population using additional filters on top of currently implemented means-test, FBiH



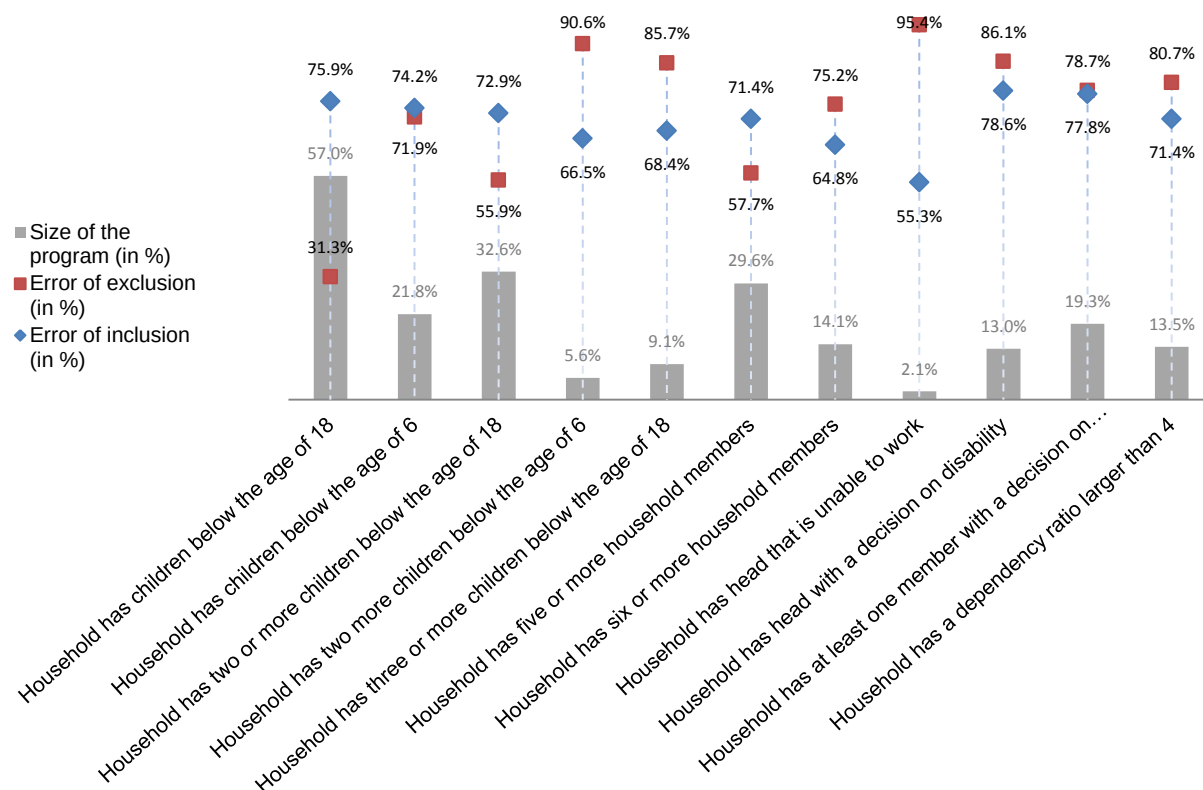
Source: Author's calculations based on HBS 2011. Notes: Figure corresponds to table 15 of chapter 3.

Figure 2. The trade-off between exclusion and inclusion error when targeting the poorest 20% of population using additional filters on top of currently implemented means-test, RS



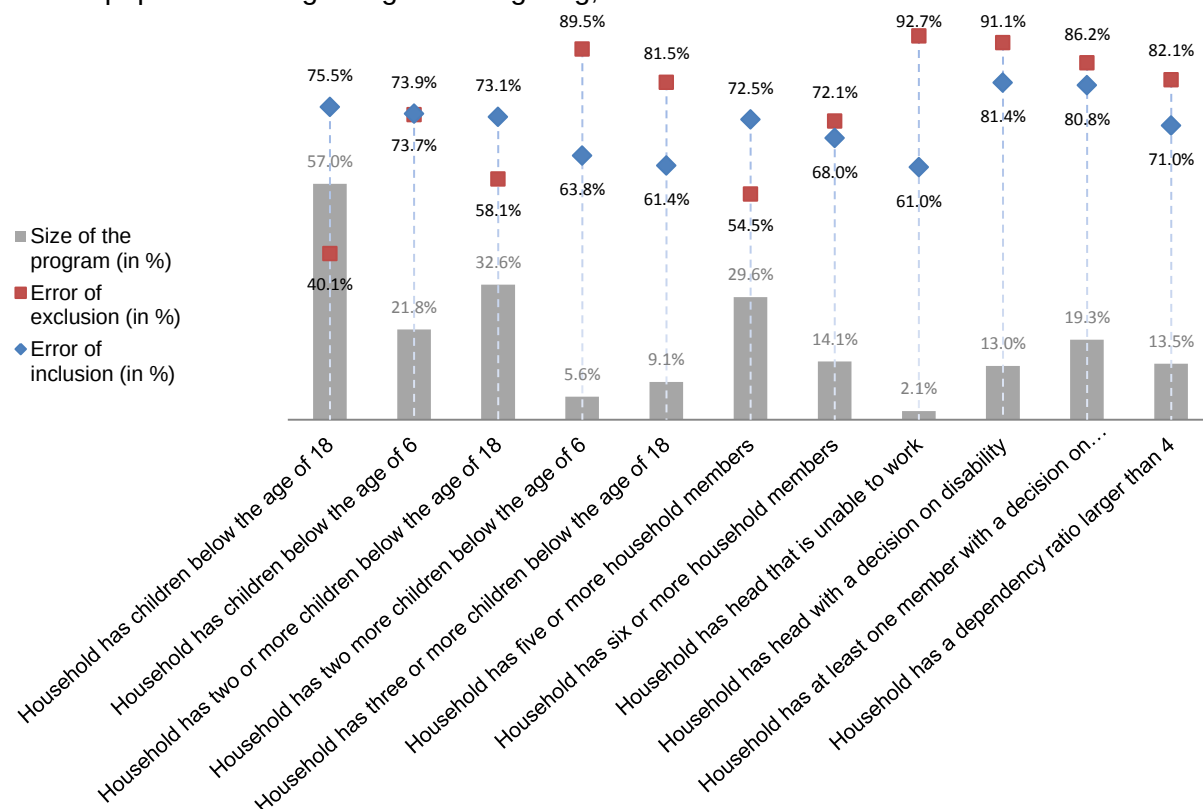
Source: Author's calculations based on HBS 2011. Notes: Figure corresponds to table 16 of chapter 3.

