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## Inequality in transition countries: The contribution of markets and government taxes and transfers

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# **Luxembourg Income Study Working Paper Series**

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**Inequality in Transition Countries: The Contributions of  
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**Michele Giammatteo**

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**Luxembourg Income Study (LIS), asbl**

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# **Inequality in Transition Countries: The Contribution of Markets and Government Taxes and Transfers.**

Michele Giammatteo<sup>§</sup>

August, 2006

## **Abstract**

This paper examines inequality patterns in the 1990s in Poland, Russia and Hungary. We consider three different definitions of income and analyse the contributions to inequality of their main components using LIS micro data. Inequality is measured using the Gini and Theil indices, which in turn are decomposed by source using two alternative approaches (the Shorrocks' axiomatic approach and the Theil-based decomposition). The role of transfers and taxes in mitigating total inequality during the transition period is highlighted, as are the contributions of market factors.

*Keywords:* Inequality; Income sources; Decomposition; Transition economies.

*JEL Classification:* D31; O15; P20

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## 1. Introduction

At the beginning of the Nineties ex-socialist countries started the process of transformation from planned to market economy. Drastic market-oriented reforms were carried out by the governments, and many of the rules characterizing the pre-transition society abandoned. State influence was radically weakened in favour of market liberalizations, firm privatisations, international openings to foreign investments, etc. The main priority was to promote economic growth, but after many years of strong beliefs coming from the socialist era, welfare systems operations could not be altered too rapidly. Thus, in this very mutable context one of the governments' main interests was to contain the social cost of the reforms, trying to maintain some fundamental forms of social protection deriving from the past communist experience. In other words, social policies contributed to alleviate the impact on the population of the economic and social changes, trying to find the right compromise between the necessary States' reformation and the population consensus. Unemployment benefits, pensions, family and child allowances, etc., provided economic protection for the most vulnerable citizens, avoiding that the greatest weight of the transformation entirely fell on them.

Over the last fifteen years the Eastern Europe scene has offered economists many opportunities of verification, revision and additional understanding about efficiency and equity connections. Traditional *trade-off* hypothesis has been gradually surrounded from alternative forms of *causal dependence* approaches, which consider equality (and, as a result, redistribution policies) suitable basis for growth enhancement<sup>1</sup>. To such an end, many inequality studies have been carried out during the last decade, also as a consequence of the increasing availability of micro data on incomes. Much of them converge on one fundamental conclusion: income inequality decisively increased during the first half of the 1990s (with slight differences between states), followed by a continuous reduction until the end of the decade; around 2000 income differences were lower than the five previous years but still higher than 1990. However, this largely shared evidence has not been preserved in deeper analyses interested in discerning the causes underlying total inequality. In this case, in fact, a great heterogeneity of empirical outcomes has arisen because of different theoretical approaches, as well as a large number of data and methodological choices.

In this paper a source-based study of income inequality is proposed for Poland, Hungary and Russia, for which Luxemburg Income Study (LIS) furnishes homogeneous, highly detailed and extended micro data information. The main objectives have been to perform empirical applications for different definitions of total income (market, gross and disposable), using two standard inequality measures (the Gini and Theil indices), together with two rules for factor-decomposition (the Shorrocks and Theil-based procedures). Despite a low percentage of incoherent results, this extensive empirical analysis allowed us to identify a bigger set of robust inequality and source-based decomposition findings. Because of the fundamental role played by redistribution schemes during the transition process, particular attention has been devoted to quantify as accurately as possible State transfers (and taxes) influence on gross (disposable) income inequality. This has been facilitated by the LIS rich availability of income sources, especially with respect to transfer components definition.

The next Section presents the main empirical literature on transition countries' inequality. Beyond few stylized results, the attention is devoted to illustrate the inconsistencies, which emerge as soon as plain inequality inquiries are extended to the more profound analysis, like the detection of its main determinants. Moreover, a discussion concerning the standard instruments employed by researchers for identifying the inequality impact of redistribution policies also sheds light on the origin of those empirical discrepancies. Section 3 is dedicated to a brief analysis of the Eastern European transition, with particular attention devoted to the role of welfare systems and the mutable context in which authorities and private actors were called to operate during the 1990s. Section 4 provides a detailed description of data and methodology implemented in the empirical application object of Section 5. As already emphasized, an inequality study of market, gross and disposable income distribution has been

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<sup>1</sup> See Aghion P., et. al. (1999) for an extensive empirical and theoretical survey on the linkage between inequality and economic growth.

performed for Poland, Russia and Hungary. For each country LIS data availability furnished results for the early, mid and late Nineties, covering in such a way ten years of their transition period.

## 2. Income inequality in transition economies

### 2.1. Empirical literature

For several years economists have tried have been carried out using a large variety of data, methodologies, and theoretical approaches. Nevertheless, much of these studies converge on one fundamental conclusion: the Eastern countries' transition has been characterized by a strong increase in income inequality during the first half of the 90s (with slight differences among states), followed by a continuous reduction until the end of the millennium. Around 2000 the level of inequality was lower than the half decade before, but still higher than 1990.

A first important affirmation of this evidence comes from the analysis of Förster et. al. (2003). Using LIS datasets, they analysed the change in inequality of four Eastern countries between 1990 and 1999. The results show income inequality (and poverty) increased in all of the countries between the early and mid 1990s. In the case of Poland (which, in 2003, was the only country in Eastern Europe with LIS data available until 1999) their evidence suggests that this trend had reversed towards the end of the decade. They found similar levels of inequality for Poland and Hungary, while Russia showed the higher level among the four countries considered<sup>2</sup>. These results have been recently supported by a wider World Bank analysis (2005), which furnishes a very rich and accurate overview of the inequality and poverty trends in Eastern Europe and Former Soviet Union during the past fifteen years.

Common agreement on few general aspects does not prevent divergences on country specific inquiries. Keane and Prasad (K&P, 2002), for instance, provide a partially different picture about the inequality trend in Poland. They examined the evolution of income distributions between 1985 and 1997, using micro-data from the Household Budget Surveys (HBS) conducted by the Polish Central Statistical Office (CSO). Contrary to the conventional view about the Polish inequality, they did not find evidence of a sharp increase of inequality in the early years of the transition (until 1992). Despite this, they observe a gradual increase between 1993 and 1997. These results differ from other studies, such as Gorecki (1994), OECD (1997), and Milanovic (1999). While the OECD figure detects a very large increase in income inequality until 1991, the Milanovic and Gorecki results do not show this. Moreover, the OECD and Milanovic evidences are consistent with K&P analysis about the large increase in inequality between 1992 and 1993, but diverge on the following period<sup>3</sup>.

If only slight differences exist in total inequality trends, moving to search for its major causes produces also greater heterogeneity of empirical results. K&P (2002), for instance, ascribe to labour earnings the major source of inequality in Poland during the 90s. They also find social (cash) transfers having played a crucial role in inequality dynamics after the transition, contributing to dampen the rise in total inequality (mainly in the early phase of the period). More precisely, the increase in the public sector pensions seems to have led to a considerable exit of "older workers" from the labour force, which in turn improved the relative income position of pensioner-headed households. A very high proportion of transfers were consequently directed, not towards households at the bottom of the distribution but towards the middle-income class, mainly composed of state workers. Expected to be the "big loser" of the first phase of the transition, they obtained a high compensation due to very

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<sup>2</sup> The Czech Republic was the fourth country examined: it consistently showed the lowest levels of income inequality and poverty.

