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The Poverty Reduction Capacity of Public and Private Transfers in Transition

Paolo Verme[1]

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The paper estimates and compares the impact of public and private transfers on welfare in Moldova, the poorest country in Europe. Making use of a combination of evaluation methods for panel data we consistently find that private transfers are a better welfare improving mechanism than public transfers across the distribution of welfare. Among public transfers, social insurance works best as a poverty alleviation measure. On the contrary, social assistance has no evident positive effect on welfare, a finding only revealed when behavioral effects are taken into account. The paper shows how, in retrospective studies, incidence evaluations such as the PROT and PROM tests proposed by Ravallion et Al. (1995) can lead to different results as compared to impact evaluations such as double difference and error component models. We also show how the PROT and PROM tests can be derived from Markov-type transition matrixes.

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1. Introduction

Evaluating the impact of public policies on welfare is one of the central knots in public economics. Enlightened decisions on public policies should derive from a careful consideration of the impact of past policies and from the modeling of possible changes induced by potential new policies. Recent advances in evaluation theory and methods emerged from the works of Rubin (1973, 1974, 1978), Heckman (1998, 2000), Imbens (2000, 2004), Manski (1990, 2005), Angrist (1991, 1994) and Rosenbaum (1995) among others together with the progressive availability of household data worldwide have greatly improved the evaluator tool-kit. While most of welfare evaluations until the 1990s relied on the comparison of welfare with and without transfers (incidence evaluations), today most evaluations make an effort to consider more in detail behavioral effects (impact evaluations).

These tools are also important for poor countries where public transfers can have a very significant impact on household welfare. During the past decade, a new vague of evaluations of public transfers has developed in emerging economies and these evaluations are gaining an increasingly important role in public debates. The evaluations of Conditional Cash Transfers and other types of programs in Latin America are examples of this recent phenomenon but impact evaluations are becoming the norm also in African and Asian countries. Many of these country evaluations have already found space in top ranking economics journals witnessing the weight attributed to this branch of applied economics by the research community (Angrist et Al., 2002; Galiani et Al., 2005; Kremer and Miguel, 2007; Duflo, 2001). Multilateral organizations such as the World Bank have also greatly improved their evaluation capacity in recent years in an effort to orient developmental policies towards policies that work.[2]

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[2] See for example, the World Bank website on impact evaluations at http://web.worldbank.org.

More recently, transitional economies have also benefited from a number of evaluation studies but these largely remained in the tradition of incidence evaluations. Milanovic (2000), for example, looked at social protection transfers in Latvia and found a weak pro-poor role of social protection benefits. Lokshin and Ravallion (2000) analyzed the role of the social safety net in protecting the poor from the 1998 Russian financial crisis and concluded that the social safety net in place was largely insufficient to protect the poor from the Russian crisis. Ravallion et Al. (1995) looked at the early years of the transition in Hungary and 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 looked at social benefits in Poland and found 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 evaluation of public transfers in transitional economies has also its own peculiarities. Unlike developing countries, transitional economies during the Socialist period had already established a complex system of public transfers based on categorical principles which focused mainly on children, disabled and war veterans. These countries were also characterized by low levels of poverty and inequality and good standards in the education and health sectors. The transition toward a market economy and the subsequent recession, unemployment growth and reduction in budget revenues confronted these economies with unprecedented challenges with rising poverty and inequality and falling standards in the provision of public services which transformed the old social protection systems in obsolete institutions. These systems needed to be restructured by moving from categorical type of systems to means-tested and poverty oriented systems.

The economic recessions experienced during the 1990s by transitional economies have also fostered two other major phenomena. One is the expansion of inter-household exchanges as a form of protection from economic risks and the second is remittances from abroad, consequence of profound and prolonged periods of outmigration. A study on Russia has shown for example how pensions can play an important role in inter-household other than intra-household redistribution (Kuhn and Stillman, 2004). More importantly, remittances from abroad have come to play a major role in the poorest of the transitional economies becoming for some countries one of the major sources of growth (Korovilas, 1999) and contributing significantly in other countries to improvements in household welfare (Nguyen-Viet 2008).

What is the impact of public and private transfers on welfare and poverty in transition is the theme of this paper. Evaluations carried out in transitional economies are prevalently incidence evaluations in that they largely ignore behavioral responses to changes in transfers. In this paper we provide both an incidence and an impact evaluation and compare results in an effort to better understand how transfers affect poverty and welfare and validate in this way the information that may emerge from incidence evaluations alone. To this end, the paper first measures the incidence of transfers on poverty making use of transition probabilities matrices and the PROT and PROM testes proposed by Ravallion et AI. (1995) and then moves on with double difference estimates and error component models to account for behavioral effects. In our knowledge, this is also the first paper that compares the welfare performance of public and private transfers in transitional economies.

We focus on one country - Moldova - for a number of useful features. Moldova is the economy that experienced the worst recession on record during the 1990s and is today the poorest country of Europe; it is the transitional country which had the largest migration relative to its population and that today benefits the most from remittances as a share of

GDP; and it is also one of the countries which expanded very significantly public transfers in terms of coverage and expenditure in recent years. It is also one of a few countries in transition that disposes of a consistent panel household budget survey since 1997.

2. Evaluating public and private transfers in Moldova

Moldova is an extreme example of the transitional 'path' experienced by the countries of the Former Soviet Union (FSU). After the desegregation of the Union in 1991, the country went through a deep recession between 1991 and 1995, two years of stabilization between 1996 and 1997 and a new smaller recession in the aftermath of the 1998 Russian financial crisis. By 1999, the country had lost over 60% of its GDP[3] as compared to 1990 and poverty stood at 71% of the population (World Bank, 2004).

Economic recovery really started only in the year 2000 but the gains since then have been remarkable. Annual growth rates since 2000 have been on average around 7% and poverty declined rapidly to around 26% of the population by 2004 (GoM, 2004). The beginning of the new growth period also coincided with the re-election of a communist government and the combination of increasing resources and a communist agenda allowed for a net growth in public spending in all areas including social insurance and social assistance.

