Evaluating the Performance of Means-Tested Benefits in Bulgaria

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Highlights

- The paper analyses the performance of three means-tested benefits in Bulgaria.
- We use individual and household level data and microsimulation techniques.
- We find high benefit non take-up, inclusion of non-entitled or non-poor recipients.
- The transfers have negligible effect on the poverty rates.
- Our results are robust to potential benefit underreporting in the household data.

Evaluating the Performance of Means-Tested Benefits in Bulgaria[1]

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Abstract

Using household survey data and microsimulation techniques, we analyse the performance of three means-tested benefits in Bulgaria. We find that the transfers reach a small proportion of households with incomes below a relative poverty line, they have high non take-up rates, and large proportions of the recipients are neither poor nor entitled to receive the benefits. Unsurprisingly, although an important income source for poor households, the benefits have a very small impact on reducing the poverty rates. We show that our results are robust to potential underreporting of benefit receipt in the household survey. Finally, we analyse the effect of five reform scenarios, one of which fiscally neutral, on poverty and find that there is a large scope for policy improvement.

JEL Classification: D04, D63, I38

Keywords: benefit non take-up; leakage; means-tested benefits; poverty; microsimulation

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1. Introduction

In recent years, poverty has been increasing in Bulgaria, rising in relative terms from 14 percent in 1999 to 21 percent in 2012 and in absolute terms from 1.2 million individuals in 1999 to 1.5 million individuals in 2012, despite a fall in the total population. In 2012, relative poverty in Bulgaria was among the highest in the EU, with an average poverty rate across the 28 member states of 17 percent. One of the reasons is the small impact that social transfers in Bulgaria have on poverty, estimated to be among the lowest in the EU. This poor performance of the social transfers may in turn partly reflect low levels of expenditures on social protection – in 2011 the total spending on social protection in Bulgaria was 16.9 percent of GDP, compared to an EU average of 28.3 percent, while the spending on means-tested benefits was only 0.7 percent of GDP in Bulgaria relative to 3 percent of GDP on average in the EU (Eurostat)[2] – but may also be due to poor design or implementation.

This paper provides a comprehensive assessment of the performance of means-tested benefits in Bulgaria using household survey data and microsimulation methods. We look at the largest three means-tested benefits in Bulgaria – the heating allowance (HA), guaranteed minimum income (GMI) and child allowance (CA) – and evaluate their performance in terms of targeting and poverty reduction. Several targeting issues are addressed. We measure the degree to which benefits are not taken-up by the entitled population (non take-up) and to which non-entitled are among the benefit recipients (leakage). For those benefits which are means-tested, and therefore ought to target individuals on low incomes by design, we estimate how many of the poor are not being awarded with a benefit (exclusion of the poor) and how many among the recipients are in fact not poor (inclusion of the non-poor).[3] We show that our results on targeting are robust to underreporting of benefit receipt in the

[2] All figures from Eurostat database, "At-risk-of-poverty rate by poverty threshold, age and sex (indicator: ilc_li02)"; "At-risk-of-poverty rate before social transfers (pensions included in social transfers) by poverty threshold, age and sex (indicator: ilc_li09)"; "Expenditure - Tables by functions, aggregated benefits and grouped schemes - in % of the GDP (indicator: spr_exp_gdp)".

[3] The definition of being poor is defined with respect to the relative poverty line, which is 60% of the median equivalised household disposable income.

household survey data. Finally, we estimate the effect of the benefits on poverty.

Addressing targeting issues and thus understanding why benefits are not claimed by the entitled (or why they are received by the non-entitled) is important because this affects programme implementation and limits the extent to which policy goals can be achieved. Furthermore, if the reasons for not receiving are involuntary, such as imperfect information, high transaction costs or stigma, the groups intended to be targeted are not being treated equally by the welfare state (see, for a discussion, Oorschot, 1991). Equity issues will also arise if unintended and non-poor beneficiaries are awarded with a benefit, while the entitled and poor are excluded.[4] If such issues are present, policy makers cannot anticipate the true effect of policy interventions.

The paper enriches the analysis on the performance of means-tested benefits in Europe by providing some of the first estimates of non take-up and leakage for an Eastern European country. Although there is a variety of means-tested benefits in Bulgaria to protect those at risk of poverty, to date there has been little empirical evidence on how successful these benefits are in reaching and protecting them (although see World Bank, 2009)[5]. In particular, the ability of the programmes to target specific population groups (those entitled to the benefits) has remained unknown. Although there is a large literature estimating non take-up of means-tested benefits and trying to understand the drivers of this behaviour (see, for example, Mangiavacchi & Verme, 2013; Bargain et al., 2012; Matsaganis et al., 2010), leakage rates have been rather neglected in the literature (for some exceptions see Benitez-Silva et al., 2004, and Kleven et al., 2011).

In this analysis, we make use of household survey data combined with a tax and benefit microsimulation model. The former, namely the European Union Statistics on Income and Living Conditions (EU-SILC), tell us which households are receiving benefits in 2007; the latter allows us to identify the households in the EU-SILC that are entitled to receive means-tested benefits (as well as estimate the financial value of these entitlements). The tax-benefit

[4] Depending on the policy rules, the entitled and poor can be overlapping groups but not necessarily the same. The same is valid for the non-entitled and non-poor.

[5] To the best of our knowledge, this is the only extensive empirical analysis on social assistance benefits in Bulgaria. The study provides an evaluation of the performance of social transfers in Bulgaria and it finds low levels of coverage among the poor with high levels of inclusion of non-poor recipients. However, the analysis does not provide any estimates on benefit non take-up and leakage, i.e. the number of entitled who do not claim the benefits or the number of non-entitled among the benefit recipients.

microsimulation model used here is the Bulgarian component of the EU-wide microsimulation model EUROMOD (for more information on EUROMOD, see Sutherland & Figari, 2013). In addition, after analysing the status quo, we simulate five reform scenarios to the existing benefits (one of which fiscally-neutral) as a way to explore the impact of policy changes on poverty and the scope for policy improvement.

Our main findings are as follows. First, we find that most of the spending and beneficiaries of the social assistance benefits, HA and GMI, come from the left tail of the income distribution. However, the programmes reach a very small proportion of the households with incomes below the relative poverty line. Recipients of the child benefit, CA, are distributed almost evenly across the deciles of the income distribution, due to its generous income-test. However, the benefit fails in providing income support to all poor households with families with children, leaving 30 percent of them unreached by the transfer. Second, we find that more than 40 percent of the intended beneficiaries of HA and GMI, and 30 percent of the intended beneficiaries of CA, do not take up benefits to which they are entitled.[6] We also find that a large proportion of beneficiaries report incomes which exceed the income-test threshold, and so should have disqualified them from entitlement. These results raise serious concerns about the quality of programme implementation. Third, the three benefits have negligible effect on the poverty rate: less than a 1 pp reduction. Moreover, we show that poverty rates would remain broadly unchanged even under a scenario of 100 percent benefit take-up and no leakage to the non-entitled. These results put Bulgaria among the worst performers in the region in terms of targeting the vulnerable and reducing poverty (see Avram, 2013). Finally, we consider the effect of five reform scenarios on poverty. Even a fiscally neutral scenario proves to be more effective than the current system in reducing poverty, showing that there is scope for policy improvement.

The paper is structured as follows. Section 2 provides a summary of the three means-tested benefits in Bulgaria. Section 3 describes the definitions of targeting, the methodology we adopt, the household survey data from EU-SILC and the tax-benefit microsimulation model EUROMOD. It also discusses the implications of benefit underreporting in the survey data on

[6] Reasons for non take-up of benefits come from both the demand and supply side. Due to stigma, high transaction costs (long waiting time, queues etc.), and the low level of the benefits, entitled individuals could consider the application process too complicated or too costly and decide not to apply for the social transfers (Moffitt, 1983). On the supply side, excessive bureaucracy or complicated programme design can mean that benefits are not provided to the intended population (see Currie, 2006).

the results and other data and microsimulation-related issues. Section 4 shows the results for targeting and poverty reduction. Section 5 presents five alternative policy scenarios and analyses their effect on poverty. Section 6 concludes.

2. Means-tested benefits in Bulgaria

This section describes the details of the three benefits under study. These are the heating allowance, guaranteed minimum income and child allowance. The three benefits amount to 84 percent of the total budget for means-tested benefits in 2007 (see Boshnakov et al. (2012) and Eurostat).[7] Although there is a range of other means-tested cash and in kind benefits, they are not part of the analysis because their role in terms of income support provision is smaller or information on them is missing from the household survey data.

The **heating allowance** (HA) *(целева помощ за отопление)* is given to the household and is intended to cover various groups of the population: single-person households, elderly, orphans, lone parents, families with children, students and individuals with disabilities. The benefit is paid each month for a period of 5 months during the winter. The applicant needs to fulfil conditions related to various demographic and economic characteristics such as age, health status, employment status, and household size, as well as assets. Furthermore, entitlement requires household income to be below a certain threshold where the threshold varies by individual characteristics and household type. This threshold is calculated as a percentage of a guaranteed minimum income level (*gmil*), which is defined as a minimum level for survival and amounts to 55 BGN per month in 2007 (28 EUR). The percentage rate varies from 120 percent for an adult living with her spouse to 240 percent for an elderly person. The benefit is paid at a rate common to all households (but varying by the heating source used by the household – electricity, central heating, natural gas or coal). The average benefit amount in the European Union Survey on Income and Living Conditions (EU-SILC) used for the analysis is 17 BGN per month (9 EUR or 8 percent of the relative poverty line).

