

Social Assistance and Poverty Reduction in Moldova, 2001–2004

An Impact Evaluation

Paolo Verme

The World Bank
Europe and Central Asia Region
Poverty Reduction and Economic Management Sector
June 2008



Abstract

This paper assesses the impact of social assistance benefits on household welfare in Moldova. Ignoring standard issues of impact evaluations such as selection bias, behavioral responses, unobserved heterogeneity and endogeneity, an incidence analysis suggests that increased spending on social assistance enhances the probability of moving out of poverty and reduces the probability of moving into poverty. However, double difference estimates (based on a mimicked randomized experiment) and parametric estimates (based on panel

data) indicate that social benefits have not contributed to improve household welfare or reduce poverty. Double difference estimates point to a negative impact on welfare. Parametric estimates do not yield any consistent significant impact on welfare or poverty. The author concludes that the growth in population coverage and expenditure on cash benefits that characterized social assistance policies in recent years has not resulted in a significant improvement in welfare, all other factors being equal.

This paper—a product of the Poverty Reduction and Economic Management Sector, Europe and Central Asia Region—is part of a larger effort in the department to understand the economic transition in former centrally planned economies. Policy Research Working Papers are also posted on the Web at <http://econ.worldbank.org>. The author may be contacted at [@unito.it](mailto:paolo.verme@unito.it) or @worldbank.org.

The Policy Research Working Paper Series disseminates the findings of work in progress to encourage the exchange of ideas about development issues. An objective of the series is to get the findings out quickly, even if the presentations are less than fully polished. The papers carry the names of the authors and should be cited accordingly. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

Social Assistance and Poverty Reduction in Moldova, 2001-2004

An Impact Evaluation

*Paolo Verme*¹

JEL: H53; I32; I38; P35

Keywords: Social assistance, Poverty, Evaluation, Moldova

¹Department of Economics "S. Cagnetti de Martiis", University of Torino and School of Management SDA-Bocconi, Milan. The work developed out of my contribution to the World Bank Report No. 37933 - MD "Improving Public Expenditure Efficiency for Growth and Poverty Reduction: A Public Expenditure Review for the Republic of Moldova", 2007.

1. Introduction

The first decade of the transition to a market economy has been very difficult for the countries of the Former Soviet Union (FSU). All the 15 Republics that constituted the Union experienced a deep recession between 1990 and 1995 with an average fall in GDP of about 40%. As they were starting to recover in 1996 and 1997, Russia defaulted on its debt and unleashed a financial crisis that reached all FSU republics with a subsequent new fall in GDP of several percentage points. Hidden and open unemployment and poverty increased consistently during the decade leading to a severe decline in living standards (WB 2005). Understandably, the populations of these countries have lived the 1990s as a painful experience that overshadowed the initial enthusiasm for reforms.

This is also the story of Moldova, a small FSU republic that suffered severe economic consequences following the desegregation of the Soviet Union, transitional reforms and the 1998 Russian financial crisis. By 1999, Moldova had lost almost 60% of its GDP² and had an estimated poverty rate (headcount index) of 71% (WB 2004). As for other countries in the region, the economic situation started to improve after the beginning of the new millennium. Between 2001 and 2004, GDP grew, on average, by 7% a year (GoM 2005) while it is estimated that poverty (headcount index) declined from 54.6% to 26.5% (GoM 2004). The beginning of the new growth period also coincided with the election of a new government in 2001 which increased public spending on social assistance very significantly during its first mandate (2001-2004).

Can poverty reduction be attributed to specific pro-poor government policies or is more generally the product of economic growth?

This paper addresses this question by focusing on one policy instrument which is specifically designed to support the poor and the vulnerable: social assistance benefits in cash (henceforth 'social benefits'). We carry out a welfare impact evaluation of social benefits using household panel data that cover the period 2001-2004. The purpose is to try to isolate from other effects the impact of social benefits (and their increase) on the welfare of Moldovan households and assess in this way the merits of social assistance policies.

The paper is organized as follows. Section 2 provides a brief review of the literature on poverty and social assistance in transition. Section 3 looks more in detail at the Moldovan case. Section 4 discusses some of the key issues we are confronted with in making a retrospective impact evaluation. Section 5 outlines the evaluation strategy we opted for. Section 6 illustrates data and variables used and section 7 discusses the results. Section 8 concludes.

2. Poverty and social assistance in transition

The social protection system in the FSU countries went through important changes during the 1990s. The Soviet system did not really make a distinction between social insurance and social

²See <http://www.cisstat.com/eng/mac-01.htm>

assistance. As all adults were expected to work and provided with the same means, social protection was designed around the needs of the workforce or confined to a set of 'pensions' granted to citizens who were not able to work such as the disabled. The transitional recession and the growth in unemployment and poverty changed this scenario drastically and governments found themselves unequipped to deal with these new challenges. With the support of international institutions, FSU countries embarked on a program of social protection reforms. The distinction between social insurance and social assistance became more important as the pension funds were made extra-budgetary and the informal sectors were expanding quickly leaving large sections of the populations unprotected. It became also necessary to shift from a categorical type of cash benefits to a means-tested system in order to focus attention on the real poor.

In many FSU republics, social protection reforms are still largely incomplete and the evaluation of such reforms is in an early stage. In particular, reforms have largely focused on social insurance relegating social assistance to a backstage role which explains the scarce attention of researchers to such instruments. This is also explained by the fact that the household budget surveys which are necessary to evaluate public transfers are still few and discontinuous.

There are, however, some studies that evaluated public transfers in transitional economies combining social insurance and social assistance transfers. Milanovic (2000) looked at social protection transfers in Latvia using one cross-section survey. He finds a weak pro-poor role of social protection benefits but does not distinguish between social insurance and social assistance benefits and provides an incidence rather than an impact evaluation. Lokshin and Ravallion (2000) analyzed the role of the social safety net in protecting the poor from the 1998 Russian financial crisis. They use two spells of the Russian Longitudinal Monitoring Survey (RLMS) and a rather broad definition of government transfers that includes social assistance and social insurance. They conclude that the social safety net in place was largely insufficient to protect the poor from the Russian crisis.

Welfare impact evaluations of social assistance benefits in other countries in transition outside the FSU are also scarce. Ravallion et al. (1995) looked at the early years of the transition in Hungary and focused on the role of the social safety net in protecting people from poverty and promoting their escape from poverty. Combining social insurance and social assistance benefits, they found that the safety net was able to protect effectively from poverty but did not play an important role in lifting people out of poverty. Van de Walle (2003) followed in the steps of this last paper to test the public safety net in Vietnam and found a very marginal role of the social safety net in protecting people from poverty or promoting an exit from poverty. Okrasa (1999a and 1999b) has used a four years panel survey from Poland to assess the impact on poverty of the public safety net using a survival analysis. The transfers considered are family allowances and unemployment benefits and the author finds a general positive impact on redistribution, a positive but moderate impact on reducing the poverty spell and a positive impact on exiting poverty with all

these effects being different depending on the household prototype considered.

The present study may be the first to focus exclusively on the welfare impact of social assistance benefits in a transitional economy. The distinction between social assistance and social insurance is not a trivial one for welfare evaluations. Social insurance relates to the world of work and is designed to protect past and present workers from risk (old age, disability, work injury, unemployment, maternity). Social insurance benefits are granted based on contributions and irrespective of welfare status. By contrast, social assistance benefits are specifically designed to assist the poor and the vulnerable irrespective of whether they have contributed to social insurance schemes or not. Only social assistance benefits are specifically designed to alleviate poverty and for this reason they are a better candidate for evaluating pro-poor government policies.

3. The case of Moldova

Moldova is one example of the changes occurred in the FSU during the 1990s with a deep recession during the early part of the decade, two years of stability in 1996 and 1997 and a new recession caused by the 1998 Russian financial crisis. It is an extreme example in that the fall in GDP (-60%) and the peak poverty level (71%) reached by 1999 are remarkable figures even within the FSU scenario. Indeed, the case of Moldova can be listed as one of the worst recessions of the twentieth century on record. But what can social assistance do to help the poor and the vulnerable under such circumstances?

Despite the growing needs, the social assistance system lagged behind in terms of reforms. In the Soviet Union, the system did not distinguish between social insurance and social assistance and welfare benefits were characterized by an emphasis on special categories of citizens such as the war veterans, children and the disabled. During the 1990s, the transitional recession and attempted reforms led to contrasting effects. On the one hand, reforms aimed at two major objectives including the separation of social insurance from social assistance and the transition of social assistance from a categorical to a means-tested system. The first objective was principally designed to make social insurance independent and extra-budgetary. The second objective aimed at focusing scarce resources on the poor. On the other hand, financial resources were quickly shrinking because of the recession preventing these same reforms from being implemented. By the end of the 1990s, the government of Moldova had substantially reduced the number and size of social assistance benefits and had also accumulated a certain amount of arrears in payments without really implementing structural changes.