Figure 3. The trade-off between exclusion and inclusion error when targeting the poorest 20% of population using categorical targeting, FBiH



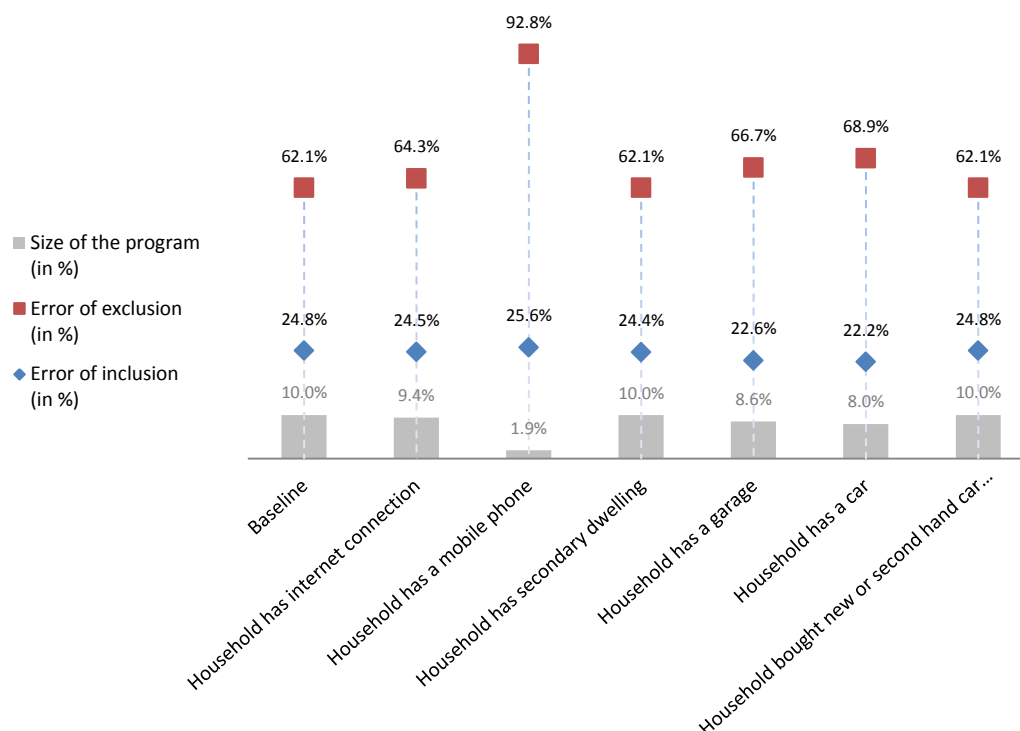
Source: Author's calculations based on HBS 2011. Notes: Figure corresponds to table 17 of chapter 4.

Figure 4. The trade-off between exclusion and inclusion error when targeting the poorest 20% of population using categorical targeting, RS



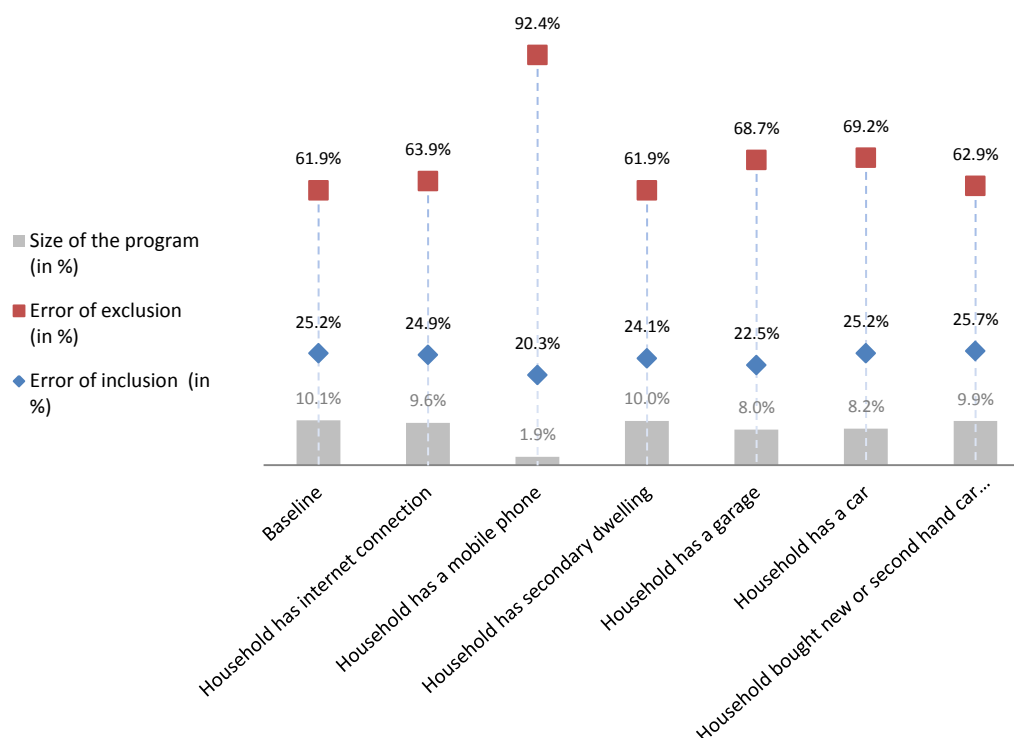
Source: Author's calculations based on HBS 2011. Notes: Figure corresponds to table 18 of chapter 4.

Figure 5. Inclusion and exclusion error when applying filters in addition to the urban/rural PMT model, baseline program size: 10%, FBiH



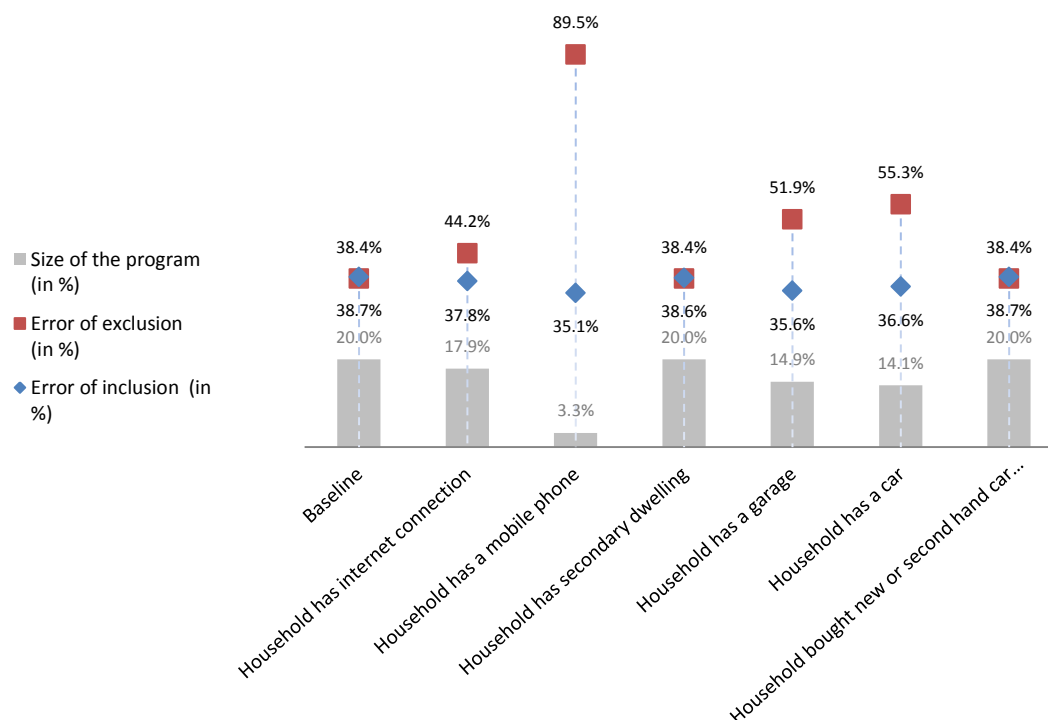
Source: Author's calculations based on HBS 2011. Notes: Figure corresponds to table 20 of chapter 5.

