# Poverty- Dominant Reforms of Transfer Program in Bulgaria

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**Abstract:**

The impact of Bulgarian transfer programs on poverty alleviation will be analyzed in this paper using a Program Dominance curve methodology proposed by Duclos, Makdissi and Wodon (2005)[1].The study of PD curves, including targeting dominance curves and allocation dominance curves, can help to determine whether marginal program reforms are poverty dominant for a large range of classes of poverty indices and a wide choice of poverty lines. This paper also discusses ways to reduce poverty by analyzing economic efficiency costs.

**Keywords:** Efficiency costs, Foster-Greer-Thorbecke indices, Poverty line, Program dominance, Stochastic dominance, Targeting Dominance, Transfer programs

[1] Jean-Yves Duclos, Paul Makdissi and Quentin Wodon, *"Poverty-Dominant Transfer Programs: The Role of Targeting and Allocation Rules,"* Journal of Development Economics, Vol.77, No. 1 (2005) 53-57.

## 1. Introduction:

Governments in both developed and developing countries are constantly struggling to reduce poverty. The agencies that are charged with this task have many different techniques at their disposal, including subsidies on food, education and health. In Bulgaria, many programs are designed to reduce the number of people living below the poverty line, such as the Guaranteed Minimum Income Program and Child Allowances. These programs were somewhat successful in alleviating poverty and played a significant role in improving the lives of the poor.

Economists typically use cardinal measurement to assess a country's poverty level. Poverty indices are used to compare the level of poverty before and after a program's introduction and to draw conclusions about how well the programs work. However, this approach could be criticized because of the sensitivity of these poverty indices to the economist's choice of poverty line. Another problem is the changing in programs could cause the different economic deadweight loss thus to efficiency costs. To counteract this problem, I have decided to use ordinal methods based on stochastic dominance literature. Stochastic dominance curves allow us to make a robust comparison of distribution corresponding to their level of poverty and inequality. It has many classes of ethical orders[2]; These classes refer to "orders of normative judgment"; an order can be denoted as s=0,1,2,3,... The interpretation of each order is as follows:

- The first-order judgment is that poverty indices decrease as a single

[2] Jean-Yves Duclos and Abdelkrim Araar, *Poverty and Equity Measurement, Policy, and Estimation with DAD,* (New York: Spring and Ottawa: International Development Research Center, 2006), 155-172

person's income increases, meaning that all incomes except for this one person's remain the same. These indices also obey symmetry or anonymity axiom;[3]

- Second-order indices are such indices that obey the Pigou-Dalton citation, which means that social welfare must be improved after a mean-preserving redistribution from the relatively rich persons to the poorer persons;
- Third-order indices belong to second-order indices and are sensitive to favorable composite transfers, which is made up of a beneficial Pigou-Dalton transfer within a lower part of the distribution, coupled with a reverse Pigou-Dalton transfer within an upper part of the distribution,[4] without change in the variance of the distribution.

We can define higher order by using generalized transfer principle of Fishburn and Willig (1984)[5]. For instance, fourth-order indices are made up of an unfavorable pair of transfers occurring in the higher part of distribution and a favorable pair of transfers occurring in the lower part of distribution. For a given order, if two stochastic dominance curves do not intersect, then all indices will give the same results for two distributions. When the first, second, third, or higher order is implemented, the respective improvements are known as Pen-improving, Dalton-improving, Kolm-improving and higher order

[3] Symmetry or anonymity axiom is that interchange the distribution of two income level will not affect the distributive indices.

[4] Jean –Yves Duclos and Paul Makdissi, *"Restricted and unrestricted dominance for welfare, inequality, and poverty orderings,"* Journal of Public Economic Theory 6 (1) (2004), 145-164.

[5] Fishburn, P.C. and R.D. Willig, *"Transfer Principles in Income Redistribution,"* Journal of Public Economics 25 (1975), 323-328.

welfare-improving reform. According to Foster and Shorrocks (1988a[6], 1988b[7], and 1988c[8]), for a wide range of poverty lines, poverty orderings of FGT indices are equivalent to stochastic dominance orderings.

The idea of Program Dominance (PD) is based on Stochastic Dominance and PD curves which exhibit a similar concept as Consumption Dominance (CD) Curves, which are used by Makdissi and Wodon(2002)[9] for the analysis for indirect tax reforms. The only difference is that CD curves concentrate on the variations in poverty due to the price changing whereas PD curves focus on the assessment of the impacts of program changes on poverty. A program reform is regarded as a "poverty dominant" program if it decreases poverty robustly under the Program Dominance literature. Essentially[10]:

- First-order PD( $PD^1(z)$ ) curves indicate the share of total program benefits among those individuals at a given income level;
- second-order PD ( $PD^2(z)$ )curves explain the cumulative share of program benefits of those individuals with an income below a given threshold;
- Higher-order PD curves weight program benefits by increasingly higher powers of poverty gaps.

Increasing proportional expenditures on a given program *k* and decreasing corresponding expenditures on another program *l* is said to be poverty

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[6] Foster, J., Shorrocks, A.F., *"Poverty orderings,"* Econometirca: Journal of the Econometric Society 56 (1988a), 173-177.

[7] Foster, J.E., Shorrocks, A.F., *"Poverty orderings and welfare dominance,"* Social Choice and Welfare 5(1988b), 179-198.

[8] Foster, J.E., Shorrocks, A.F., *"Inequality and poverty orderings,"* European Economic Review 32 (1988c), 654-662.

[9] Paul Makdissi and Quentin Wodon, *"Consumption Dominance Curves: Testing for the Impact of Indirect Tax Reforms on Poverty,"* Economics Letters 75 (2002), 227-235.

[10] Jean-Yves Duclos, Paul Makdissi and Quentin Wodon, *"Poverty-Dominant Transfer Programs: The Role of Targeting and Allocation Rules,"* Journal of Development Economics, Vol.77, No. 1S (2005), 53-57.

dominant if, for all poverty lines up to $z^+$ and for all poverty indices of a given order, PD curves of program *k* are above PD curves of program *l* at the given order.

PD curves consist of targeting dominance (TD) curves and allocation dominance (AD) curves. TD curves tend to focus on those receiving benefits, while AD curves focus on the differences between PD curves and TD curves. A program is considered to be targeted well if it reaches more poor than non-poor persons, while a good allocation distributes a higher percentage of benefits to poor persons compared to non-poor. For simplicity, this paper focuses on the analysis of program dominance curves and targeting dominance curves.

The objective of this paper is to suggest possible reforms that would reduce poverty through methodologies of Program Dominance, Targeting Dominance and Allocation Dominance. It also explains that different efficiency costs could result in a different conclusion of the comparison at a given order of dominance. In addition, this paper focuses on analysis based on marginal program reforms. According to Feldstein (1975)[11], due to the fact that the actual changes take a long time and no estimation of individual demand and supply functions is needed to evaluate the welfare changes, it is advantageous to focus on marginal reform of programs which can simplify the analysis.

The method described above is used to illustrate the comparison of

[11] Feldstein, M.S., *"The income tax and charitable contributions: Part I. Aggregate and distributional effects,"* National Tax Journal 28 (1975), 81-100.

program reforms in Bulgaria. Some of these programs include:

- Unemployment benefits programs designed to keep those people who dropped out of the labor market from being impoverished and becoming unemployed in the long term ;
- A retirement program, which has become the major source of income for approximately 30 percent of the Bulgarian population, and is intended to reduce the poverty among the retirees;
- A disability program aimed to aid those people who have lost 50 percent of their working abilities;
- Child allowances, introduced on April 1st 2002 , which transfers cash into those families who have children and have income level lower than 150BGN per month[12];
- The objective of the Guarantee Minimum Income(GMI) program, which ensures people's living standard above the official poverty threshold
- Heating subsides allocated the subsidies to those families and persons who did not benefit from the social assistance program during wintertime.