Economic recovery started in the year 2000 and GDP growth continued at a sustained level between 2000 and 2005 with annual growth rates in between 5% and 8%. By 2004, poverty had significantly recovered to a level below the pre-1998 Russian financial crisis and estimated at 26.5% of the population (GoM 2004). The beginning of the growth period almost coincided with the election of the communist government in 2001 and the concomitance of growth and a conservative

agenda contributed to change the fortunes of the social assistance system. Between 2000 and 2005, all social assistance benefits increased in number, size or coverage with growth rates in real expenditure ranging from 6% to 335%. Benefits continued to be mainly targeted to the war veterans, disabled and children and these three categories of beneficiaries together increased in size between 2001 and 2004 to reach about 90% of all beneficiaries and total expenditure. By 2005, the social assistance benefits system included nine different types of benefits and had a total expenditure estimated at 1.7% of GDP and 4.6% of public expenditure (WB 2007).

The stated aim of social assistance benefits in Moldova is to assist the poor and the vulnerable. According to the Social Report 2001 prepared by the former Ministry of Labor and Social Protection: *(1) Social assistance benefits and facilities are provided to persons that find themselves at risk or are unable to make a living. (2) The objective of social assistance is to support persons who temporarily or continuously face difficulties which impede them obtaining necessary conditions for a decent life, helping them to develop their own capacities and competencies for a relevant social functioning. (GoM 2001, p.9, English version)*

Yet, the practice of social assistance has continued to be biased in favor of selected categories of beneficiaries irrespective of wealth status and, to date, none of the benefits are really means tested.³ The government of Moldova had plans to experiment with means-tested benefits and a few categorical benefits were complemented with means-tests but - *de facto* - all social assistance benefits continued to be granted according to categorical criteria. The government of Moldova may have been successful in targeting its political constituencies. But has it really addressed its stated intention of improving welfare?

4. Key issues

We are confronted with a retrospective evaluation. There was no design to evaluate social assistance benefits before the program was launched and we cannot rely on a randomized experiment and/or household surveys which were specifically designed for evaluating social assistance benefits. This is the rule rather than the exception in transitional economies. These countries face financial and skills constraints which limit the funds and capacities to undertake a proper evaluation design.

The social program we are evaluating is expected to be affected by most problems which are typical of evaluations of this kind including selection bias and lack of a proper comparison group, unobserved heterogeneity, model endogeneity and measurement error. Selection bias accrues from the fact that the group of households that received social benefits - the treated group - was not randomly selected by the government. This group may be very different in terms of its characteristics from the group of households that did not receive social benefits - the untreated

³Benefits for children in age 0-3 and material assistance are supposed to be accompanied by means-tests but in reality the system pre-selects categories of beneficiaries making the means-test an almost redundant exercise.

group - which is therefore a poor choice of counterfactual.

Several factors which determine program selection are not observed in our data and some of the observed factors are likely to be plagued by endogeneity and measurement error. Participation to the program depends on the application decision on the part of the household and on the selection decision on the part of the government. On the household decision, we do not have any information about whether the household has applied for benefits or not. On the government decision, we know that benefits are assigned to predetermined categories of citizens such as children, the disabled and the war veterans but we cannot identify from the survey the exact categories that correspond to each benefit. For example, we do not know the category of disability or the war veteran status. Nor, we can distinguish those variables that determine the household decision from those variables that determine the government decision. For example, having many children may be a factor that induces households to apply for benefits because poor households tend to have many children but is also a categorical criteria used by the government to assign benefits.

The social benefits program also suffers from mismanagement and not all benefits are assigned to those who are supposed to be targeted. Disability status is a gatekeeper for a whole range of benefits and it is widely recognized in Moldova that the commission that grants disability status is not sufficiently transparent in its decisional process. Endogeneity may arise due to the fact that some of the unobserved criteria used for program selection may be correlated with observed variables. Also, the proxy-means tests in place for two of the existing benefits are only subsequent to the categorical criteria and result in significant targeting error type I (non coverage of poor people) and targeting error type II (coverage of rich people). Again, these are not exceptional circumstances for an evaluation of government transfers in transitional economies but the rule.

In substance, program selection is not entirely deterministic but contains several sources of stochasticity. The social assistance scheme has also expanded during the period considered and this has occurred in concomitance with output growth and poverty reduction which means that we also need to disentangle the impact of social assistance transfers from the impact of growth.

5. Evaluation strategy

Our objective is to evaluate the impact of social assistance benefits on household welfare and poverty. We use four consecutive rounds of a household budget survey (2001-2004) that covers income and consumption and which measures the social assistance benefits received by households (more on the survey in the data and variables section). We also know that the social benefits program was already on-going in our period one and expanded throughout the four year period considered.

Let i be our unit of interest - the household - with $i = 1, 2, \dots, n$; t an indicator of time with $t = 1, 2, 3, 4$; P_i a binary variable that describes whether households participate ($P_i = 1$) or

do not participate ($P_i = 0$) to the social benefits program; B_i a variable that measures the intensity of total benefits received by each household with $B_i = 0$ if the household does not receive benefits and $0 < B_i \leq B_{\max}$ if the household receives benefits; and Y_i a variable representing household welfare with $0 < Y_i \leq Y_{\max}$. We will use the notation ' T ' to identify the group treated with social benefits and ' C ' to identify the comparison group.⁴ With $t = 1, 2$, we can identify four groups of households (A, B, C, D) according to participation P_i as follows:

| <i>Group</i> | P_1 | P_2 |
|--------------|-------|-------|
| <i>A</i> | 0 | 0 |
| <i>B</i> | 0 | 1 |
| <i>C</i> | 1 | 0 |
| <i>D</i> | 1 | 1 |

We call group A 'Stayouts', group B 'Joiners', group C 'Leavers' and group D 'Stayins'. Our primary interest is the comparison of groups A and B over the period given that we are trying to assess the impact of accrued benefits. However, comparing C and D can also provide a useful counterfactual. For example, Ravallion et Al. (2005) study the impact on welfare of falling out of the *Trabajar* workfare program in Argentina therefore focusing on groups C and D.

We propose a three steps evaluation process. The first step involves estimating the transition probabilities between different welfare groups over time. The advantage of this approach is that is very versatile and provides information which can be used for at least four different exercises: 1) An assessment of the upward and downward mobility of households across welfare groups and time; 2) An assessment of the role of social benefits in fostering or hampering such mobility; 3) Two separate tests that assess the ability of social benefits to protect the non-poor from falling into poverty (PROT) and to promote the poor to exit poverty (PROM); 4) A poverty incidence evaluation.

For the first exercise it is sufficient to read the transition probability matrix between two time periods in the presence of benefits. This provides information on household mobility across welfare groups. For the second exercise and if we estimate the transition probability matrix also in the absence of social benefits, we can use the percentage of households in each cell of the transition

⁴Note that the comparison group is not necessarily the group of non treated households observed in the data. The latter can be one of the possible choices of comparison groups and - as already explained - not a good choice for our specific case.

matrices to measure changes in probabilities with and without benefits.

A similar procedure can be used to calculate the PROT and PROM tests. These tests have been developed by Ravallion et Al. (1995) and used in other works since (see for example van de Walle 2003). Simplifying the exposition, let $F_t(z)$ be the share of the poor at time t in the presence of social benefits and given a poverty line z and let $G_t(z)$ be the corresponding share in the absence of social benefits. Let also $F(z, z)$ and $G(z, z)$ be the shares of those who stay poor between the time periods considered. The protection (PROT) and promotion (PROM) tests are defined as:

$$PROT(z) = G_2(z) - G(z, z) - F_2(z) + F(z, z) \quad (1)$$

$$PROM(z) = G(z, z) - F(z, z) \quad (2)$$

Positive values of these measures will indicate that social benefits have been able to protect the non-poor from poverty and promote the poor out of poverty. Using the same two transition matrices (in the presence and absence of social benefits) we can estimate the incidence of social benefits on poverty and on different welfare groups. To estimate the incidence on poverty, it is sufficient to read the columns totals and compare these figures in the estimates with and without benefits.

These are useful information but we constrained the analysis to the sphere of incidence evaluations where the comparison group is simply the population without social benefits. We have not really constructed yet a proper comparison group able to deliver an impact evaluation.

For this purpose, the second step will be to mimic a randomized experiment and then use a double difference (*DD*) or 'difference in difference' method to estimate the impact of benefits on welfare. In our two years scheme, groups A and B did not participate in the program in time 1 while in time 2 only group B participates. If group A and B were identical in all respects in time 1 then the social benefits program could be considered as randomly assigned. In our data, group A happens to be very large while groups B, C and D are smaller (the coverage of benefits is low). With propensity score matching we can extract from group A in time 1 the nearest match to group B in time 1. We can then compare changes in welfare of the two groups during the period with the double difference method as follows:

$$D_{AB} = [E(Y_{i2}^T) - E(Y_{i1}^T)] - [E(Y_{i2}^C) - E(Y_{i1}^C)] \quad (3)$$

where $E(Y_i)$ is the expected value (the mean) of welfare. Positive values of D_{AB} will indicate that social benefits had a significant impact on welfare.