The **guaranteed minimum income** benefit (GMI) *(месечна парична помощ поради ниски доходи)* is granted to households with low incomes. Entitlement is defined in a similar way as for HA. The allowance is granted to households, which fulfil certain requirements related

[7] For information on the total spending on means-tested benefits see Eurostat database, 'Tables by functions, aggregated benefits and grouped schemes - in MIO of national currency (indicator: spr_exp_nac)'.

to demographic and economic characteristics, household size, assets[8] and whose household income is below a certain threshold. The threshold ranges from 30 percent of *gmil* for a child aged between 7 and 16 years, to 165 percent for an elderly person. If a household comprises of more than one individual, the sum of all thresholds for all individuals in the household represents the threshold for the whole household. The amount of the benefit equals the difference between the total household threshold and the gross household income; that is, the benefit is withdrawn with income. It is paid for 12 months. The household average monthly benefit amount in EU-SILC is 63 BGN (32 EUR or 30 percent of the poverty line).

The monthly **child allowance** for bringing up a child until completion of secondary school (CA) *(месечна помощ за отглеждане на дете до завършване на средното образование, но не по-късно от 20-годишна възраст)* targets low income families with children. It is paid to families with child(ren) up to the age of 18 (or 20 if the child is enrolled in secondary school). The value of the income test in 2007 is 200 BGN per month (100 EUR) per family member. The benefit is provided to the family on a monthly basis. In 2007, its value is 18 BGN for the first child, 20 BGN for the second child and 20 BGN (in total) for the third and all subsequent children. The average monthly benefit amount per family in the EU-SILC is 24 BGN (12 EUR or 12 percent of the poverty line).

The income sources used in the income-test of the three benefits are: employment income, self-employment income, income from rent, public pensions, contributory benefits (for unemployment, sickness, pregnancy and childbirth, and maternity), and education scholarships. The benefits HA and GMI also enter the income-test for CA and vice versa. The application for the benefits is based on self-reported income (and other information). Applicants have to attach an income declaration issued by a relevant person or institution (e.g. the employer) as evidence. However, no evidence needs to be attached if zero income is reported in the application.

The objective of HA and GMI, as defined in the Law on Social Assistance (LSA) (2012), is to supplement or replace incomes and cover individuals' basic needs defined as sufficient

[8] According to the conditions for the asset-test for both HA and GMI, the benefit claimant should: live in a dwelling composed of maximum 1 room per household member; not possess assets that can represent a source of income, except for the belongings that serve the usual needs of the family; not have contracts for a transfer of property in return for support and care (e.g. caring for lone elderly owners); not have acquired property through purchase or donation during the last 5 years.

amount of food, clothing and housing to survive. CA has the goal of providing income support for families with children. We could not find documentation on the methodology used to determine the value of the *gmil*, the thresholds for the various population groups or benefit levels. There are also no indexation rules in place for *gmil* and the size of the benefits.

3. Methodology and data

This section starts with the different definitions of targeting: non take-up, leakage, exclusion of the poor and inclusion of the non-poor. After that, we explain our approach of combining household survey data with a tax-benefit microsimulation model, followed by a detailed description of the data and the model. We then focus on the issue of benefit underreporting in the survey data and describe the robustness checks we undertake. Finally, we validate the reported benefits in the household survey data and simulated benefit entitlements produced by the tax-benefit model using data from official administrative records.

Definitions of targeting

Our approach is to assess the extent of vertical and horizontal targeting efficiencies. They imply that only the poor, and all the poor, should be awarded with a means-tested benefit. We measure two targeting errors related to these concepts: the rate of inclusion of the non-poor, and exclusion of the poor. Additionally, two more types of targeting errors are calculated: benefit non take-up (two definitions are considered following Brewer (2003) and Bargain et al. (2012)) and leakage to non-entitled households.

Starting with the last two definitions, estimating benefit non-take up and leakage rates is crucial in assessing the performance of transfer programmes because they affect programme implementation and policy goals achievement. Non take-up can be measured in two ways. First, it can be the fraction of people entitled to receive a benefit, but not provided with it.

$$R_{non-take\ up1} = \frac{N_{entitled,not\ in\ receipt}}{N_{entitled}},$$

where $N_{entitled,not\ in\ receipt}$ is the number of entitled households (or households with entitled families as in the case of CA) who did not receive the benefit and $N_{entitled}$ is the total number of intended beneficiaries (those in receipt and not in receipt).

The second type of non take-up rate:

$$R_{non-take\ up2} = \frac{N_{entitled,not\ in\ receipt}}{N_{in\ receipt} + N_{entitled,not\ in\ receipt}},$$

expresses the total number of households eligible for the benefit, but not in receipt of it, as a percentage of the sum made up of those receiving the benefits (whether entitled or non-entitled) and those entitled but not reporting receipt. This definition of non take-up acknowledges that some of the recipients may not be assessed as entitled due to error in identifying them or that some of the recipients may be truly non-entitled due to leakage. The denominator of the second non take-up rate is equal or larger than the denominator of the first non take-up rate and so estimates for this indicator are equal or lower, respectively, than for the first definition. In the literature, these two rates are combined to show in a way an upper (definition 1) and lower (definition 2) bounds of non take-up (see Brewer (2003) and Bargain et al. (2012)).

The leakage rate is defined as the non-entitled households who receive a social transfer ($N_{non-entitled,in\ receipt}$) as a proportion of all beneficiaries ($N_{in\ receipt}$):

$$R_{leakage} = \frac{N_{non-entitled,in\ receipt}}{N_{in\ receipt}}.$$

To calculate the extent of exclusion of the poor, and inclusion of the non-poor among beneficiaries, we use a poverty line of 60% of the median equivalised household disposable income, and denote individuals in households with incomes lower than the poverty line as being poor. Regarding horizontal equity, the definition of the exclusion error refers to the proportion of poor not in receipt of a social transfer. This rate estimates the capacity of the programmes to correctly identify the poor. The exclusion error equals:

$$R_{exclusion\ of\ the\ poor} = \frac{N_{poor,not\ in\ receipt}}{N_{poor}}.$$

$N_{poor,not\ in\ receipt}$ is the number of households with income below the relative poverty line who did not receive the benefit and N_{poor} is the total number of poor households below the relative poverty line (or poor households with families with children as in the case of CA).

The inclusion error looks at how many of the programme recipients were not poor before

receiving the benefit. The rate is equal to the following fraction:

$$R_{inclusion\ of\ the\ non-poor} = \frac{N_{non-poor,in\ receipt}}{N_{in\ receipt}},$$

where $N_{non-poor,in\ receipt}$ is the number of non-poor households who receive the benefit.

To be able to estimate benefit non-take up and leakage, we require information at the individual or household level on 1) who actually receives the benefit and 2) who is legally entitled to receive it. Information on the former can be found in the data from the European Union Survey on Income and Living Conditions (EU-SILC) used for the analysis, where households report different sources of incomes. However, EU-SILC, similar to any other survey, does not ask households/individuals if they are entitled to a benefit. This information can be only acquired through a tax-benefit microsimulation model which calculates entitlements based on information on household circumstances available in the survey data and knowledge of the benefit legislation. We discuss our approach in more detail below.

Data description

The household survey data are from the European Union Survey on Income and Living Conditions (EU-SILC). EU-SILC is the largest and most detailed household income survey existing at the moment in Bulgaria. It is used by the National Statistical Institute for official statistics on social inclusion and living conditions. The data are nationally representative and contain individual and household level information on demographic and socio-economic characteristics and incomes from various sources such as (self-)employment, pensions and benefits. The data we use are collected in 2008 with income reference period 2007. EU-SILC used in this analysis is a combination of the User Data Base SILC, which contains aggregate information about benefits, and some national SILC variables, which provide data about the separate benefit components. For a detailed data description, see Appendix 1.

EUROMOD

The entitlements to means-tested benefits for each household in the EU-SILC are calculated by EUROMOD. The model consists of components for each EU member state. It operates based on nationally representative household survey data. By using information on household and individual characteristics and market incomes taken from the data and combining it with country-specific legislation rules, the model calculates (simulates) household and individual-

level benefit entitlements, tax and social insurance liabilities as well as household disposable income (for a detailed model description, see Sutherland & Figari (2013)). EUROMOD has been widely used in the economics literature (for recent publications see e.g. Bargain et al., 2014; Dolls et al., 2012). It has also been used to estimate non take-up rates in Greece and Spain (Matsaganis et al., 2010). To calculate benefit non take-up and leakage rates, we compare information on receipt of the three means-tested benefits observed in the survey data with simulated entitlements to the same three benefits as calculated by EUROMOD, all for a given household.

The definition of household disposable income used throughout the analysis includes the sum of market income (income from employment, self-employment, property (rent), net private transfers (private transfers received minus maintenance payments), interest, other (income received by children under 16)), pension income (benefits for old-age, survivor and disability), other benefits (for unemployment, maternity, sickness, family, social assistance, housing, education), income from agricultural and own production, minus income tax, property tax and social insurance contributions.

Accounting for benefit underreporting

When using household survey data and microsimulation techniques, five issues could bias the results. Measurement error in the data and the simulations may drive the bias in different directions.