<sup>3</sup> K&P 2002, assign as the main factor generating these dissimilar results to the CSO switch from quarterly to monthly data collection in 1993 (which the OECD and Milanovic studies do not take into account). Since income is typically more variable at the monthly than at the quarterly frequency, they argue that the change would have created a substantial increase in the Gini coefficient.

generous state disbursements. At the same time, this allowed inequality to be decisively preserved from market forces<sup>4</sup>.

A partially divergent analysis is furnished by Milanovic (1999), which attempts to explain the increase in inequality observed in several transition economies between 1987 and 1995, using a mixed set of individual and grouped data. Proposing as a starting point of the analysis a model of employment composition change during the transition, his main attention is devoted to understand which way the sources' inequality and share of total income contribute to define the overall inequality patterns. He found the concentration coefficient of wages increased everywhere, and resulted in the most important element of inequality increasing. At the same time, contrary to the K&P outcomes, Milanovic underlines how pensions, unemployment benefits, and other cash (and non-cash) transfers failed to moderate the social impact of market liberalization because of the disbursement of unfairness benefit. More precisely, the increasing State sector income (due to the government payments of unemployment benefits in addition to unchanged amount of pensions) seems to have played the key role in the increasing total inequality. He distinguishes pensions as being a significant source of inequality in Eastern Europe, while non-pension social transfers, because of their small initial amount, did not seem to have made much difference. More in detail, social transfers (which was the most equally distributed income source in Russia before the transition) increased their share on overall income. In Poland and Russia, the greater concentration of transfers (principally pensions) pushed up overall inequality; non-pension transfers did not have much effect on the overall change in inequality anywhere (with the exception of Russia). Finally, Milanovic's decomposition by income sources suggests that Russia represented the unique case where *all* income sources' concentration coefficients were higher than before the transition: as a consequence, all the factors affected positively overall inequality<sup>5</sup>. Two other important sources of evidence are furnished by the Garner and Terrell (1998) and Commander and Lee (1998) analysis. While the former conclude that government policies significantly weakened the increase in inequality in the early years of Czech and Slovak republic transition, the latter shows (in accordance with Milanovic) that social transfers may have powerfully exacerbated the rise of inequality in the Russian transition.

Although the empirical analysis performed until now did not lead to clear and homogeneous results concerning the sign (and intensity) of the actual contributions of transfer and taxation components on income inequality, the above discussion points to the key role of redistribution policies in the definition of total inequality in transition economies. The approach followed by K&P (2002) offers a proper theoretical and empirical description of the fundamental role played by public transfers. Their major merit is to set up the linkage between state transfers and inequality under a general growth-based framework. Cross-country evidence exhibits a strong negative correlation between growth and inequality in all the transition economies they considered, together with a positive relationship between social transfers and growth<sup>6</sup>. It is also interesting to note how other authors, for a larger sample of industrial and developing countries, have also reported these results<sup>7</sup>. A plain theoretical corroboration of these evidences comes from the standard political economy literature. Alesina and Rodrik (1994), for instance, show that income redistribution can enhance growth by reducing political support for taxation of capital, while Perotti (1996) finds empirical support for the view that redistribution can improve growth by providing socio-political stability. In sum, increasing state transfers can be assumed as

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<sup>4</sup> The Gini coefficient for income excluding transfers increased, from 1988 to 1997, by more than three times the increase in the Gini for overall income (K&P, 2002)

<sup>5</sup> This direct implication deserves prudent attention. Higher concentration coefficients not always imply higher contribution to total inequality, because of the sources' weight on total income and interaction effects among them. I think that this *may* generate confusion since the different explaining factors (sources' inequality, relative share and interaction) are kept separate and not summarised in a unique measure as the rules of decomposition implemented in Section 5 actually do.

<sup>6</sup> «Poland and Slovenia were the only countries that surpassed pre-transition levels of GDP after eight years, having, at the same time, among the highest relative levels of social transfers (17.7% of GDP for Poland and 14.8% for Slovenia)».

<sup>7</sup> See, for example, Perotti (1996).

necessary in order to achieve suitable political support for the implementation of new political (economic) strategies<sup>8</sup>. Running regressions of growth on changes in Gini coefficient, and controlling for a set of variables concerning the extent of liberalizations and the initial conditions facing each country at the beginning of the transition, K&P (2002) find that: *i*) greater progress towards market oriented reforms enhanced growth; *ii*) public policies which preserved a greater degree of equality was more conducive to growth; *iii*) countries with better initial conditions have not only made more rapid progress towards liberalization, but they have also tended to implement policies which implied smaller increases in inequality.

Redistribution schemes and, more in general, all those policies able to contain the potential increase in socio-economics inequalities, appear to have been a crucial ingredient during the transition process. They created the proper conditions for political support in post-socialist governments, allowing their profound market-oriented reforms to be more easily implemented. Many analysts have tried to discern the States' contribution on total inequality, often showing discordant outcomes. Positive or negative contributions, low or high incidences can strongly depend on the various databases, public expenditure definitions and the disaggregations implemented. The existing literature demonstrates that conflicting evidence is far to be considered an exception. The rest of this section describes in detail the possible - and largely applied - tools for the detection of the redistribution effect on total inequality of transfers and taxes plans.

## 2.2. Measurement tools

If the relevance of searching for State contribution to total inequality is largely shared by the literature, which measurement tools have the researchers been using in order to seek for inequality impact of redistribution policies? How much of post-government (gross or disposable) national inequality comes from an uneven distribution of market incomes and how much is produced by the influence of various transfers and tax components? One of the basic approaches is to perform cross-national studies where the share of social benefits in the gross domestic product is used as fundamental proxy. The implicit assumption is that the role of the States in redistributing income is directly proportional to the share of a country's economy that is devoted to public social benefits. A first problem implied by this method consists in an endogenous relation "within" the key variable (the transfers increase is also incorporated in the denominator of the ratio, the GDP). Moreover, this approach does not allow the redistribution effect of transfers being separated from tax impact; transfer components are usually considered as a whole (under the expression of "public spending"), avoiding any kind of analysis concerning redistribution targeting or results in marginal sensitivity. Finally, similar (different) proportions of taxes and transfers on GDP can furnish conflicting (analogous) results because of ordinary (but out of control) composition effects.

A second, and more important, methodology is to measure state redistribution simply by calculating an inequality index for market income distribution, subtracting from it the same index computed on disposable (gross) income, and derive from this absolute difference the redistribution effect on inequality (see K&P, 2002; FJS, 2003). As emphasized by Lerman (1999), this approach «does lead to misleading results». In order to understand why the before-after calculation of one inequality index cannot be a proper evaluation of factors impact on inequality, he indicates three basic problems which inevitably arise: *a*) «when two income sources have no natural ordering [...] whether an income source shows up as equalizing can depend on whether one takes account of the source before or after other sources<sup>9</sup>»; *b*) «when we consider more than two income sources, such as pre-tax earnings,

<sup>8</sup> Political economy literature also suggests that because individuals in the middle class tend to have a significantly higher propensity to vote than individuals at lower income levels, transfers targeted may have been more effective in "buying" the social stability that characterized the transition period, despite the potentially disruptive effects of the economic transformation (see also Roland, 1997).