In conclusion, all the programs above are made to reduce the poverty level in Bulgaria. This paper will identify which program is the most desirable to implement.

The structure of this paper is as follows: section 2 introduced the basic

[12] Bulgarian fixed rate: 1EUR=1.95583BGN exchange rate: 1 CAD =1.2431CAD as of July 20, 2009,according to Bulgarian National Bank

definitions and methodologies; section 3 is the empirical analysis based on the methodologies introduced in section 2 and section 4 is the conclusion.

## 2. Methodology :

### 2.1 Poverty measurements

In general, economists use cardinal and ordinal measurements to assess the poverty level of countries. The poverty gap approach is the most popular approach for cardinal measurement. The approach consists of transforming income into poverty gaps by means of a poverty line, and computing these poverty gaps using poverty indices. Aggregating functions are then used to analyze social welfare. Poverty indices are likely to decrease when a rise in someone's income improves their social welfare. Foster-Greer-Thorbecke (FGT) class (1984)[13] indices which satisfy the above conditions are the particular additive poverty indices used to calculate poverty gaps. However, because cardinal measurements of poverty are sensitive to the choice of poverty line and indices, it is necessary to use an ordinal method to assess the robustness of poverty comparisons. In other words, an ordinal method is used to evaluate whether poverty has declined after program reform for a broad class of poverty indices and for any choice of poverty line.

#### 2.1.1 Poverty effects

All additive indices may be written as $p(z) = \int_0^a p(y,z)dF(y)$, where z is the poverty line and $p(y,z)$ is the contribution of an individual with income to

[13] Foster, J., Greer,J., Thorbecke, E., *"A class of decomposable poverty measures,"* Econometrica 52 (1984), 761-776.

poverty. Assuming first order class as $\Pi(z)$, all the indices that are included in this order will decrease if the income of individuals at some given percentile grows without a change in the income of others. These indices are Paretian and obey the symmetry or anonymity axiom: interchanging any two individuals' incomes would not change the poverty indices. This class can be described as[14]:

$$\pi^1(z) = \left\{ p(z) \middle| \begin{matrix} p_y^1(y,z) \leq 0 \text{ when } y \leq z \\ z \leq z^1, \end{matrix} \right\},$$

Where $p_y^1(y,z)$ is the first derivative respect to y.

The second class of poverty indices belongs to the first class and includes those indices that obey the Pigou-Dalton principle. This principle assumes that the wellbeing of society must improve after a mean-preserving redistribution from a richer individual to a poorer individual. In other words, the poverty indices which belong to the second order class are always expected to decrease when income is re-allocated equally among individuals.

$$\pi^2(z) = \left\{ p(z) \middle| \begin{matrix} p(y,z) \in \pi^1 \\ p_y^2(y,z) \geq 0 \text{ when } y \leq z \\ y(z,z) = 0, \end{matrix} \right\}$$

Similarly, third-order indices belong to second-order indices and are sensitive to favorable composite transfers. Favorable composite transfers are composed of a beneficial Pigou-Dalton transfer within a lower part of the distribution, coupled with a reverse Pigou-Dalton transfer within an upper part of the

[14] Jean-Yves Duclos and Paul Makdissi, *"Restricted and unrestricted dominance for welfare, inequality, and poverty orderings,"* Journal of Public Economic Theory, 6(1) (2004),145-164

distribution,[15] without a changing in the distribution variance. Even though there is an unfavorable transfer happening at a higher percentile of the distribution, the transfers are still regarded as reducing poverty since the favorable transfer taking place at the bottom of the distribution is more significant.

$$\pi^3(z) = \left\{ p(z) \middle| \begin{array}{c} p(y,z) \in \pi^1 \\ p_y^3(y,z) \leq 0 \text{ when } y \leq z \\ p(y,z) = 0 \text{ and } p_y^1(y,z) = 0, \end{array} \right\}$$

In conclusion, poverty indices belong to $\pi^s(z)$ if

$$(-1)^s p_y^s(y,z) \leq 0 \text{ and if } p^s(z,z) = 0 \text{ for } i = 0,1,2 \ldots, s-2$$

As order s increases, the generalized transfer principle of Fishburn and Willig (1984) is used to interpret the indices of this class. For example, fourth-order indices can be interpreted as a combination of composite transfers, a favorable one occurring in the lower part of the distribution and an unfavorable one occurring in the higher part of the distribution. It is evident that the larger the order, the greater the transfers that occur at the lower part of the distribution contribute to the index.

2.1.2 Foster-Greer-Thorbecke (FGT) indices:

FGT indices, which are a particular subset of the additive indices aforementioned, are members of $\pi^s$ for $a \geq s-1$ and are defined as:

$$FGT_F^a(z) = \int_0^z \left(\frac{z-y}{z}\right)^a dF(y)$$

[15] Jean-Yves Duclos and Paul Makdissi, *"Restricted and unrestricted dominance for welfare, inequality, and poverty orderings,"* Journal of Public Economic Theory, 6(1) (2004),145-164

When the inequality aversion in poverty measurement is $a>0$, $(z-y)$ is the poverty gap, where *z* is the poverty line and y is individual's income. These indices signify the contribution of individuals at different ranks to total poverty, and this contribution is defined by $(\frac{z-y}{z})^a$. When $a$>1 and $a$ increases, the total poverty contributions from those who suffer most severely will rise, and this inequality among impoverished people will increase the cost to resolve poverty. When $a$=0, this is known as the headcount ratio and it is the simplest and the most commonly used index. It can be expressed as the absolute number of population whose incomes are below the poverty line. In this case, poor populations would contribute a constant of 1 while rich populations would contribute a constant of 0. Another unique case is when $a$= 1, the normalized average poverty gap $FGT_F^1(z)=\int_0^z \frac{(z-y)}{z} dF(y)$ is achieved, representing the social poverty gap, where inequality exists and there is no cost to resolve the poverty. When $a$ is located between 0 and 1, inequality in poverty will reduce poverty.

As proposed by Davidson and Duclos (2000)[16], we can compare welfare, poverty and inequality for any order through stochastic dominance curves that are draw by the following formula:

$$D^s(z)=\frac{1}{(s-1)!}\int_0^z [z-y]^{(s-1)} dF(y)$$

which can be obtained by a process of integrating: $D^1(z)=F(z)$ and

[16] Russel Davidson and Jean-Yves Duclos, *"Statistical Inference for Stochastic Dominance and for the Measurement of Poverty and Inequality,"* Econometrica, 68 (2002), 1435-1464.

$D^s(z) = \int_0^z D^{s-1}(y)dy$ for s=2,3,4... and is made up of poverty gap and linear transforms of FGT indices. For s=1, the stochastic dominance curve is also named "poverty incidence curve". For s=2, "poverty deficit" or "poverty intensity" curve will be given: the larger s value, the larger the poverty gaps contribute to the stochastic dominance.