First, EU-SILC does not collect enough information on assets to allow the simulation of all eligibility criteria for HA and GMI. In the absence of data, we assume the household meets that particular criterion. As a result, the following two biases may arise: First, if non-entitled recipients are misclassified as entitled recipients, the numerator in the calculation of leakage will go down while the denominator in the calculation of non take-up based on the first definition only will go up which would result in both leakage and non take-up being underestimated. Second, if non-entitled non-recipients are wrongly classified as entitled non-recipients, the numerator in the formula for non take-up based on both definitions will increase (more relatively to the denominator) and non take-up will be overestimated.

Second, a known problem of survey data on incomes is that it may fail to cover individuals at the very bottom of the income distribution (e.g. people not living in households). In this case

then our results may be biased in either direction, depending on the size of the excluded population and the number of (non-)entitled (non-)recipients among them.

Third, a general sort of error can occur if there are errors in the calculations done by the microsimulation model (for example, a mismatch between the data reference period in the survey data and the time period when the income-test has been applied); these could cause biases in any direction.[9]

Fourth, we typically think the prevailing measurement issue in survey data is income underreporting (see for a recent analysis Brewer et al. (2013) and Meyer et al. (2015)). Underreporting of those sources of income, that are used to assess entitlements to benefits, could result in the following biases (similar to the biases described under the first point): If non-entitled recipients underreport incomes, so they are misclassified as entitled recipients, then both non take-up based on the first definition and leakage will be underestimated (the denominator in the formula for non take-up will increase, while the numerator in the leakage rate will decrease). If non-entitled non-recipients underreport incomes, so they look like entitled non-recipients, then the numerator in the calculation of non take-up (both definitions) will increase more relatively to the denominator and so, non take-up will be overestimated. There will be no impact on these rates if households – entitled recipients or entitled non-recipients – are not misclassified even though they underreport incomes. Appendix 1 gives more details on the EU-SILC data, and a comparison between EU-SILC and national accounts data. To sum up, we find limited evidence on the extent of income underreporting in EU-SILC and among the recipients of HA, GMI and CA. This does not allow us to measure the direction or size of a potential bias in the results.

Finally, an important concern for the validity of the results is the issue of benefit underreporting (see Lynn et al. (2012) on the incidence of benefit underreporting and ways of reducing it in panel data). Benefit underreporting may refer either to a household reporting a lower amount of the received benefit or to a household declaring falsely that it has not received a benefit at all. When calculating non take-up and leakage only the second type of

[9] For GMI and HA, the income-test refers to incomes from previous month. There is no information in the data, on when benefit receipt started and the available data are only for 2007. For the income-test, we used therefore average monthly incomes for 2007, although there might have been fluctuations over the months, which are not considered, and the income-test might have referred to incomes from 2006, which are not observed. It is not clear, though, in which direction the results will be biased.

benefit underreporting may bias our results: If the benefit of interest has been underreported only by entitled households, then non take-up and leakage will be overestimated. However, if the benefit has been underreported only by the non-entitled (i.e. there genuinely is leakage but it is underreported in the survey), then results for leakage will be underestimated while non take-up based on the second definition will be overestimated.

Due to lack of administrative data, none of these biases can be measured and so the magnitude of the error is, in general, not verifiable. However, we can address the issue of benefit underreporting, i.e. not reporting to have received a benefit, which we believe may be one of the largest concerns.

We proceed by noting two discrepancies. First, the total number of reported benefit recipients in the EU-SILC data is lower than the total number of households that are simulated to be entitled (by EUROMOD). Second, the total number of reported benefit recipients in the EU-SILC data is also lower than the total number of recipients according to administrative figures (see next subsection). Let us assume that this is entirely due to benefit underreporting in EU-SILC. Thus, the magnitude of underreporting can be quantified according to either the first or second discrepancy.

We consider the following five scenarios: a baseline scenario with no correction for underreporting, and scenarios for which we assume that benefits have been underreported in EU-SILC by non-recipients who are i) entitled, ii) non-entitled, iii) poor, or iv) non-poor. We impute benefit receipts (by random selection) for each scenario separately, so that non-recipients are transformed into recipients. As a result, there is an increase in the number of recipients in EU-SILC who are i) entitled, ii) non-entitled, iii) poor, or iv) non-poor. The number of imputed benefit receipts depends on the two discrepancies: according to the first one, the number of benefit recipients in EU-SILC would equal the number of households with a simulated entitlement; according to the second one, the number of benefit recipients in EU-SILC would match the number of recipients from administrative statistics. Scenarios i) to iv) represent the extremes and we have selected these to calculate lower and upper bounds around the targeting error rates. Scenarios i) and ii) provide bounds around non take-up and leakage, while scenarios iii) and iv) provide bounds around the rates of exclusion of the poor and inclusion of the non-poor.

The imputations under scenario i) will provide a lower bound for benefit non take-up and leakage: as the number of entitled recipients goes up, the numerator in the formulae for non take-up (i.e. the number of entitled non-recipients) will go down and so, non take-up will fall. In terms of leakage, the denominator in the formula (i.e. all recipients) will increase and so, the rate will fall.

Scenario ii) will provide us with an upper bound for leakage: the numerator in the leakage rate (i.e. the number of non-entitled recipients) will increase more relatively to the denominator (i.e. all recipients) and so, leakage will increase. Non take-up based on the first definition will not change because of non-accountability of non-entitled in the calculation. Non take-up based on the second definition will fall as the denominator (i.e. the number of recipients plus entitled non-recipients) will increase.

Under scenario iii) a lower bound for the rates of exclusion of the poor and inclusion of the non-poor will be calculated: as the number of poor recipients among all poor increases, the rate of exclusion of the poor will go down. In addition, the denominator in the rate of inclusion of the non-poor (i.e. all recipients) will also increase and so, the rate will go down.

Finally, under scenario iv) an upper bound for the rate of inclusion of the non-poor will be generated: the numerator in the rate (i.e. the number of non-poor recipients) will increase more relatively to the denominator (i.e. all recipients) and so, the rate of inclusion of the non-poor will increase. The rate of exclusion of the poor will remain the same, because non-poor are not taken into account in the calculation.

Data comparisons and related issues

In this subsection, we validate the simulated benefit entitlements produced by the EUROMOD model and reported benefits in EU-SILC using data from official administrative records with a view to understand if there is benefit non take-up or leakage. Table 1 compares the number and total amount of simulated entitlements (calculated by EUROMOD) with the number of benefit recipients and total spending recorded in EU-SILC, and the corresponding totals of recipients and spending recorded in administrative data. We observe that the number of simulated social assistance entitlements is less than the number of recipients from administrative figures (the ratio is 0.69 for HA and 0.73 for GMI, see ratio (1/2) in panel A); this could be an indication that part of the benefits may be distributed to non-entitled recipients (i.e. there is benefit leakage). In contrast, the number of simulated CA entitlements

is higher than the number of CA recipients from administrative figures (the ratio is 1.11): this discrepancy points to the possibility of benefit non take-up.

Comparing the number of benefit recipients from EU-SILC with those from the administrative figures (ratio (4/2)) in panel A suggests that all benefits might be underreported in EU-SILC. On the other hand, the number of recipients from EU-SILC is lower than the number of simulated entitlements, which could also indicate benefit non take-up.

Moving on to panel B of Table 1, ratio (1/2) shows the total amount of simulated entitlements from EUROMOD over the total spending from administrative figures. As the ratios for HA and GMI are lower than 1, this indicates that the spending of the two benefits has been undersimulated by EUROMOD; the ratio for CA is 1.07 meaning that the total spending for CA is slightly oversimulated. This is in line with the findings in the paragraphs above. In the case of the three benefits, ratio (1/2) is higher than ratio (4/2), implying that the average simulated entitlements are higher than the average amount of benefit receipt reported in the underlying micro data EU-SILC.

'place Table 1 here'

Table 2 compares the mean monthly values of the benefit entitlements, separately for those reporting positive amounts in EU-SILC and for those simulated to be entitled by EUROMOD. In the case of HA, which is paid at a rate common to all households, the average reported value of the benefit and simulated entitlements are close to identical.[10] GMI and CA are not paid at a common rate to all households: the GMI amount depends on household incomes, while the CA amount depends on the number of children. Table 2 shows that the mean simulated unclaimed entitlement (for those simulated eligible but not reporting a positive amount) for both benefits is lower than the mean simulated claimed entitlement (for those simulated eligible and reporting a positive amount). This is in line with the idea that a higher entitlement to benefits helps offset the (actual or opportunity) costs of claiming benefits, e.g. the cost of collecting necessary application documents, long waiting times and stigma.

'place Table 2 here'

[10] The small discrepancy can be explained as the average benefit duration assumed by EUROMOD is the maximum possible and it is slightly higher than the average benefit duration reported in the data.

4. Results

This section presents the main results and assesses the performance of the benefits across several dimensions. It starts with looking at the benefit incidence across the income distribution. The analysis moves on to targeting issues, by providing estimates for benefit non take-up, leakage to non-entitled claimants, exclusion of the poor and inclusion of the non-poor among the benefit recipients. The results are demonstrated to be robust to an adjustment for benefit underreporting in the data if the adjustment is based on the difference between the number of reported claimants in EU-SILC and the total number of simulated entitlements by EUROMOD. If the adjustment is based on the difference between the number of recipients in EU-SILC and administrative figures, the bounds of the estimates for social assistance increase and the results become less robust, while the opposite is true for the child benefit. The final part of the section compares the pre-transfer and post-transfer poverty figures, providing a discussion on the impact of the benefits on poverty in Bulgaria.