Despite these positive changes, the social protection system remained largely unchanged with significant reforms being implemented only for pensions. The social assistance system today continues to include a wealth of categorical benefits mainly targeted at children, the disabled and the war veterans and - with two minor exceptions - benefits are not means-tested although the Government of Moldova at the beginning of its mandate clearly stated that social assistance benefits are meant for poverty reduction (GoM, 2001).

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[3]See http://www.cisstat.com/eng/mac-01.htm

The expansion of public transfers initiated by the new government in 2001 has also been accompanied by a remarkable increase in remittances from abroad. There are scattered data on out-migration during the 1990s but one of the peculiarities of Moldova is that emigration increased four folds between 1999 and 2004, from 100,000 to 400,000 people a year in a country of only 3.6 million people. By 2004, remittances from abroad accounted for 27% of GDP, an increase of almost 100% from 2000 (IMF, 2006).

The concomitant expansion of public and private transfers during a period of sustained growth raises several questions on what may have really driven poverty reduction and how both types of transfers may have altered household behavior. Do public and private transfers explain improvements in welfare and poverty?

In addressing this question we face a number of critical issues. We are confronted with a retrospective evaluation. There was no design to evaluate transfers *ex-ante* and we cannot rely on a randomized experiment and/or household surveys which were specifically designed for evaluating transfers. We face therefore most of the problems that *ex-post* evaluations share including selection bias, lack of a proper comparison group, unobserved heterogeneity, model endogeneity and measurement error. We do not know what drives the household decision to apply to certain transfers such as social assistance and we do not have any information about those households who applied for benefits but were rejected. Nor we know about the motives and criteria that people working abroad use for deciding about size and beneficiaries of remittances. Several factors that may determine program selection are not observed in our data such as the improper or illegal selection mechanisms used by administrators of public transfers. We cannot always 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. These are not exceptional

circumstances for an evaluation of government transfers in transitional economies but the rule.

On our side, we have the fact that we dispose of a consistent panel survey that covers the period 2001-2004, the entire first mandate of the new Communist government elected in 2001. The survey is the Moldova Household Budget Survey (MHBS) initiated in 1997 and administered by the National Bureau of Statistics. It covers approximately 6,240 households every year interviewed in monthly blocks of about 520 households each. The panel component has an elaborate rotation scheme and a maximum tenure of each household of four years which explains why we retained only four of the seven years available.[4] The survey is a multi-stage sampling and multi-purpose survey and includes sections on income and consumption. We base the analysis on households rather than individuals. In the data used for this paper, a balanced panel (with only original observations) includes about 2,400 households over two years and 866 over the four years' period.

In the next sections, we use the MHBS to evaluate the impact of public and private transfers on welfare and poverty. We start with a statistical overview of transfers, we then look at household mobility and poverty incidence by means of transition probabilities matrixes and we conclude extending the analysis to behavioral effects with double difference estimates and panel error component models.

3. Poverty and income distribution

Between 2001 and 2003 household poverty has sharply declined in Moldova (Table 1, panel A).[5] The headcount ratio estimated at 63% in 2001 was down to less than 36% in

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[4]Signoret, J.E. (2003) provides full details on the panel structure and rotation mechanisms.
[5]Note that figures refer to households, not individuals. 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 basked 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 (World Bank, 2005). Either the poverty line or consumption are adjusted with the Consumer Price Index (CPI) for the period 2001-2004. We opted to ignore equivalence scales. This is the

2003.[6] The poverty gap ratio more than halved and the severity of poverty ratio in 2003 was a third of its 2001 value. Therefore, not only the number of households under the poverty line has dropped significantly but also the poverty depth and the severity of poverty for those households living below the poverty line have improved. We can also remark that the decline occurred entirely between 2001 and 2003 whereas all the three poverty indexes have increased between 2003 and 2004. It is as if improvements suddenly stalled, a phenomenon that persisted in 2005 and 2006.

If we look at household coverage (Table 1, panel B), wages have expanded with 54% of households receiving at least one wage in 2004 as compared to a figure of 48% in 2001. Coverage has also increased for all transfers. From 12% to 15% for personal transfers, from 39% to 41% for social insurance and from 7% to 23% for social assistance.[7]

All incomes from work and from finance increased in real terms between 2001 and 2003 and decreased in 2004 with the exception of wages which continued to increase in 2004 (Table 1, panel C). Both public and private transfers also increased very significantly between 2001 and 2003 and continued to increase in 2004 with the exception of social assistance which decreases in 2004.

These trends determined a structural change in the sources of household income away from income from work and finance and towards income from public and private transfers (Table 1, panel D). Incomes from work together decreased from 71.5% to 69.4% of total income, income from finance decreased from 13.2% to 9.9% while income from transfers

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approach followed by the World Bank in its study on poverty in Moldova (World Bank, 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.

[6]Note that the poverty figures presented in this paper may differ from those published by government sources or international organizations. Differences are explained by the different use of equivalence scales, the use of different consumption aggregates or the use of different deflators (regional or national, based on the MHBS or based on the national consumer price index).

[7]Personal transfers include both inter-household transfers in Moldova and remittances from abroad. Social insurance includes pensions and unemployment benefits. Social assistance includes utilities compensations, child allowances, war veterans allowances, social allowances, death grants, Chernobyl compensations, care-taker allowances for the disabled, transport compensations for the disabled and material assistance. Utilities compensations, child benefits, war veterans allowances and social allowances account for the quasi-totality of social assistance

increased from 13.7% to 19.1%.

In substance, wages have increased in coverage and real value. Social insurance and personal transfers have increased marginally in coverage and significantly in real value and social assistance has increased steadily in both coverage and real value. The result of these changes is that household welfare has improved but also that household dependency on transfers has increased between 2001 and 2004 by almost six percentage points.