2.1.3 The impacts of program reforms

Let *y* be equivalent income[17] and for simplicity we consider y as income, ranging from 0 to a. Let *F(y)* be cumulative distribution of y, and *f(y)* be the density of y. Assume program *k* transfers an average monetary amount $t_k(y)$ to each beneficiary with income y, therefore the targeting function is $\phi_k(y) = \tau_k(y) * f(y)$ (1) , where $\tau_k(y)$ is the proportion of the population that receives benefits from the program at a given income y. Integrating $\phi_k(y)$ yields the total share of the population that benefits from the program $\Phi_k(y)$, that is $\Phi_k(y) = \int_0^a \phi_k(y)dy$ (2)

The cumulative distribution function of beneficiaries is then defined as $G_k(y) = \frac{\int_0^y \phi_k(x)dx}{\Phi_k(y)}$ (3). The density function is $g_k(y) = \frac{dG_k(y)}{dy} = \frac{\phi_k(y)}{\Phi_k}$ (4), and to calculate the program's mean transfer across total population we use: $T_k = \int_0^a t_k(y)\phi_k(y)dy$ (5), but the average benefits among the recipients will be: $\bar{t}_k = \frac{T_k}{\Phi_k} = \int_0^a t_k(y)g_k(y)dy$ (6).

To determine the influence of marginal program reform we must consider

[17] Equivalent income is converted by equivalent scale. The incomes are weighted after household size and composition for a convenient comparison among different households.

the proportional changes in the transfer of the reform. An individual's initial income y will increase to $t_k(y)\Delta t_k$ after receiving the transfer. This impact can be written as sum of targeting and allocation impact:

$$t_k(y)\Delta t_k = \bar{t}_k\Delta t_k - \bar{t}_k\Delta t_k + t_k(y)\Delta t_k = \bar{t}_k\Delta t_k + (t_k(y) - \bar{t}_k)\Delta t_k \quad (7),$$

where $\bar{t}_k\Delta t_k$ is the targeting effect and $(t_k(y) - \bar{t}_k)\Delta t_k$ is the allocation effect. Since everyone's benefit increases by the same proportion, $\bar{t}_k\Delta t_k$ does not influence the concentration of program's benefits.

To evaluate the influence of marginal program reform on poverty, we considered the FGT poverty indices again:

$$FGT_F^a(z) = \int_0^z \left(\frac{z-y}{z}\right)^a dF(y) \quad (8)$$

The impact of a proportional change in the program on FGT indices can be shown as:

$$\frac{\partial FGT^a(z)}{\partial t_k} = \begin{Bmatrix} -t_k(z)\phi_k(z) \text{ if a} = 0 \\ -\alpha z^{-a}\int_0^z t_k(y)(z-y)^{\alpha-1}\phi_k(y)dy \text{ if a} > 0 \end{Bmatrix} \quad (9)$$

And this can be divided into a targeting and an allocation component, using formula (7), the targeting effect can be given by:

$$\frac{\partial \mathrm{FGT}^{\alpha}(z)}{\partial t_k} = \begin{cases} -\bar{t}_k \emptyset_k(z) & \text{if a} = 0 \\ -\alpha\, z^{-\alpha}\int_0^z (z-y)^{\alpha-1}\bar{t}_k \emptyset_k(y)dy & \text{if } a > 0 \end{cases} \quad (10)$$

And the allocation effect can be given by:

$$\frac{\partial \mathrm{FGT}^{\alpha}(z)}{\partial t_k} = \begin{cases} -(t_k(z) - \bar{t}_k)\emptyset_k(z) & \text{if a} = 0 \\ -\alpha\, z^{-\alpha}\int_0^z (t_k(y) - \bar{t}_k)(z-y)^{\alpha-1}\emptyset_k(y)dy & \text{if a} > 0 \end{cases} \quad (11)$$

With this formula, the different impacts of every type reforms on poverty

indices can be expressed as such: [18]

- The poverty impact of a "proportional" program change is such that to increase all the program transfers by the same proportion would leave the relative distribution of transfers among existing beneficiaries unchanged;
- The poverty impact of a "lump-sum" program change is such that to increase all the program transfers by the same absolute amount would leave the existing program recipients population unchanged;
- And the poverty impact of an "allocation" program change is such that to increase the spread of all transfers from their mean value proportionately will change the transfer's concentration index among recipients proportionately.

The program dominance curve can be now described as follows by using formula (9):

$$PD_k^s(z) = \left\{ \begin{array}{c} \frac{t_k(z)}{\bar{t}_k} g_k(z) \text{ if } s = 1 \\ (s-1) z^{1-s} \int_0^z (z-y)^{s-2} \frac{t_k(y)}{\bar{t}_k} g_k(y) dy \text{ if } s > 1 \end{array} \right\} \quad (12)$$

$PD_k^1(z)$ shows the weight of total program benefits shared by total population with income level $z^+$; $PD_k^2(z)$ explains the cumulative share of program benefits by those individuals with income z or less. Poverty gaps play a significant role in distributing the share of program benefits for $s > 3$.

According to the propositions from Duclos, Makdissi and Wodon (2005)[19]:

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[18] Jean-Yves Duclos, Paul Makdissi, and Quentin Wodon, *"Poverty-dominant program reforms: the role of targeting and allocation rules,"* Journal of development Economics 77 (2004), 53-73.

[19] Jean-Yves Duclos, Paul Makdissi, and Quentin Wodon, *"Poverty-dominant program reforms: the role of targeting and allocation rules,"* Journal of development Economics 77 (2004), 53-73.

Proposition 1: *A revenue-neutral marginal policy reform that increases all transfers under program k proportionately and reduces proportionately all those under program l will reduce poverty indices* $p(z) \in \Pi^s(z)$ *and for all poverty lines* $z \in [0, z^+]$ *if and only if*

$PD_k^s(y) - \gamma PD_l^s(y) \geq 0$ *for all* $y \in [0, z^+]$.

$\gamma$ is the economic efficiency costs of increasing resources allocation to program *k* relative to that of increasing resources allocation to program *l*. At a given order, $\gamma \prec 1$ indicates that allocating resources to program *l* will cause more efficiency cost that allocating resources to program *k*. By analogy, $\gamma \succ 1$ states that increased allocation of resources to program *k* is more desirable since it causes less economic efficiency cost. Assuming $\gamma = 1$ at the first order, the condition above implies that at the same given income level y the weight of total population at income y shares higher benefits from program *k* than program *l*, and this must hold for every income up to $z^+$. Meanwhile, under second order with the same efficiency cost value, the condition explains that the cumulative share of program *k* benefits among those individuals with income y or below is higher than the cumulative share with program *l* among the same individuals. Also, this holds true for every income level up to $z^+$. Overall for any order of poverty index classes the marginal program reform is poverty dominant if the PD curve for program *k* is higher than program *l*, and this holds true for all income levels. As a policy directive the program designer could raise the allocation of the resources to program *k* at the expense of

program *I* for the income level up to $z^+$ to improve the wellbeing of the targeted population.

An absolute "Lump-sum" amount change in the marginal program reform can be evaluated by targeting dominance curve, which can be defined as by using equation (10):

$$TD_k^s(z) = -T_k^{-1}\frac{\partial FGT^{s-1}(z)}{\partial t_k}\Big|_{T}$$

$$= \begin{cases} g_k(z) & \text{if } s = 1 \\ (s-1)z^{1-s}\int_0^z (z-y)^{(s-2)} g_k(y)dy & \text{if } s > 1 \end{cases} \qquad (13)$$

The first order TD curve is just the density of distribution of program beneficiaries at income z. The second order represents the weight of cumulative beneficiaries who have an income less than z- among total population. As order increases, it becomes a linear transformation of the $FGT_{GK}^{S-2}(Z)$ index.

The second proposition of Duclos, Makdissi and Wodon (2005)[20] states that *a revenue-neutral "lump-sum" marginal policy reform that increases the income of all recipients of program k by the same amount and decreases the income of all recipients of program I by the same amount will reduce poverty indices* $p(z) \in \Pi^s(z)$ *and for all poverty lines* $z \in [0, z^+]$ *if and only if*

$TD_k^s(y) - \gamma TD_l^s(y) \geq 0$ *for all* $y \in [0, z^+]$.