The *DD* estimator is generally used to address the problem of endogenous placement that arises from single difference estimators. The aim is to compare participants and non participants pre and post intervention.⁵ Such procedure generally entails a program start in period 2 and a

⁵ *DD* evaluations are very popular in all sciences. A frequently cited reference of a *DD* evaluation for developing countries is Duflo (2001) while Lokshin and Yemstov (2003) provide an example of *DD* applications to transitional economies.

selection bias which is time-invariant. If this is the case, the *DD* estimator is unbiased and the program impact is correctly estimated (Ravallion 2008). In our case, we can relax the time-invariant assumption given that we do not use group A as a comparison group but a match of group B extracted from group A. One problem may instead arise from the fact that we need to use the panel component of the surveys rather than the two full cross-section surveys.⁶ We need to trace the same households between period 1 and 2. This implies a certain attrition resulting in a loss of observations and a possible loss of sample representativeness. This potential loss will be assessed by testing means equality of the balanced and unbalanced panels.

The third step will be to exploit the availability of a four years period for a longitudinal parametric analysis. We regress the intensity of benefits (conditional on a number of other variables) on a measure of welfare and the social benefits status (conditional on a number of variables) on the poverty status as follows:

$$y_{it} = \alpha_i + \beta B_{it} + \gamma X_{it} + \varepsilon_{it} \quad (4)$$

$$Poor_{it} = \alpha_i + \beta P_{it} + \gamma X_{it} + \varepsilon_{it} \quad (5)$$

where α_i , β , γ are parameters, ε_{it} is the error term, $Poor_{it}$ is a binary variable with $1 = Poor$ and $0 = Non_Poor$, y_{it} is a continuous measure of welfare (described in the next section), B_{it} is a continuous measure of benefits (described in the next section), P_{it} represents program participation and i and t stand respectively for units of observation and time. We call [4] the welfare equation and [5] the poverty equation. The advantage of this approach is that we can exploit the ability of longitudinal models to treat non-observed time-variant and time-invariant factors under various assumptions and address the problems of unobserved heterogeneity and endogeneity.

The choice of panel models estimators is extremely rich. We opted to use Fixed effects (FE), Between Effects (BE) and Random Effects (RE) models addressing separately the question of consistency of results across specifications with different sets of regressors and the question of consistency of results across these three models (more on the variables used in the next section).⁷ To check for results consistency across models specified with different sets of regressors we use

⁶Note that the standard *DD* approach does not require a panel structure (Ravallion 2008).

⁷We excluded the pooled OLS because this estimator would provide bias estimates given that we expect significant endogeneity due to unobserved heterogeneity. We also excluded dummy variable regressions (LSDV) because this is practical only when N is small and Instrumental Variables (IV) models because they rely on assumptions about the instrument that cannot be tested. Dynamic panel models were excluded because they would require IV specifications to be unbiased. A conditional fixed-effects logit model was also excluded because it drops observations where the treatment variable does not change over time. In our data, these are groups A and D which would mean wasting most of the dataset. Among error components models we opted to use both FE and RE models. A RE model assumes no covariance between the explanatory variables and the error term that represents person specific and time invariant unobserved heterogeneity. This would be a rather unrealistic assumption. In a country like Moldova, unobserved factors such as individual contacts matter a great deal for finding a job or accessing cash benefits. However, this model has the advantage of accommodating all types of regressors including time invariant and cross-section invariant regressors. This is important because we want to test the model conditional on variables such as rural location or the season when the interview took place which would be dropped in a FE model.

the RE model as this is the only one that can accommodate all types of variables including time-invariant and unit invariant variables. Equation [4] is estimated with a GLS estimator while equation [5] is estimated with a probit. The GLS specification is as follows:

$$RE : (y_{it} - \theta y_i^*) = (1 - \theta)\alpha + (x_{it} - \theta^* x_i)\beta + [(1 - \theta)v_i + (\varepsilon_{it} - \theta\varepsilon_i^*)] \quad (6)$$

where y is the welfare variable and y^* is its mean, x is a vector of explanatory variables as described in equations [4] and [5], θ is an arbitrary function of σ_v^2 and σ_ε^2 , α is the intercept, β is the slope parameter of the regressors which is assumed to be fixed across observations, v is the unit-specific residual and ε is the error term with i and t standing for units of observations and time respectively.

In a second stage we addressed the question of results consistency across different estimation models by comparing the three models FE, BE and RE. The within and between effects models are specified as follows:

$$FE : y_{it} - y_i^* + y^{**} = \alpha + (x_{it} - x_i^* + x^{**})\beta + (\varepsilon_{it} - \varepsilon_i^* + v^*) + \varepsilon^{**} \quad (7)$$

$$BE : y_i^* = \alpha + x_i^*\beta + v_i + \varepsilon_i^* \quad (8)$$

with:

$$\begin{aligned} \varepsilon_{it} &\sim IID(0, \sigma_\varepsilon^2); \quad \forall \quad i \in N, t \in T \\ y_i^* &= \sum_{t=1}^{T_i} y_{it} / T_i; \quad y^{**} = \sum_i \sum_t y_{it} / nT_i; \\ x_i^* &= \sum_{t=1}^{T_i} x_{it} / T_i; \quad x^{**} = \sum_i \sum_t x_{it} / nT_i; \\ \varepsilon_i^* &= \sum_{t=1}^{T_i} \varepsilon_{it} / T_i; \quad \varepsilon^{**} = \sum_i \sum_t \varepsilon_{it} / nT_i \end{aligned}$$

With a fixed (within) effects model the problem of time constant unobserved heterogeneity is addressed but the model uses information only on the 'movers' wasting information on the 'stayers'. The FE model also assumes that the independent variables and the idiosyncratic error term are independent. In reality and in our case such endogeneity may arise from systematic shocks due to macroeconomic factors such as growth (period effect), omitted variables such as those variables that explain program selection and are not observed, shocks that can also affect regressors such as changes in growth that may lead to changes in labor market conditions (simultaneity) and measurement error which we know we have. Autocorrelation in the disturbance term may also be an issue as people who have already successfully applied for benefits may apply again or simply continue to be granted benefits with no further enquiry⁸.

We can address period effects by introducing time dummies in the fixed (within) effects model and this partly addresses simultaneity and we can also estimate a within effects model with autoregressive disturbance term. We opted instead to use macroeconomic variables which identify the

⁸As already mentioned, some of the factors that determine the decision to apply are likely to be non observed in the data.

macroeconomic shocks that occurred during the period considered. We know that between 2001 and 2004 Moldova enjoyed sustained growth and that employment has improved during the period. We can use the growth and the employment rates as regressors in place of time dummies and check the impact of these shocks on the social benefits parameter.

In conclusion, the RE model is an obliged choice for comparing models with all forms of regressors. The FE model with the macroeconomic variables is probably the best choice to address issues of unobserved heterogeneity, period effects and simultaneity but it drops time invariant regressors. The BE model is less relevant but is a useful counterfactual to the FE model which is a within effects model and focuses on time invariant effects.

6. Data and variables

Data are drawn from the 2001-2004 Moldova Household Budget Survey (MHBS). The survey covers approximately 6,240 households every year interviewed in monthly blocks of about 520 households each. It includes a panel component with an elaborate rotation scheme and a maximum tenure of each household of four years.⁹ The survey is a multi-stage sampling and multi-purpose survey and includes sections on income and consumption as well as sections on labor, health and others. In the data used for this paper, a balanced panel includes 2,469 households over two years and 866 over the four years period. A balanced panel includes only observations included in the panel by design.

As a measure of welfare we use real monthly consumption per capita divided by the poverty line (y). This is a standard approach in similar studies (Ravallion et Al. 1995, van de Walle 2003). Consumption is expected to be a better measure of welfare than income given that income is underreported and is more sensitive than consumption to seasonal variations. We use real consumption measured at 2001 prices. The poverty line is the one adopted by the Government of Moldova in 2001 which was 195 Lei (GoM 2004). The poverty line was calculated with a cost of basic needs approach based on a food basket of 2,100 calories/day and an extra amount calculated for non food items. The Purchasing Power Parity (PPP) equivalent value of the 2001 poverty line was approximately 2.5 USD/day which is what the World Bank considers as an appropriate poverty line for transitional economies (WB 2005). We opted to ignore equivalence scales. This is the approach followed by the World Bank in its study on poverty in Moldova (WB 2004) and is also justified by the arbitrary nature of equivalence scales and by the fact that results are often very sensitive to the type of equivalence scale used.¹⁰

Nine types of benefits are considered: utilities compensations, child allowances, war veteran allowances, social allowances, death grants, Chernobyl compensations, care-taker allowances for

⁹Signoret, J.E. (2003) provides full details on the panel structure and rotation mechanisms.

¹⁰For example, in a study on poverty (GoM 2004), the Government of Moldova uses an equivalence scale of 1 for the first adult in the household, 0.7 for the other adults and 0.5 for children below the age of 16. The poverty estimations provided by this study are very different from the estimations provided by the World Bank (2004) for the same years.

the disabled, transport compensations for the disabled and material assistance. Utilities compensations, child benefits, war veteran allowances and social allowances account for the quasi-totality of benefits captured by the surveys. These benefits are all allocated monthly and the aggregated variable (B) has been transformed in real and per capita terms and relative to the poverty line so as to be comparable with the welfare indicator (y).