Benefit incidence

This subsection shows the incidence of the three benefits across the income distribution. Individuals are ranked based on their equivalised household disposable income before receiving each one of the transfers in turn.

Figure 1 shows the distribution of spending on HA, GMI and CA as reported in EU-SILC (the grey lines) alongside the total amount of simulated entitlements by EUROMOD (the black lines). The figure shows that based on EU-SILC, all three benefits target the poor well. GMI performs best with 77 percent of its spending going to the poorest two deciles. A similar picture emerges for HA with 69 percent of the budget going to the poorest two deciles of the income distribution. In terms of CA spending, 26 percent is transferred to the bottom two income deciles. This is in line with the design of the benefit – high income-test – which aims at reaching families from the higher tail of the income distribution.

‘place Figure 1 here’

Figure 2 repeats the exercise but for benefit receipt: 74 percent of GMI and 69 percent of HA recipients come from the bottom two income deciles, but CA reaches the poor to a lesser extent as only 25 percent of CA recipients come from the poorest two deciles. Contrasting this to Figure 1, the results suggest that the mean value of GMI is slightly higher for the

lower 2 deciles than for the rest of the distribution. The value of HA is equal across recipients, given that it is a uniform benefit paid at the household level. The mean value of CA is larger for the poorer deciles because of larger number of children in poorer households.

'place Figure 2 here'

Turning to the results of the simulated benefit entitlements, we see that the distribution of the simulated GMI and HA is even more concentrated in the first two income deciles, making them more progressive than the benefits reported in EU-SILC. The distribution of the simulated CA is also more concentrated at the bottom part of the distribution making it appear more progressive than actual receipt as reported in EU-SILC. Assuming that there are no programme implementation errors, one would expect that the distribution of the reported benefits and simulated entitlements (both spending and recipients) to be identical. The next subsection addresses this puzzle.

Targeting

The previous indicators offer only limited information about the performance of the benefits in terms of targeting, the extent to which the actual distribution of a benefit corresponds to the desired distribution. Given that the benefits are aimed at satisfying the basic living needs of the individuals, it is important to see what proportion is given to the entitled and/or poor and what proportion is given to the non-entitled and/or non-poor.

The estimates for the targeting errors i.e. non take-up, leakage, exclusion of the poor and inclusion of the non-poor, together with their standard errors, are shown in Table 3. Based on the first definition of non take-up (the proportion of entitled non-recipient over all entitled households), the non take-up rate amounts to large 66 percent for HA and 73 percent for GMI, and 39 percent for CA. The substantial non take-up rates of HA and GMI are in line with the qualitative analysis in Bogdanov & Zahariev (2009) which suggests that the high complexity of the programmes causes confusion for the social workers, who are forced to deal with an enormous amount of paper work. This could result in incorrectly turning down applications by otherwise entitled households. Similarly, claimants of social assistance report that the application process is very long and cumbersome and that the benefit amount is too low to provide sufficient income support.

When we compare the estimates for the first definition with the ones for the second definition

of non take-up (the proportion of entitled non-recipient over all recipient and entitled non-recipient households), some key differences between the two are revealed. In line with the non take-up rates under definition 1, the rates under definition 2 are the highest for HA and GMI (41 percent and 47 percent, respectively). However, in contrast to CA, there is substantial difference under the two definitions for HA and GMI. This suggests a potentially large leakage to the non-eligible population for these two benefits.

In comparison to non take-up of means-tested benefits in other countries, the estimated rates in Bulgaria are relatively high. Non take-up for social assistance is of similar size to the rates (definition 1) in Germany (63 percent for Social Assistance in 1993 (Riphahn, 2001)) and Greece (63 percent for pensioner social solidarity benefit and 38 percent for pension to uninsured elderly in 2004 (Matsaganis et al., 2010)). In Spain, Australia and Finland, on the other hand, benefit non take-up is smaller compared to the estimates for HA and GMI: based on definition 1, 22 percent for supplements to reach the minimum and 44 percent for non-contributory old-age pensions in 2004 in Spain (Matsaganis et al., 2010); 15 percent for Income Support and 29 percent for Parenting Payment in 2002 in Australia using definition 1 (Mood, 2006); and between 43 percent (definition 2) and 51 percent (definition 1) for social assistance in 2003 in Finland (Bargain et al., 2012). In the UK, the Department for Work and Pensions (DWP) has been publishing benefit take-up estimates ranges until 2009/10. We have translated these into non take-up rates based on definition 2 and the extent of the issue varies depending on the benefit: 11-23 percent for Income Support and Employment and Support Allowance, 20-27 percent for Guarantee Credit, and 16-22 percent for Housing Benefit (DWP, 2012). The evidence about the USA is also somewhat mixed, depending on the benefits (see Currie (2006) for an overview).

Moving to leakage, the proportion of non-entitled recipient over all recipient households, the rate equals 64 percent for HA and 68 percent for GMI. Although recipients are mostly in the first two income deciles, the estimate of leakage is high because the programmes are targeted at the first income decile only. Thus, whilst we see high non take-up rates for HA and GMI amongst the targeted population, a substantial number of households who do not fulfil the income-test are in receipt of social assistance. In contrast, the estimated leakage rate for CA is lower at 19 percent reflecting the fact that a larger share of the population is eligible for the benefit.

We consider three possible channels through which the high leakage of HA and GMI could occur. First, the confusion among social workers due to the complex benefit rules (see Bogdanov & Zahariev, 2009) could not only result in falsely rejecting applications by entitled households but also accepting applications by ineligible households. Second, corruption through bribes could be another channel through which benefits are transferred to non-entitled households. Although there are no estimates on the size of corruption in Bulgaria, a few studies suggest very high public perception levels.[11] The third channel could be related to the informal economy in Bulgaria in terms of underdeclaring income to authorities in order to avoid the payments of taxes or to receive benefit entitlements. Although there is no conclusive evidence on the size of informal economy in the country, again there is evidence on high public perception levels.[12]

Worryingly, the results also show that very large numbers of the poor are excluded from the social assistance benefits: 77 percent for HA and 94 percent for GMI or in other words, only 23 percent and 6 percent of the poor receive HA and GMI, respectively. In comparison, the results for 2007 of the World Bank study (2009) show similarly that the exclusion error of HA and GMI is equal to 87.9% and 88.6%, respectively.[13] Although HA and GMI are mainly provided to the poor, their coverage is very low. Avram (2013) estimates the percentage of poor receiving social assistance for 8 Central and Eastern European countries using the cross-sectional component of EU-SILC for 2008. She finds very low coverage of the poor in the three Baltic countries, Estonia (8 percent), Latvia (16 percent) and Lithuania (20 percent). In

[11] For example, for a study on public perceptions of corruption levels see Eurobarometer report (2008): "The attitudes of Europeans towards corruption", Special Eurobarometer 291, available at: http://ec.europa.eu/public_opinion/archives/ebs/ebs_291_en.pdf. The study shows that in 2007 92% of the respondents agree with the statement that corruption is a major problem in Bulgaria. This puts the country on place 5 (out of 27) with EU27 average score of 75%. Between 82% and 85% of the respondents agree with the statement that there is corruption at local, regional or national institutions (with EU27 average score of 73% to 77%). Bulgaria also scores about two times the EU27 average on the question if "giving and taking of bribes, and the abuse of positions of power for personal gains are widespread among": the people working in the judicial, police or custom services, public health or education sectors. For other studies which show high levels of perceived corruption in Bulgaria, see http://www.transparency.org/research/cpi/cpi_2007/0/.

[12] For a study on employers and employees perceptions on the size of informal economy in Bulgaria see Bulgarian Industrial Capital Association (2012): "The first monitoring report on the informal economy and progress achieved in its prevention", available in Bulgarian at: http://www.ikonomikanasvetlo.bg/c/document_library/get_file?uuid=cc8fb441-d183-42a5-b4b9-14241cf5cd76&groupId=55360. There is also a study by Buehn & Schneider (2012) which estimates the size of shadow economy in Bulgaria in 2007 at high 32.7%.

[13] The discrepancy in our and the World Bank (2009) results are likely to be due to differences in the survey data used in the analysis, in the definition of household disposable income and as a result, in the value of the relative poverty line.

the Czech Republic, Poland, Slovakia and Slovenia, the coverage rate varies between 26 percent and 37 percent, while in Hungary it is found to be 46 percent. The findings suggest that social assistance benefits in Bulgaria, despite having the aim of covering basic needs and providing income support to the poor, have a low coverage of the poor similar (or worse) to the ones in the Baltic countries.

The exclusion of poor households (with families with children) is 30 percent for CA, showing that it has a better coverage. We see that the smallest coverage of the poor occurs among the benefits with the highest leakage. This is an important finding, as it suggests that the coverage of the poor could be improved, by better targeting the benefits on poor households only (at no additional cost).

The results for the inclusion of the non-poor are 34 percent for HA and 27 percent for GMI. In regard to this indicator, Bulgarian benefits are characterized with lower error in comparison to their counterparts in the other countries; the inclusion errors estimated by Avram (2013) are 30 percent for social assistance benefits in Lithuania, around 38 percent in the Czech Republic, 37 percent in Slovakia, 44 percent in Poland, 49 percent in Estonia, 54 percent in Latvia, and more than 60 percent in Slovenia and Hungary. This might well be due to the higher income-test and larger population coverage of the schemes in the other Central and Eastern European countries (Avram, 2013). The inclusion of the non-poor is significantly higher for CA: the rate is estimated at 78 percent. This supports the above evidence showing substantial room for poverty reduction, by better targeting the available funds to the poor.