Similarly, AD curves can be used to test if a revenue-neutral allocation program reform could be a poverty dominant.AD curve as defined as by using

[20] Jean-Yves Duclos, Paul Makdissi, and Quentin Wodon, *"Poverty-dominant program reforms: the role of targeting and allocation rules,"* Journal of development Economics 77 (2004), 53-73.

equation (11):

$$AD_k^s(z) = -T_k^{-1}\frac{\partial FGT^{s-1}(z)}{\partial t_k}\Big|_A$$

$$= \begin{cases} \dfrac{t_k(z)-\bar{t}_k}{\bar{t}_k}g_k(z) & \text{if } s=1 \\ (s-1)z^{1-s}\displaystyle\int_0^z \frac{t_k(y)-\bar{t}_k}{\bar{t}_k}(z-y)^{(s-2)}g_k(y)dy & \text{if } s>1 \end{cases} \tag{14}$$

This can interpreted that it is poverty dominant to re-allocate the benefits of a program *k* if those living below the poverty line receive more than their share of the benefit for the first order, therefore benefit from the re-allocation or the spread $(t_k(y)-\bar{t}_k)$ and the poverty contributions $(z-y)^{(s-2)(y)}g_k$ is positively correlated.

According to Duclos, Makdissi and Wodon's third proposition[21], *a marginal reform of program k that increases the spread of all transfers proportionately from their mean will reduce all poverty indices* $p(z)\in\Pi^s(z)$ *and for all poverty lines* $z\in[0,z^+]$ *if and only if*

$AD_k^s(y)\geq 0$ *for all* $y\in[0,z^+]$.

For any order of classes, AD curves are simply the differences between PD curves and TD curves: these are the differences between benefits and beneficiaries.

Because this paper is focused on how well the programs work in Bulgaria, so I will focus on Program Dominance curves and Targeting Dominance curves.

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[21] Jean-Yves Duclos, Paul Makdissi, and Quentin Wodon, "*Poverty-dominant program reforms: the role of targeting and allocation rules*," Journal of development Economics 77 (2004), 53-73.

## 3. Social System in Bulgaria

### 3.1 Economic system in Bulgaria

EXPENDITURES BY FUNCTION (2003)[22]

| Expenditures By Function | Millions of BGN |
|---|---|
| I. GENERAL PUBLIC SERVICES | 1097.8 |
| II. DEFENCE AND SECURITY | 1787.7 |
| III. EDUCATION | 1504.7 |
| IV. HEALTHCARE | 1697.7 |
| ***V. SOCIAL SECURITY, SOCIAL SUPPORT AND CARETAKING*** | ***4805.2*** |
| VI. CONSTRUCTION, PUBLIC WORKS, UTILITIES AND ENVIRONMENTAL ISSUES | 497.3 |
| VII. RECREATION, RESORTS, CULTURE AND RELIGIOUS ACTIVITIES | 286.1 |
| VIII. ECONOMIC ACTIVITIES AND SERVICES | 1668 |
| IX. EXPENDITURES NOT CLASSIFIED IN THE OTHER FUNCTIONS | 724.2 |
| Expenses(total) | 14068.8 |
| Budget Balance: | 0.9 |
| Revenues and Grants(total) | 14069.7 |

| Expenditures By Function as % of GDP[23] | |
|---|---|
| I. GENERAL PUBLIC SERVICES | 3.2 |
| II. DEFENCE AND SECURITY | 5.2 |
| III. EDUCATION | 4.3 |
| IV. HEALTHCARE | 4.9 |
| ***V. SOCIAL SECURITY, SOCIAL SUPPORT AND CARETAKING*** | ***13.9*** |
| VI. CONSTRUCTION, PUBLIC WORKS, UTILITIES AND ENVIRONMENTAL ISSUES | 1.4 |
| VII. RECREATION, RESORTS, CULTURE AND RELIGIOUS ACTIVITIES | 0.8 |
| VIII. ECONOMIC ACTIVITIES AND SERVICES | 4.8 |
| IX. EXPENDITURES NOT CLASSIFIED IN THE OTHER FUNCTIONS | 2.1 |
| Revenues and Grants(total) | 40.6 |
| Budget Balance: | 0 |
| Expenses(total) | 40.6 |

The table above showed the government expenditure in Bulgaria, 2003. It is evident that in 2003, the Bulgarian government placed high emphasis on programs related to poverty reduction. The social security and social support

[22] Ministry of Finance of Republic of Bulgaria, *consolidated fiscal program1998-2008* http://www.minfin.bg/en/search/?q=expenditures,

[23] Resource from Ministry of Finance of Republic of Bulgaria,GDP in 2003: 34 628 000 000 BGN

programs were its single greatest expenditure, accounting for 13.9 percent of GDP.

3.2 Descriptions of the social system in Bulgaria:

The social protection system in Bulgaria is composed primarily of the social security system and the social assistance system, both of which are aimed at marginalized populations and those who tend to fall into poverty. This covers two thirds of the poor population and around half of the non-poor population. The social security system is responsible for various compulsory insurance programs, such as disability benefits, old age and survivors' benefits, illness and maternity aid, work injuries and job-related diseases, and the control of information services for all obligatory contributions[24]. In 2003, 51.3 percent of Bulgarians benefited from the social protection system, with retirees and the unemployed as the largest beneficiaries, covering over 28.8 percent of the population[25]. According to the Multipurpose Household Survey data, the implementation of the social security program decreased the population of the poor from 39.7 percent to 14 percent. The social assistance system, which is supplementary to the social security system, primarily benefits vulnerable families and those who have dropped out of the labor market and cannot take advantage of the social security system. The main functions of social assistance are to reduce poverty, to ensure that a household's standard living

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[24] Vassil Tsanov and Bogdan Bogdanov, eds. *"Bulgaria: Challenges of Bulgarian Poverty,"*(Bulgaria: National Statistical Institution and the Ministry of Labor and Social Policy) 2003.

[25] Resource from Multipurpose Household Survey data

is above the minimum level, and to transfer income to those people who are not insured due to unemployment.[26] It includes four main programs, each targeting a specific group: the minimum wage program, wintertime heating subsidies, subsides for those who have lost their capacity to work and child allowances. The first two groups are intended to support low income persons and families; the objectives of the other two programs are to help people with disabilities and support those individuals who have children but do not earn enough to sustain a family. The average of social insurance income in 2003 is 280.76BGN[27] and there are more than half of the poor households have received supports from at least one of the social assistance programs. It has reduced the poverty level from 17.6 percent before the transfers to 14 percent after the transfers. In another words, the number of poverty decreased by 18.1 percent.

Unemployment benefits and retirement benefits form the largest part in the social security system. Unemployment benefits are a temporary poverty relief tool designed to compensate the loss of labor related income and to keep the unemployed from falling into poverty. As a major component of the social security system, it covers 2.1 percent of the population, with 17.4 percent poor people and 82.6 percent non poor people receiving the unemployment compensation. To be eligible for unemployment benefits, one must have paid 9 months of social insurance contributions out of the last 15 months before the

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[26] Teodora Noncheva and Denitsa Satcheva, *"Study on the Social Protection Systems in the 13 Applicant Countries Bulgaria Country Study,"* Study financed by the European Commission- Employment and Social Affairs DG, 2003.
[27] Source from National Social Security Institution: http://www.noi.bg/en/index.html

end of one's payment. Furthermore the amount of the benefits depends on the average of the total payment of last nine months. In addition the period of benefits depends on the length of the existing contributing period and is calculated again according to data from the National Social Security Insurance (NSSI) website. The strictness of these criteria is intended to protect the system from those who wish to illegally acquire benefits. In 2003, the population eligible for the unemployment benefits was 94500, 17.9 percent of the total unemployed population. However, this number declined by 0.7 percent in 2004.[28] The adoption of above strict criteria, to some extent, contributed to the reduction the number of recipients from unemployment benefits.