Figure 6. Inclusion and exclusion error when applying filters in addition to the urban/rural PMT model, baseline program size: 10%, RS



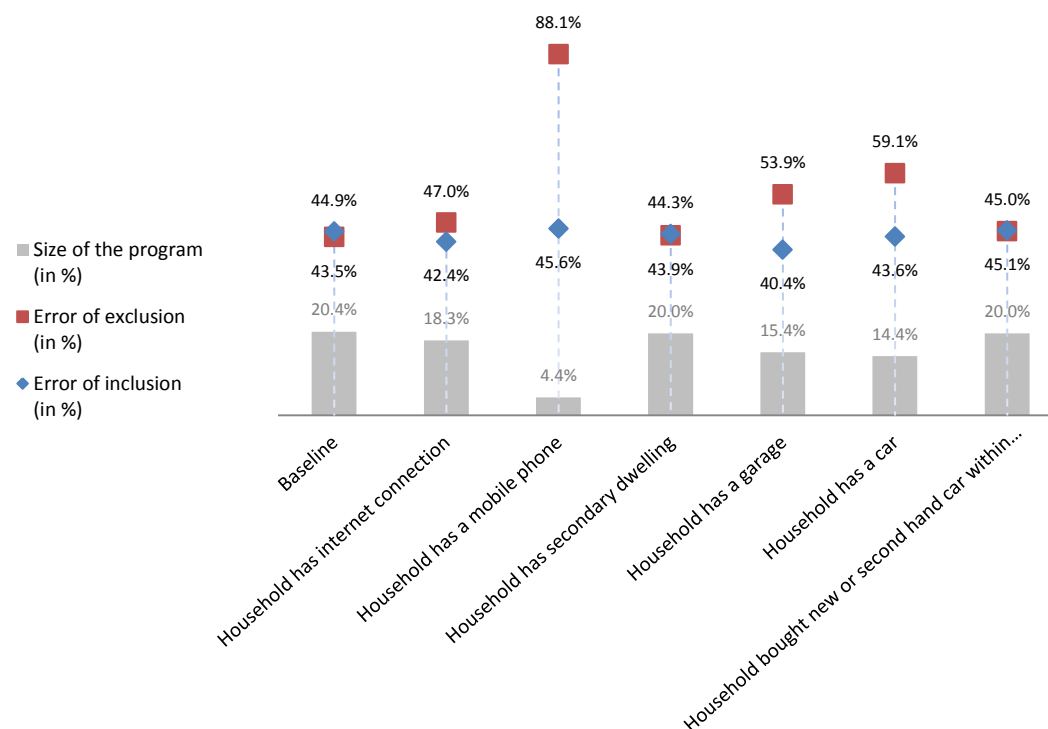
Source: Author's calculations based on HBS 2011. Notes: Figure corresponds to table 23 of chapter 5.

Figure 7. Inclusion and exclusion error when applying filters in addition to the urban/rural PMT model, baseline program size: 20%, FBiH



Source: Author's calculations based on HBS 2011. Notes: Figure corresponds to table 22 of chapter 5.

Figure 8. Inclusion and exclusion error when applying filters in addition to the urban/rural PMT model, baseline program size: 20%, RS



Source: Author's calculations based on HBS 2011. Notes: Figure corresponds to table 25 of chapter 5.

7 *Conclusions, policy recommendation*

Social safety nets serve to alleviate poverty through redistribution and to ensure basic living standards for individuals. In their minimum function, they aim to alleviate extreme poverty through redistribution and to ensure basic living standards for individuals (MGSoG, 2013). The accurate targeting of benefits towards those most in need is essential when aiming to fulfill this objective in a financially sustainable manner. Considering that Bosnia Herzegovina is one of the highest spenders on social assistance in the Europe and Central Asia region, but simultaneously manages to reach only a small share of the poor and its benefits are generally regressive, current targeting performance of its social transfers is far from optimal. The aim of this report was to develop alternative targeting mechanisms for non-contributory civilian benefits in Bosnia and Herzegovina in order to ultimately improve the targeting performance, poverty reduction impact, and distributional impact of these social transfers.

Since income is difficult to verify in Bosnia and Herzegovina due to a high degree of informality, simple means-testing (MT) would be an inappropriate targeting mechanism in the country. Instead, several other mechanisms were explored that make use of easily observable household characteristics to proxy household income, including proxy means-testing, additional filters for existing means-tests, categorical targeting and other/hybrid forms of targeting. Based on existing statistics on poverty incidence in Bosnia and Herzegovina, the objective was set to maximize welfare impacts for the poorest 20% of the population. In addition to reaching a larger share of this group, an improved targeting performance should ideally result in efficiency gains, meaning that the number of households that are wrongfully included to receive non-contributory civilian benefits should also decrease.

7.1 *Striking a balance between effectiveness and efficiency gains*

The above-presented methods for targeting non-contributory means-tested cash transfers in Bosnia and Herzegovina indicate that the newly calibrated PMT model yields the best targeting performance in terms of identifying the poorest 20% of the population. When basing the model on the rural and urban population separately, targeting performance further improves, which is due to the fact that separate consumption models for urban and rural areas more accurately capture varying living conditions in urban and rural parts of the entities. This is particularly the case in RS. Aside from its accurate targeting performance, PMT has the advantages that it captures multidimensional poverty instead of focusing on income poverty.

In spite of these advantages, PMT has a number of disadvantages. Aside from the fact that its eligibility criteria are difficult to communicate as they may seem arbitrary, and should be adapted regularly due to their fraud sensitivity, as well as the fact that PMT is rigid in the sense that it does not capture economic changes quickly, its most important disadvantage is its administrative burden. In particular, the higher degree of precision of PMT models generally demands a more sophisticated implementation process and respectively involves higher administrative costs.

An alternative to the PMT model for RS, which would be far less administratively demanding, would be the model based on electricity expenditures. In spite of its simple design, it yields a relatively accurate targeting performance.