The results are remarkable because the programmes are characterised by both high non take-up and leakage, and both inclusion and exclusion errors. Elderly, people of working age, children, lone parents, parents of small children, and people with disabilities are targeted according to the programmes' design, and, yet, the coverage of the entitled and poor remains low, while leakage and inclusion of the non-poor is high.

'place Table 3 here'

Robustness checks

In Section 3, Table 1 showed that for the three benefits, the number of observed receipts in the EU-SILC data is lower than both the total number of simulated entitlements by EUROMOD and the number of recipients from administrative figures. We assume that these

differences are entirely due to benefit underreporting, i.e. not reporting to have received a benefit (as opposed to reporting lower benefit amounts), in EU-SILC. In this way, we test the sensitivity of our results on the targeting error rates: non take-up, leakage, exclusion of the poor and inclusion of the non- poor.[14]

As described in detail in Section 3, we look at the following five scenarios: the baseline scenario with no correction for underreporting, and scenarios where the benefits have been underreported in EU-SILC by non-recipients who are i) entitled, ii) non-entitled, iii) poor, or iv) non-poor. We impute benefit receipts for each scenario separately, so that non-recipients are transformed into recipients. As a result, there is an increase in the number of recipients in EU-SILC who are i) entitled, ii) non-entitled, iii) poor, or iv) non-poor. Scenarios i) and ii) provide bounds around non take-up and leakage, while scenarios iii) and iv) provide bounds around the rates of exclusion of the poor and inclusion of the non-poor. The number of imputations is such that the total number of benefit receipts (both reported and imputed) in EU-SILC matches in the first case, the total number of simulated entitlements by EUROMOD and in the second case, the total number of benefit receipts according to administrative figures. Table 4 and Table 5 report how the targeting error rates change according to the first and second case, respectively.

'place Table 4 here'

'place Table 5 here'

The range of the bounds for HA and GMI in Table 4 is much smaller than in Table 5: this is because the discrepancy between the number of benefit receipts reported in EU-SILC and entitlements calculated by EUROMOD is smaller than the discrepancy between the number of receipts in EU-SILC and according to administrative records. The opposite is true for CA. Table 4 shows that after accounting for benefit underreporting the results remain robust with one exception – in the case of CA the lower bound for the exclusion of the poor equals 0.

[14] In addition, Appendix 2 reports the results from another sensitivity check based on simulations of measurement error in the income data. The results provide some limited evidence that suggests that the estimates on non take-up and leakage in this analysis cannot be explained by measurement error in the data. We thank an anonymous referee for the suggestion to implement these simulations.

In Table 5, the rate of non take-up 1 for HA and GMI is within a much larger range than as shown in Table 4. In Table 4, the range is between 60-66 percent for HA and 56-73 percent for GMI. In Table 5, the bounds increase to 16-66 percent for HA and 20-73 percent for GMI. There is also a substantial discrepancy between the lower and upper bounds for the rate of inclusion of the non-poor for both benefits. In Table 4, the estimates range between 32-38 percent for HA and 23-39 percent for GMI. These increase to 22-57 percent for HA and 17-56 percent for GMI in Table 5. The variation in the rates is also large for the leakage of HA and GMI in Table 5, 42-77 percent for HA and 41-80 percent for GMI; in contrast, in Table 4 it is only 60-66 percent for HA and 56-73 percent for GMI. However, the exclusion of the poor rate shows relatively close bounds for HA and GMI according to both tables.

The estimated bounds for CA are much narrower in Table 5 than in Table 4. Furthermore, the lower limit for the exclusion of the poor while being 0 percent in Table 4 is 18 percent in Table 5.

It should be stressed that the two tables show ranges based on the extreme assumption that benefit underreporting is the (only) reason why the number of benefit receipts in EU-SILC is lower than the number of entitlements calculated by EUROMOD and the number of benefit receipts from administrative data. Despite larger variations in some of the estimates for HA and GMI in Table 5 and CA in Table 4, we can see that the issues of targeting errors are persistent and suggest flaws in the benefit design and implementation.

Impact on poverty

Means-tested benefits are an important income source for the poor households, who receive them. In EU-SILC, for recipients in the poorest 10 percent of the population, GMI provides on average 67 percent of household disposable income, HA provides 46 percent, and CA 33 percent (all conditional on receipt). Across those in receipt of at least one benefit, the benefit share of household income is, on average, 51 percent for the bottom income decile group. These proportions fall quickly as income rises, although benefits remain a significant income source up to the third decile (or the fourth decile in the case of CA) for those receiving them.

Although an important income source for some of those in poverty, the benefits have a very small impact on reducing the poverty rates. Table 6 shows the estimated poverty figures based on the pre-transfer (column 2) and post-transfer (including reported benefits, column 3;

or including simulated entitlements, column 5) equivalised household income. The effect of the transfers is measured by the Foster – Greer – Thorbecke (FGT) (1984) poverty indicators: poverty headcount, gap and severity. The headcount ratio is the share of people with equivalised income below the poverty line. The poverty gap is the per capita amount of money, as a percentage of the poverty line, needed to be transferred to the poor to be lifted above the poverty threshold. The poverty severity shows the poverty variation by taking the square of the poverty gap relative to the poverty line.

First, comparing pre-transfer and post-transfer estimates (columns 2 and 3 in Table 6): The poverty rate in 2007 based on the pre-transfer equivalised income is 18.1 percent, and the estimated reduction is only 0.1 percentage points (pp) (or 0.6 percent). The pre-transfer poverty gap is 6.3 percent (1.2 billion BGN). However, the total budget of the three means-tested benefits represents only 28 percent of the gap (Boshnakov et al., 2012), while the spending on all means-tested benefits provide 34 percent of the gap (Eurostat); thus, even assuming that all poor would be reached by the transfers, these programmes would reduce the gap by around one third. Due to large targeting errors found in the previous subsection, the estimated reduction in the poverty gap after the provision of the transfers is only 0.6pp (or about 9 percent).

We can compare these results with evidence for other European countries. Sainsbury & Morissens (2002) discuss the impact of means-tested benefits on poverty reduction across several European countries at the beginning and in the mid-90s. In the later period, the largest absolute poverty reduction effect is observed in the Czech Republic, Sweden, Finland, UK and Poland with absolute poverty reduction equal to 4.2pp, 5.5pp, 5.1pp, 8.5pp and 4pp, respectively. In Germany, the Netherlands, Hungary, France, Belgium and Italy, the effect is much smaller (2.7pp, 2.6pp, 1.8pp, 1.7pp, 0.8pp and 0.2pp, respectively), however, still larger than in Bulgaria. Avram (2013) shows that the poverty reducing effect of social assistance in 2007 in the Czech Republic, Hungary, Poland, Slovenia and Slovakia is also larger than in Bulgaria. These results can be explained by the much larger coverage of the programmes among the poor population and the larger spending as a share of the poverty gap. Furthermore, in the three Baltic countries, where both coverage and spending are smaller, the poverty reduction effect is still slightly larger than the one we observe in Bulgaria.

If we compare the pre-transfer with post-transfer poverty figures, based on the simulated

benefits (columns 2 and 5 in Table 6), the simulated benefits reduce the headcount by 0.1pp (0.7 percent), and the gap and severity both by 1.4pp (22 percent and 43 percent, respectively). Importantly, the simulated results demonstrate that with error-free programme implementation the benefit payments would reduce the poverty gap and severity around 3 times as much as the observed benefits do. These findings suggest that there is scope for policy improvement. And yet, poverty rates do not change dramatically, showing that the generosity of the benefits is too low for them to contribute to a large poverty reduction.

'place here Table 6'

5. Reform scenarios

The findings on targeting errors and poverty reduction raise concerns about the effectiveness of the benefit programmes, and suggest the need to explore policy alternatives which could result in better targeting and higher poverty reduction. In this section we explore the poverty reducing effect of five different reform scenarios by using EUROMOD to calculate benefit entitlements under hypothetical policy rules. We assume full take-up and no leakage throughout.

The first reform, called the income-test reform, alters the income-test only, while leaving the rest of the policy rules the same, with the aim to improve targeting of the poor. The reformed income-test is based on equivalised household disposable income, instead of per capita gross family (CA) or household (HA and GMI) income, as embedded in the current legislation.

The remaining four reform scenarios illustrate the abolition of the three means-tested benefits and the introduction of only one benefit which will be equal either to a flat rate, or to the shortfall between the poverty threshold and the equivalised household disposable income. The arguments in favour of such reforms are that administering only one programme instead of three implies fewer costs to government agencies; simplifying and decreasing the number of eligibility criteria could lead to an increase in the take-up rate; better targeting of benefit resources towards the poor could increase the poverty reduction effect of the transfers.

A budget-neutral scenario would involve a flat rate of 12.7 BGN per month being given to individuals with equivalised household disposable income below the 60 percent of the median poverty line. The other three scenarios differ from each other in the definition of the

poverty line: it is in turn 40 percent (40pl), 50 percent (50pl) or 60 percent (60pl) of the median equivalised household disposable income.