The amount of unemployment benefits is adjusted by the Social Security Budget Act every year. In 2003 the national population received on average Unemployment benefits of 97.63BGN. In January 2005, 5% of the population received the amount up to 80BGN and the maximum amount of these benefits are 140BGN. [29] Unemployment benefits are an important part of the social security program, accounting for about 60% of the average monthly social security income,

Retirement benefits are the largest element of the Social Security System, covering 26.8 percent of the population, with 12.3 percent of poor pensioners

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[28] Vassil Tsanov and Bogdan Bogdanov, eds. *"Bulgaria: Challenges of Bulgarian Poverty,"*(Bulgaria: National Statistical Institution and the Ministry of Labor and Social Policy) 2003.

[29] National Social Security Institution, "*Statistical Reference book-Demography, Economy and Social Insurance for 1986-2006* (2007)

among all retirees and 87.7 percent of non poor pensioners. These benefits play a significant role in reducing poverty: in 2003 they became the major source of income for approximately 30 percent of the population. The legal retirement age in 2003 was 62 for men and 57 for women[30]. The qualification period is the sum of one's age and the length of their insurance payment. The claimants must score a certain number of points in order to qualify for pensions, at least 100 points for men and 90 points for women. In addition, a record of at least 15 years of insurance payments must be shown. However, uninsured elders who are over 70 are entitled to non-contributory social pensions. The average length of the retirement pension is 16 years and the minimum retirement pension is 44BGN, which is higher than the Guarantee Minimum Income level, 40BGN, which is considered as the official poverty threshold. As a result, the poverty among retirees is not high.

Disability pensions, also known as invalidity pensions, are given to a relatively small share of the population, only 4.2 percent. 17.4 percent of these beneficiaries are poor while the remaining 82.6 percentage of beneficiaries are not. They are designed for people who have lost at least 50 percent of their working ability. Meanwhile, the level of injury is determined by the Territorial Expert Medical Commission. For those who have passed this criterion the payment period depends on their Social Insurance Contributions. General disease insurance requires claimants to have already paid a one year period of

[30] Source from National Social Security Institution

insurance if they are 25 years of age; three years if they are 30 years of age, and five years if they are above age 40.[31]

Child allowances were introduced on April 1st 2002. Intended to support those families with monthly incomes lower than 150BGN per person, they target the largest cross-section of the population out of all the social assistance programs. The allowance amounts are determined by the Family Allowances Act[32]. As a program that has the widest coverage it has become a main source of income for approximately 20 percent of the country's households and has covered about 12 percent of persons. The percent of poor persons eligible for the allowances is 18.4, while the percent of non-poor persons eligible is 10.3. The program includes a one-time grant at birth, monthly allowances for children up to 18 years of age and monthly allowances for children less than twelve months old. All parents are eligible to receive 200 BGN for their first, second and third child and 100 BGN for each subsequent child. In 2003, the monthly allowance for children up to 18 years old was 200 BGN per family member. The program also granted 100 BGN every month to families who have children up to 12 months of age and who do not receive compensation for pregnancy, birth and or the raising of a child in accordance to the Social Insurance Code. For those families who have children with disabilities this amount will be paid until the child is 2 years old irrespective of their family's income. As the most important part of the social assistance program child

[31] Source from National Social Security Institution
[32] Resource based on the Social Assistance Agency, http://www.mlsp.government.bg/en/index.htm

allowances have done an admirable job not only on reducing the absolute poverty level by 0.8 percent but also by decreasing the extent of poverty by 15 percent and the falling severity of poverty coefficient by approximately 30 percent.[33]

The Guaranteed Minimum Income Program was introduced in 1991 to alleviate poverty through three distinct programs: monthly distribution, targeted distribution or immediate benefit allocation. The criteria for these programs are strict, including assessments of income, property, marital status, health, school attendance and employment. Because of this thorough examination and its stringent requirements, as well as its specific targeting, the program is only allocated to a relatively small part of the population: 3.2 percent of individuals and 3.6 percent of households[34] receiving monthly benefits. Although the program was designed for poor people, the number of non-poor persons that share the program is 1.7 percent. Of these three programs, targeted benefits comprise the largest share of benefits since they are targeted at persons whose consumption level is the lowest. The program is not as effective as other programs in alleviating poverty, only reducing the poverty level from 14.3 percent to 14 percent[35].

A subsided heating program is designed to allocate heating subsidies to socially disadvantaged families and persons during the wintertime and to bring

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[33] Source of Family Allowance Act, revised in December 2002

[34] Teodora Noncheva and Denitsa Satcheva, *"Study on the Social Protection Systems in the 13 Applicant Countries Bulgaria Country Study,"* Study financed by the European Commission- Employment and Social Affairs DG, 2003

[35] Source, MHS, 2003

their consumption level close to the poverty threshold. This program covers a relatively high proportion of population and more than half of the benefits are allocated to the poor, playing a significant role in poverty level reduction.

**4. Empirical illustration:**

4.1 Program Dominance Curve between each two programs:

All the reform programs above are intended to help the poor, in the hope that allocating income to them will increase their income and their consumption level, alleviating poverty. Using Distributive Analysis/Analyze distributive (DAD) software[36], I employed the above methodologies to attempt to identify poverty-reducing reforms . I will focus on:

- unemployment benefits,
- retirement benefits,
- disability benefits, and
- guaranteed minimum income (GIM) programs

since these programs are the primary components of the social protection system.

The illustration below uses data from the 2003 Integrated Household Survey conducted by the Bulgarian government's National Statistical Institution (NSI),[37]. Twenty eight regional managers and 80 specially trained interviewers were involved in this survey. The survey sample included 3023 typical

[36] The DAD software was conceived by Jean-Yves Duclos and Araar Abedlkrim and was programmed in Java by Araar Abdelkrim and Carl Frtin.

[37] Data can be found at World Bank website http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTLSMS/0,,contentMDK:21900811~menuPK:4196952~pagePK:64168445~piPK:64168309~theSitePK:3358997,00.html

Bulgarian households. This investigation used net household income in order to distinguish the household income spent on goods and services to ensure a basic well-being. The questionnaire collected information from all members of the household on demographic characteristics, migration, education, employment and health.