We use four groups of conditional variables to which we attach different economic interpretations. The first group of variables (a) is the characteristics of the household head including age, sex and education. These are standard variables which are generally known to be relevant for household welfare. The second group (b) is variables indicating different levels of household dependency from active individuals including the number of children and the number of household members relatively to the number of earners in the household. These variables are expected to be correlated with welfare and also with the probability of receiving benefits but they are not dropped by the software for multicollinearity and the correlation coefficients with the social benefits variables are rather low. The third set of variables (c) includes those variables that are time-invariant but may be relevant for welfare including rural location and whether the household has been interviewed in the summer months or not. Rural areas are known to be poorer and welfare is generally subject to seasonal variations. The fourth group of variables (d) includes two macroeconomic variables which are expected to capture macroeconomic shocks. One is the growth rate which is cross-section invariant and one is the district employment rate which is defined as the average district number of earners divided by the number of adults in the district as captured by the survey. This last variable varies over time and across districts. Means of all variables used in the regressions are reported in Table A1 in the Annex for the four years and for the balanced and unbalanced panels.

7. Results

Social assistance benefits in Moldova privilege the poor, meaning that the greatest share of these benefits is allocated to households with monthly consumption per capita below the poverty line. However, between 2001 and 2004 the share of social benefits received by the first quintile (the poorest 20% of households) has declined significantly from 57.6% of total benefits to 49.2%. Redistribution has occurred in favor of the second and third quintiles while the top two quintiles maintained a flat and non insignificant share of around 10% of total expenditure each (Figure 1).

Living conditions have improved very significantly between 2001 and 2004. Average consumption relatively to the poverty line (y) has increased from 1.05 in 2001 to 1.53 in 2004 and the poverty headcount ratio has declined from 62.6% to 34.1%.¹¹ The average benefit relative to

¹¹The poverty trends indicated here differ from those reported in poverty studies on Moldova (GoM 2005 and World Bank 2004). This is explained by the adoption of different deflators for the consumption figures and by the use or non use of equivalence scales.

the poverty line (B) for benefits recipients has instead declined between 2001 and 2004 from 0.16 to 0.14. However, this decline has been accompanied by a remarkable growth in coverage (from 5.7% to 19%) which explains the growth of average benefits per capita in the population (Table 1). The government clearly opted to increase expenditure and coverage rather than focusing on proper targeting based on means tests and the fine tuning of individual transfers.

The transition probability matrices would suggest a positive incidence of social benefits on poverty. Table 2 reports the transition probabilities between poor and non poor. The first two columns in Table 3 report the difference between these probabilities estimated with and without benefits. Positive values indicate an increased probability of moving across poverty groups in the presence of social benefits and vice-versa for negative values. To check for consistency, we repeated the estimations using the balanced and unbalanced four years panels and also the balanced panels for the three periods 2001-2002, 2002-2003 and 2003-2004. We can see that the values for the transition from poor to non-poor (P-NP) are all positive while the values for the transition from non poor to poor (NP-P) are all negative.

The PROT and PROM tests proposed by Ravallion (1995) confirm these findings with positive values for both PROT and PROM for all estimates (Table 3, columns 3 and 4).¹² The poverty headcount index in the presence of social benefits is also lower than in the absence of benefits for all estimates (Table 3, column 5). In substance, the presence of social benefits enhances the probability of moving from poor to non-poor and reduces the probability of moving from non-poor to poor. As already mentioned, the problem with this procedure is that we ignore the issue of the reference group using the untreated individuals as comparison group unconditional on household characteristics.

The double difference estimates with matched samples provide a rather different picture. Table 4 reports the relevant statistics for each group and the respective match over each of the three periods considered. When we compare those who joined the social benefits scheme (group B) with a matched sample extracted from those who did not join (group A) we find that all DD estimates are negative. This indicates that joining the scheme did not improve welfare for the treated everything else being equal. As a counterfactual, we estimated the DD measures comparing those who left the scheme (group C) with a matched sample extracted from those who continued to stay in the scheme (group D). Leaving the scheme seems to improve welfare everything else being equal. From these estimates, social benefits seem to have a negative effect on welfare.

The disadvantage of the double difference approach as we designed it is that we constrain the sample to a rather small number. This is due to the fact that coverage is initially low and that the treated group is small. On the other hand, if the matched sample is valid, estimates should be

¹²Note that columns 1 and 4 in table 3 report the same values. That is because the PROM test is reduced to the difference of the transition probabilities between estimates with and without benefits.

consistent and close to a randomized experiment.

Also, double difference estimates and a randomized experiment can miss on some of the behavioral effects that may arise from unobserved heterogeneity such as differences in individual abilities. During a period of sharp growth such as the one we observe, those who profit from and contribute to growth are probably the most skilled, with better contacts and social abilities, all attributes which are difficult to measure in household surveys. This motivates the third step in our analysis where we use longitudinal data to control for unobserved heterogeneity.

Tables 5a and 5b report random effects estimates using all 16 possible specifications and the balanced and unbalanced panels.¹³ Table 5a illustrates results for the welfare equations and 5b for the poverty equations. For simplicity of exposition, we report only the coefficients and the z statistics for the variables of interest (B and P). With a balanced panel (top panel in Table 5a), B is significant with a positive sign in equations 2, 6, 9 and 13. In all these equations, the macroeconomic variables (district employment rate and annual growth - d) are omitted which would suggest that once we control for growth social benefits do not influence welfare. This same statement is not true if we consider the unbalanced panel. In 12 of the 16 welfare equations B is significant, including four equations where the macroeconomic variables are present (Table 5a).

Similar results are found with the poverty equations (Table 5b). With the balanced panel, P is significant in equations 2, 6, 9, 12, 13, 14 and 16. In all these equations the macroeconomic variables are omitted. When we control for the economic cycle, the significance of social benefits disappears. However, with the unbalanced panel, in eight of the 16 poverty equations P is significant including four equations where the macroeconomic variables are present (Table 5b). Therefore, the unbalanced panel would suggest that the economic cycle is not sufficient to explain improvements in welfare and that social benefits may play a role.

Tables 5a and 5b used a random effects model. In order to test different estimation models, we have to exclude the time-invariant variables (rural and summer) which are not supported by the fixed effects model. Table 6a and 6b report the results for the balanced and unbalanced panel estimations and include the three estimation models considered (FE, RE and BE). As before, the exercise is repeated for the welfare and poverty equations. With the balanced panel estimations (Table 6a), none of the social assistance variables is significant in either the welfare or poverty equations. With the unbalanced panel (Table 6b) the social assistance variables are significant in equations 2, 3 and 4. Again, the difference is between balanced and unbalanced panel with the balanced panel suggesting no effect of social benefits and the unbalanced panel suggesting some effect.

¹³By 'all possible specifications' we mean inserting and omitting all groups of variables a, b, c and d one at the time.

The balanced panel is more appropriate to assess the impact of benefits provided that the attrition rate, which is very large over the four years, does not bias the sample. Table A1 in the Annex reports the means for all variables and the t-test for means differences between balanced and unbalanced panels. The difference in means is generally rather small and below 10% across variables with most variables showing a gap below 20%. The t-test shows a significant difference between the balanced and unbalanced panels only for the rural and summer variables. In particular, for the variables of main interest (y , $poor$, B and P) the difference in means is never very significant. Moreover, the unbalanced panel largely 'pollutes' time effects with incomplete spells which is a serious shortcoming if annual macroeconomic shocks are responsible for explaining most of the variation in welfare which seems to be our case.

The Hausman tests reported on the bottom of Tables 6a and 6b speak also in favor of the FE model rather than the RE model and in the FE model used with the unbalanced panel the intensity of benefits variable (B) is not significant. In substance, when we use the most appropriate model (FE), the most appropriate sample (balanced) and when we control for macroeconomic trends social assistance does not seem to have any positive and significant effect on welfare or poverty.

8. Conclusion

Between 2001 and 2004, Moldova experienced sustained growth and poverty reduction. The system of social assistance continued to focus on selected categories of beneficiaries including mainly children, the disabled and the war veterans irrespective of welfare status. Relative expenditure on the bottom quintile and expenditure per beneficiary decreased during the period in favor of increased overall expenditure and a sharp rise in population coverage.

This approach does not seem to have improved household welfare, all other factors being equal. If we ignore the questions of selection bias, behavioral responses, unobserved heterogeneity, endogeneity and measurement error, an incidence analysis would suggest that social benefits enhance the probability of moving out of poverty and reduce the probability of moving into poverty. However, double difference estimates and regression analyses which are able to control for at least some of these factors would suggest that social benefits have not contributed to improve welfare overall.

Double difference estimates show a negative impact on welfare. The main difference between the incidence and the double difference analyses as we structured them in this paper is that the incidence analysis simply compares the beneficiaries and non beneficiaries ignoring the question of comparability of the two groups whereas we used a matching procedure to carry out the double difference estimations. Comparing two homogeneous groups with the double difference procedure allowed us to observe that the non beneficiaries of social assistance benefits have performed better than the beneficiaries.