[Table 1]

The distribution of transfers is bias in favor of upper consumption quintiles (Table 2).[8] Only about a third of total expenditure on social assistance went to the first two quintiles in 2001. Targeting improves between 2001 and 2004 with the first two quintiles receiving almost half of total social assistance in 2004 but this share is still evidence of very poor targeting. Social insurance in 2001 was more pro-poor than social assistance with around 36% of total expenditure reaching the first two quintiles. However, this share remains approximately the same throughout the period with a small redistribution in favor of the second quintile. Personal transfers are the most pro-rich of the transfers with only 13% of these benefits reaching the first two quintiles in 2001 and this share declining to 8.6% by 2004. The incidence that transfers may have on poverty is evidently limited by the pro-rich distribution of both private and public transfers.

[Table 2]

In Figure 1 we compare the distributions of wages, social assistance, social insurance

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[8]These data should be taken with caution. First, we opted to construct quintiles on consumption per capita given that we use consumption per capita as a measure of welfare. However, transfers are part of income, not consumption and we know that income is underreported in Moldova. We assume here that underreporting mostly concerns illegal or informal incomes and much less transfers. Second, we use consumption gross of transfers. That is because, as we said, transfers are part of income, not consumption. However, public decisions on the allocation of transfers are based on income or consumption before transfers are paid, not after. Yet, private transfers are not income based but based on kin relations while public transfers are not means tested but categorical in Moldova. This explains our final choice of constructing quintiles on consumption per capita gross of transfers.

and personal transfers between 2001 and 2004 using kernel densities.[9]

The distribution of wages has a quasi-normal shape and centers around the poverty line which witnesses the very low wage standards existing in Moldova. However, the distribution shifts to the right during the period contributing to improve living standards.

The distribution for social assistance is right-skewed with most of these transfers distributed around very low levels rather far from the poverty line. The distribution shifts rightward during the period but in 2004 most observations are still far below the poverty line. For those households who are only recipients of social assistance, crossing the poverty line between 2001 and 2004 would have been very hard.

On the contrary, the amounts of pensions and personal transfers are much larger and the shift of the distribution over the years more marked. The distribution of social insurance is also narrow and close to the poverty line. A small shift in the distribution of social insurance can move many households above the poverty line, a phenomenon less likely to happen with personal transfers because of the flatter shape of the distribution.

Based on the distributions plotted in Figure 1, we could argue that the transfers potential for poverty alleviation is greater for social insurance, personal transfers and social assistance in this order.

[Figure 1]

4. Household mobility and poverty incidence

In this section we restrict the data set to the panel observations taking two years at a time and using transition probabilities matrixes to explore household mobility in and out of the different types of transfers and in and out of poverty. When used with a poverty dummy, transition probabilities are also a very useful tool to measure the incidence of transfers on poverty and poverty transitions by simply subtracting transition probabilities

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[9]These are obtained with the 'kdensity' command in Stata which, by default, uses the kernel Epanechnikov function.

calculated in the presence of transfers with those calculated in the absence of transfers.

Let i be our unit of interest - the household - with $i=1,2,...r$; t an indicator of time with $t=1,2$; P_i a binary variable that describes whether households participate ($P_i=1$) or do not participate ($P_i=0$) to the transfer program. We can identify four groups of households according to participation P_i which we call 'Stayouts' (So), 'Joiners' (J), 'Leavers' (L), and 'Stayins' (Si) as follows:

Group	$P_{i,t=1}$	$P_{i,t=2}$
Stayouts	0	0
Joiners	0	1
Leavers	1	0
Stayins	1	1

Based on two years' panels and on the taxonomy provided above, we can construct two types of transition probabilities matrixes which we call A and B as follows:

A	0	1	Tot
0	$\dfrac{So}{So+J+L+Si}$	$\dfrac{J}{So+J+L+Si}$	$\dfrac{So+J}{So+J+L+Si}$
1	$\dfrac{L}{So+J+L+Si}$	$\dfrac{Si}{So+J+L+Si}$	$\dfrac{L+Si}{So+J+L+Si}$
Tot	$\dfrac{So+L}{So+J+L+Si}$	$\dfrac{J+Si}{So+J+L+Si}$	1

B	0	1	Tot
0	$\dfrac{So}{So+J}$	$\dfrac{J}{So+J}$	1
1	$\dfrac{L}{L+Si}$	$\dfrac{Si}{L+Si}$	1
Tot	$\dfrac{So+L}{So+J+L+Si}$	$\dfrac{J+Si}{So+J+L+Si}$	1

Both matrixes are read by row. Matrix A can be used to compare transitions in (0->1) and out (1->0) of each status as all cells are 'standardized' to the panel population. Matrix B is a non-efficient estimation of the more common Markov type of transition matrix.

Matrix B can be used to calculate the incidence of transfers on poverty and on poverty transitions and to calculate the PROT and PROM tests proposed by Ravallion et Al. (1995). To calculate the incidence of transfers on poverty and on poverty transitions, it is sufficient to take the difference between the cells values of matrix B calculated in the presence of transfers and those calculated in the absence of transfers.

The PROT and PROM tests are also easily derived from matrix B. 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 (PR) and promotion (PR) tests are defined as:

$$ \qquad [1] $$

$$ \qquad [2] $$

However, given that $F_0(z) = G_0(z)$ by definition (in the pre-benefits period $F(z)$ cannot include benefits) the PR equation is reduced to:

$$ \qquad [3] $$

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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. In the framework of Matrix B described above, $G_2(z)$ and $F_2(z)$ are equal to $\left(\frac{JSi}{SJHS}\right)_i$ while $C_{z,z}$ and $F_{z,z}$ are equal to $\left(\frac{Si}{L+Si}\right)$ with G representing the transition probabilities without transfers and F those with transfers.

The transition probabilities for matrix A and B are reported in Table 3a and 3b respectively.

There is a significant mobility for all transfers with inflows dominating outflows (table 3a). The largest outflows are shown by personal transfers while the largest inflows are shown by social assistance. Social insurance is the least 'mobile' of the transfers with the lowest inflows and outflows. As we have already seen, coverage is expanding during the period for all transfers but we can also note that significant shares of households move out of transfers every year.