In terms of total cost, the 40pl and income-test reforms will be cheaper than the existing systems, with a budget of 49 percent and 84 percent, respectively, of the budget for existing benefits. However, the number of benefit entitlements will be also significantly smaller, only 30 percent and 43 percent, respectively, of the number of the 2007 benefit recipients. The budget-neutral, flat-rate benefit will have nearly the same number of benefit entitlements, 89 percent. The other two scenarios, 50pl and 60pl suggest higher spending, equal to 1.03 and 1.96 times the 2007 budget. Both scenarios will provide fewer entitlements, 57 percent and 89 percent, respectively.

Table 7 shows that, under the cheapest scenario, the 40pl reform, the reduction in the poverty gap and severity (0.9pp (equal to 14 percent) and 1.1pp (equal to 32 percent), respectively) would be greater than by the observed in the EU-SILC 2007 benefits (but less than by the simulated entitlements). The next cheapest option, the income-test reform, would have a larger reduction effect on the rates (larger than by the observed benefits as well as simulated entitlements). After the changes, the benefits would reach more households below the poverty threshold and provide them with higher benefit amounts. As a result, the headcount would be reduced by 0.4pp (2 percent), and the poverty gap and severity both by 1.6pp (26 percent and 48 percent, respectively). These results highlight once again that the level of the benefits is too low and that there is potentially room for improvement.

The budget-neutral, flat rate reform would have much larger headcount reducing effect of 2.9pp (16 percent). The effect on both poverty gap and severity would be around 2-3 times higher than the effect of the 2007 observed benefits (although the effect on poverty severity will be lower compared to the effect of the simulated entitlements). Thus, at the same cost, policy effectiveness in terms of poverty reduction can be significantly increased.

The 50pl reform would have a larger effect on the gap and severity (1.8pp (equal to 28 percent) and 1.7pp (equal to 50 percent) reduction, respectively) but no effect on the headcount (the same as the 40pl reform). Finally, the 60pl reform would have the largest poverty reducing effect leading to the headcount, gap and severity falling by 3.4pp (19

percent), 3.1pp (50 percent) and 2.2pp (66 percent), respectively.[15]

'place Table 7 here'

The results in this section are purely illustrative. By exploring five reform scenarios we show that there is a large scope for policy improvement which, if further explored, could contribute to better targeting of the benefits to those in need, more adequate income support, and a significant reduction in poverty.

6. Conclusion

In recent years, poverty has been increasing in Bulgaria, rising from 14 percent in 1999 to 21 percent in 2012. One of the explanations for this is the small impact that social transfers have on poverty, which could in turn partly reflect low levels of expenditures on social protection but may also be due to poor policy design or implementation.

We provide a comprehensive assessment of the performance of the three largest means-tested benefits in Bulgaria combining household survey data with estimates of entitlements to benefits produced by the tax-benefit microsimulation model EUROMOD. We measure their performance in terms of targeting by estimating rates of benefit non take-up, leakage, exclusion of the poor, inclusion of the non-poor and the extent to which they reduce poverty. The paper contributes to the existing literature by providing some of the first measures of non take-up and leakage for an Eastern European country and of the benefits under study.

The analysis finds very high rates of non take-up, leakage of the benefits to non-entitled households, exclusion of a large part of the poor, and inclusion of non-poor households and families mainly positioned in higher income deciles. Depending on the definition of benefit non take-up, we find that more than 40 percent of the households entitled for HA and GMI do not claim the benefits. Although GMI is a benefit intended to have a widespread coverage of the population, due to the very low income-test and, possibly, due to stigma, it has the smallest number of entitled and, together with HA, the highest rate of non take-up. In contrast, the child benefit CA, the entitlement to which is mainly defined based on the age of the children and a higher income-test, has a higher take-up, suggesting lower associated

[15] It should be noted that poverty rates are not reduced by 100% because the definitions of the income-test and the equivalised income used for estimating the poverty indicators differ.

stigma with claiming the benefit or lower information costs.

Furthermore, a large proportion of the beneficiaries have incomes exceeding the income-test which should disqualify them from entitlement. This high rate of leakage could be explained by a failure of the social workers to administer the programmes correctly, by corruptions of civil servants through bribes or by under-declaring of claimants' incomes to the tax authorities. In either case, the very low performance of the benefits raises serious concerns about the quality of the programme implementation. We consider possible biases in the results that would arise if benefit receipt were underreported in EU-SILC, and calculate upper and lower bounds around the rates: the findings of the paper remain robust to these checks.

In addition, despite the objectives of the programmes to cover basic needs and provide income support to the vulnerable, the level of the benefits and the coverage of the poor population are too low to have a significant poverty-reducing effect.

Taking a longer-term perspective, since 2007, not much has been done in terms of reforming the Bulgarian means-tested benefit system. The main changes have been to income-thresholds and benefit levels although we should note that statutory indexation rules are missing and the increases have lagged growth in prices and/or earnings (see Boshnakov et al., 2012 and Boshnakov et al., 2014). Given that the three benefits form the bulk of the social security budget spent on the poor, and given the increase in poverty in Bulgaria over the last decade, the results show that there is a need for policy improvement. We consider five potential reform scenarios and show that, even without increasing spending, the government could achieve the provision of more adequate income support and a significant reduction in poverty.

Appendix 1

Appendix 1 describes in detail the characteristics of the underlying household survey data from the European Union Survey on Income and Living Conditions (EU-SILC). The response rate of the EU-SILC survey is 66.6%. Household non-response is mainly due to the following three reasons. First, 7.3% of the households did not respond because e.g. it was not possible to contact them at their address. Second, 26% of the households that were contacted did not complete the interview due to refusal to cooperate, absence of household members or

entire household, objective inability to respond, etc. Furthermore, due to person's non-response and inability to impute the missing data, 5 households were dropped from the sample. Children born after the income reference period were also excluded. The final sample size consists of 4,339 households represented by 12,148 individuals.

The National Statistical Institute (NSI) in Bulgaria, responsible for the collection of the data, has carried out various data cleaning and imputation procedures in case of income misreporting and unit non-response. For example, all gross income values have been checked against their net values. Lower and upper bounds based upon the national legislation have been also used as a check on most of the recorded social benefits and pensions. Administrative data from the National Social Security Institute, other administrative sources and data from previous waves of the longitudinal EU-SILC have been used for a comparison against extreme income values.

An example of the checks carried out by the NSI is in regard to the contributory family-related benefits. If an individual receives such benefits she is generally not eligible for non-contributory social assistance benefits. NSI checks for consistency and makes data adjustments accordingly. Other adjustments are carried out if reported benefit amounts exceed the maximum possible payments, e.g. in the case of benefits for unemployment, old-age, survivor, sickness and disability benefits. The data have also been corrected for possible double-reporting of income components.

In regard to the two social assistance benefits, HA (Q30.1) and GMI (Q30.3), the question asked in the household EU-SILC questionnaire is: "Q.30 Have you or another member of the household received some of the following social benefits during 2007 for: Q30.1 assistance payments for heating; Q30.2 monthly assistance payments for rent; Q30.3 monthly monetary benefit for low income, Q30.4 lump-sum social aid for satisfying accidentally occurred health, educational, communal, household and other needs." The respondent has to give answers for each of the benefits. If in receipt of the benefit, the respondent has to provide information on the duration of receipt and benefit amount.

For the CA (Q32.3), the question in the survey is: "Q32 Have you or another member of the household received some of the following monthly family/children benefits during 2007 for: Q32.1 monthly benefits for bringing up a child younger than 1; Q32.2 monthly benefit for

bringing up child with permanent disabilities; Q32.3 monthly child benefits till 18 years of age; Q32.4 monthly child benefits till 20 years of age with permanent disability". Here as well, the respondent has to give answer on the duration and amount of each of the benefits.

The three benefits in the analysis are among the largest and most popular means-tested benefits in Bulgaria and their names are distinctive from each other suggesting they target different types of needs (provision of minimum income level, cash support for heating and support for children). Therefore, we do not have any reason to believe that respondents might not be aware of the name of the benefit if they receive it or that they have misreported it under a different benefit.

In terms of validating the income variables reported in EU-SILC, we did extensive checks as part of validating the entitlements simulations done by EUROMOD. We compared information on market incomes, benefits, pensions and taxes and social insurance contributions (number of recipients/contributors and aggregate amounts) with data from national accounts, Household Budget Survey estimates, and administrative data from the National Social Security Institute and Agency for Social Assistance. Where there were deviations between EU-SILC reported data, EUROMOD simulation results and data from external sources, these were carefully studied and explained by Boshnakov et al. (2012).

For employment income, Boshnakov et al. (2012) report that EU-SILC, relative to national accounts data, overestimates both the number of individuals with employment income (by 32.5 percentage points) and the total employment income (by 13.9 percentage points) which they explain could be due to informal employment and wages not accounted for in the national accounts. The average employment income in the survey is, however, 14.1 percentage points lower than the national accounts average which could be explained by the extra employees in EU-SILC reporting low amounts of income on average (this could reflect informal earnings or underreporting of amounts in EU-SILC; there is no evidence of the relative size of either issue).