<sup>9</sup> A plain example is given by considering total economic status  $Y_T$  as the sum of annual income  $Y_Y$  plus the annuity value of wealth  $Y_W$ . The before-after approach will show annual income as reducing overall inequality

income taxes, and payroll taxes, the effects of payroll taxes will vary depending on whether we subtract it from pre-tax earnings or from pre-tax earnings net of income taxes»; c) «a global change in an income source generally alters overall ranking. As a result, the equalizing impact of a second income source can vary with the size of the income shift. One cannot speak of the inequality reducing effect per added dollar of the first source without specifying the size of this change». Moreover, he observes how «despite a substantial amount of new works emphasizing alternative methods for source decompositions of income, some empirical researchers have ignored development in the literature on inequality decomposition».

Another *hybrid* practice consists of decomposing total inequality following a source-based approach but, instead, applying decomposition by population subgroups. Distinguishing between them is not trivial. Breaking up inequality according to population attributes (in this case, types of income) requires labelling individuals (households), assuming that they have only one source of income<sup>10</sup>. This requirement is simply not realistic. People usually have composite entrances: a capital-owner may work; a workman may own stocks and engage in entrepreneurial activity; a pensioner may work part-time or lease some of his assets. To overcome this difficulty, we need to move from a population income-receivers disaggregation to a proper study by income sources. In this case “labelling” is not required: it is enough to add all the individual entrances (outflows), correct total amount for specific characteristics (household size, number and age of children, etc.), and then ranking everybody according to this adjusted household income. Thus, while decomposing by population subgroups allows separating inequality into *within* and *between*-group components, a source-based approach furnishes the percentage contribution to total inequality coming from each type of income.

Both the approaches briefly described above concern the study of personal income distribution. Despite this, as Atkinson (1997) pointed out: «[...] much of what can be found today in the textbook under the heading of the ‘Theory of Distribution’ is concerned with the determinants of payments to factors (labour, land and capital). In mainstream economic theory, the competitive theory of factor pricing determines the division of national income between wages, profit and rent. [...] However, as Dalton observed, *the relationship of the factor distribution with the personal distribution of income is typically not spelled out*. [...] The factor distribution is certainly part of the story, but it is only part, and the other links in the chain need to receive attention». Accepted the importance of such thought, which contribution can the population and factor decompositions give to this objective? I believe that one of the most appropriate ways of connecting *functional* and *personal* income distribution analysis is given by the source-based approach. A plain example of this possibility is given by Deutsch and Silber (2004). With the final purpose of furnishing alternative explanations of the Kuznets U-inverted curve, they focus the relation between total income inequality and its various components, and wrote: «This study represents an attempt to derive the size distribution of incomes from the functional distribution of income, assuming that the income categories provided by the data sources provide information on the functional distribution of income. [...] it is also possible to link variations in total inequality to changes that occur at the level of the various income sources, either in the shares of these sources or in the inequality of their distribution. Such an alternative approach emphasizes the link between the functional and personal income distributions».

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since  $I_Y$  is usually less than  $I_W$ , and  $I_T < I_W$ , reversing the order and considering  $I_Y$  as the before component, despite the fact that  $I_W$  is bigger than  $I_Y$  there are cases in which  $I_T$  is lower than  $I_Y$  (see Habib, Kohn and Lerman, 1977), which would indicate wealth as reducing inequality of total economic status. Another case is given by ‘married couples’ income: if one starts with husbands’ earnings, adding the earnings of wives will generally reduce total inequality. But starting with wives’ earnings and adding the earnings of husbands will also generally reduce inequality.

<sup>10</sup> A common practice is to consider the entrance of the head-person’s job (or main activity).



### 3. The Eastern European countries transition

In the early 1990s the Eastern European countries began the process of transformation from planned to market economy. During the transition period a wide range of economic reforms were carried out by governments, in order to achieve specific development goals. The attention of post-socialist States was mainly addressed on growth targets, to be reached through productivity increases, liberalization, privatisation, international openings, and other market-oriented reforms. At the same time, after decades of strong beliefs deriving from the socialist era, a drastic reorganization of the institutions' role and objectives has had to occur. The conciliation of two basic citizens' demands, *i)* the current generation propensity towards radical reforms and *ii)* the previous generations expectation coming from the former economic system, represented the most critical task the authorities was called to face. The liberalizations in the labour and financial markets, the opening up of the domestic product to foreign investments, the appearance of private firms, the fall of a job security system (with the consequent new "anonymous" event of unemployment), are only a few among the greater range of new notions which contributed to radically change the citizens' life.

The transition of Eastern European countries into market economy also required a necessary transformation of their welfare systems. One of the main government interests was to contain the social cost of the reforms, trying to maintain some fundamental forms of social protection coming from the past communist experience. In other words, social policies contributed to alleviate the impact on the population of the economic changes, trying to find the right compromise between the necessary state reformation and the population consensus. The disbursement of unemployment benefits, pensions, family and child allowances, etc., has ensured that the weight of the transformation did not entirely fall on the most vulnerable individuals.

A plain example which properly describes the (social and economic) scenery characterizing the eastern countries' itinerary toward the market economy is the change in labour market operations. Before 1989, the economy was characterized by full and extensive security of employment, ensuring all families had access to a basic income. It also guaranteed for a large part of social insurance benefits, avoiding the authorities' intervention through the disbursement of direct contributions. The citizens could also rely on the enterprises (or unions) as a major vehicle for the provision of social benefits (house, social services, etc.) allowing the wages to be relatively low. Finally, the States used to provide people with health care, education, and other free basic services. Together with price control and production subsidies this system was able to ensure the basic needs for the greater part of the population. During the transition period the institutions' role was drastically weakened. The process of privatization has carried out in a large exclusion of the States from the direct determination of wages, in order to ensure that prices correspond more closely to marginal costs. This has implied the progressive adjustment of employment and earnings to the new market norms, however not eliminating all the pre-transition rigidities. At the same time, the desertion of the guarantee of the "right to work" has involved acceptance of the possibility of unemployment. This induced the authorities to provide financial support to those who lost their jobs through the payment of unemployment benefits.

Pension systems also played a key role in post-socialist countries. Under central planned economy pensions covered a very high percentage of income in order to compensate for relatively low wages during the working ages<sup>11</sup>. Their relative weight on GDP drastically increased at the beginning of the Nineties, allowing the pensioners to hold on better during the first phase of the transition. Similarly to all other sources of income, pensions fell in real terms during the initial period of price decontrol and inflation; however, as prices stabilized, pensioners recovered more of the purchasing power lost during the inflationary period than wage earners did. In order to confine unemployment, countries allowed

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<sup>11</sup> Retirement ages were set very low: the legal retirement age was around 55 for women and 60 for men. In order to understand their magnitude, observe that during the Nineties many of the Western countries spent less on pensions (as share of GDP) than the post-communist States did. Pension expenditure represented about 15 percent of GDP in Poland and Slovenia and 10 percent in Hungary, Bulgaria, Latvia, and Slovakia (Fox, 1997).

workers to retire before what was prospected and receive a full pension<sup>12</sup>. Despite the high costs of such policies, governments have been able to keep most pensioners out of poverty, avoiding the social cost of the transition to disproportionately fall on the vulnerable group of elder citizens (World Bank, 2005). It is worth noting how this process of extended “young retirements” was helpful also from an efficiency point of view: it encouraged the entrance of younger and more educated workers, keeping away the older (traditional) segments of employment, which would have plausibly delayed the necessary process of modernization. Despite this, some problems arose (Fox, 1997): such policies have significantly contributed in worsening the public financial position of post-communist countries, resulting in a substantial increase in the general government budget deficit. At the end of the Nineties, an estimated 50 to 70 percent of pensioners continued to work during the first decade of their retirement period, but most of them were outside of the tax net; at the same time, many in the working-age population have escaped taxation by moving out of the formal sector, leaving the burden of paying for pension benefits to those who cannot avoid taxes; most pensioners still have access to relatively cheap housing, or have started the transition with more consumer durables than younger households did, or simply do not live alone and are thus sustained by intra-household transfers<sup>13</sup>. To partially recover public spending from worsening, various transition economies (following many OECD countries) have extended the basic pension system with more than one pillar, with an increasing role attached to privately managed savings and insurance programs<sup>14</sup>.