There may be both demand and supply side reasons which could explain the negative values

we find with the double difference estimates. On the supply side, different distortions of the social assistance system such as a lack of transparency in the selection mechanism of beneficiaries or the use of categorical selection criteria resulted in distorted targeting. Targeting the non poor, in turn, may have had negative behavioral effects in terms of labor supply which could explain foregone income opportunities for those non poor who participated to the social assistance program. These problems may also have increased in weight during the period considered given that the volume of benefits increased without real restructuring of the targeting system. A second set of explanations may relate to the demand side through the mechanism of self-selection of beneficiaries. With the double difference procedure we compared two similar groups selected on the basis of observed characteristics. However, unobserved characteristics such as individual abilities may play an important role. It may be that the group of non beneficiaries is also the group with better individual abilities and which was able to better exploit the emerging growth opportunities. This problem is not really addressed by the matching procedure and the double difference estimates and motivated the panel approach that followed.

Panel survey estimates did not evidence any consistent significance of social assistance benefits in explaining welfare or poverty and pointed instead toward a strong growth effect. Therefore, even when we take into account unobserved heterogeneity, social assistance benefits do not seem to explain poverty reduction. We can conclude that the real engine of poverty reduction in Moldova between 2001 and 2004 has been growth and that social assistance has had either a negative effect through a displacement effect (social assistance beneficiaries who would have done better without benefits) or a non significant role.

References

Abadie, Alberto, Drukker, David, Leber Herr, Jane and Imbens, Guido, 2001. Implementing Matching Estimators for Average Treatment Effects in Stata. *The Stata Journal*, 1, pp. 1-18.

Abadie, Alberto and Imbens, Guido, 2002. Simple and Bias-Corrected Matching Estimators for Average Treatment Effects. *NBER Technical Working Paper No. 283*

Abadie, Alberto and Imbens, Guido, 2006. Large Sample Properties of Matching Estimators for Average Treatment Effects. *Econometrica* 74, 1, 235-267

Duflo, Esther, 2001. Schooling and labor market consequences of school construction in Indonesia: Evidence from an unusual policy experiment. *The American Economic Review* 91, 4, 795-813.

Government of Moldova, 2001. Social Report 2001. Ministry of Labor and Social Protection. *Mimeo*.

Government of Moldova, 2004. Policy and Poverty Impact Report. Ministry of Economy and Trade. *Mimeo*.

Government of Moldova, 2005. Medium Term Expenditure Framework 2006-2008. Ministry of Finance. *Mimeo*.

Imai, Kosuke, King, Gary, Stuart, Elizabeth, 2006. The Balance Test Fallacy in Matching Methods for Causal Inference. *Wired at: polmeth.wustl.edu/*

Lokshin, Michael, and Ravallion, Martin, 2000. Welfare impacts of the 1998 financial crisis in Russia and the response of the public safety net. *The Economics of Transition* 8, 2, 269-295.

Leuven, Edwin and Sianesi, Barbara, 2003. PSMATCH2: Stata module to perform full Mahalanobis and propensity score matching, common support graphing, and covariate imbalance testing. *Wired at: <http://ideas.repec.org/c/boc/bocode/s432001.html>*.

Lokshin, Michael, and Yemtsov, Ruslan, 2003. Evaluating the impact of infrastructure rehabilitation projects on household welfare in rural Georgia. *World Bank Policy Research Working Paper* 3155.

Milanovic, Branko, 2000. Social transfers and social assistance: An empirical analysis using Latvian household survey data. *World Bank Policy Research Working Paper* 2328.

Okrasa, Włodzimierz, 1999a. The dynamics of poverty and the effectiveness of Poland's safety net (1993-1996). *World Bank Policy Research Working Paper* 2221.

Okrasa, Włodzimierz, 1999b. Who avoids and who escapes from poverty during the transition? Evidence from Polish panel data, 1993-96. *World Bank Policy Research Working Paper* 2218.

Ravallion, Martin, Galasso, Emanuela, Lazo, Teodoro, and Philipp, Ernesto, 2005. What can ex-participants reveal about a program's impact? *Journal of Human Resources* 40, 1, 208-230.

Ravallion, Martin, van de Walle, Dominique, and Gautam, Madhur, 1995. Testing a social safety net. *Journal of Public Economics* 57, 175-199.

Signoret, José E., 2003. The Moldova hbs: A note on the panel sample. *Mimeo*.

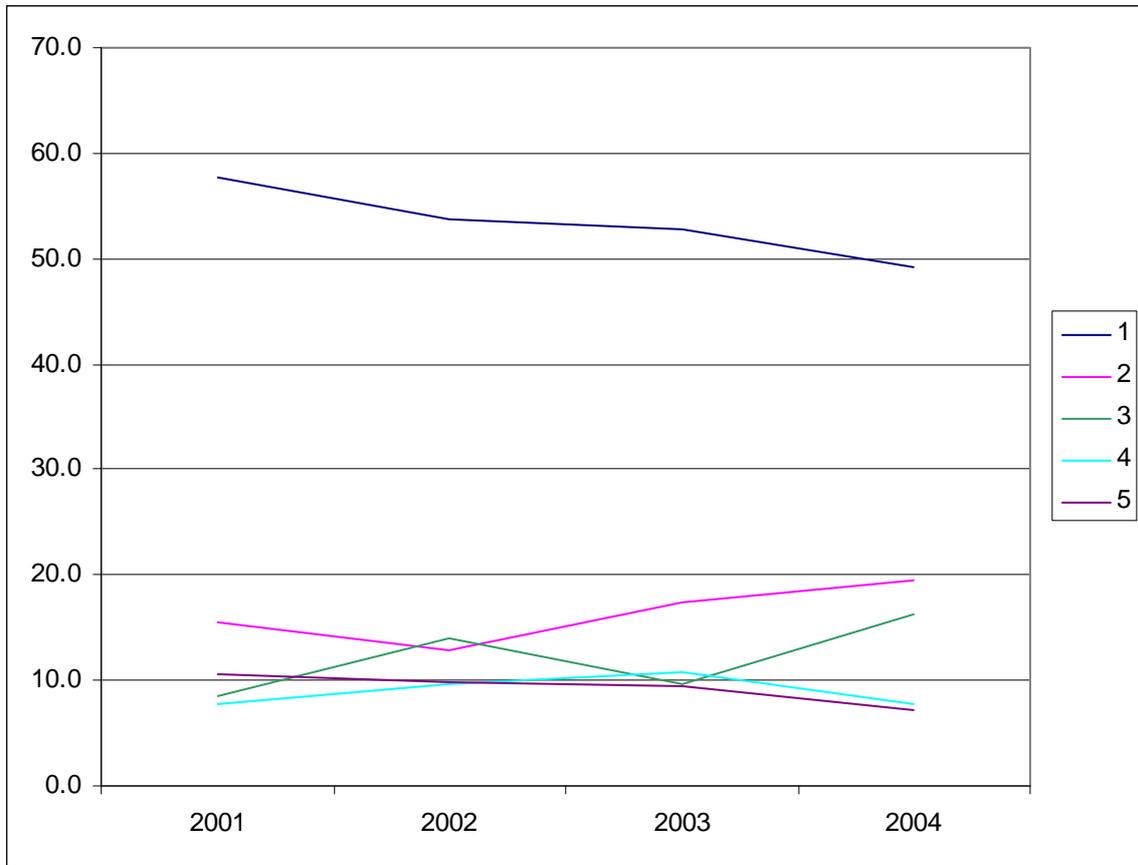
van de Walle, Dominique, 2004. Testing Vietnam's public safety net. *Journal of Comparative Economics* 32, 4, 661.679.

World Bank, 2005. Growth, Poverty and Inequality: Eastern Europe and the Former Soviet Union. The World Bank.

World Bank, 2004. Recession, Recovery and Poverty in Moldova. *The World Bank; Report No. 28024*.

World Bank, 2007. Improving Public Expenditure Efficiency for Growth and Poverty Reduction: A Public Expenditure Review for the Republic of Moldova, *World Bank Report No. 37933 - MD 2007*.

Figure 1 – Structure of Social Benefits by Consumption Quintile



Note: Consumption quintiles are based on consumption net of social benefits.