[Table 3a]

All types of transfers contribute to reduce poverty (Table 3b). Social insurance is the transfer that contributes the most. In the absence of social insurance the poverty headcount index would have been 11.8% higher in 2002, 13.6% higher in 2003 and 15.6% higher in 2004 (Table 3b, panel A-C). Personal transfers follow in terms of importance reducing poverty by 4% in 2002, 5.9% in 2003 and 5.9% in 2004 (Table 3b, panel A-B). The incidence of social assistance is more marginal but still positive with 1.6% in 2002, 2.1% in 2003 and 2.4% in 2004 (Table 3b, panel A-D).

We can also note that all benefits are able to protect people from poverty and promote an exit from poverty in all three periods considered (PROT and PROM tests, bottom of table 3b).

Social insurance is the benefit that best contributes to promoting an exit from poverty confirming our speculations based on Figure 1. We have already noted that the shape of

the distribution of social insurance was such that the shift to the right between 2001 and 2004 allowed many households to cross the poverty line. On the other hand, the role of social insurance in protecting the non poor from falling into poverty is very marginal.

Personal transfers provide both promotion out of poverty and protection from poverty but in a limited amount relatively to the other two types of transfers. We saw that despite the larger amounts of personal transfers the distribution of these benefits is rather flat and pro-rich, with a limited capacity to move a large number of observations across the poverty line.

Instead social assistance, which is theoretically designed to lift people out of poverty, functions best to protect people from poverty. This is probably explained by the very poor targeting of social assistance which we showed to be strongly bias in favor of the non poor.

In a sense, it is as if social insurance and social assistance had swapped roles in Moldova with social assistance functioning as an income protection mechanism and social insurance as a poverty alleviation measure.

[Table 3b]

5. Behavioral implications

We now exploit the panel component of the survey to control for self-selection, unobserved heterogeneity and endogeneity accounting in this way for the possible behavioral effects that public and private transfers may have.

We carry out two separate exercises. First we design an *ex-post* pseudo-random experiment with propensity score matching and calculate double means differences comparing the performance of participants and non-participants before and after treatment. In a second stage we estimate a set of panel error component models including fixed effects and random effects models evaluating the impact of transfers on welfare and poverty separately.

Our primary interest is the comparison of Stayouts and Joiners over the period given that we are trying to assess the impact of accrued transfers. However, comparing Leavers and Stayins can also provide a useful counterfactual as in Ravallion et Al. (2005) who study the impact on welfare of falling out of the *Trabajar* workfare program in Argentina therefore focusing on the Leavers and Stayins.

Over a two years' period, a double difference estimator is defined as:

$$\text{[illegible equation]} \qquad [4]$$

where $E(Y_i)$ is the expected value (the mean) of welfare, Y_i is a variable representing household welfare with $\ldots$,[10] $'T'$ represents the group of treated individuals and $'C'$ the comparison group. Positive values of $D1$ will indicate that social benefits had a significant impact on welfare.

In our scheme, the treated group is the Joiners. The question is how to identify the comparison group because a $D1$ estimator is unbiased only if the treated and comparison groups are identical in the pre-treatment period. In the absence of a random experiment, one possibility is to select from the Stayouts a matched group of the Joiners with propensity score matching and construct in this way a pseudo-random experiment. This is possible thanks to two unique features of our data. One is that the Stayouts are the largest group of all (coverage of public and private transfers is low relatively to the size of the population). The second is that the Stayouts contain in fact many households who are eligible for public transfers (targeting errors or type I and II are very frequent in Moldova for social assistance and unemployment insurance and many old aged people do not receive pensions) and who could have received private transfers because have relatives working abroad but did not (this was checked in the data).

The same matching procedure and with the same caveats can be done comparing the

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[10]We use household consumption per capita relative to (divided by) the poverty line. This is a rather standard approach in similar studies (Ravallion et Al., 1995, van de Walle, 2003).

Leavers with the Stayins. In this case we can extract matches of Leavers from the Stayouts and then compare these matches with the stayins. The matching procedure is explained in detail in annex A. The purpose of this exercise is to provide a counterfactual to the results of the stayouts-joiners comparisons.

Results of the $D1$ estimates are shown in table 4.[11] If we compare Joiners and Stayouts we can see that personal transfers and social insurance have both a positive effect which is also increasing over time. Personal transfers show the strongest impact providing to the treated group a 14% increase in net welfare between 2001 and 2002 and reaching a gain of almost 17% between 2003 and 2004. Social insurance shows the largest increase over the period providing a net gain of 7.8% between 2001 and 2002 and increasing to 17.4% between 2003 and 2004. Social assistance shows instead consistent negative values for all the three years considered. In particular, for the period 2003-2004, beneficiaries of social assistance show a net loss of almost 12% vis-à-vis the comparison group.

If we compare Leavers and Stayins, we find opposite results for personal transfers and for social assistance but not for social insurance. In other words, leaving personal transfers has a strong and negative effect on well-being while leaving social assistance has a positive effect, both results reinforcing the findings from the comparison of the Joiners with the Stayouts. Exiting social insurance has instead a positive result on well-being for the periods 2001-2002 and 2002-2003 but negative for the period 2003-2004. This last result should be taken with caution because there is very low mobility with social insurance and very few people exit the scheme as already shown in Table 3a (mainly households on unemployment insurance who terminate the entitlement period).

[Table 4]

Although the $D1$ estimates are an improvement over incidence evaluations, the

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[11]For the $D1$ estimations we use the same two years' panel we used for the transition matrixes (about 2,400 households per period considered).

matching procedure we used and the choice of extracting the matched groups from the Stayouts determined a certain degree of arbitrariness in outcomes.

We can also address issues of self-selection, unobserved heterogeneity and endogeneity making use of error components models specifically designed for panel data. The substance of the models is similar to double difference estimates but introduces an explicit treatment of the error component. Moreover, with error component models we can better exploit the four years' panel rather than taking two years at a time. The general model is described as follows:

$$y_{it} = \alpha_i + \beta B_{it} + \gamma X_{it} + \mu_i + \varepsilon_{it} \qquad [5]$$

where α_i, β and γ are the parameters, μ and ε are the error terms, B_{it} is a continuous measure of transfers,[12] X is a vector of household characteristics[13] and i and t stand respectively for units of observation and time. We consider a welfare and a poverty equation. In the welfare equation, the dependent variable y is household consumption per capita relative to the poverty line. In the poverty equation, y is a dummy variable which takes the value of '1' for poor and '0' for non poor.