Summarizing, the difficult social-economic and institutional reorganization experienced by ex-socialist countries has had to take place mutually with the achievement of a level of development closer to Western Europe. Given this priority, the central issue has been to minimize the social cost of the transition, also overcoming the difficulties coming from the rooted belief system and past experiences of the society. What deserves to be emphasized is that if the “incomplete” process of transformation in favour of market rules has contributed to a still low productivity with respect to the Western economies, it allowed the first (and plausibly more difficult) step toward the system reorganization to be less painful for millions of people (McAuley, 1997).

## 4. Data and methodology

### 4.1. Data

The Luxembourg Income Study (LIS) database is a harmonized collection of datasets including 30 countries, and covering the period between 1967 and 2002. For some countries the availability of data covers the entire period (Canada, Germany, Sweden, UK and US), while in other cases it is narrowed to few years (with the extreme case of Estonia, for which only the 2000 dataset is available). Its central aim is to harmonize household-level micro-data reported in income surveys conducted by national statistical authorities or research institutes in order to reach a common definitional framework. It represents the largest and most reliable source of information on incomes allowing comparable cross-national analysis for many developed countries. In particular, it offers household-level data on a large number of individual and job characteristics as well as on detailed sources of income (from both the private and public sectors). This provides many opportunities to measure the distributive effect of taxes and transfers, discerning the overall impact of redistribution on total inequality as well as exploring in detail *in which way* the specific policies have been accomplished.

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<sup>12</sup> In Poland, for instance, more than two-thirds of pensioners are under age 60 (see also Andrews and Rashid, 1996).

<sup>13</sup> While many pensioners may be better off than the average citizen, other evidences suggest that there are segments of very vulnerable *old people living alone* (World Bank, 2005).

<sup>14</sup> The multi-pillar system consists of: *i*) a basic public pension scheme, extended to all the elderly persons; *ii*) a private management of pensions, based on personal accounts or occupational plans; *iii*) a voluntary system (also funded and privately managed), to provide for additional savings and insurance.

In order to attain accurate results, some preliminary procedures of standardization of incomes, correction for outliers, missing, and zero values are recommended. The empirical applications presented in the next Section took into account many of the LIS suggestions. A key issue in any inequality measurement is how to account for household composition and economies of scale when assigning individual income levels to all the household members. Unlike most social indicators, the basic unit is not the individual but the household, whose members live together and pool their incomes<sup>15</sup>. Most studies simply assign the *per capita* household income to each member of a household. Since households vary in size, it is desirable to construct an *equivalence scale* that accounts for the number of household members. In accordance with most works using LIS database, household incomes have been equivalised dividing each total income by the square root of the number of household members<sup>16</sup> [ $y_h^e = y_h / \sqrt{n_h}$ ]. We thus compare income at the level of individuals, but in a way that accounts for the structure of the household in which they live<sup>17</sup>. The second fundamental issue consists of the appropriate treatment of *outlier observations*. This is because many inequality measures are sensitive to the values at the bottom and top of the income distribution, and some are not defined for non-positive values of income (for example, any measure which calculates a logarithm). The LIS recommendation is to impose ‘bottom’ and ‘top codes’ redefinition of incomes, so that all the observations below the 1% of equivalent mean income and all those above 10 times the median unequivalised income are substituted by the respective thresholds. Despite this, performing decomposition analysis by factor components does not allow such procedure to be applied. In fact, since the sum of all income sources has to equal the corresponding individual (household-based) total income, the redefinition of ‘code’ incomes into two thresholds would generate inconsistencies between the (adjusted) total income and the sum of its factor components. For this reason our choice has been that of erasing the top and bottom codes of each distribution<sup>18</sup>, paying a cost in term of fully appropriate methodology but allowing the decomposition by income sources and the correction for outliers to be simultaneously employed. For what concern the *missing data* problem (in many case recorded as zero incomes), every elaboration has taken into account only positive incomes. The main motivation comes from the fact that one of the indices used in the analysis (the Theil index) is not defined for negative and zero observations. As a consequence, the two total inequality indices and the two decomposition procedures taken as reference have been executed on this restricted distribution, in order to achieve fully comparable results. Note that households with zero private sector income but positive gross income have been included, while the small number of households which report zero disposable (post-government) income have been excluded, on the assumption that these households must have at least some monetary entrance from unreported sources. Finally, the entire analysis has been performed applying *weighted procedures*.

#### 4.2. Methodology

Decomposing total inequality by income components basically concerns the analysis of three fundamental factors: the degree of source variability, the share on total income, and an interaction effect produced by the differences between *sub* and *total* income ranks. Despite this, many

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<sup>15</sup> As expressly stated by the Canberra Group recommendation on how to improve income statistics, the LIS basic reference of income has to be the household, which is in preference to other possible definitions such as family nucleus, benefit unit, or tax unit.

<sup>16</sup> Another common equivalency scale is the OECD scale, which weights the first adult in a household as 1.0, the second adult as 0.7 and all other persons as 0.5.

<sup>17</sup> Keane & Prasad, 1999 constructed food share-based equivalence scales for Poland using the Engel (1895) method, which assumes that two households with different demographic composition are equally well off at income levels that enable them to have equal food shares (ratio of expenditure on food to total expenditure on non-durables).

<sup>18</sup> The highest and lowest 0.1% of total observations has been erased in each country-year elaboration, consistently with the income definition of market, gross and/or disposable income distribution.

methodologies provide shorter and more meaningful tools able to condense those three basic factors into a unique measure: the proportional contribution of each source<sup>19</sup>. If, on one hand, all the existing rules of decomposition satisfy some crucial properties (adding consistency<sup>20</sup>, independence of the level of disaggregation<sup>21</sup>, etc.) on the other hand some divergent implications come from the use of one or another of those techniques<sup>22</sup>. For this reason, in the following section, we present empirical evidence coming from a double computation of inequality measures (Gini and Theil indices) and decomposition procedure (Theil-based and Shorrocks' axiomatic approach), with the final purpose of furnishing more robust results. The necessary cost to be paid in case of incoherent outcomes has been considered lower than the gain coming from a more reliable and rigorous analysis.