4.1.2 Comparison of first-order Program Dominance curves and Targeting Dominance curves

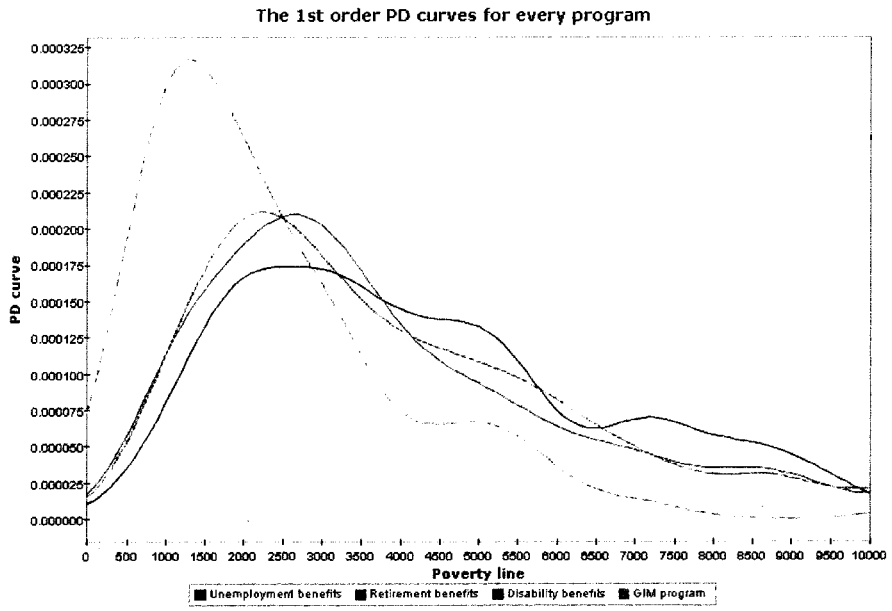


Figure 1

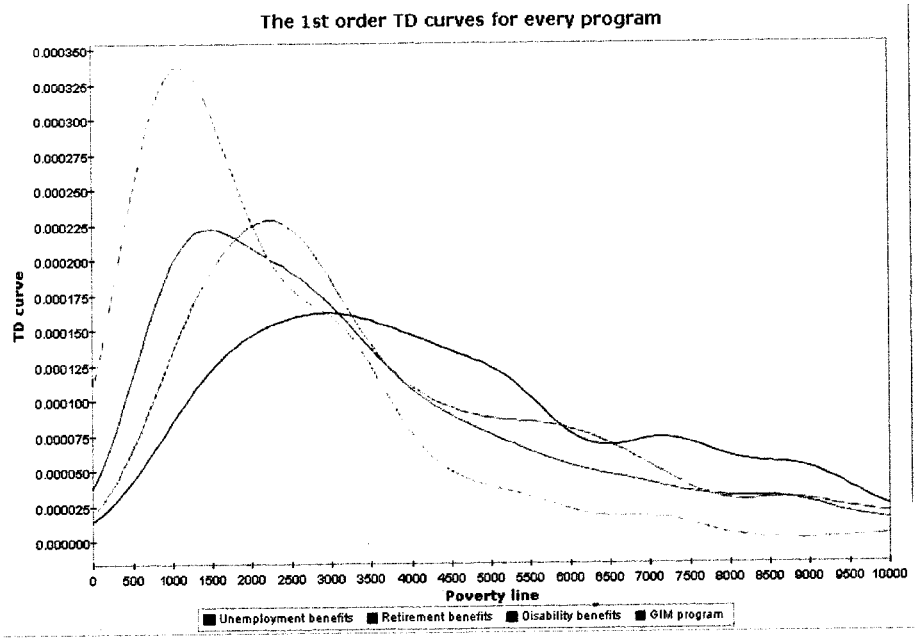


Figure 2

Figures 1 and 2 give the PD curves and TD curves for the four programs listed above at the first order with different z values. The horizontal axis represents individuals' income while the vertical axis is the value of PD or TD curves. It also gives the crossing points of $PD^1(Z)$ where there exists a reversal ranking of PD curves. The crossing points refer to "critical poverty lines", up to which the program reform is said to be poverty dominant. For the choice of poverty line, I considered the table below[38] which was obtained by analyzing data from the 2003 Integrated Household Survey:

Total cash income

| | Percentiles | smallest | | |
|---|---|---|---|---|
| 1% | 0 | 0 | | |
| 5% | 720 | 0 | | |
| 10% | 948 | 0 | Obs | 3023 |
| 25% | 1720 | 0 | Sum of weights | 3023 |
| 50% | 3261 | | Mean | 4309.388 |
| | | Largest | Std. Dev. | 4165.119 |
| 75% | 5866 | 45800 | Variance | 1.73e+07 |
| 90% | 8672 | 46080 | Skewness | 6.209824 |
| 95% | 10808 | 68200 | Kurtosis | 100.189 |

[38] The table was obtained from Stata10

The table illustrates the 2003 distribution of net household income in Bulgaria. The table shows 50% percent of people have incomes equal or below 3261BGN. Using 50% of median income as a poverty line, the FGT headcount value is 0.24, which indicates that 24% of the population has an income equal to or below 50% of the median income: 1630BGN[39].

The $PD^1(Z)$ of GIM programs is above all other program curves up to a poverty line of 2475. Hence, for any choice of poverty line z below 2475, if there are no efficiency costs among these programs a program designer could increase the proportional funding of a GMI program while decreasing the proportional funding of another program in order to reduce the poverty line for all first order poverty indices. Additionally, the GMI program also has the best targeting performance, with its $TD^1(Z)$ curves above all other programs for a reasonable choice of poverty line. Therefore, the marginal program reform is considered to be Pen improving if a program designer decides to increase the funding of a GMI program by a lump-sum amount and reduce the funding of another program. This reduction must be done by the same amount for all first order poverty indices and for any poverty choice up to a poverty line of 2000, given that the efficiency costs are the same for all programs. Meanwhile, the unemployment benefits program is the least efficient of all the poverty reducing programs, not only in program performance but also in targeting performance. It is mainly because Bulgarian labor market policies are not only targeted at

[39] The poverty line used in this paper is 50% of median income.

poor persons but also at non-poor persons. According to the Multipurpose Household Survey data, unemployment benefits are distributed as follows: poor recipients, 17.2 percent and non-poor, 82.8 percent. Other reasons are the changing of regulatory criteria or the inability of people to qualify for benefits due to the activity of the labor market. The program and targeting performance of the retirement benefits program is unambiguously better than the disability program for all poverty indices up to 2475[40] and 2029. This is likely because the disability benefits program is targeted at a relatively limited population. $PD^1(Z)$ curves of the unemployment benefits program and the retirement benefits program cross the poverty line at 3770.13.This indicates that increasing funding proportionally to the retirement benefits program at the expense of the unemployment benefits program will result in a reduction in all poverty indices that belong to $\pi^1$ for any choice of poverty line z below 3770.13, which is more than two times the poverty line I used in this paper. Their $TD^1(Z)$ curves cross at z=3106: therefore, for any poverty line up to 3106, a policy director could appropriately allocate an absolute lump-sum amount of funding for the retirement program while decreasing the same amount for the unemployment program, thus reducing the poverty line for any indices belong to $\pi^1$. In conclusion, the retirement benefits program is arguably the second best program.

[40] We will not consider the two curves under poverty line 1010, since they are nearly identical, so that they can't give any information.

In addition, $PD^1(Z)$ gives the density of program benefits shared by individuals at a given income level, while $TD^1(Z)$ gives the density of program beneficiaries at the same income level. It shows in the graph that the individuals at income level 1306 shares 0.0315 percent of GIM benefits, 0.015 percent of Retirement benefits, 0.013 percent of Disability benefits and 0.0119 percent of Unemployment benefits. Similarly, 0.0338 percent of the population received GIM benefits, 0.022 percent received Retirement benefits, 0.018 share Disability benefits and 0.0113 percent of population share Unemployment benefits.