7.2 Implementation of new schemes

Implementation problems often occur due to inconsistent key parameters of programs and weak registry systems. Results may be error, fraud, and duplicate benefits within and across households. In order to ensure that the implementation of a social assistance scheme based on the proposed PMT targeting mechanism achieves outcomes close to those simulated in this report, it is important that benefits administration and beneficiary registry systems are well-organized (WB, 2009, p.36).

7.3 Next steps

Based on this report alone, no decisions can be taken on the precise design of a new targeting method for the allocation of non-contributory benefits in Bosnia and Herzegovina. As stated in the Work Schedule, the selection of the final models, which will be used for the dry-run and further analyses/simulations, will be taken following discussions with key stakeholders and focus group discussions in FBiH and RS. Once the most promising models are selected, special attention will be paid to the analysis of benefit adequacy, which will be presented in the next report.

In order for a social assistance programs to be effective, in addition to targeting the poor, the adequacy of benefits is of importance, meaning that benefit levels should be sufficiently high to have an impact on the living standards of eligible households. In this respect, it is necessary to analyze the impact of different potential programs and benefit levels on poverty reduction. As stated in the ToR and Work Schedule, the development of new targeting methods is a process and this report is the second step in that direction (the first step was the document "Targeting of non-contributory cash transfers - Theory and evidence from selected countries").

References

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Appendix

Table A 1. Replication of 2007 proxy means testing model with 2011 data

Dependent variable	FBIH		RS	
	<i>Log of monthly per capita consumption after transfers</i>	<i>Log of monthly per adult equivalent consumption (OECD 1) before transfers</i>	<i>Log of monthly per capita consumption after transfers</i>	<i>Log of monthly per adult equivalent consumption (OECD1) before transfers</i>
<i>Household characteristics</i>				
Number of household Members	-0.252*** (0.01)	-0.227*** (0.01)	-0.203*** (0.01)	-0.168*** (0.01)
Number of children below 14	0.061*** (0.02)	0.107*** (0.02)	0.015 (0.02)	0.048*** (0.02)
Number of children 14-24	0.072*** (0.02)	0.065*** (0.01)	0.027* (0.02)	0.012 (0.02)
Head of household: female	0.039* (0.02)	0.016 (0.02)		
Head of household: postgraduate education	0.156*** (0.03)	0.151*** (0.03)	0.096** (0.04)	0.096** (0.04)
Head of household: employed (full- or part-time)			-0.041 (0.03)	-0.016 (0.03)
Number of employed (full- (full- or part-time)	0.095*** (0.01)	0.096*** (0.01)	0.048*** (0.01)	0.045*** (0.01)
<i>Housing characteristics (dummy variables)</i>				
Dwelling has sewage system	-0.127*** (0.02)	-0.122*** (0.02)		
Dwelling has central heating	-0.200*** (0.03)	-0.204*** (0.03)		
Dwelling has heating	0.091*** (0.02)	0.089*** (0.02)	0.040 (0.10)	0.043 (0.09)
Dwelling uses single-equipment heating			-0.108 (0.10)	-0.113 (0.09)
Dwelling has indoor toilet	0.096 (0.08)	0.086 (0.08)		
Dwelling has balcony	0.057*** (0.02)	0.055*** (0.02)	0.033 (0.02)	0.032 (0.02)
Dwelling is multifamily residential building			-0.144*** (0.03)	-0.141*** (0.03)
Age of the dwelling	0.001* (0.00)	0.001 (0.00)		
Secondary home	0.297*** (0.04)	0.289*** (0.04)	0.395*** (0.06)	0.382*** (0.06)
<i>Ownership of durables (dummy variables)</i>				
Phone	0.123***	0.124***	0.084***	0.083***

	(0.02)	(0.02)	(0.02)	(0.02)
Washer	0.096** (0.04)	0.111** (0.04)	0.148*** (0.04)	0.165*** (0.04)
Sewing machine	0.111*** (0.02)	0.106*** (0.02)		
PC			0.083*** (0.03)	0.093*** (0.02)
Car	0.258*** (0.02)	0.270*** (0.02)	0.215*** (0.02)	0.225*** (0.02)
Electric or gas cooker			0.065* (0.04)	0.069* (0.04)
Firewood or coal stove	-0.102*** (0.03)	-0.102*** (0.03)		
Dishwasher	0.200*** (0.02)	0.203*** (0.02)	0.100*** (0.03)	0.085*** (0.03)
DVD player/video recorder	0.061*** (0.02)	0.076*** (0.02)		
HIFI system			0.029 (0.02)	0.035* (0.02)
Mobile phone	0.087*** (0.03)	0.129*** (0.03)	0.062** (0.03)	0.098*** (0.03)
<i>Affordability of selected expenses</i>				
Log of utility expenses ¹	0.260*** (0.02)	0.263*** (0.02)	0.185*** (0.02)	0.192*** (0.02)
<i>Income source (dummy variable)</i>				
At least one household member receives a pension	0.113*** (0.02)	0.092*** (0.02)		
Constant	5.094*** (0.11)	5.184*** (0.11)	5.492*** (0.12)	5.504*** (0.12)
Observations	4596	4595	2417	2360
R-squared	0.509	0.487	0.447	0.412

Source: Authors' calculations based on HBS 2011.

Notes: The dependent variable is the natural logarithm of monthly per capita household consumption after transfers/the natural logarithm of monthly per adult equivalent consumption (OECD 1 scale) before the transfer of non-contributory civilian benefits, assuming a marginal propensity to increase consumption by 33%. Individual level sampling weights are applied. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

¹ Utility expenses comprise expenditure on electricity, gas from city network, central heating, water and sewage system, and waste removal.

² Pension incomes include old-age pension, family survivor pension, work disability pension, pension from abroad, and veterans' pension.

Table A 2. Consumption models based on complete population, rural and urban areas, FBiH

Dependent variable	Complete population: Log of monthly per capita consumption before transfers	Rural area: Log of monthly per adult equivalent consumption (OECD 1) before transfers	Urban area: Log of monthly per adult equivalent consumption (OECD 1) before transfers
<i>Household characteristics</i>			
Log of household size	-0.578*** (0.03)	-0.560*** (0.04)	-0.606*** (0.05)
Number of children below 18			0.039*** (0.01)
Number of children below 14	0.059*** (0.01)		
Number of children below 6		0.031* (0.02)	
Number of children 6-13		0.072*** (0.01)	
Age of household head	-0.001* (0.00)	-0.002** (0.00)	
Household head: Secondary education completed	0.097*** (0.02)	0.088*** (0.02)	0.138*** (0.03)
Household head: Higher degree of education	0.153*** (0.03)	0.144*** (0.03)	0.195*** (0.04)
Household head: Employed (permanent contract)	0.089*** (0.02)	0.079*** (0.02)	0.075*** (0.03)
Household head: Pensioner (age-related or premature)	0.080*** (0.02)	0.095*** (0.02)	
Number of employed household members (full or part time)	0.061*** (0.01)	0.063*** (0.01)	0.049*** (0.02)
<i>Housing characteristics</i>			
Dwelling is located in urban area	-0.043** (0.02)		
Dwelling's main source of water is piped inside the dwelling		0.108** (0.05)	
Dwelling mainly uses water from an individual source (well, standing pipe...)		0.281*** (0.07)	
Dwelling has indoor flushing toilet for sole use	0.045*** (0.02)		0.088*** (0.02)
Dwelling mainly uses coal as a fuel for Heating		-0.138*** (0.05)	
Dwelling has a gas-fired boiler	0.160*** (0.04)		0.176*** (0.04)
Dwelling has heating		0.070*** (0.03)	
Dwelling is an individual house or part of	-0.050**		-0.066**