For the estimations we opted for fixed effects (FE) and random effects (RE) models constructed as follows:

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[12] All transfers are measured per capita and divided by the poverty line.

[13] We use four groups of conditional variables to which we attach different economic interpretations. The first group of variables $\lfloor a \rfloor$ are 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 $\lfloor b \rfloor$ are variables indicating different levels of household dependency on 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 transfers but they are not dropped by the software for multi-collinearity and the correlation coefficient with the transfers variables are rather low. The third set of variables $\lfloor c \rfloor$ 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 $\lfloor d \rfloor$ 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.

$$[6]$$

$$[7]$$

with:

where θ is an arbitrary function of σ_v^2 and σ_ε^2.

Results are shown in Table 5 for the welfare equations and in Table 6 for the poverty equations. In column 1 of both tables we report the full model which includes all three types of transfers taken together, columns 2-3 report the results for personal transfers, columns 4-5 for social insurance and columns 6-7 for social assistance. The sample used is restricted to the four years' panel which includes 866 household observations per year. Means tests comparing balanced and unbalanced samples are provided in Table A1 in annex.

If we consider welfare (Table 5), personal transfers have a strong, positive and significant effect on welfare in all three equations where this variable appears. The impact is estimated at in between 0.198 (FE model) and 0.244 (RE model). Social insurance is also significant in the three equations and coefficients are comparable with personal transfers but the significance level is much lower. Social assistance instead is non significant in all the three equations where this variable is present. This type of transfer does not seem to have any significant impact on welfare. These results confirm and reinforce the double difference estimates.

[Table 5]

If we consider poverty (Table 6), personal transfers show a negative and significant coefficient witnessing the capacity of this type of transfers to reduce poverty, not just improving welfare across the distribution. Social insurance also shows a negative and consistent sign and with a larger coefficient as compared to personal transfers. Social assistance is instead significant in only one of three equations where this type of transfer is present. We can also note that the coefficient of personal transfer in equation 1 (where public transfers are also present) is much lower suggesting a sort of displacement effect of public transfers on private transfers.[14]

[Table 6]

6. Conclusion

Moldova has experienced a remarkable recovery after the deep recession of the 1990s and this recovery turned into a very significant poverty reduction. The period of output growth and poverty reduction has also been accompanied by a significant surge in public and private transfers. The paper questioned whether these transfers have contributed or not to improvements in welfare and poverty.

An incidence evaluation based on transition probabilities matrixes showed that all types of transfers have contributed to reduce poverty with private transfers leading the way. We also noted that social insurance and social assistance have somehow swapped roles with social assistance functioning as an income protection mechanism and social insurance as a poverty alleviation measure.

Adding behavioral implications to the analysis with double difference and error component models refined further the picture. Private transfers have a strong and positive

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[14]The question of displacement (crowding out or transfers' derivatives) of public and private transfers is important and only sketched in this paper but it will be treated in detail in a separate paper by the same authors.

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impact on welfare and a positive impact on poverty. Social insurance transfers have a positive impact on welfare and a positive and robust impact on poverty. Social assistance benefits instead do not show any positive impact on welfare and a weak and non robust impact on poverty. As compared to the incidence evaluation, the impact evaluation strengthened the findings on private transfers and social insurance but rejected the finding on social assistance.

We can conclude that there is a clear ranking between the three types of transfers considered. Private transfers are the best welfare improving mechanisms while social insurance transfers function best as poverty alleviation measures. Social assistance benefits come last with non robust effects on poverty.

These findings suggest that the gains in welfare and poverty reduction observed between 2001 and 2004 remain very vulnerable to shocks in private and public transfers and that social protection is in great need of restructuring. These two factors may contribute to explain why poverty reduction has stalled in Moldova since 2004, despite continued growth in output.

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Appendix A - Propensity score matching for the double difference estimates

For the Propensity Score Matching (PSM) we used the Stata module "psmatch2" (version 3.1.2) developed by E. Leuven and B. Sianesi.[15] The module is designed for static cross-section analyses and calculates Average Treatment Effects (ATE) or simple means differences between the treated and comparison groups. As our interest is estimating double differences with a panel survey, we use information left behind by 'psmatch2' to trace the treated and matched groups over time and calculate double difference estimates accordingly.[16]

The unit of observation is the household. We chose the one to one option with no replacement. K-nearest neighbors estimates with $K>1$ and matching with replacement may provide a better match but we have to use one to one matching because we want to locate the same households in the panel in each point in time used for the double difference estimations.

The 'psmatch2' module runs first a probit regression where the dependent variable D_i is a dummy variable that takes the value '1' for the treated group and '0' for the non treated group ($D_i=\{0,1\}$). In our case, these values correspond to households who received and did not receive transfers. In a second stage, the propensity score (p) is estimated using predicted values and in a third stage, the treated household is matched to its nearest neighbor minimizing the difference in propensity scores. Common support is imposed on the treated units. Treated units whose propensity score is larger than the largest p in the non treated pool are left unmatched.

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[15]E. Leuven and B. Sianesi. (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.
[16]A different Stata module called "match" is also available for estimating ATE's (Abadie et Al., 2001). This module implements the Abadie et Imbens (2002) bias corrected matching estimator but could not be used because the program does not leave behind indicators variables that we needed to trace the treated and matched groups over time. See also Abadie and Imbens (2006) for a discussion on large sample properties of ATEs estimators.

The set of regressors that we use for the probit equation include: The head of the household sex, age and education; the number of children in the household; the share of earners among household members; a dummy for whether the household received income from properties; a dummy for rural households and a dummy for households interviewed during the second or third quarter of the year. These are the variables that we thought relevant for matching. Apart from the classic variables used such as sex, age and education we added variables important for household welfare irrespective of transfers such as the share of earners and income from properties as well as variables that characterized the type of household (rural or urban) and the time of the year when the interview was administered (summer months). This last variable is necessary as the survey questions different households in different quarters on a rotating basis. None of the variables selected is a known criteria used for selecting households beneficiaries of either private or public transfers. Transfers are also allocated to individuals while the matching is household based. We expect therefore the Conditional Independence Assumption (CIA) to be met.