As we have already observed, the LIS database furnishes (for each county and year) the system of weights through which to repair for biases in the characteristics of the group of respondents. The correction for distortions coming from probability of selection and/or contact implies to adopt weighted inequality measures and decompositions. Weights are reported for each observation in the dataset (at household level<sup>23</sup>): they are proportional to the population of the strata which the sample observations are drawn from. Thus, the estimates of the population Gini and Theil coefficients are calculated using the following weighted formulae:

$$G_w(Y) = \frac{1}{2\mu_w} \sum_{j=1}^n \sum_{i=1}^n |y_i - y_j| p_i p_j \quad [1]$$

$$T_w(Y) = \sum_{i=1}^n p_i \frac{y_i}{\mu_w} \ln \left( \frac{y_i}{\mu_w} \right) \quad [2]$$

where  $\mu_w$  is the weighted average of attribute  $Y$  in the sample, and  $p_i$  and  $p_j$  are the normalized weights of observations  $i$  and  $j$ , such that the weights sum to one over the entire sample.

In order to identify, consistently with the weighted indices, the specific factor contributions to total inequality, we adopt the following weighted Shorrocks and Theil-based decompositions:

$$s_m^{(w)} = \frac{\overline{Cov}(Y_m, Y)}{\sigma^2(Y)} \quad [3]$$

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<sup>19</sup> Milanovic (1999) proposes the following disaggregation of the Gini by factor incomes: «the global coefficient for gross income is equal to the weighted average of the concentration coefficient of the sources (wages, transfers, private-sector income ...) where weights are their shares in total income. As a consequence, the total variation between two point-times of the total Gini will be given by (i) the changing shares of different income sources; (ii) the change of each concentration coefficient; (iii) an (unexplained) interaction term».

<sup>20</sup> The proportional factor contributions have to sum to one.

<sup>21</sup> The contribution of each factor does not depend on how many other types of income are distinguished: otherwise, the contribution of earnings might change if capital income were subdivided into rent, interest, and dividends; or transfer payments were split into pensions, unemployment benefits, and so on.

<sup>22</sup> See Paul (2004) for an analysis of decompositions sensitivity to the addition/exclusion of an equally distributed source.

<sup>23</sup> «Since LIS focuses on household surveys, the variable "hweight" contains the household weight for each sample case in the dataset for a particular country. This weight (or in other words this weighting factor) tells us the household's relative importance compared to other households. [...] By applying the weights, you restore the balance between groups in the sample, based on their original probability of being drawn as sample units». LIS web site guide: [www.lisproject.org/techdoc.htm](http://www.lisproject.org/techdoc.htm).

$$t_m^{(w)} = \frac{1}{T_w(Y)} \sum_{i=1}^n p_i \frac{y_{im}}{\mu_w} \ln \left( \frac{y_i}{\mu_w} \right) \quad [4]$$

where  $\overline{Cov}(Y_m, Y) = \sum_{i=1}^n [(y_i - \mu) y_{im}] p_i$  and  $\overline{\sigma}^2(Y) = \sum_{i=1}^n (y_i - \mu)^2 p_i$  are, respectively, the weighed covariance between the  $m$ -th source and total income and the weighed variance of total income.

Dresher (1999), applying sources decomposition to Danish inequality, underlines how the Shorrocks procedure is the only unambiguous way to decompose inequality by income sources. If this opinion is largely accepted by the theoretical literature<sup>24</sup>, it is worth observing that the Shorrocks decomposition does not satisfy (as well as *all* the possible Gini-based rules) the fundamental property of *uniform addition*<sup>25</sup> (or *negativity* as defined by Paul, 2004). The Theil index, satisfying that property, permits us to reach a decomposition procedure which is consistent both with the *transfers* and *scale invariance* axioms. To understand the importance of this point, let us remember the Podder (1993) claim about the interpretation of the Gini decomposition: «[...] it is shown to be wrong and totally misleading, since it assigns zero contribution to a constant component of income». In particular he emphasizes how «[...] it is reasonable to think the addition of a constant to all incomes leading to a reduction in inequality, if we accept relative measures». Finally, we think that a revaluation of the Theil decomposition by factor components should be encouraged also because of its perfect decomposability by population subgroups. In fact, since these two approaches represent the core of all the analysis devoted to discern explanatory factors in inequality studies, the possibility of contemporarily applying them could assist analysts in more exhaustive inquiries.

## 5. Inequality decomposition by income sources: Poland, Russia and Hungary.

### 5.1. Study outline

In the previous sections we summarized the basic characteristics of the Eastern European countries' transition toward market economy. Considering the specific differences which each country has exhibited in terms of macroeconomic outcomes, in what follows a detailed empirical analysis of income inequality is presented for three big transition economies: Poland, Russia and Hungary. The choice of these countries has been due to various reasons. They represent a significant part of the total population and economic activities in the Eastern region. Poland and Hungary, since 2004, are also two among the most important new EU members, while Russia remains, for its historical and geographic proximity to Europe, a country of fundamental socio-economic relevance. Their recent development has shown significant peculiarities in terms of markets operation and liberalization, welfare systems reorganization and growth patterns, carried out during the last fifteen years of transition after the socialist era. Contemporarily, the increasing income inequality trends have induced the governments to mediate (through redistribution policies) the propensity towards an unfair economic growth coming from market forces. This allowed policy makers to contain the potential negative costs coming from citizens' dissatisfaction, impoverishment and, more in general, social tensions. Because of these considerations, looking for inequality explanations coming from different sources of income allowed us to perform an analysis which took into account strict (market) economic factors as well as State

<sup>24</sup> In his survey on the decomposition of inequality measures by factor components, Lerman (1999) takes Shorrocks (1982) as the state-of-the-art and J. Foster and A. Sen (1997, p.149) go as far as to say that Shorrocks has provided a «definitive study» of the decomposition problem.

<sup>25</sup> Following Morduch and Sicular (2002) a rule of decomposition «satisfies the *property of uniform addition* if it registers strictly negative contributions to overall inequality for any income component equally distributed and positive».

propensities towards redistribution policies. Finally, the availability of LIS data for these countries is the most extensive in the region, covering, in three waves of observation, the entire decade of the Nineties.

The starting point of our analysis has been to measure inequality in *market income* (i.e. pre-government private sector income). It is given by the sum of earnings (including wages and incomes from self-employment), and (cash) property income. In order to discern States' redistribution effect, it is necessary to add the fraction coming from the various categories of social transfers to the market income. The LIS database covers many of these different social benefits in a harmonious and quite extensive way. The main categories are given by: social retirement benefits, universal child and family allowances, unemployment compensation, sick pay, accident pay, disability pay, maternity pay, military/veterans/war benefits, near-cash benefits (in-kind transfers whose value is easy to determine, such as food, medical, housing, heating, educational or child care allowances), and means-tested cash benefits of various kinds. Adding all these components to the previous aggregate allows us to discern the inequality level in *total gross income*. Nevertheless, it is still not the amount effectively available for each household. *Disposable income* differs because of the impact of direct and indirect taxation<sup>26</sup>. Despite the importance of this last component, the available information did not allow taxes to be broadly considered, and when possible it is not for the entire period of analysis. More precisely, we furnish results for *market income* inequality in each country and year, but *net of income taxes* (because of net information reported in the national surveys). As a consequence, the addition of state transfers yielded directly to *disposable income*, rather than total gross income. A complete three level inequality analysis has been performed only for Poland 1999, in which gross wages and salaries, together with income (direct) taxes, were consistently available<sup>27</sup>.