house	(0.02)		(0.03)
Dwelling has a garage	0.085 ^{***} (0.02)	0.077 ^{***} (0.02)	0.082 ^{***} (0.03)
Dwelling has an attic	-0.036 ^{**} (0.02)	-0.042 ^{**} (0.02)	
Dwelling has a telephone line			0.080 ^{***} (0.03)
Secondary dwelling	0.209 ^{***} (0.04)	0.294 ^{***} (0.07)	0.167 ^{***} (0.04)
Age of the dwelling			0.001 [*] (0.00)
Number of persons per room	-0.171 ^{***} (0.02)	-0.157 ^{***} (0.03)	-0.157 ^{***} (0.05)
Dwelling's legal status: household is (joint) owner (also if credit not fully paid)		0.087 ^{**} (0.04)	

Ownership of durables

Dishwasher	0.163 ^{***} (0.02)	0.181 ^{***} (0.02)	0.146 ^{***} (0.03)
Washing machine		0.080 [*] (0.05)	
Furnace/stove, heater, boiler, hood	0.113 ^{***} (0.04)	0.127 ^{**} (0.05)	
Air-conditioning	0.062 ^{***} (0.02)		0.089 ^{***} (0.03)
Sewing or knitting machine	0.073 ^{***} (0.02)	0.129 ^{***} (0.03)	
Car, bought within last 12 months	0.515 ^{***} (0.04)	0.502 ^{***} (0.05)	0.609 ^{***} (0.06)
Car, not bought at least 12 months ago	0.231 ^{***} (0.02)	0.232 ^{***} (0.02)	0.235 ^{***} (0.03)
Motorbike, scooter, moped	0.114 ^{**} (0.04)	0.155 ^{***} (0.04)	
Phone	0.084 ^{***} (0.02)	0.081 ^{**} (0.02)	
Mobile phone	0.154 ^{***} (0.02)	0.140 ^{***} (0.03)	0.177 ^{***} (0.03)
Fax	0.132 ^{**} (0.05)		
Satellite dish	0.070 ^{***} (0.02)	0.078 ^{***} (0.02)	
DVD player or video recorder	0.059 ^{***} (0.02)	0.078 ^{***} (0.03)	
Internet connection	0.041 ^{**} (0.02)		0.076 ^{***} (0.02)
Cable TV connection	0.039 ^{**} (0.02)	0.051 ^{**} (0.02)	

Connection packet	0.096 ^{***} (0.03)	0.063 [*] (0.04)	0.124 ^{***} (0.04)
<i>Affordability of selected expenses</i>			
Log of utility expenses ¹	0.199 ^{***} (0.02)	0.205 ^{***} (0.02)	0.190 ^{***} (0.03)
<i>Income source (dummy variable)</i>			
At least one household member received a veteran's benefit ²	0.090 ^{***} (0.03)	0.108 ^{***} (0.03)	
Constant	5.617 ^{***} (0.09)	5.425 ^{***} (0.13)	5.702 ^{***} (0.12)
Number of observations	4604	2844	1743
R-squared	0.537	0.498	0.537

Source: Authors' calculations based on HBS 2011.

Notes: The dependent variable is the natural logarithm of monthly per capita household consumption after transfers/the natural logarithm of monthly per adult equivalent consumption (OECD 1 scale) before the transfer of non-contributory civilian benefits, assuming a marginal propensity to increase consumption by 33%. Individual level sampling weights are applied. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

¹ Utility expenses comprise expenditure on electricity, gas from city network, central heating, water and sewage system, and waste removal.

² Veteran's benefits include personal disability benefits (military PWDs), long-term care and support benefits, survivor's dependent benefits, veteran's allowances (FBiH and RS) and demobilized soldier's benefits (FBiH).

Table A 3. Consumption models based on complete population, rural and urban areas, RS

Dependent variable	Complete population: Log of monthly per capita consumption before transfers	Rural area: Log of monthly per adult equivalent consumption (OECD 1) before transfers	Urban area: Log of monthly per adult equivalent consumption (OECD 1) before transfers
<i>Household characteristics</i>			
Log of household size	-0.501 ^{***} (0.03)	-0.446 ^{***} (0.04)	-0.470 ^{***} (0.05)
Number of children below 14	0.042 ^{***} (0.01)		0.057 ^{***} (0.02)
Number of children 14-17		0.044 [*] (0.02)	
Number of elderly 65+		-0.045 ^{***} (0.02)	
Age of household head	-0.002 [*] (0.00)		
Household head: Completed secondary education	0.079 ^{***} (0.02)		0.213 ^{***} (0.04)
Household head: Completed higher degree of education	0.142 ^{***} (0.03)		0.279 ^{***} (0.04)
Household head: Employed (permanent contract)	0.083 ^{***} (0.02)	0.068 ^{**} (0.03)	0.086 ^{**} (0.04)
Household head: Pensioner (age-related or premature)	0.090 ^{***} (0.03)	0.089 ^{***} (0.03)	0.081 ^{**} (0.03)
Household head: Married or living or living together / informal marriage	0.060 ^{**} (0.02)	0.072 ^{**} (0.03)	
Number of employed household members (full or part time)	0.040 ^{***} (0.01)		0.077 ^{***} (0.02)
Dependency ratio: household members per employed	-0.011 [*] (0.01)		-0.020 [*] (0.01)
<i>Housing characteristics</i>			
Dwelling is located in urban area	-0.062 ^{**} (0.02)		
Dwellings is a multifamily type dwelling / among <10 dwellings in the building	0.084 [*] (0.05)		0.087 [*] (0.05)
Dwelling has heating	0.134 ^{***} (0.03)	0.253 ^{***} (0.04)	
Dwelling has a garden	0.066 ^{***} (0.02)	0.104 ^{***} (0.04)	
Dwelling has an attic	0.052 ^{***} (0.02)	0.071 ^{***} (0.03)	
Dwelling has a garage		0.050 [*] (0.03)	
Telephone line		0.088 ^{***} (0.03)	