The PSM is conducted separately for the three periods 2001-2002; 2002-2003 and 2003-2004. Matching is made using the second of the two consecutive years (the post-treatment period). An indicator variable is then constructed to trace the treated and matched groups back to the first year. The means for the two groups in each of the two years are then calculated making use of weights and these means are used - in turn - to calculate the double differences.

Table 1 - Household Poverty and Income

	2001	2002	2003	2004
A. Poverty				
Headcount ratio %	63.0	49.1	36.0	37.6
Poverty gap ratio %	24.5	16.7	10.3	11.1
Severity of poverty ratio %	12.3	7.6	4.1	4.6
B. Coverage (Population=1)				
Wages	0.48	0.52	0.55	0.54
Personal transfers	0.12	0.13	0.14	0.15
Social insurance	0.39	0.41	0.42	0.41
Social assistance	0.07	0.16	0.21	0.23
C. Average income per month per capita (Lei, real terms)				
Income from work	*118.0*	*150.8*	*181.2*	*190.1*
wages	91.2	113.1	134.1	150.6
agriculture	17.3	26.7	29.0	23.2
self-employment	4.7	5.2	7.9	7.8
sales	2.3	2.2	3.7	2.6
services	2.6	3.7	6.4	5.8
Income from transfers	*22.7*	*31.1*	*41.1*	*52.4*
personal transfers	25.2	37.7	43.3	49.4
social insurance	20.3	25.8	34.6	46.0
social assistance	2.4	5.3	6.6	6.3
Income from finance	*21.8*	*23.9*	*28.6*	*27.1*
finance	21.1	23.6	26.9	25.9
property	0.6	0.4	1.7	1.2
Other incomes	*2.6*	*3.9*	*4.0*	*4.3*
Total incomes	**165.1**	**209.7**	**255.0**	**273.8**
D. Structure of average income per month per capita (Lei, real terms)				
Income from work	*71.5*	*71.9*	*71.1*	*69.4*
wages	55.2	53.9	52.6	55.0
agriculture	10.5	12.7	11.4	8.5
self-employment	2.8	2.5	3.1	2.9
sales	1.4	1.1	1.4	1.0
services	1.5	1.8	2.5	2.1
Income from transfers	*13.7*	*14.8*	*16.1*	*19.1*
personal transfers	15.3	18.0	17.0	18.1
social insurance	12.3	12.3	13.6	16.8
social assistance	1.4	2.5	2.6	2.3
Income from finance	*13.2*	*11.4*	*11.2*	*9.9*
finance	12.8	11.2	10.5	9.5
property	0.4	0.2	0.7	0.4
Other incomes	*1.6*	*1.8*	*1.6*	*1.6*
Total incomes	*100.0*	*100.0*	*100.0*	*100.0*

Table 2 - Distribution of Consumption and Transfers by Quintiles

	2001	2002	2003	2004
Consumption				
1	9.0	10.1	11.0	10.2
2	13.6	13.5	14.8	13.6
3	16.6	16.7	17.2	17.1
4	21.1	21.5	20.6	21.0
5	39.8	38.3	36.5	38.1
Total	100.0	100.0	100.0	100.0
Social Assistance				
1	17.5	17.1	20.5	23.7
2	17.1	18.7	20.1	23.2
3	24.3	18.7	20.9	22.4
4	14.0	21.6	19.5	18.6
5	27.1	23.9	19.0	12.1
Total	100.0	100.0	100.0	100.0
Social Insurance				
1	16.9	15.5	18.4	16.8
2	19.2	20.6	22.0	21.0
3	21.7	23.0	20.8	23.0
4	22.1	21.1	20.6	21.6
5	20.0	19.8	18.2	17.6
Total	100.0	100.0	100.0	100.0
Personal Transfers				
1	4.8	4.2	5.3	3.9
2	8.2	8.0	8.7	4.7
3	10.4	10.3	15.3	10.4
4	20.7	14.7	17.2	19.0
5	55.9	62.8	53.5	62.0
Total	100.0	100.0	100.0	100.0

Table 3a - Transition Probabilities 2001-2004

	2001-2002			2002-2003			2003-2004		
	0	**1**	**Total**	**0**	**1**	**Total**	**0**	**1**	**Total**
A. Personal Transfers									
0	82.4	6.9	89.3	80.0	8.3	88.3	78.2	8.1	86.3
1	6.6	4.1	10.7	6.7	5.0	11.7	7.2	6.4	13.7
Total	89.0	11.0	100.0	86.7	13.3	100.0	85.5	14.5	100.0
B. Social Insurance									
0	55.8	5.0	60.9	54.4	3.4	57.8	54.0	3.6	57.5
1	2.6	36.5	39.1	2.9	39.3	42.2	2.4	40.0	42.5
Total	58.4	41.6	100.0	57.3	42.7	100.0	56.4	43.6	100.0
C. Social Assistance									
0	81.7	11.4	93.1	76.2	9.5	85.7	72.6	7.5	80.1
1	2.4	4.5	6.9	4.5	9.8	14.3	4.4	15.6	19.9
Total	84.2	15.8	100.0	80.7	19.3	100.0	77.0	23.0	100.0