Table 1 – Household Benefits and Social Welfare

| | 2001 | 2002 | 2003 | 2004 |
|--|-------------|-------------|-------------|-------------|
| Average consumption relative to PL (y) | | | | |
| Obs | 6214 | 6159 | 6123 | 6121 |
| Popul. | 3,630,500 | 3,623,991 | 3,553,774 | 3,603,873 |
| Mean | 1.044 | 1.271 | 1.509 | 1.534 |
| Std. Dev. | 0.876 | 1.005 | 1.160 | 1.225 |
| Average benefits relative to PL for benefits recipients (B) | | | | |
| Obs | 356 | 876 | 1115 | 1166 |
| Popul. | 269,759 | 586,764 | 731,134 | 813,745 |
| Mean | 0.162 | 0.167 | 0.164 | 0.143 |
| Std. Dev. | 0.281 | 0.311 | 0.267 | 0.195 |
| Average benefits relative to PL for all (B) | | | | |
| Obs | 6217 | 6159 | 6123 | 6121 |
| Popul. | 3,632,407 | 3,623,991 | 3,553,774 | 3,603,873 |
| Mean | 0.012 | 0.027 | 0.034 | 0.032 |
| Std. Dev. | 0.087 | 0.139 | 0.138 | 0.110 |
| Coverage and poverty | | | | |
| <i>Benefits coverage</i> | <i>5.7</i> | <i>14.2</i> | <i>18.2</i> | <i>19.0</i> |
| <i>Poverty headcount</i> | <i>62.6</i> | <i>48.5</i> | <i>34.8</i> | <i>34.1</i> |

Table 2 – Transition Probabilities Matrices

| With benefits | | | | Without benefits | | | |
|---------------------------------|------|----------|-------|-------------------------|------|----------|-------|
| Unbalanced panel 4 years | | | | | | | |
| | Poor | Non poor | Total | | Poor | Non poor | Total |
| Poor | 55.0 | 45.0 | 100 | Poor | 56.4 | 43.7 | 100 |
| Non poor | 17.8 | 82.3 | 100 | Non poor | 19.5 | 80.5 | 100 |
| Total | 34.2 | 65.8 | 100 | Total | 36.4 | 63.6 | 100 |
| Balanced panel 4 years | | | | | | | |
| | Poor | Non poor | Total | | Poor | Non poor | Total |
| Poor | 56.4 | 43.6 | 100 | Poor | 57.6 | 42.5 | 100 |
| Non poor | 17.0 | 83.0 | 100 | Non poor | 19.6 | 80.4 | 100 |
| Total | 33.8 | 66.2 | 100 | Total | 36.4 | 63.6 | 100 |
| Balanced panel 2001-2002 | | | | | | | |
| | Poor | Non poor | Total | | Poor | Non poor | Total |
| Poor | 56.0 | 44.0 | 100 | Poor | 57.4 | 42.6 | 100 |
| Non poor | 19.9 | 80.1 | 100 | Non poor | 22.5 | 77.5 | 100 |
| Total | 40.9 | 59.1 | 100 | Total | 42.9 | 57.1 | 100 |
| Balanced panel 2002-2003 | | | | | | | |
| | Poor | Non poor | Total | | Poor | Non poor | Total |
| Poor | 48.4 | 51.6 | 100 | Poor | 49.8 | 50.3 | 100 |
| Non poor | 16.5 | 83.5 | 100 | Non poor | 17.8 | 82.2 | 100 |
| Total | 30.8 | 69.2 | 100 | Total | 32.8 | 67.2 | 100 |
| Balanced panel 2003-2004 | | | | | | | |
| | Poor | Non poor | Total | | Poor | Non poor | Total |
| Poor | 60.0 | 40.0 | 100 | Poor | 61.5 | 38.6 | 100 |
| Non poor | 17.1 | 82.9 | 100 | Non poor | 18.7 | 81.3 | 100 |
| Total | 29.7 | 70.3 | 100 | Total | 32.2 | 67.8 | 100 |

Table 3- Social Benefits Incidence

| | 1 | 2 | 3 | 4 | 5 |
|--------------------------|------------------------------------|------------------------------------|-------------|-------------|--------------------|
| | Diff. Trans. Prob. P-NP | Diff. Trans. Prob. NP-P | PROT | PROM | Pov. Incid. |
| Unbalanced panel 4 years | 1.38 | -1.79 | 0.82 | 1.38 | -2.2 |
| Balanced panel 4 years | 1.14 | -2.59 | 1.47 | 1.14 | -2.61 |
| Balanced panel 2001-2002 | 1.32 | -2.56 | 0.74 | 1.32 | -2.06 |
| Balanced panel 2002-2003 | 1.37 | -1.29 | 0.61 | 1.37 | -1.98 |
| Balanced panel 2003-2004 | 1.45 | -1.54 | 1.05 | 1.45 | -2.5 |

Table 4 – Double Difference Estimates

| Group | Obs | Popul. | Mean y | Std. Dev. | DD |
|--|------------|---------------|---------------|------------------|---------------|
| Joiners Vs. Stayouts matched with Joiners | | | | | |
| 2002 Joiners | 259 | 165757 | 1.168 | 0.888 | -0.043 |
| 2002 match Joiners | 259 | 143902 | 1.219 | 0.878 | |
| 2001 Joiners | 259 | 160209 | 0.968 | 0.778 | |
| 2001 match Joiners | 259 | 143311 | 0.976 | 0.748 | |
| 2003 Joiners | 146 | 99830 | 1.223 | 1.051 | -0.064 |
| 2003 match Joiners | 146 | 94481 | 1.307 | 0.850 | |
| 2002 Joiners | 146 | 88335 | 1.051 | 0.823 | |
| 2002 match Joiners | 146 | 94135 | 1.071 | 0.690 | |
| 2004 Joiners | 145 | 113299 | 1.433 | 0.863 | -0.127 |
| 2004 match Joiners | 145 | 102581 | 1.481 | 1.381 | |
| 2003 Joiners | 145 | 94748 | 1.473 | 0.985 | |
| 2003 match Joiners | 145 | 97609 | 1.394 | 0.942 | |
| Leavers Vs. Stayins matched with Leavers | | | | | |
| 2002 Leavers | 39 | 32707 | 1.289 | 0.977 | 0.327 |
| 2002 match Leavers | 39 | 30376 | 1.018 | 0.587 | |
| 2001 Leavers | 39 | 37366 | 0.818 | 0.455 | |
| 2001 match Leavers | 39 | 29887 | 0.874 | 0.691 | |
| 2003 Leavers | 58 | 40889 | 1.400 | 1.201 | 0.308 |
| 2003 match Leavers | 58 | 44655 | 1.131 | 0.609 | |
| 2002 Leavers | 58 | 48179 | 1.030 | 0.557 | |
| 2002 match Leavers | 58 | 43424 | 1.068 | 0.656 | |
| 2004 Leavers | 87 | 58151 | 1.313 | 1.322 | 0.145 |
| 2004 match Leavers | 87 | 65966 | 1.059 | 0.482 | |
| 2003 Leavers | 87 | 64179 | 1.252 | 1.360 | |
| 2003 match Leavers | 87 | 64399 | 1.143 | 0.615 | |

Table 5a - Random Effects (GLS) Welfare Regressions with Different Sets of Regressors

| Balanced panel | | | | | | | |
|--------------------|------------------|------------------|------------------|------------------|----------------|----------------|----------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| y=B+a+b+c+d | y=B+a+b+c | y=B+a+b+d | y=B+a+c+d | y=B+b+c+d | y=B+a+b | y=B+a+c | y=B+a+d |
| 0.135 | 0.229 | 0.138 | 0.102 | 0.147 | 0.233 | 0.185 | 0.104 |
| -1.41 | (2.33)* | -1.44 | -1.05 | -1.52 | (2.36)* | -1.86 | -1.07 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| y=B+b+c | y=B+b+d | y=B+c+d | y=B+a | y=B+b | y=B+c | y=B+d | y=B |
| 0.24 | 0.148 | 0.115 | 0.187 | 0.241 | 0.194 | 0.114 | 0.194 |
| (2.42)* | -1.52 | -1.17 | -1.89 | (2.43)* | -1.94 | -1.16 | -1.94 |
| Unbalanced panel | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| y=B+a+b+c+d | y=B+a+b+c | y=B+a+b+d | y=B+a+c+d | y=B+b+c+d | y=B+a+b | y=B+a+c | y=B+a+d |
| 0.103 | 0.183 | 0.103 | 0.074 | 0.108 | 0.183 | 0.155 | 0.074 |
| (2.24)* | (3.93)** | (2.24)* | -1.59 | (2.32)* | (3.92)** | (3.28)** | -1.58 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| y=B+b+c | y=B+b+d | y=B+c+d | y=B+a | y=B+b | y=B+c | y=B+d | y=B |
| 0.183 | 0.106 | 0.08 | 0.155 | 0.181 | 0.144 | 0.075 | 0.141 |
| (3.85)** | (2.26)* | -1.69 | (3.29)** | (3.81)** | (3.03)** | -1.59 | (2.96)** |

L

egenda: z-stat under coefficients; (*) Significant at 5%; (**) Significant at 1%; y = Real cons./Pov. Line; B = Real Soc. Ben./Pov. line; a=hfem, hage30_45, hage46_60, hage60plus, hprim, hsec, htert; b=nchildm dep3_4, dep5plus; c=rural, summer; d=terrempate, growth.