4.1.3 Comparison of second-order Program Dominance curves and Targeting Dominance curves

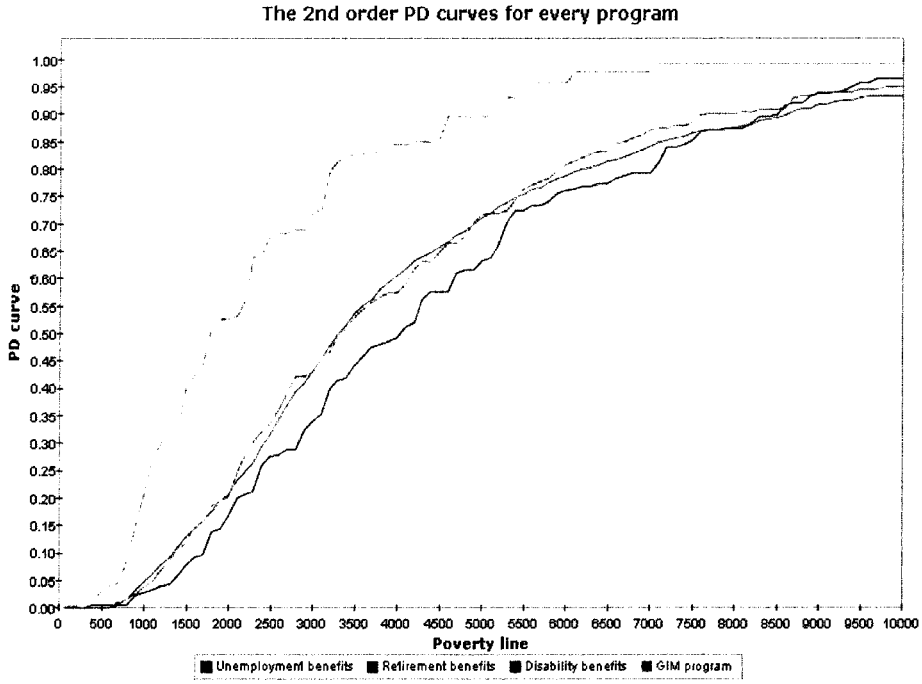


Figure 3

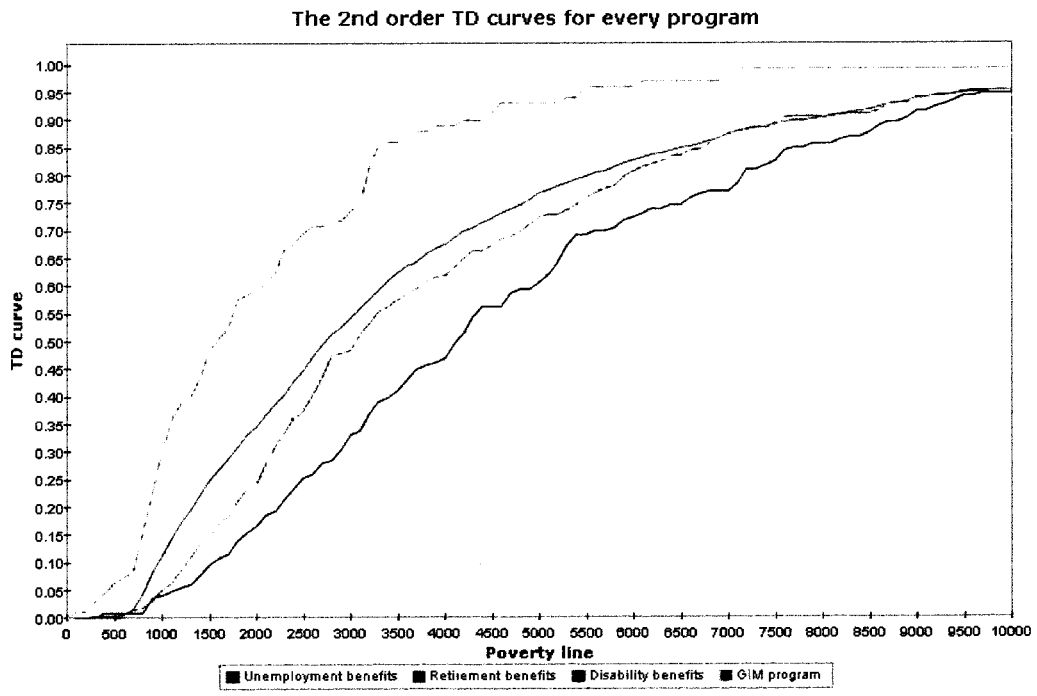


Figure 4

Figures 3 and 4 show the second-order PD and TD curves for all programs. These results strengthen the outcomes obtained from the first order.

It is obvious that $PD^2(z)$ and $TD^2(z)$ curves of GMI program are still above that of all other programs for a wide range of poverty line and do not cross with $PD^2(z)$ and $TD^2(z)$ of other programs. Hence, under the assumption that there are no efficiency costs among these programs, enhancing the GIM program and cutting another program is poverty dominant up to the maximum income and for all distributive-sensitive poverty indices. The $PD^2(z)$ curve of retirement benefits is unambiguously higher than that of the disability benefits program for a low choice of poverty line. However, considering the higher poverty line, it shows that proportionally increasing the funding of the retirement benefits program while proportionally decreasing the

funding of the disability benefits program could be poverty dominant for all distributive-sensitive poverty indices given the same efficiency costs. Moreover, the targeting performance of the retirement benefits program is clearly more effective than the disability benefits for all distributive-sensitive poverty indices and for a reasonable choice of poverty line. In other words, it is poverty dominant if the policy designer allocates a "lump-sum" amount of funding to Retirement benefits program on the expense of Disability benefits program. Also, this program reform benefits 100 percent of the poor. Retirement benefits program still dominate the unemployment benefits program at the second order comparison, therefore, it is the second best program. The unemployment benefits program is the worst both in program performance and in targeting performance.

Recall that $PD^2(z)$ represents the cumulative share of program benefits and $TD^2(z)$ represents the weight of beneficiaries. In this case, for example, it is estimated that 34 percent of the GIM program benefits are shared by an individual with income up to 1360, and 40 percent of the population received benefits from this program. The population who lives below the poverty line 1360 shares 9 percent of retirement benefits and accounts for 22 percent of Retirement benefits beneficiaries; Individuals at the same percentile share 8 percent of the Disability benefits and account for 11 percent of the beneficiaries; the unemployment benefits shared by the same individuals weighted the least, with the smallest of recipients, 5 percent and 7 percent respectively.

4.1.4 Comparison of third-order Program Dominance curves and Targeting Dominance curves

The conclusions above are further strengthened when we consider the third order.