Table 3b - Transition Probabilities 2001-2004

	2001-2002			2002-2003			2003-2004		
	0	**1**	**Total**	**0**	**1**	**Total**	**0**	**1**	**Total**
A. Poverty									
0	74.7	25.3	100	79.7	20.3	100	77.7	22.3	100
1	37.5	62.5	100	43.9	56.1	100	33.5	66.5	100
Total	50.8	49.2	100	61.0	39.0	100	61.97	38.0	100
B. Poverty without personal transfers									
0	71.1	28.9	100	74.9	25.1	100	72.3	27.6	100
1	34.9	65.1	100	39.7	60.3	100	33.0	67.0	100
Total	46.8	53.2	100	55.2	44.8	100	56.0	43.9	100
C. Poverty without social insurance									
0	68.1	31.9	100	74.7	25.3	100	70.3	29.7	100
1	27.3	72.7	100	31.8	68.2	100	21.8	78.2	100
Total	39.0	61.0	100	47.5	52.5	100	46.4	53.6	100
D. Poverty without social assistance									
0	72.4	27.6	100	78.2	21.8	100	76.3	23.7	100
1	36.5	63.5	100	42.4	57.6	100	31.9	68.1	100
Total	49.2	50.8	100	58.9	41.1	100	59.5	40.4	100
A-B. Incidence of personal transfers									
0	-3.6	3.6	0.0	-4.8	4.8	0.0	-5.4	5.4	0.0
1	-2.6	2.6	0.0	-4.2	4.2	0.0	-0.4	0.5	0.0
Total	-4.0	4.0	0.0	-5.9	5.9	0.0	-5.9	5.9	0.0
A-C. Incidence of social insurance									
0	-6.5	6.5	0.0	-5.0	5.0	0.0	-7.4	7.4	0.0
1	-10.1	10.1	0.0	-12.1	12.1	0.0	-11.7	11.7	0.0
Total	-11.8	11.8	0.0	-13.6	13.6	0.0	-15.6	15.6	0.0
A-D. Incidence of social assistance									
0	-2.2	2.2	0.0	-1.5	1.5	0.0	-1.4	1.4	0.0
1	-1.0	1.0	0.0	-1.4	1.4	0.0	-1.6	1.6	0.0
Total	-1.6	1.6	0.0	-2.1	2.1	0.0	-2.4	2.4	0.0
		PROM	**PROT**		**PROM**	**PROT**		**PROM**	**PROT**
Personal transfers		2.6	1.4		4.2	1.7		0.5	5.5
Social insurance		10.1	0.6		12.1	0.7		11.7	0.8
Social assistance		1.0	14.0		1.4	17.9		1.6	29.3

Table 4 - Double Difference Estimates

	Pers.Trans		Soc.Ins.		Soc.Ass.	
	DD	Std.Dev.	DD	Std.Dev.	DD	Std.Dev.
Joiners Vs. Match						
2001-2002	0.140	2.287	0.078	1.614	-0.038	1.645
2002-2003	0.166	2.123	0.126	1.432	-0.070	1.699
2003-2004	0.169	2.208	0.174	3.271	-0.116	2.109
Leavers Vs. Match						
2001-2002	-0.312	2.597	0.559	2.572	0.328	1.428
2002-2003	-0.057	2.895	0.024	2.189	0.319	1.603
2003-2004	-0.445	3.502	-0.159	2.523	0.133	1.978

Table 5 - Welfare Impact of Transfers

Col.	1	2	3	4	5	6	7
Model	RE	FE	RE	FE	RE	FE	RE
Personal transfers	0.245	0.198	0.244				
	(17.67)**	(13.41)**	(17.54)**				
Social insurance	0.201			0.267	0.205		
	(2.93)**			(3.12)**	(2.88)**		
Social assistance	0.142					0.13	0.132
	-1.54					-1.26	-1.38
HH Head Female	0.093	0.144	0.089	0.172	0.136	0.17	0.134
	(2.26)*	(2.55)*	(2.18)*	(2.96)**	(3.16)**	(2.92)**	(3.10)**
HH Head age 30-45 (1)	-0.112	0.051	-0.108	0.005	-0.133	0.015	-0.123
	-1.47	-0.53	-1.4	-0.05	-1.64	-0.15	-1.53
HH Head age 46-60 (1)	-0.12	0.081	-0.119	0.05	-0.147	0.053	-0.135
	-1.51	-0.74	-1.5	-0.45	-1.75	-0.47	-1.61
HH Head age 60+ (1)	-0.262	0.057	-0.208	-0.046	-0.316	0.009	-0.252
	(2.81)**	-0.48	(2.30)*	-0.37	(3.23)**	-0.07	(2.64)**
HH Head edu primary (2)	0.118	0.135	0.133	0.139	0.14	0.165	0.159
	-1.12	-0.77	-1.26	-0.77	-1.23	-0.91	-1.39
HH Head edu secondary (2)	0.133	0.158	0.148	0.118	0.141	0.139	0.166
	-1.34	-0.96	-1.49	-0.7	-1.32	-0.82	-1.56
HH Head edu tertiary (2)	0.733	0.458	0.776	0.477	0.783	0.513	0.832
	(6.09)**	(2.34)*	(6.58)**	(2.36)*	(6.14)**	(2.54)*	(6.57)**
Number of children	-0.232	-0.189	-0.24	-0.192	-0.237	-0.207	-0.249
	(8.41)**	(5.10)**	(8.75)**	(5.01)**	(8.13)**	(5.40)**	(8.59)**
Share of dependants 3-4 (3)	-0.113	-0.166	-0.112	-0.145	-0.097	-0.144	-0.095
	-1.77	(2.34)*	-1.76	(1.98)*	-1.47	(1.97)*	-1.43
Share of dependants 5+ (3)	0.109	0.038	0.153	0.052	0.159	0.091	0.196
	-1.16	-0.35	-1.63	-0.46	-1.61	-0.81	(2.00)*
Rural areas	0.065						
	-1.11						
District	0.003						
	-1.44						
Summer	-0.221						
	(4.44)**						
District empl. rate	0.392	0.222	0.352	0.277	0.417	0.249	0.379
	(3.97)**	(1.98)*	(3.59)**	(2.38)*	(4.06)**	(2.14)*	(3.72)**
Annual GDP growth	4.227	4.602	4.646	4.272	4.486	4.724	4.81
	(10.48)**	(12.08)**	(12.09)**	(10.07)**	(10.87)**	(11.95)**	(12.20)**
Constant	-3.304	-3.794	-3.741	-3.459	-3.599	-3.889	-3.918
	(7.34)**	(8.55)**	(8.71)**	(7.17)**	(7.87)**	(8.46)**	(8.88)**
Observations	3463	3463	3463	3463	3463	3463	3463
Number of hhid	866	866	866	866	866	866	866
Hausman test FE/RE (chi2)		137.18			39.16	36.15	
prob>chi2		0			0.0002	0.0006	

(§) 'xtreg' estimation in Stata. Dep. Var.=household consumption per capita/poverty line.