Table 5b – Random Effects (Probit) Poverty Regressions with Different Sets of Regressors

| Balanced panel | | | | | | | |
|------------------|--------------|--------------|--------------|--------------|------------|------------|------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Poor=P+a+b+c+d | Poor=P+a+b+c | Poor=P+a+b+d | Poor=P+a+c+d | Poor=P+b+c+d | Poor=P+a+b | Poor=P+a+c | Poor=P+a+d |
| -0.132 | -0.336 | -0.152 | 0.078 | -0.156 | -0.354 | -0.174 | 0.06 |
| -1.35 | (3.66)** | -1.54 | -0.82 | -1.58 | (3.83)** | -1.96 | -0.62 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Poor=P+b+c | Poor=P+b+d | Poor=P+c+d | Poor=P+a | Poor=P+b | Poor=P+c | Poor=P+d | Poor=P |
| -0.352 | -0.169 | 0.073 | -0.19 | -0.364 | -0.195 | 0.061 | -0.205 |
| (3.83)** | -1.71 | -0.76 | (2.12)* | (3.95)** | (2.19)* | -0.64 | (2.30)* |
| Unbalanced panel | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Poor=P+a+b+c+d | Poor=P+a+b+c | Poor=P+a+b+d | Poor=P+a+c+d | Poor=P+b+c+d | Poor=P+a+b | Poor=P+a+c | Poor=P+a+d |
| -0.012 | -0.16 | -0.023 | 0.181 | -0.01 | -0.168 | 0.005 | 0.172 |
| -0.35 | (4.67)** | -0.66 | (5.16)** | -0.27 | (4.89)** | -0.14 | (4.92)** |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Poor=P+b+c | Poor=P+b+d | Poor=P+c+d | Poor=P+a | Poor=P+b | Poor=P+c | Poor=P+d | Poor=P |
| -0.147 | -0.01 | 0.19 | 0 | -0.148 | -0.011 | 0.194 | -0.007 |
| (4.27)** | -0.27 | (5.40)** | -0.01 | (4.30)** | -0.34 | (5.53)** | -0.22 |

Legenda: z-stat under coefficients; (*) Significant at 5%; (**) Significant at 1%; poor (1=poor; 0=Non poor); P (1= soc. ben. Recipient; 0=Others); a=hfem, hage30_45, hage46_60, hage60plus, hprim, hsec, htert; b=nchildm dep3_4, dep5plus; c=rural, summer; d=terremprate, growth.

Table 6a – Regressions with Different Estimators – Balanced Panel

| Column Dep. Var. Model | 1 y fe | 2 y re | 3 y be | 4 poor fe | 5 poor re | 6 poor be |
|---------------------------------------|-----------------------|-----------------------|-----------------------|--------------------------|--------------------------|--------------------------|
| b/sbd | 0.136 -1.3 | 0.138 -1.44 | 0.173 -0.7 | -0.056 -1.95 | -0.033 -1.39 | 0.001 -0.03 |
| hfem | 0.179 (3.05)** | 0.134 (3.07)** | 0.017 -0.25 | -0.062 (2.05)* | -0.03 -1.51 | 0.012 -0.45 |
| hage30_45 | 0.019 -0.19 | -0.116 -1.42 | -0.345 (2.45)* | -0.104 (2.00)* | -0.012 -0.31 | 0.092 -1.59 |
| hage46_60 | 0.065 -0.57 | -0.119 -1.4 | -0.413 (3.07)** | -0.138 (2.35)* | -0.017 -0.44 | 0.086 -1.55 |
| hage60plus | 0.028 -0.23 | -0.232 (2.40)* | -0.616 (3.66)** | -0.117 -1.8 | 0.036 -0.78 | 0.178 (2.56)* |
| hprim | 0.181 -0.99 | 0.17 -1.47 | 0.15 -1.01 | -0.06 -0.63 | -0.084 -1.64 | -0.089 -1.46 |
| hsec | 0.168 -0.98 | 0.18 -1.67 | 0.12 -0.86 | -0.144 -1.63 | -0.091 -1.91 | -0.044 -0.77 |
| htert | 0.529 (2.60)** | 0.833 (6.50)** | 1.027 (6.21)** | -0.25 (2.37)* | -0.26 (4.56)** | -0.265 (3.89)** |
| nchild | -0.213 (5.50)** | -0.252 (8.59)** | -0.353 (6.89)** | 0.13 (6.49)** | 0.131 (9.49)** | 0.138 (6.41)** |
| dep3_4 | -0.152 (2.05)* | -0.098 -1.46 | 0.194 -1.2 | 0.061 -1.61 | 0.042 -1.28 | 0 -0.01 |
| dep5plus | 0.069 -0.6 | 0.18 -1.81 | 0.63 (3.04)** | -0.056 -0.95 | -0.127 (2.64)** | -0.303 (3.52)** |
| terrempate | 0.217 -1.85 | 0.36 (3.49)** | 0.799 (3.58)** | -0.051 -0.84 | -0.141 (2.78)** | -0.304 (3.23)** |
| growth | 4.953 (12.39)** | 5.049 (12.67)** | 26.627 -0.26 | -2.977 (14.12)** | -3.095 (14.88)** | 1.122 -0.03 |
| Constant | -4.116 (8.86)** | -4.153 (9.30)** | -26.924 -0.25 | 3.782 (15.55)** | 3.817 (16.65)** | -0.638 -0.01 |
| Observations | 3463 | 3463 | 3463 | 3463 | 3463 | 3463 |
| Number of hhid | 866 | 866 | 866 | 866 | 866 | 866 |
| R-squared | 0.09 | | 0.18 | 0.11 | | 0.14 |
| Hausman test (fe/re) | | | | | | |
| Chi2 | 36.74 | | | 26.71 | | |
| Prob>chi2 | 0.0005 | | | 0.0136 | | |

z-stat or t-stat under coefficients

Table 6b – Regressions with Different Estimators – Unbalanced Panel

| Column Dep. Var. Model | 1 y fe | 2 y re | 3 y be | 4 poor fe | 5 poor re | 6 poor be |
|---------------------------------------|-----------------------|-----------------------|-----------------------|--------------------------|--------------------------|--------------------------|
| b/sbd | 0.038 -0.52 | 0.103 (2.24)* | 0.144 (2.39)* | -0.053 (2.74)** | -0.007 -0.74 | 0.005 -0.48 |
| hfem | 0.118 (2.88)** | 0.108 (6.77)** | 0.095 (5.45)** | -0.017 -0.86 | -0.03 (4.53)** | -0.031 (4.33)** |
| hage30_45 | -0.008 -0.12 | -0.351 (12.10)** | -0.419 (13.05)** | 0.005 -0.16 | 0.042 (3.46)** | 0.044 (3.40)** |
| hage46_60 | -0.085 -1.07 | -0.441 (15.14)** | -0.506 (15.96)** | -0.018 -0.47 | 0.07 (5.84)** | 0.076 (5.92)** |
| hage60plus | -0.094 -1.04 | -0.586 (17.12)** | -0.675 (17.88)** | 0.022 -0.49 | 0.09 (6.37)** | 0.088 (5.80)** |
| hprim | 0.253 (2.09)* | 0.152 (3.69)** | 0.138 (3.11)** | -0.129 (2.18)* | -0.092 (5.44)** | -0.088 (4.91)** |
| hsec | 0.161 -1.33 | 0.162 (4.20)** | 0.154 (3.73)** | -0.126 (2.12)* | -0.071 (4.52)** | -0.067 (4.04)** |
| htert | 0.446 (3.09)** | 0.766 (17.62)** | 0.786 (17.06)** | -0.205 (2.91)** | -0.258 (14.59)** | -0.261 (14.07)** |
| nchild | -0.23 (7.97)** | -0.293 (25.18)** | -0.312 (23.76)** | 0.153 (10.80)** | 0.138 (28.26)** | 0.138 (25.81)** |
| dep3_4 | -0.086 -1.68 | 0.006 -0.23 | 0.063 -1.85 | 0.02 -0.77 | -0.002 -0.13 | -0.013 -0.92 |
| dep5plus | 0.068 -0.83 | 0.239 (5.73)** | 0.314 (6.44)** | -0.067 -1.66 | -0.095 (5.42)** | -0.099 (5.01)** |
| terrempate | 0.132 -1.55 | 0.297 (6.83)** | 0.357 (7.00)** | -0.06 -1.43 | -0.12 (6.49)** | -0.129 (6.22)** |
| growth | 4.353 (16.14)** | 5.022 (25.80)** | 5.751 (20.71)** | -2.409 (17.95)** | -2.994 (34.10)** | -3.35 (29.69)** |
| Constant | -3.286 (10.34)** | -3.771 (17.60)** | -4.516 (14.95)** | 3.038 (19.34)** | 3.609 (37.66)** | 3.984 (32.57)** |
| Observations | 24597 | 24597 | 24597 | 24597 | 24597 | 24597 |
| Number of hhid | 18011 | 18011 | 18011 | 18011 | 18011 | 18011 |
| R-squared | 0.06 | | 0.12 | 0.08 | | 0.12 |
| Hausman test (fe/re) | | | | | | |
| Chi2 | 93.53 | | | 57.62 | | |
| Prob>chi2 | 0.0000 | | | 0.0000 | | |

z-stat or t-stat under coefficients

Table A1 – T-tests, Joiners Vs. Match

| | 2001-2002 | | 2002-2003 | | 2003-2004 | |
|---------------------|-------------|-------|-------------|-------|-------------|-------|
| | t | p>t | t | p>t | t | p>t |
| | 2001 | | 2002 | | 2003 | |
| hh head sex | 1.186 | 0.236 | 1.055 | 0.292 | -0.719 | 0.472 |
| hh head age | 0.280 | 0.780 | -0.363 | 0.717 | -0.860 | 0.391 |
| hh head education | 1.804 | 0.072 | -0.534 | 0.594 | -0.334 | 0.738 |
| hh n. of children | 0.472 | 0.637 | 1.753 | 0.081 | 1.148 | 0.252 |
| hh share of earners | -0.832 | 0.406 | -0.947 | 0.344 | -1.148 | 0.252 |
| hh properties | 0.380 | 0.704 | -0.579 | 0.563 | 0.579 | 0.563 |
| hh rural | 1.398 | 0.163 | -0.251 | 0.802 | -1.094 | 0.275 |
| dummy for Q2 and Q3 | 0.446 | 0.656 | -0.122 | 0.903 | 0.356 | 0.722 |
| | 2002 | | 2003 | | 2004 | |
| hh head sex | 0.639 | 0.523 | 0.935 | 0.350 | 0.000 | 1.000 |
| hh head age | 0.198 | 0.843 | -0.363 | 0.717 | -0.123 | 0.902 |
| hh head education | 2.093 | 0.037 | 0.411 | 0.682 | -0.348 | 0.728 |
| hh n. of children | 0.343 | 0.732 | 0.323 | 0.747 | -0.057 | 0.955 |
| hh share of earners | -0.461 | 0.645 | 0.603 | 0.547 | -0.116 | 0.908 |
| hh properties | -1.417 | 0.157 | 0.000 | 1.000 | 0.000 | 1.000 |
| hh rural | 1.398 | 0.163 | -0.251 | 0.802 | -1.094 | 0.275 |
| dummy for Q2 and Q3 | 0.446 | 0.656 | -0.122 | 0.903 | 0.356 | 0.722 |