Secondary dwelling	0.337 ^{***} (0.05)		0.346 ^{***} (0.07)
Age of the dwelling			-0.002 ^{**} (0.00)
Number of persons per room	-0.130 ^{***} (0.03)	-0.106 ^{***} (0.03)	-0.173 ^{***} (0.04)
<i>Ownership of durables</i>			
Washing machine	0.102 ^{**} (0.04)	0.105 ^{**} (0.04)	
Dishwasher			0.069 ^{**} (0.03)
Furnace/stove, heater, boiler, hood		0.089 ^{**} (0.04)	
Sewing or knitting machine	0.081 ^{***} (0.02)	0.117 ^{***} (0.03)	
Internet connection	0.052 ^{**} (0.02)		
Cleaning equipment (vacuum cleaner, carpet washing machine)	0.094 ^{**} (0.04)		
Car, bought within last 12 months	0.452 ^{***} (0.04)	0.403 ^{***} (0.05)	0.566 ^{***} (0.06)
Car, bought at least 12 months ago	0.196 ^{***} (0.02)	0.190 ^{***} (0.03)	0.221 ^{***} (0.03)
Motorbike, scooter, moped			0.100 [*] (0.05)
Bicycle			0.051 [*] (0.03)
Phone	0.052 ^{**} (0.02)		
Mobile phone	0.136 ^{***} (0.03)	0.127 ^{***} (0.03)	0.146 ^{***} (0.05)
TV connection			0.055 [*] (0.03)
Connection packet	0.101 ^{***} (0.04)	0.222 ^{***} (0.06)	
Satellite dish	0.116 ^{***} (0.03)	0.130 ^{***} (0.04)	0.096 ^{**} (0.05)
DVD player or video recorder	0.056 ^{***} (0.02)	0.065 ^{**} (0.03)	
<i>Affordability of selected expenses</i>			
Log of utility expenses ¹	0.212 ^{***} (0.02)	0.214 ^{***} (0.03)	0.179 ^{***} (0.03)
Constant	5.359 ^{***} (0.10)	5.189 ^{***} (0.10)	5.672 ^{***} (0.13)

R-squared	0.475	0.459	0.510
Number of observations	2371	1458	913

Source: Authors' calculations based on HBS 2011.

Notes: The dependent variable is the natural logarithm of monthly per capita household consumption after transfers/the natural logarithm of monthly per adult equivalent consumption (OECD 1 scale) before the transfer of non-contributory civilian benefits, assuming a marginal propensity to increase consumption by 33%. Individual level sampling weights are applied. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

¹ Utility expenses comprise expenditure on electricity, gas from city network, central heating, water and sewage system, and waste removal.

² Veteran's benefits include personal disability benefits (military PWDs), long-term care and support benefits, survivor's dependent benefits, veteran's allowances (FBiH and RS) and demobilized soldier's benefits (FBiH).

Table A 4. PMT including income, rural areas, FBiH

Dependent variable	<i>Rural areas: Log of monthly per adult equivalent consumption (OECD 1) before transfers</i>
<i>Household characteristics</i>	
Log of household size	-0.539 ^{***} (0.04)
Number of children 6-13	0.066 ^{***} (0.02)
Age of household head	-0.003 ^{***} (0.00)
Household head: completed secondary education	0.077 ^{***} (0.02)
Household head: completed a higher degree of education	0.135 ^{***} (0.03)
Household head: employed (permanent contract)	0.064 ^{**} (0.02)
Household head: Is a pensioner (age-related or premature)	0.096 ^{***} (0.02)
Number of employed household members (full or part time)	0.052 ^{***} (0.01)
<i>Housing characteristics</i>	
Dwelling mainly uses water from an individual source (well, standing pipe...)	0.275 ^{***} (0.07)
Dwelling's main source of water is piped inside the dwelling	0.104 ^{**} (0.05)
Dwelling has heating	0.079 ^{***} (0.03)
Fuel mainly used for heating: coal	-0.136 ^{***} (0.05)
Dwelling has a garage	0.077 ^{***} (0.02)
Dwelling has an attic	-0.045 ^{**} (0.02)
Dwelling's legal status: household is (joint) owner (also if credit not fully paid)	0.088 ^{**} (0.04)
Persons per room	-0.159 ^{***} (0.03)
<i>Ownership of durables</i>	
Sewing or knitting machine	0.129 ^{***} (0.03)
Dishwasher	0.186 ^{***} (0.02)
Household owns furnace/stove, heater, boiler, hood	0.155 ^{***}

	(0.05)
Household uses another apartment, house, country house in addition to main dwell	0.308*** (0.08)
Household owns car, bought within last 12 months	0.510*** (0.05)
Household owns car, bought at least 12 months ago	0.234*** (0.02)
Household owns a motorbike, scooter, moped	0.164*** (0.04)
Household owns a phone (cf. module 6)	0.082*** (0.02)
Household owns a mobile phone	0.136*** (0.03)
Household has cable TV connection	0.047** (0.02)
Household owns a satellite dish	0.078*** (0.02)
Household owns a DVD player or video recorder	0.079*** (0.03)
<i>Affordability of selected expenses</i>	
Log of utility expenses ¹	0.208*** (0.02)
<i>Income source (dummy variable)</i>	
At least one household member receives a veteran's benefit ²	0.105*** (0.03)
At least one household member received income from a formal local or foreign employer	0.047*** (0.02)
Constant	5.470*** (0.13)
R-squared	0.499
Number of observations	2833

Source: Authors' calculations based on HBS 2011.

Notes: The dependent variable is the natural logarithm of monthly per capita household consumption after transfers/the natural logarithm of monthly per adult equivalent consumption (OECD 1 scale) before the transfer of non-contributory civilian benefits, assuming a marginal propensity to increase consumption by 33%. Individual level sampling weights are applied. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

¹ Utility expenses comprise expenditure on electricity, gas from city network, central heating, water and sewage system, and waste removal.

² Veteran's benefits include personal disability benefits (military PWDs), long-term care and support benefits, survivor's dependent benefits, veteran's allowances (FBIH and RS) and demobilized soldier's benefits (FBIH).

Table A 5. Coverage and distribution for targeting based on electricity water and sewage expenditure, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, FBiH

	I	II	III	IV	V	Total	
<i>Coverage</i>							<i>Error of exclusion</i>
Size of the program: 10%	26.1	12.3	6.8	3.1	1.8	10.0*	73.9
Size of the program: 15%	34.9	18.9	10.7	7.2	3.2	15.0*	65.1
Size of the program: 20%	44.1	25.6	16.4	9.3	4.6	20.0*	55.9
<i>Distribution</i>							<i>Error of inclusion</i>
Size of the program: 10%	52.2	24.5	13.6	6.2	3.5	100.0	47.8
Size of the program: 15%	46.5	25.3	14.3	9.6	4.3	100.0	53.5
Size of the program: 20%	44.1	25.6	16.4	9.3	4.6	100.0	55.9
<i>Source:</i> Authors' calculations based on HBS 2011. Notes: Quintiles are based on monthly per adult equivalent (OECD 1 scale) consumption before transfers of civilian benefits, assuming a marginal propensity to increase consumption by 33%. * Program sizes may deviate from 10, 15 or 20% due to using household-level data on which individual-level sampling weights are applied.							