Transfers are also per capita and relative to the poverty line.

(*) Significant at 5%; (**) Significant at 1%. t-stat for FE and BE and z-stat for RE under coefficients.

(1) Base category: HH Head age < 30; (2) Base category: HH Head no education; (3) Base category: Share of dependants < 3

Table 6 - Poverty Impact of Transfers (§)

Col. Model	1 RE	2 FE	3 RE	4 FE	5 RE	6 FE	7 RE
Personal transfers	-0.03 (4.08)**	-0.587 (3.67)**	-0.947 (5.31)**				
Social insurance	-0.138 (3.98)**			-1.162 (3.06)**	-1.235 (4.27)**		
Social assistance	-0.082 -1.71					-0.716 -1.61	-0.84 (2.14)*
HH Head Female	-0.027 -1.34	-0.494 (2.17)*	-0.119 -0.85	-0.519 (2.30)*	-0.198 -1.41	-0.501 (2.22)*	-0.187 -1.34
HH Head age 30-45 (1)	0.014 -0.38	-1.075 (2.46)*	-0.003 -0.01	-0.987 (2.31)*	0.079 -0.29	-1.06 (2.43)*	0.026 -0.09
HH Head age 46-60 (1)	0.015 -0.38	-1.221 (2.47)*	0.011 -0.04	-1.188 (2.48)*	0.098 -0.35	-1.238 (2.55)*	0.022 -0.08
HH Head age 60+ (1)	0.113 (2.43)*	-0.783 -1.48	0.453 -1.4	-0.492 -0.94	0.888 (2.68)**	-0.747 -1.44	0.492 -1.53
HH Head edu primary (2)	-0.065 -1.3	-0.483 -0.6	-0.509 -1.45	-0.322 -0.39	-0.425 -1.2	-0.442 -0.55	-0.508 -1.44
HH Head edu secondary (2)	-0.078 -1.64	-0.556 -0.8	-0.449 -1.38	-0.482 -0.69	-0.406 -1.23	-0.593 -0.85	-0.538 -1.64
HH Head edu tertiary (2)	-0.26 (4.49)**	-1.36 -1.56	-1.961 (4.80)**	-1.482 -1.68	-1.818 (4.39)**	-1.474 -1.69	-2.057 (5.01)**
Number of children	0.124 (9.08)**	0.803 (5.37)**	0.906 (8.95)**	0.754 (5.14)**	0.832 (8.23)**	0.82 (5.54)**	0.903 (8.96)**
Share of dependants 3-4 (3)	0.058 -1.77	0.566 (2.00)*	0.426 -1.82	0.517 -1.86	0.368 -1.6	0.496 -1.77	0.342 -1.48
Share of dependants 5+ (3)	-0.084 -1.74	-0.408 -1.02	-0.694 (2.09)*	-0.281 -0.69	-0.601 -1.79	-0.481 -1.21	-0.83 (2.52)*
Rural areas	-0.074 (2.78)**						
District	0 -0.34						
Summer	0.103 (4.58)**						
District empl. rate	-0.143 (2.82)**	-0.26 -0.61	-0.807 (2.31)*	-0.392 -0.93	-1.137 (3.23)**	-0.264 -0.62	-0.908 (2.61)**
Annual GDP growth	-2.843 (13.20)**	-21.165 (13.31)**	-21.12 (13.86)**	-18.766 (11.09)**	-18.916 (12.01)**	-20.686 (13.17)**	-20.861 (13.81)**
Constant	3.534 (14.83)**		22.361 (13.26)**		20.3 (11.75)**		22.213 (13.28)**
Observations	3463	2035	3463	2035	3463	2035	3463
Number of hhid	866	509	866	509	866	509	866
Hausman test FE/RE (chi2)		4.81		31.69		30.42	
prob>chi2		0.9792		0.0027		0.0041	

(§) 'xtlogit' estimation in Stata. Dep. Var.=Dummy for poverty with poor=1. Transfers are per capita and relative to the poverty line.

(*) Significant at 5%; (**) Significant at 1%. t-stat for FE and BE and z-stat for RE under coefficients.

(1) Base category: HH Head age < 30; (2) Base category: HH Head no education; (3) Base category: Share of dependants < 3

Table A1 - T-Tests for Means, Balanced Vs. Unbalanced Samples

Var.	2001	2002	2003	2004
y = Real cons./Pov. line	0.12	-0.62	1.83	1.40
b = Real Soc. Ben./Pov. line	-0.52	-1.12	0.61	-1.98
pt=Real Personal Transfers/Pov.line	0.14	1.00	0.79	-0.11
Share of poor	-0.17	1.99	-2.02	-1.66
HH Head Female	1.87	2.24	1.17	0.67
HH Head age 30-45	1.36	0.29	0.92	1.47
HH Head age 46-60	-0.36	-0.78	-0.89	-1.36
HH Head age 60+	-1.23	-0.98	-1.12	-1.58
HH Head edu primary	0.20	-1.25	-2.14	-1.16
HH Head edu secondary	-1.19	-0.79	-0.17	-0.90
HH Head edu tertiary	2.50	2.90	2.27	2.58
Number of children	-0.11	-0.19	-0.25	0.49
Share of earners 3-4	3.23	1.18	1.38	0.65
Share of earners 5+	-0.12	-0.28	-1.18	-0.94
Rural areas	-5.17	-4.96	-4.83	-4.86
Territorial unit	3.06	2.86	2.65	2.80
District empl. Rate	-0.90	-0.62	0.44	0.84

Unbalanced sample: 24,617 observations; Balanced sample: 3,464 observations.

Figure 1 – Distribution of Wages and Transfers