In what follows we will refer the analysis to the Poland, Russia and Hungary household file. For the purpose of this paper we will need to use only income variables, paying no attention to other important and very rich information on jobs types, family composition, education, ethnicity, etc. For instance, Russia has been studied as a whole, not distinguishing its large number of regions where economic development and social conditions are enormously different<sup>28</sup>. These attributes are planned to be treated in a next work, with the objective of going through the 'multidimensional decomposition' of total inequality by population subgroups *and* income sources.

## 5.2. Inequality patterns and total redistribution impact of State transfers

Table 1 shows the inequality patterns of Poland, Russia, and Hungary throughout the whole of the 1990s, observed in three different years and measured by two inequality indices for both market (MI) and disposable income (DI). The first fundamental evidence is given by the general inequality increase during the decade, either in the case of market income or disposable income. When analysing the table more in detail, some other important indications arise:

- Russia shows in each year the most unequal market and disposable income distribution, followed in order by Hungary and Poland. This result remains true independently of the inequality measure adopted;
- The general inequality exacerbation is constantly detected to be bigger when the Gini is the reference measure, while market inequality results increased more than disposable differences consistently among indices;
- When considering *market income*, it is possible to distinguish two different dynamics: while in Poland and Russia the inequality recorded in the middle year is always higher than what is observed for the initial and final years, the Hungarian market inequality resulted continuously increasing for both the indices;

<sup>26</sup> Indirect taxes were rarely available and, when present, of very small amount. Since their contribution was expected to be trivial, they have been excluded from the analysis.

<sup>27</sup> Poland 1995 and Russia 1992 surveys also have income taxes variable not empty, but the income amounts are filled net.

<sup>28</sup> See Förster et. al. (2003) for a detailed regional analysis of Eastern Europe inequality.

- For what concerns *disposable income* inequality, all countries show an increasing trend at the beginning of the Nineties and a decreasing one in the following half of the decade, all consistently among different measures.

**Table 1** - Inequality patterns of market and disposable income; Redistribution effect as relative (percentage) differences. Poland, Russia, and Hungary.

	Poland			Russia			Hungary		
	1992	1995	1999	1992	1995	2000	1991	1994	1999
<i>Absolute indices</i>									
$G(MI)$	0.341	0.391	0.372	0.418	0.499	0.493	0.386	0.422	0.478
$T(MI)$	0.195	0.267	0.240	0.307	0.434	0.431	0.265	0.307	0.396
$G(DI)$	0.270	0.301	0.284	0.393	0.445	0.435	0.280	0.320	0.291
$T(DI)$	0.123	0.163	0.141	0.274	0.348	0.337	0.141	0.179	0.148
<i>Relative (percentage) differences</i> $\delta I = [I(MI) - I(DI)]/I(MI)$									
$\delta G$	20.9	22.9	23.5	6.0	10.8	11.8	27.3	24.2	39.0
$\delta T$	36.6	38.7	41.0	10.7	19.8	21.7	46.6	41.7	62.6

Source: Own calculations on LIS database.

$G(\cdot)$  = Gini index;  $T(\cdot)$  = Theil index.

$MI$  = market income net of taxes;  $DI$  = Disposable income ( $GI$ ).

A second relevant evidence comes out comparing market and disposable income inequality through relative differences (lower side of Table 1). Due to the equalizing effect of redistribution, the various transfer components contribute as a whole to bound market forces impact on inequality. More precisely, two main aspects deserve to be emphasized:

- Poland and, mainly, Hungary are the countries where the redistribution effect of state transfers has had the major importance in moderating market inequality;
- The global reducing effect of transfers on total inequality increased over the decade, with a continuously rising trend for Poland and Russia. The same pattern is observed for Hungary when the Gini index is the reference measure; instead when adopting the Theil index the containing effect of transfers declines between 1991 and 1994 but then rises very fast to very high values in 1999.

At this point of the analysis a first important remark emerges: redistribution policies have played a key role in containing total inequality during the transition period. Each country pursued efficiency target damping, with different vigour and dependently of their specific macroeconomic constraints, the negative effects expected to be paid in terms of (the “old guarantee” of) equity. The inequality decreasing effect of transfers resulted to be widely robust with respect to the inequality measure adopted, continuously increasing during the nineties, and more vigorous in Poland and Hungary. Their states’ redistribution policies have been more successful in countries with relative low market inequality (Poland and Hungary) than in worse circumstances (Russia).

Empirical and theoretical literature commonly ascribes the amplification of market income inequality in post-socialist countries to factors such as the increase of unemployment rates, the reduction of the States’ role, the emerging of private enterprises, the opening to foreign markets, and so on. If on one hand this evidence furnishes an important source of evaluation for the *overall* State policies effect on inequality, on the other hand it misses out on a more accurate analysis concerning *the way* in which alternative transfer schemes contribute to lower total inequality. How much market inequality can we assign to wages, self-employment or property income? To which percentage various components of transfers contribute to mitigate the inequity generated by market forces? How can we distinguish (and motivate) similar/different patterns of disposable income inequality? One of the possible ways to follow is to operate decomposition procedure by factor components<sup>29</sup>. As already

<sup>29</sup> See, for instance, the econometric-simulation proposed by Heady et. al. (2001) with ECHP database.

stressed in Section 2.2, it allows us to overcome serious problems of inconsistency due to the *pre* and *post* redistribution computation of an inequality measure (Lerman, 1999).

To such propose, in what follows we put forward the results of several applications of two different methodologies of inequality decomposition by income sources. They allow us to detect the proportional contribution on total inequality coming from various income components, provided by LIS datasets with a very detailed level of disaggregation. Let us point out a few among the major benefits coming from this kind of analysis:

- The possibility of connecting specific policy choices with income components directly interested by such interventions (for instance: the definition of minimum wages and share of inequality explained by wages; welfare state reforms and the contributions of pensions, unemployment benefits, etc.);
- The problematic practice of “labelling” individuals (or household) in terms of the head-person job or main activity is completely avoided: all the entrances (and outflows) are pooled together, and then standardized by a specific equivalence scale;
- Decomposition by income sources has to be thought as a *complementary* but fundamental instrument for inequality understanding, mainly because of its fine correspondence to the payment of factors (earning, profit, rent) and policy scheduling (transfers and taxes systems).

### 5.3. *Inequality decomposition by factor components: evidence for market and disposable income.*

The next two Tables show the proportional contributions to market and disposable income inequality coming from their respective sub-components, as measured by two different procedures of decomposition. All the analysis have been replicated in each year in which data were available between 1990 and 2000. The higher sides of Tables 2 and 3 also contain information on the percentage factor shares on total income. It is worth keeping in mind that while the Shorrocks’ proposal allows the results to be interpretable freely of the global measure of inequality used, the Theil-based decomposition can be applied (and, as a consequence, it assumes a sense) only when that index is taken as reference.

As first sight, all counties show a considerable percentage of wages and salary contributions to total market income. In 1992 inequality in Poland is explained by (net) wages and salaries with a proportion of 82% applying the Shorrocks rule and 88% when the Theil index decomposition is employed, while self-employment incomes and rent components explain up to 18% of total inequality. In 1995 a drastic decrease in *wages and salaries* influence is observed: both the decompositions indicate an increasing weight of autonomous jobs, with a joined contribution of farm and non-farm incomes of 50%. Jointly, these two complementary facts can be thought to be the main cause of the Polish inequality increase in the first half of the decade. In the same year property incomes reduced their contribution: the diminishing pattern is consistent among different procedures and follows the decrease of their relative incidence on market income. Finally, between 1995 and 1999 the share of market inequality explained by wages and salaries does not significantly vary, while self-employment contributions are rescheduled in favour of an increase (decrease) of incomes.