Table A2 – T-Tests, Leavers Vs. Match

| | 2001-2002 | | 2002-2003 | | 2003-2004 | |
|---------------------|-------------|-------|-------------|-------|-------------|-------|
| | t | p>t | t | p>t | t | p>t |
| | 2001 | | 2002 | | 2003 | |
| hh head sex | -0.245 | 0.807 | 0.191 | 0.849 | -0.308 | 0.759 |
| hh head age | 0.239 | 0.812 | 0.223 | 0.824 | 0.100 | 0.920 |
| hh head education | 0.143 | 0.887 | 0.632 | 0.529 | -0.051 | 0.959 |
| hh n. of children | -1.843 | 0.069 | -0.161 | 0.873 | -0.174 | 0.862 |
| hh share of earners | 0.454 | 0.651 | -0.017 | 0.986 | 0.828 | 0.409 |
| hh properties | na | na | 0.000 | 1.000 | -1.000 | 0.319 |
| hh rural | -0.467 | 0.642 | 0.208 | 0.836 | 0.619 | 0.537 |
| dummy for Q2 and Q3 | 0.226 | 0.822 | 0.000 | 1.000 | 0.980 | 0.328 |
| | 2002 | | 2003 | | 2004 | |
| hh head sex | -0.475 | 0.636 | 0.768 | 0.444 | -0.155 | 0.877 |
| hh head age | 0.224 | 0.823 | -0.029 | 0.977 | -0.031 | 0.975 |
| hh head education | -0.389 | 0.698 | 0.618 | 0.538 | 0.622 | 0.535 |
| hh n. of children | -0.371 | 0.712 | 0.551 | 0.583 | 0.476 | 0.635 |
| hh share of earners | -0.130 | 0.897 | -0.712 | 0.478 | -0.152 | 0.879 |
| hh properties | na | na | na | na | na | na |
| hh rural | -0.467 | 0.642 | 0.208 | 0.836 | 0.619 | 0.537 |
| dummy for Q2 and Q3 | 0.226 | 0.822 | 0.000 | 1.000 | 0.980 | 0.328 |

Table B1 – Variables Means and Means Tests for Balanced and Unbalanced Panels

| Variable | 2001 | | | | 2002 | | | | 2003 | | | | 2004 | | | |
|---|-------------|------------|---------|--------|-------------|------------|---------|--------|-------------|------------|---------|--------|-------------|------------|---------|--------|
| | Unbal. | Bal. | % Diff. | t-test | Unbal. | Bal. | % Diff. | t-test | Unbal. | Bal. | % Diff. | t-test | Unbal. | Bal. | % Diff. | t-test |
| y = Real cons./Pov. Line | 1.12 | 1.12 | 0.3 | 0.12 | 1.38 | 1.40 | -1.8 | -0.62 | 1.65 | 1.56 | 5.3 | 1.83 | 1.64 | 1.58 | 4.0 | 1.40 |
| b = Real Soc. Ben./Pov. line | 0.01 | 0.01 | -13.5 | -0.52 | 0.03 | 0.04 | -18.0 | -1.12 | 0.04 | 0.04 | 10.4 | 0.61 | 0.03 | 0.05 | -22.7 | -1.98 |
| poor (1=poor; 0=Non poor) | 0.58 | 0.58 | -0.5 | -0.17 | 0.42 | 0.38 | 9.2 | 1.99 | 0.27 | 0.31 | -10.7 | -2.02 | 0.29 | 0.31 | -8.7 | -1.66 |
| sbd (1= soc. ben. Receipt; 0=Others) | 0.06 | 0.05 | 7.8 | 0.49 | 0.14 | 0.15 | -3.0 | -0.35 | 0.18 | 0.18 | -0.9 | -0.11 | 0.19 | 0.22 | -13.2 | -2.01 |
| hfem = Head of household, Female | 0.38 | 0.35 | 9.4 | 1.87 | 0.41 | 0.37 | 10.8 | 2.24 | 0.41 | 0.39 | 5.3 | 1.17 | 0.43 | 0.41 | 2.9 | 0.67 |
| hage30_45 = Head of household, age 30-45 | 0.30 | 0.27 | 8.2 | 1.36 | 0.28 | 0.28 | 1.7 | 0.29 | 0.27 | 0.26 | 5.8 | 0.92 | 0.27 | 0.24 | 9.6 | 1.47 |
| hage46_60 = Head of household, age 46-60 | 0.29 | 0.30 | -2.0 | -0.36 | 0.29 | 0.31 | -4.2 | -0.78 | 0.31 | 0.32 | -4.6 | -0.89 | 0.30 | 0.33 | -7.0 | -1.36 |
| hage60plus = Head of household, more than 60 | 0.32 | 0.35 | -6.1 | -1.23 | 0.33 | 0.35 | -4.8 | -0.98 | 0.34 | 0.36 | -5.4 | -1.12 | 0.34 | 0.37 | -7.4 | -1.58 |
| hprim = Head of household, primary education | 0.12 | 0.11 | 2.1 | 0.20 | 0.10 | 0.12 | -11.9 | -1.25 | 0.10 | 0.13 | -18.9 | -2.14 | 0.11 | 0.13 | -10.6 | -1.16 |
| hsec = Head of household, secondary education | 0.72 | 0.74 | -2.6 | -1.19 | 0.73 | 0.74 | -1.7 | -0.79 | 0.72 | 0.72 | -0.4 | -0.17 | 0.73 | 0.74 | -2.0 | -0.90 |
| htert = Head of household, tertiary education | 0.11 | 0.09 | 33.3 | 2.50 | 0.12 | 0.09 | 39.3 | 2.90 | 0.13 | 0.10 | 27.4 | 2.27 | 0.11 | 0.08 | 34.7 | 2.58 |
| nchild = Number of children in the household | 0.60 | 0.61 | -0.6 | -0.11 | 0.58 | 0.59 | -1.0 | -0.19 | 0.55 | 0.56 | -1.4 | -0.25 | 0.53 | 0.52 | 2.9 | 0.49 |
| dep3_4 = 1 if Household size/No. of Earners = Between 3 and 4 | 0.15 | 0.11 | 38.2 | 3.23 | 0.14 | 0.12 | 12.1 | 1.18 | 0.14 | 0.12 | 14.3 | 1.38 | 0.14 | 0.13 | 6.1 | 0.65 |
| dep5plus = 1 if Household size/No. of Earners = Five or more | 0.35 | 0.35 | -0.6 | -0.12 | 0.34 | 0.35 | -1.4 | -0.28 | 0.33 | 0.35 | -5.8 | -1.18 | 0.33 | 0.35 | -4.6 | -0.94 |
| rural = Rural areas | 0.60 | 0.69 | -13.3 | -5.17 | 0.60 | 0.69 | -12.7 | -4.96 | 0.60 | 0.69 | -12.4 | -4.83 | 0.60 | 0.69 | -12.5 | -4.86 |
| summer = Household interviewed in quarter 2 and 3 | 0.50 | 0.65 | -23.7 | -8.60 | 0.50 | 0.65 | -23.8 | -8.64 | 0.50 | 0.65 | -23.9 | -8.68 | 0.50 | 0.65 | -23.5 | -8.53 |
| terrempate = District Average No. Of earners/No. Of adults | 0.58 | 0.59 | -2.5 | -0.90 | 0.58 | 0.59 | -1.7 | -0.62 | 0.56 | 0.55 | 1.2 | 0.44 | 0.55 | 0.54 | 2.4 | 0.84 |
| growth = GDP annual growth rate | 1.00 | 1.00 | 0.0 | na | 1.08 | 1.08 | 0.0 | na | 1.07 | 1.07 | 0.0 | na | 1.07 | 1.07 | 0.0 | na |
| Sample | 6217 | 866 | | | 6159 | 866 | | | 6125 | 866 | | | 6121 | 866 | | |