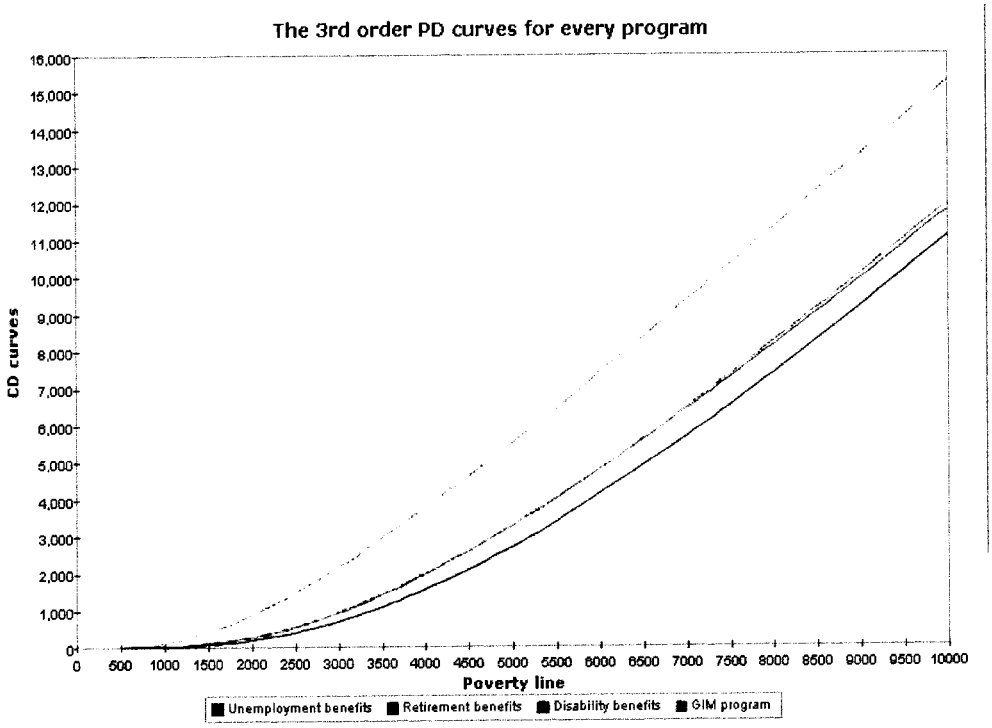


Figure 5

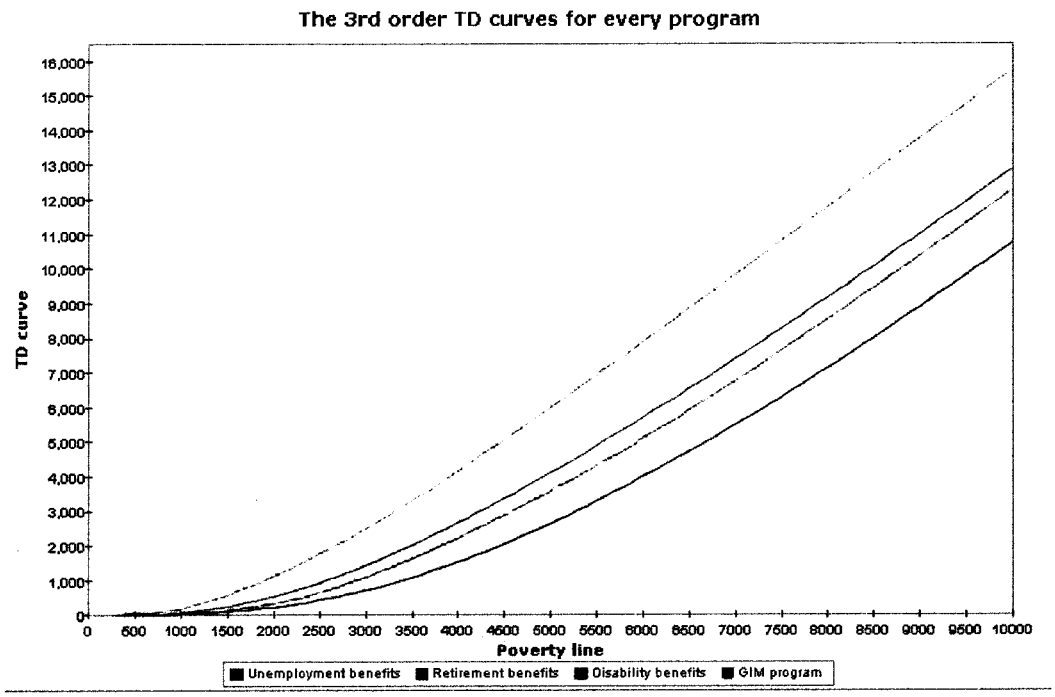


Figure 6

Figures 5 and 6 show the results for poverty indices that belong to $\pi^3(z)$.Obviously, the outcomes I calculated from the first order and second order are further strengthened. $PD^3(Z)$ and $TD^3(Z)$ for GIM programs are consistently above all other programs and do not intersect with other $PD^3(Z)$ and $TD^3(Z)$ Therefore, it is poverty reducing to allocate more resources to GIM programs while reducing the allocation of other programs for any poverty indices belonging to $\pi^3(z)$ and for any choice of poverty lines. It is ambiguous if the retirement benefits program performs better than the disability program since their $PD^3(Z)$ curves are nearly identical. However, its targeting performance is obviously better than the disability benefits program. Consequently, the poverty line will decrease for any third-order poverty indices if a policy designer applies an increase in "lump-sum" funding for retirement

benefits and correspondingly decrease by the same amount funding for disability benefits.The unemployment program is still the least effective both in program performance and targeting performance.

4.2 Efficiency costs

The conclusions above are based on the assumption of equal efficiency costs: $\gamma = 1$. However, each program could have different behavioral and incentive effects and as a result the ranking of the programs could be different. In practical terms, I propose that the economic efficiency cost of unemployment benefits is always higher than that of retirement benefits, because of the government's need to design an unemployment benefits encourage people to positively look for a job and avoid long-term unemployment. However, this could cause economic distortion: if the unemployment benefits are too high, a welfare society could developed as people prefer to stay unemployed and achieve the benefits without making any efforts. In this case, the marginal return of the unemployment benefits program could be lower than its marginal costs. However, this is not necessarily the case with retirement benefits as it is less likely to cause economic distortion since whether retirees re-enter the labor market is not a concern of the government. It is reasonable to anticipate that the economic efficiency cost of the retirement benefits program is smaller than that of unemployment benefits program, which is $\gamma < 1$. We can even assume that the retirement benefits program costs half the amount as the unemployment benefits program. In this

case, PD curves of retirement benefits program are two times the original PD curves for any order of poverty dominance. It can be shown that $PD^s(z)$ curves of retirement benefits program will be always above those of unemployment benefits program, no matter the value of s and the critical poverty line. This increases the strength of the conclusion that expanding Retirement while downsizing unemployment benefits is Dalton improving poverty in Bulgaria.

We also expect that as order increases, the critical poverty line expands, and the economic efficiency cost is less of a constraint. Recalling figure 3 and 4, the program and targeting dominance curves of retirement benefits is significantly above that of unemployment benefits for the third-order indices and for all poverty lines, no matter the value of efficiency costs between each program. Therefore, one could say with confidence that increasing the funding of retirement benefits program and decreasing funding of unemployment benefits program is deemed to be third-order poverty dominant for the poverty line up to maximum income.

**5. Conclusion**

This paper introduced some graphical methods based on Program Dominance curves to assess the poverty improving marginal program transfer. Program Dominance curves, which focused on the share of benefits, are made up of targeting dominance curves and allocation dominance curves. Targeting dominance curves focus on the population benefits from the program reform

while the allocation dominance curve represents the differences between the share of benefits and beneficiaries. Combining all of the information together, one can analyze the poverty impact of program reforms for any order indices and any poverty line. With this method, one does not need to make any assumption about an absolute poverty line. This method also gives precious information to detect the impact of efficiency cost on the overall program performance. Using this method in the context of Bulgarian reform of program transfer, the graphs and tables indicate that the overall performance of GIM program is the most effective among four programs for any classes of orders and for any reasonable choice of poverty line, and that unemployment benefits is the least effective program because of its expensive efficiency cost. Therefore, if the policy maker were to allocate more resources to the GIM program and reduce resources to any other program it would reduce the poverty line in Bulgaria. Even though the program performance between retirement benefits and disability is nearly identical, the retirement benefits program is unambiguously better-targeting than disability benefits program for first, second and third order indices and for a wide range of poverty lines. This paper also argued that the unemployment benefits could cause economic distortion, so its efficiency costs are much more expensive than retirement benefits program due to the fact that the government tries to allocate benefits to the unemployed in order to encourage people employment. Under these circumstances, a policy designer could improve the well being of the society by

supporting the retirement benefits program at the expense of the unemployment benefits program for any choice of poverty line.

The above methodologies can not only be applied for Bulgaria, it can also be applied to evaluate program reforms for any other countries. One can also applied allocation dominance curves in assessing if the marginal program reforms are good allocated.

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