Passing to analyse the Russian case, we note how the level of market inequality is mainly defined by only two source of income: wages and non-farm self-employment incomes. More precisely, between 1992 and 1995 the increase (decrease) in wages (self incomes) contributions do not follow the related shares patterns, which actually move in opposite direction. In the final year self incomes explain as a whole almost 40% of total inequality, contrary to the moderate collapse of wages contribution. In sum, Russian inequality shows two main peculiarities: market inequality trend (initially increasing and then decreasing in the second half of the decade) follows the variation of wages incidence on total agricultural and non-agricultural income; autonomous jobs, usually characterised by a high degree of income inequality, drastically diminish their influence in 1995, when Russian income differences reached the highest level 0.5 of the Gini index.



**Table 2** – Proportional contributions to market inequality. Poland, Russia, and Hungary.

	Poland			Russia			Hungary		
	1992	1995	1999	1992	1995	2000	1991	1994	1999
<b><i>Shares of MI</i></b>									
Net wages and salaries	86.5	74.4	73.1	94.4	84.7	73.9	94.6	94.7	82.6
Farm self-empl. income	12.3	10.6	14.1	1.0	5.3	11.6	3.3	2.9	3.2
Non-farm self-empl. income	.	14.6	12.5	4.4	9.1	13.8	1.3	1.4	10.6
Cash property income	1.1	0.4	0.4	0.1	0.9	0.8	0.8	1.0	3.7
Total	100	100	100	100	100	100	100	100	100
<b><i>Shorrocks decomposition (<math>s_w</math>)</i></b>									
Net wages and salaries	81.8	50.3	48.5	74.9	85.3	61.0	92.6	92.4	71.0
Farm self-empl. income	16.5	22.6	30.3	0.6	3.5	18.0	1.4	2.6	2.8
Non-farm self-empl. income	.	26.2	20.5	24.4	10.6	20.5	4.5	3.6	22.4
Cash property income	1.7	0.9	0.6	0.1	0.6	0.5	1.6	1.4	3.8
Total	100	100	100	100	100	100	100	100	100
<b><i>Theil decomposition (<math>t_w</math>)</i></b>									
Net wages and salaries	87.7	42.2	43.6	80.6	87.1	65.2	93.6	93.6	76.9
Farm self-empl. income	11.2	25.1	30.5	-0.3	2.3	15.4	-0.1	1.2	1.9
Non-farm self-empl. income	.	32.0	25.3	19.6	10.0	18.8	4.7	3.9	20.5
Cash property income	1.1	0.8	0.6	0.11	0.7	0.6	1.8	1.3	0.7
Total	100	100	100	100	100	100	100	100	100
$G(MI)$	0.341	0.391	0.372	0.418	0.499	0.493	0.386	0.422	0.478
$T(MI)$	0.195	0.267	0.240	0.307	0.434	0.431	0.265	0.307	0.396

Source: Own calculations on LIS database.

$G(\cdot)$  = Gini index;  $T(\cdot)$  = Theil index.

$MI$  = market income net of taxes.

Let us conclude this first step of the analysis with the Hungarian outcome. The fundamental evidence is given by the very significant role played by wages in determining market inequality until 1994, clearly reflecting its share magnitude on total income (above 90%). In 1999 their contribution declines (together with their relative incidence) in favour of a partial increase of the other four components. In particular, non-farm autonomous incomes consistently shift their contribution from values just around 4% in the initial and middle years to more than 20% in 1999.

The second stage of our decomposition analysis is devoted to explore in which way State operations contribute to define inequality in disposable income. The absence of direct tax data (due to a country surveys shortage) does not allow us to distinguish gross total income from disposable income, and as a consequence to interpret the results into a complete framework of redistribution impact on total inequality<sup>30</sup>. As already stressed above, State intervention through disbursements of transfers has had a key role in transition economies. On one hand, such policies avoided the transformation costs to be paid by the more disadvantaged population groups; on the other hand, they supported social stability, allowing the necessary economic reforms to be more easily accomplished.

The following Table 3 contains, in addition to Table 2, some important transfers' sources of total income. *Social retirement benefits* includes cash social security benefits for old age or survivors, thus identifying the first pillar in a 3-tiered pension system; *Child or family allowances* consist of cash payments not relating to maternity/paternity; *Unemployment compensations* include non-means tested cash for social insurance benefits in case of unemployment; *Other social transfers* consist in sick, accident, disability, maternity, and war benefits as well as other cash or near cash benefits; *Other cash income* includes all cash

<sup>30</sup> A complete three step analysis about redistribution effects of transfers and taxes is illustrated in Table 5 for Poland 1999.

income that could not be classified in one of the previous variables<sup>31</sup>; *Privati* includes alimony received from non-household members<sup>32</sup> and other regular cash private transfers; finally, *Meansi* includes means-tested benefits or so called 'emergency' benefits<sup>33</sup> and all forms of transfers that are, in a strict sense, in-kind payments (i.e. they are tied to a specific requirement such as school attendance) but have a cash equivalent value equal or nearly equal to the market value, including near-cash housing benefits.

Also in this case we report the results obtained from the application of both Shorrocks and Theil-based decompositions, preceded by the sources' share of disposable income. The first observation concerns the frequent lower values associated to the component contributions already considered in the analysis of market income (wages, self and property incomes). This is true mainly in case of positive transfer contributions (i.e. they can be defined as "inequality increasing") which erode part of their initial positive weight. Despite this, several sources actually contribute negatively to total inequality (i.e. they can be defined as "inequality decreasing") which, in accordance with a basic intuition, means that there is an inverse correspondence<sup>34</sup> in incomes ranking between the source and total distribution.

For that which concerns Poland we can note a continuous decrease in wage influence between 1992 and 1999; their contribution varies from 57% to 41% when the Shorrocks decomposition is the reference method and from 75% to 44% as suggested by the Theil-based application. Farm self-employment incomes regularly raise their influence along the decade (till 30% in 1999), while non-farm component losses part of its importance between 1995 and 1999. If the cash property incomes influence goes down from around 2.3% in 1992 to less than 1% in 1999, some transfer components appear decisive in the definition of Polish disposable inequality. Social retirement benefits result inequality reducing in 1992 – mainly for the Theil-based rule (-14%) – but with significant positive contributions in the following period (consistently with Milanovic 1999 picture). Child/family allowances and unemployment compensations regularly show negative and decreasing impacts throughout the decade, but with different strengths among decomposition procedures. Other social transfers contribute positively but with very low value for the Shorrocks decomposition, while the Theil rule suggests a considerable negative influence in the second half of the period. For what concerns other cash incomes, the contributions of 25% and 30% in 1992 represent the highest values among the transfer components, but the very low significance observed for the rest of the decade would suggest assigning those anomalous observations to an unclear imputation of incomes in the original survey. Finally, the *Privati* component contributes positively, but with noticeable values (7% and 8%) only in 1992, while the *Meansi* aggregate source results in having had a negative impact in the second half of the decade (-1.4% and -6.5%).