Table A 6. Coverage and distribution for targeting based on electricity water and sewage expenditure, by quintiles of per adult equivalent consumption (OECD 1 scale) before transfers, RS

	I	II	III	IV	V	Total	
<i>Coverage (in %)</i>							<i>Error of exclusion</i>
Size of the program: 10%	26.8	14.0	5.3	3.7	1.0	10.2*	73.2
Size of the program: 15%	37.2	21.6	11.1	5.0	2.0	15.4*	62.8
Size of the program: 20%	45.0	27.1	15.9	8.4	5.0	20.3*	55.0
<i>Distribution (in %)</i>							<i>Error of inclusion</i>
Size of the program: 10%	52.5	27.6	10.5	7.3	2.0	100.0	47.5
Size of the program: 15%	48.2	28.2	14.4	6.6	2.5	100.0	51.8
Size of the program: 20%	44.2	26.8	15.7	8.3	4.9	100.0	55.8
<i>Source:</i> Authors' calculations based on HBS 2011. Notes: Quintiles are based on monthly per adult equivalent (OECD 1 scale) consumption before transfers of civilian benefits, assuming a marginal propensity to increase consumption by 33%. * Program sizes may deviate from 10, 15 or 20% due to using household-level data on which individual-level sampling weights are applied.							

Table A 7. List of all variables initially included for the estimation of the newly calibrated PMT models, total population as well as urban/rural, FBiH and RS

		FBiH			RS		
		Total	Urban	Rural	Total	Urban	Rural
	Type	pop.			pop.		
<i>Household characteristics</i>							
Age of household head	Dummy	•	•	•	•	•	•
Household head is male	Dummy	•	•	•	•	•	•
Household head is a permanent resident of Bosnia and Herzegovina	Dummy	•	•	•	•	•	•
Household head is living together in informal marriage	Dummy	•	•	•	•	•	•
Household head is widow(er)	Dummy	•	•	•	•	•	•
Household head completed secondary education	Dummy	•	•	•	•	•	•
Household head has a higher degree of education	Dummy	•	•	•	•	•	•
Household head is employed under a permanent contract	Dummy	•	•	•	•	•	•
Household head is employed under a temporary or other type of contract ¹	Dummy	•	•	•	•	•	•
Household head is unemployed	Dummy	•	•	•	•	•	•
Household head is a pensioner (age-related or premature)	Dummy	•	•	•	•	•	•
Household head has an official decision on disability from a commission/institute	Dummy	•		•	•	•	
Logarithm of household size		•	•	•	•	•	•
Number of children below the age of 6				•		•	•
Number of children in the age of 6-13				•		•	•
Number of children below the age of 14		•			•	•	
Number of children in the age of 14-17		•		•	•	•	
Number of children below the age of 18			•			•	•
Number of elderly 65+		•	•	•	•	•	•
Number of pensioners (age-related or premature)		•	•	•	•	•	•
Number of employed household members (full or part time)		•	•	•	•	•	•
Dependency ratio: household members per employed		•	•	•	•	•	•
<i>Housing characteristics</i>							
Dwelling is located in an urban area	Dummy	•			•		
Dwelling is an individual house or part of house	Dummy	•	•	•	•		•
Dwelling is part of a multifamily home located in a building with less than 10 dwellings	Dummy	•	•		•	•	•
Dwelling is located in a multifamily home located in a building with more than 10 dwellings	Dummy	•	•			•	•
Age of the dwelling		•	•	•	•	•	•
Number of persons per room		•	•	•	•	•	•
Dwelling has separate kitchen	Dummy	•	•	•	•	•	•
Dwelling's main source of water is piped inside the dwelling	Dummy			•		•	•
Dwelling mainly uses water from an individual source (well, standing pipe,...)	Dummy			•		•	•
Dwelling has a sewage system	Dummy		•			•	•
Dwelling has indoor bathroom with flushing toilet for joint use	Dummy	•				•	•
Dwelling has indoor bathroom with flushing toilet for sole use	Dummy	•		•		•	•

Dwelling has indoor flushing toilet for sole use	Dummy	•	•	•	•	•	•
Dwelling has a telephone line	Dummy	•	•	•	•		•
Dwelling has a garage	Dummy	•	•	•	•	•	•
Dwelling has a cellar, shed, boiler room, etc.	Dummy	•	•	•	•	•	•
Dwelling has an attic	Dummy	•	•	•	•	•	•
Dwelling has a balcony	Dummy	•	•	•	•	•	•
Dwelling has a garden	Dummy	•	•	•	•	•	•
Dwelling has heating	Dummy	•	•	•	•		•
Dwelling is heated by a single equipment apparatus	Dummy					•	
Dwelling is heated by a heating plant	Dummy					•	
Dwelling mainly uses coal as a fuel for heating	Dummy			•		•	•
Dwelling has hot water (faucet)	Dummy	•		•	•		
Dwelling has a gas-fired boiler	Dummy	•	•			•	•
Dwelling's legal status: household is (joint) owner (also if credit not fully paid)	Dummy	•	•	•	•	•	•
Dwelling's legal status: rented or sublet	Dummy	•	•		•	•	•
Household uses another apartment, house, country house in addition to main dwelling	Dummy	•	•	•	•	•	•
<i>Ownership of durables</i>							
Household owns electric/gas cooker	Dummy	•		•	•		
Household owns firewood or coal stove	Dummy	•	•	•	•	•	•
Household owns dishwasher	Dummy	•	•	•	•	•	•
Household owns clothes washing machine	Dummy	•	•	•	•	•	•
Household owns cleaning equipment (vacuum cleaner, carpet washing machine)	Dummy	•		•	•	•	
Household owns furnace/stove, heater, boiler, hood	Dummy	•	•	•	•		•
Household owns air conditioner	Dummy	•	•	•	•	•	•
Household owns a sewing or knitting machine	Dummy	•	•	•	•	•	•
Household owns car, bought within last 12 months	Dummy	•	•	•	•	•	•
Household owns car, not bought within last 12 months	Dummy	•	•	•	•	•	•
Household owns a bicycle	Dummy	•	•	•	•	•	•
Household owns a motorbike, scooter, moped	Dummy	•		•	•	•	
Household owns a phone (cf. module 6)	Dummy	•	•	•	•	•	•
Household owns a mobile phone	Dummy	•	•	•	•	•	•
Household owns a fax	Dummy	•	•			•	•
Household owns a satellite dish	Dummy	•	•	•	•	•	•
Household owns a DVD player or video recorder	Dummy	•	•	•	•	•	•
Household owns a HIFI system (CD and MP3 players, etc.)	Dummy	•	•	•	•	•	•
Household has internet connection	Dummy	•	•	•	•	•	•
Household has cable TV connection	Dummy	•	•	•	•	•	•
Household has a phone connection	Dummy	•	•	•	•	•	•
Household has a connection packet	Dummy	•	•	•	•	•	•
<i>Affordability of selected expenses</i>							
Log of utility expenses ²	Dummy	•	•	•	•	•	•
<i>Income source (dummy variable)</i>							

At least one household member received a pension during last month ³	Dummy	•	•	•	•	•	•
At least one household member received a veteran's benefit during last month ⁴	Dummy	•	•	•			•

Notes:

• Included in initial set of variables for stepwise estimation of the PMT models.