For self-employment income, there are discrepancies between the definition of self-employed in EU-SILC and the one in the national accounts data which makes the comparison between the two sources problematic. Nevertheless, a comparison between the two sources shows the following: The number of self-employed in EU-SILC is exactly half the number reported in

national accounts (see Boshnakov et al., 2012). The national accounts data for the total amount of self-employment income is captured in the category "Net operating surplus and net mixed income" for the households. The total amount of self-employment income reported by respondents in EU-SILC is only 32.5% of the figure on "Net operating surplus and net mixed income" from the national accounts data (see here: http://nsi.bg/en/content/5547/annual-data).

For rent, the national accounts figure which captures officially declared rents shows a very small amount compared to the one reported in EU-SILC.

Public pensions and other benefits that enter the income-test for the three benefits studied in the paper seem to be well captured by EU-SILC. For more detailed information on EU-SILC data and EUROMOD simulations, see Boshnakov et al. (2012).

To sum up, we find limited evidence on the extent of income underreporting in EU-SILC and among the recipients of HA, GMI and CA. This does not allow us to measure the direction or size of a potential bias in the results.

Appendix 2

To explore the possibility that our results on non take-up and leakage can be explained by measurement error in the income data, we performed a simulation. As Hernandez & Pudney (2007) argue, estimating jointly the extent of measurement error and non take-up based purely on data on incomes that contains measurement error is very challenging. Nevertheless, we present the results for illustrative purposes.

First, we simulated income data which is log-normally distributed and identical in their statistical moments (mean and variance by income centiles) to the income data observed in EU-SILC and based on which benefit entitlements are assessed. As this exercise is for illustrative purposes we assumed that the simulated income data represent true incomes as opposed to the EU-SILC data which contain measurement error. Second, as the targeting measures are assessed at the household level, the number of observations in the simulated data equals the number of households in EU-SILC. Third, we simulated entitlement to the three benefits HA, GMI and CA assuming full take-up and no leakage. We added to the (log of the) simulated income data a random term with a mean of 0 which is normally distributed. In summary, the simulations show that such type of measurement error does not seem to generate a pattern of income misreporting that would explain the results in the paper.

Specifically, we assumed different values for the standard deviation of the random term which showed the following results, also reported in Table A2:

A random term with standard deviation of 0.35 would re-produce (almost) the same non take-up rate based on the second definition for HA and leakage rate for CA observed in the paper. The generated non take-up rate based on the first definition for HA, non take-up rates (both definitions) for GMI and CA as well as leakage rates for HA and GMI would be lower than the ones estimated in the paper. Notably, the standard deviation of the income will be increased by a substantial 22 percent.

Increasing the standard deviation of the random term to 0.4 would result in an even larger 29 percent increase in the standard deviation of the income data. The simulations show that the non take-up rate based on the second definition for HA and the leakage rate for CA will be slightly overestimated. The non take-up rate based on the second definition for GMI will be re-produced at a level as estimated in the paper. However, the non take-up rates based on the first definition for HA and GMI and both definitions for CA will continue to be underestimated. The leakage rates for HA and GMI will be still nowhere near the rates estimated in the paper.

Introducing a random term with standard deviation of 0.6 would add a lot of noise to the income data – a 70 percent increase in the standard deviation. The simulations show that the leakage rate for CA and the non take-up rates based on the second definition for HA and GMI will be overestimated. However, adding the random term to the income data will generate almost the same non take-up rates based on the first definition for HA and GMI as the ones estimated in the paper. The non take-up rates for CA and leakage rates for HA and GMI will yet not be achieved by this simulation.

The non take-up rates for CA would be about the same as in the paper if the random term has a standard deviation of 1.2. However, this will also result in 6 times increase in the standard deviation of the income data.

The leakage rates for HA and GMI estimated in the paper cannot be achieved by any plausible value of the standard deviation of the random term (as we increase the standard deviation, leakage rates for both benefits converge to around 50%, which is about 20-30 percent lower than the rates estimated in the paper).

Table A2: Comparison between non take-up and leakage rates estimated in the paper and from a simulation exercise

		Estimates in the paper (EIP)	Simulation results after adding a random term to the income data									
			SD=0.35	Proportion of EIP	SD=0.4	Proportion of EIP	SD=0.6	Proportion of EIP	SD=1.2	Proportion of EIP	SD=1,000,000,000	Proportion of EIP
HA	Non take-up 1	66.4	47.7	0.7	52.3	0.8	65.5	1.0	80.0	1.2	90.8	1.4
	Non take-up 2	41.4	40.6	1.0	44.6	1.1	56.6	1.4	71.2	1.7	83.0	2.0
	Leakage	64.2	24.8	0.4	26.4	0.4	31.0	0.5	38.1	0.6	50.1	0.8
GMI	Non take-up 1	73.2	45.4	0.6	52.1	0.7	71.6	1.0	90.2	1.2	97.9	1.3
	Non take-up 2	46.9	40.9	0.9	47.2	1.0	65.8	1.4	85.8	1.8	95.6	2.0
	Leakage	67.6	16.1	0.2	17.7	0.3	23.3	0.3	33.5	0.5	50.0	0.7
CA	Non take-up 1	38.8	19.8	0.5	22.3	0.6	30.9	0.8	46.1	1.2	65.6	1.7
	Non take-up 2	33.9	16.5	0.5	18.3	0.5	24.3	0.7	34.7	1.0	48.6	1.4
	Leakage	19.4	19.5	1.0	21.6	1.1	28.2	1.5	37.5	1.9	50.0	2.6

Source: Author's calculations. *Note:* The random term is assumed to have a zero mean and to be normally distributed. SD stands for the standard deviation of the random term. The cells are highlighted in grey if the non take-up and leakage rates from the simulation exercise are equal or higher than the rates estimated in the paper. The simulations are based on 1,000 replications.

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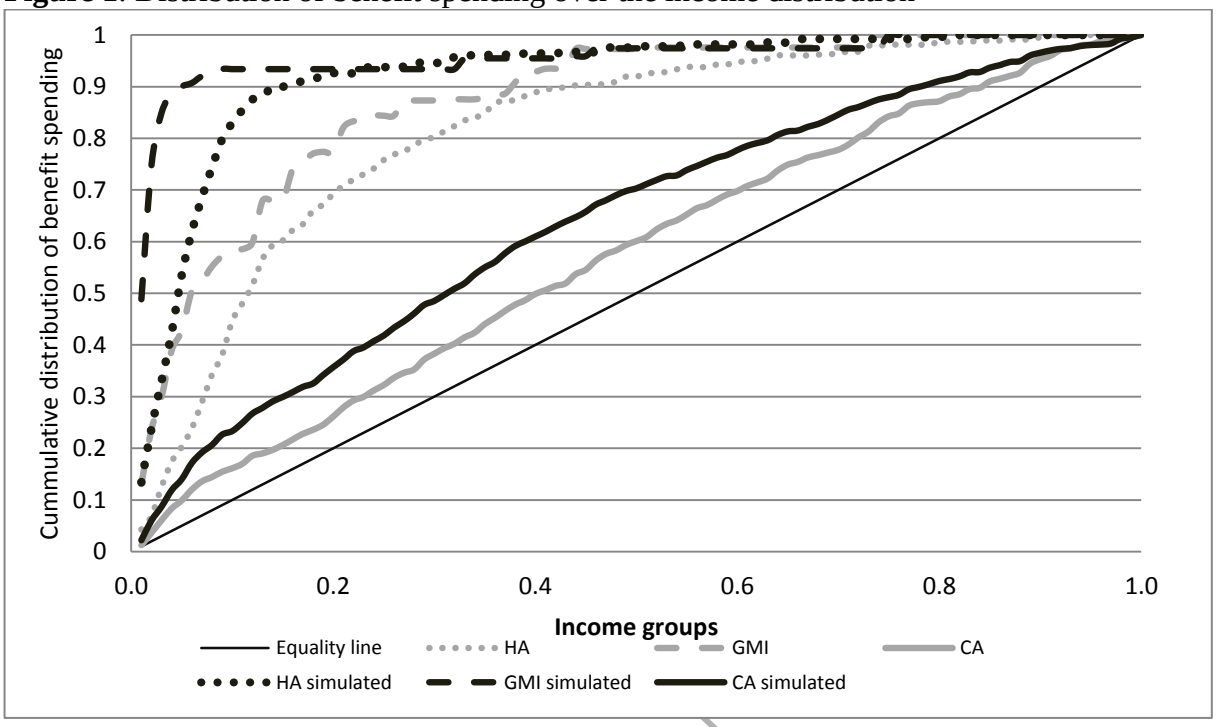
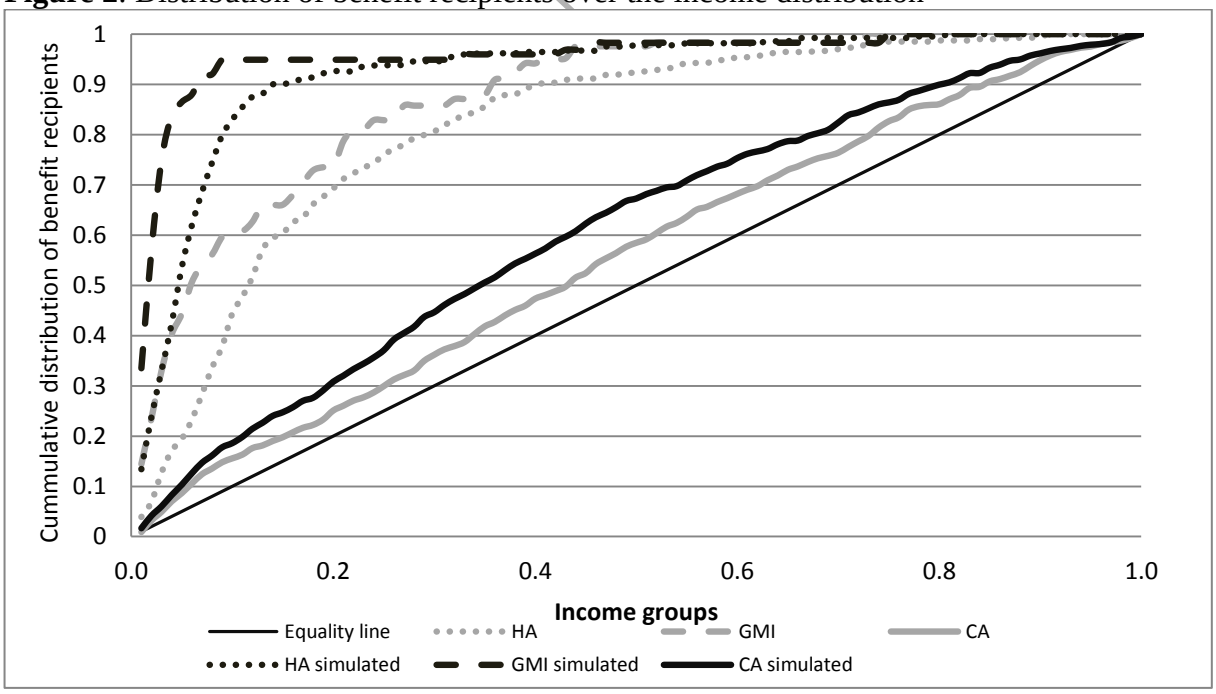
Figures

Figure 1: Distribution of benefit spending over the income distribution



Source: Author's calculations using EU-SILC 2008 and EUROMOD. *Note:* The income distribution is based on equivalised household incomes before receiving each one of the transfers in turn. The unit of analysis is the household.

Figure 2: Distribution of benefit recipients over the income distribution



Source: Author's calculations using EU-SILC 2008 and EUROMOD. *Note:* The income distribution is based on equivalised household incomes before receiving each one of the transfers in turn. The unit of analysis is the household.

Tables

Table 1: A comparison between EUROMOD, administrative figures and EU-SILC

	EUROMOD (1)	Admin figures (2)	Ratio (1/2)	EU-SILC (4)	Ratio (4/2)
A. NUMBER OF SIMULATED BENEFIT ENTITLEMENTS/REPORTED RECIPIENTS (IN THOUSANDS)					
HA	208	300	0.69	195	0.65
GMI	56	77	0.73	46	0.60
CA	927	835	1.11	808	0.97
B. TOTAL SPENDING (IN MILLION BGN)					
HA	47	83	0.56	39	0.47
GMI	57	66	0.87	35	0.53
CA	206	193	1.07	140	0.73

Source: EUROMOD: Author's calculations using EUROMOD. Administrative figures: Boshnakov et al. (2012). EU-SILC: EU-SILC 2008 for Bulgaria.

Note: EUROMOD number of simulated entitlements and EU-SILC number of recipients refer to households (GMA and HA) or children (CA). In the administrative figure, the number of GMI recipients equals the monthly-average number of recipients. The administrative figure for HA shows the total number of paid benefits, while for CA it refers to the number of children receiving the benefit. EUROMOD and EU-SILC figures are weighted.

Table 2: Value of benefit entitlement for those entitled to and in receipt of the benefits

	HA	GMI	CA
Mean value of benefit:			
Reported	17	63	24
Simulated for those simulated eligible + reporting a positive amount	19	121	33
Simulated for those simulated eligible + *not* reporting a positive amount	19	72	25
Sample size:			
Reported	364	71	774
Simulated for those simulated eligible + reporting a positive amount	119	23	587
Simulated for those simulated eligible + *not* reporting a positive amount	238	76	290

Source: Author's calculations using EU-SILC 2008 and EUROMOD.

Note: All rates are calculated at the household level. The mean benefit value is in the local currency, BGN. The reported benefits are taken from the EU-SILC data while eligibility and size of benefit entitlements (claimed and unclaimed) are simulated by EUROMOD.

Table 3: Targeting error rates

Benefit	Indicator	Rates	Standard error	95% conf. interval	
				2.5%	97.5%
HA	Non take-up 1	66.4	3.0	60.6	72.2
	Non take-up 2	41.4	2.3	37.0	45.9
	Leakage	64.2	3.1	58.2	70.2
	Exclusion of the poor	77.3	1.5	74.4	80.1
	Inclusion of the non-poor	33.9	2.9	28.1	39.6
GMI	Non take-up 1	73.2	5.4	62.6	83.8
	Non take-up 2	46.9	4.8	37.4	56.4
	Leakage	67.6	6.4	55.2	80.1
	Exclusion of the poor	94.0	1.0	92.2	95.9
	Inclusion of the non-poor	27.1	5.9	15.6	38.7
CA	Non take-up 1	38.8	1.8	35.2	42.4
	Non take-up 2	33.9	1.7	30.6	37.1
	Leakage	19.4	1.7	16.0	22.8
	Exclusion of the poor	30.0	3.4	23.5	36.6
	Inclusion of the non-poor	77.9	1.7	74.5	81.2

Source: Author's calculations using EU-SILC 2008 and EUROMOD.

Note: All rates are calculated at the household level. Bootstrap procedure has been used to calculate the standard errors and confidence intervals. The bootstrap is based on 1,000 replications of the total household sample.

Table 4: Targeting error rates adjusted for benefit underreporting – based on a comparison between EU-SILC and EUROMOD

	HA			**GMI**			**CA**		
	baseline estimate	lower bound	upper bound	baseline estimate	lower bound	upper bound	baseline estimate	lower bound	upper bound
Imputations: non-recipients		entitled	non-entitled		entitled	non-entitled		entitled	non-entitled
Non take-up 1	66.4	60.3	66.4	73.2	56.4	73.2	38.8	24.7	38.8
Non take-up 2	41.4	37.6	*39.9*	46.9	36.1	*42.4*	33.9	21.5	*30.1*
Leakage	64.2	60.3	66.4	67.6	56.2	73.1	19.4	16.3	32.2
Imputations: non-recipients		poor	non-poor		poor	non-poor		poor	non-poor
Exclusion of the poor	77.3	74.9	77.3	94.0	92.4	94.0	30.0	0	30.0
Inclusion of the non-poor	33.9	31.7	37.9	27.1	22.5	39.4	77.9	71.1	89.1

Source: Author's calculations using EU-SILC 2008 and EUROMOD.
Note: All rates are calculated at the household level.

Table 5: Targeting error rates adjusted for benefit underreporting – based on a comparison between EU-SILC and administrative figures

	HA			**GMI**			**CA**		
	baseline estimate	lower bound	upper bound	baseline estimate	lower bound	upper bound	baseline estimate	lower bound	upper bound
Imputations: non-recipients		entitled	non-entitled		entitled	non-entitled		entitled	non-entitled
Non take-up 1	66.4	16.2	66.4	73.2	20.4	73.2	38.8	35.6	38.8
Non take-up 2	41.4	10.1	*31.5*	46.9	13.1	*35.0*	33.9	31.0	*32.9*
Leakage	64.2	41.8	76.7	67.6	41.3	80.3	19.4	18.6	22.8
Imputations: non-recipients		poor	non-poor		poor	non-poor		poor	non-poor
Exclusion of the poor	77.3	58.9	77.3	94.0	88.8	94.0	30.0	17.9	30.0
Inclusion of the non-poor	33.9	22.1	56.9	27.1	16.5	55.7	77.9	75.0	81.0

Source: Author's calculations using EU-SILC 2008 and EUROMOD.
Note: All rates are calculated at the household level.

Table 6: FGT poverty figures (in %) (change in percentage points (pp))

		Post-transfer			
Poverty indicator	Pre-transfer	Observed benefits	Change in pp	Simulated benefits	Change in pp
Headcount	18.10	17.99	-0.12	17.98	-0.13**
Gap	6.31	5.74	-0.58***	4.95	-1.37***
Severity	3.34	2.79	-0.55***	1.90	-1.44***

Source: Author's calculations using EU-SILC 2008 and EUROMOD.
Note: The poverty line is equal to 60% of the median equivalised household disposable income in each scenario.
* p<0.1, ** p<0.05, *** p<0.01

Table 7: FGT poverty figures (in %) under different reform scenarios (change in percentage points (pp))

		Post-transfer									
Poverty indicator	Pre-transfer	Income-test	Change in pp	Budget-neutral, flat rate	Change in pp	40pl	Change in pp	50pl	Change in pp	60pl	Change in pp
Headcount	18.10	17.75	-0.35***	15.25	-2.86***	18.10	0	18.10	0	14.68	-3.43***
Gap	6.31	4.69	-1.62***	4.69	-1.63***	5.44	-0.88***	4.56	-1.75***	3.18	-3.13***
Severity	3.34	1.73	-1.61***	2.21	-1.13***	2.28	-1.05***	1.67	-1.67***	1.13	-2.20***

Source: Author's calculations using EU-SILC 2008 and EUROMOD.
Note: The poverty line is equal to 60% of the median equivalised household disposable income in each scenario. * p<0.1, ** p<0.05, *** p<0.01