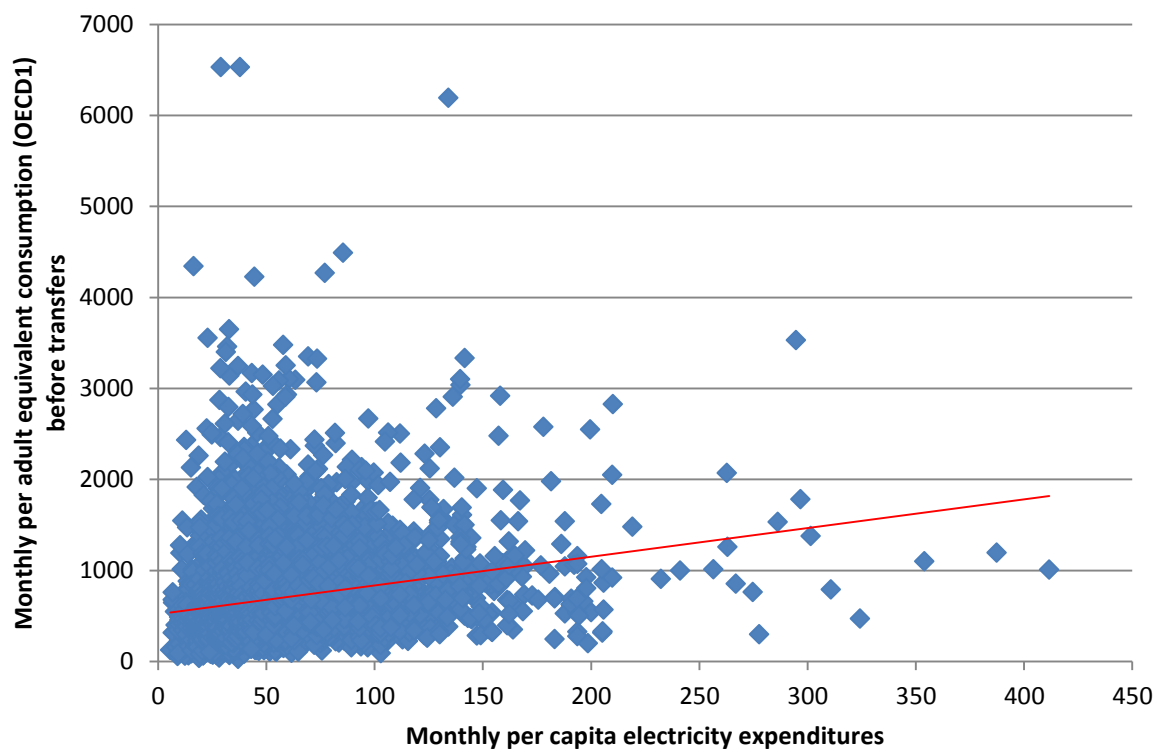
¹ Seasonal, negotiated, etc.

² Electricity, gas, central heating, water/sewage, waste.

³ Pension incomes include old-age pension, family survivor pension, work disability pension, pension from abroad, and veterans' pension.

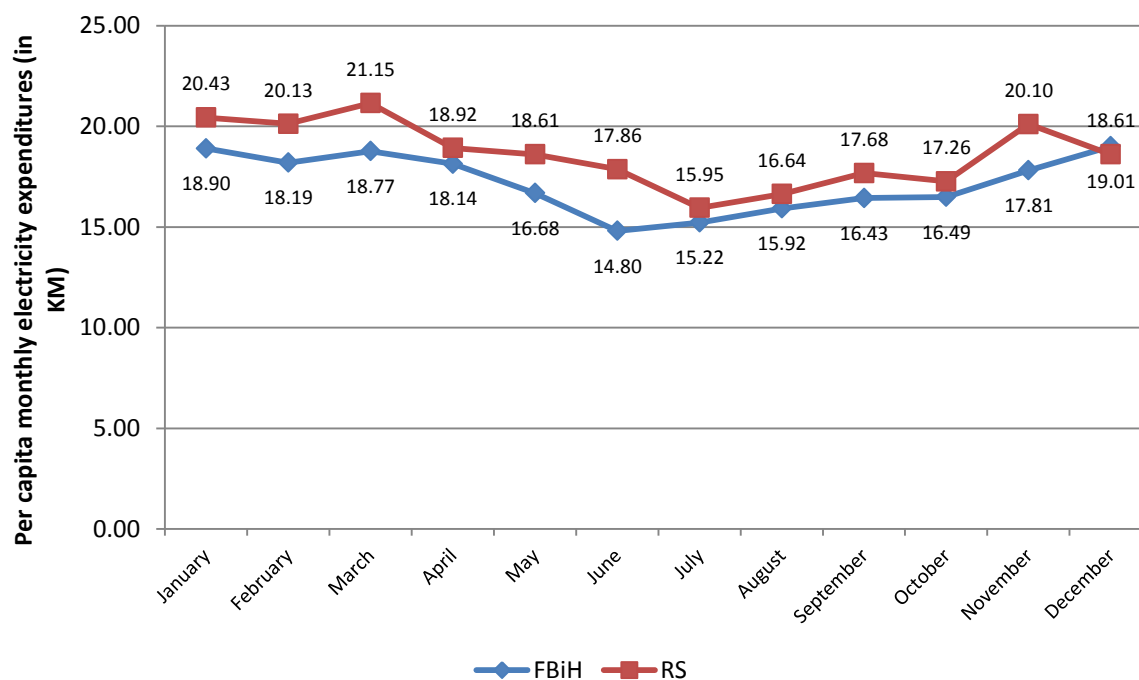
⁴ Veteran's benefits include personal disability benefits (military PWDs), long-term care and support benefits, survivor's dependent benefits, veteran's allowances (FBiH and RS) and demobilized soldier's benefits (FBiH).

Figure A 1. Relation between electricity expenditures and consumption, 2011, FBiH and RS



Source: Author's calculations based on HBS 2011. Note: Monthly per adult equivalent (OECD 1 scale) consumption before transfers of civilian benefits is based on the assumption of a marginal propensity to increase consumption by 33%.

Figure A 2. Monthly variation of reported electricity expenditures (in KM), FBiH and RS



Source: Author's calculations based on HBS 2011.