Russian decomposition of disposable income inequality does not modify considerably, as in the Polish case, the composition effects of market income components<sup>35</sup>. Despite this, the first important evidence comes out observing the Social retirement benefits behaviour: they result inequality decreasing in each year, with absolute values decreasing in the first half of the Nineties and increasing afterwards. Other cash incomes show a positive contribution around 12% in 1992, but they are missing in the following two years. Probably because of different classification of incomes in the original survey, the *Privati* cumulative component appreciably increases its positive contribution in the second half of the decade, showing in 1995 values higher than 13%.

The Hungarian decomposition analysis confirms the decisive positive influence of wages already emerged in the market income analysis but, differently from that case, we are now able to detect the signs, intensity and relative incidence of each transfer component.

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<sup>31</sup> Often referred to in the original survey as "other income".

<sup>32</sup> These are counted separately from variable *child or family allowances*, even if the alimony or child support is government mandated but not government handled or paid.

<sup>33</sup> Here LIS also includes mandatory cash transfers not tied to some form of in-kind benefit (e.g. not tied to food or education).

<sup>34</sup> Only in the Shorrocks decomposition case we could properly use the expression of "negative correlation".

<sup>35</sup> All the patterns are confirmed, even if the absolute values are lower for the Shorrocks decomposition and higher for the Theil-based procedure. This is respectively due to a positive and negative contribution of transfers considered as a whole (see Table 4).

**Table 3** – Proportional contributions to disposable income inequality. Poland, Russia, and Hungary.

	Poland			Russia			Hungary		
	1992	1995	1999	1992	1995	2000	1991	1994	1999
<i><b>Shares of GI</b></i>									
Net wages and salaries	52.9	44.7	46.8	72.8	61.0	53.6	62.5	60.2	43.6
Farm self-empl. income	7.8	5.5	9.1	0.8	3.8	8.4	2.2	1.8	1.7
Non-farm self-empl. income	.	8.7	8.0	3.7	6.5	10.1	0.8	0.9	5.6
Cash property income	0.7	0.3	0.2	0.1	0.7	0.5	0.6	0.6	1.9
Social retirement benefits	14.0	16.6	19.1	9.9	16.4	15.0	15.9	17.1	16.1
Child or family allowances	5.1	2.7	0.5	0.7	2.3	1.1	7.3	6.3	3.8
Unemployment Compensation	4.1	2.8	1.3	0.1	0.2	0.1	2.1	1.5	1.0
Other social transfers	0.1	11.5	8.4	3.0	0.5	2.0	6.6	7.7	7.2
Other cash income	11.1	1.8	0.3	4.4	.	.	0.0	1.0	16.1
Privati	4.2	4.1	3.9	3.6	8.4	8.1	1.0	1.1	1.6
Meansi	.	1.3	2.5	0.8	0.2	1.0	1.1	1.7	1.5
Total	100	100	100	100	100	100	100	100	100
<i><b>Shorrocks decomposition</b></i>									
Net wages and salaries	56.8	45.1	41.0	62.5	74.0	55.7	93.1	93.2	56.2
Farm self-empl. income	12.5	22.4	28.6	0.6	3.0	15.5	1.9	3.1	2.3
Non-farm self-empl. income	.	20.9	17.0	22.7	8.8	19.6	4.1	3.8	18.9
Cash property income	1.8	0.9	0.6	0.1	0.6	0.6	1.8	1.7	4.8
Social retirement benefits	-1.3	7.6	11.4	-2.4	-0.5	-1.2	-1.8	-1.5	-1.1
Child or family allowances	-0.6	-0.7	-0.3	0.1	0.3	0.1	0.9	0.2	-0.8
Unemployment Compensation	-1.4	-1.0	-0.7	0.0	0.0	0.0	-0.6	-0.6	-0.6
Other social transfers	0.0	0.8	1.0	0.3	0.1	-0.1	-0.3	-0.1	-1.1
Other cash income	25.4	0.8	0.4	11.8	.	.	0.0	0.2	21.2
Privati	6.9	3.3	2.4	4.3	13.8	9.5	1.1	0.8	1.3
Meansi	.	0.0	-1.4	0.1	0.0	0.3	-0.2	-0.8	-1.2
Total	100	100	100	100	100	100	100	100	100
<i><b>Theil decomposition</b></i>									
Net wages and salaries	75.0	54.1	44.4	81.7	86.8	68.6	120.1	121.5	76.8
Farm self-empl. income	11.3	30.2	32.4	0.4	2.7	15.5	2.7	4.0	2.7
Non-farm self-empl. income	.	27.1	21.9	19.1	9.8	19.4	5.0	4.7	21.7
Cash property income	2.3	1.0	0.8	0.1	0.9	0.9	2.6	2.2	6.2
Social retirement benefits	-14.5	5.6	13.9	-15.7	-11.6	-12.9	-18.8	-15.0	-13.1
Child or family allowances	-6.0	-4.6	-1.3	-0.5	-1.4	-0.6	-3.2	-4.7	-5.1
Unemployment Compensation	-7.1	-5.0	-2.8	-0.1	-0.2	-0.1	-3.1	-2.8	-2.6
Other social transfers	0.0	-8.6	-4.3	-1.7	0.0	-1.8	-5.4	-7.2	-9.1
Other cash income	30.6	-0.6	0.6	12.8	.	.	0.0	-0.2	25.7
Privati	8.4	2.3	0.8	4.2	13.1	11.1	1.3	1.0	1.2
Meansi	.	-1.5	-6.5	-0.4	-0.1	0.0	-1.3	-3.5	-4.5
Total	100	100	100	100	100	100	100	100	100
$G(DI)$	0.270	0.301	0.284	0.393	0.445	0.435	0.280	0.320	0.291
$T(DI)$	0.123	0.163	0.141	0.274	0.348	0.337	0.141	0.179	0.148

Source: Own calculations on LIS database.

 $G(\cdot)$  = Gini index;  $T(\cdot)$  = Theil index. $DI$  = Disposable income ( $GI$ ).

The Shorrocks application furnishes results which basically do not differ in pattern from what is shown by the Theil decomposition and the contribution of transfer components are generally close to nil influence (with the only exception of Other cash income in 1999). Following the second procedure we notice as: wages and salaries have had an enormous positive impact on total inequality (more than 120% in the first two years), even if with a decreasing trend throughout the decade; Non-farm self-

employed incomes show an increasing contribution, even more than 20% in 1999; Cash property incomes resulted in having exacerbated income differences with a slight increase between 1991 and 1999. For what concerns transfer sources a negative contribution is generally observed. Except than for other cash income (which showed a contribution of 25% in 1999) and the Privati summary component, all the other components played an important role in containing disposable income inequality, mainly in the first half of the decade, and through the disbursement of social retirement benefits. The contribution of this source varied from -18% to -13% between 1991 and 1999, representing the most important source for inequality alleviation. Also the Meansi aggregate source, child/family allowances, unemployment compensation and other social transfers had a negative impact along the decade, on average increasing (in absolute values) from -3.2% to -5.3%.

The following Table 4 reassumes the overall impact on disposable income inequality coming from market forces and redistribution (actual transfers) components.

**Table 4** – Proportional contributions to disposable income inequality coming from aggregated market and transfer components. Poland, Russia, and Hungary.

	Poland			Russia			Hungary		
	1992	1995	1999	1992	1995	2000	1991	1994	1999
<i><b>Shorrocks decomposition</b></i>									
Market incomes	71.1	89.3	87.2	85.8	86.4	91.4	100.9	101.7	82.3
Transfer components	28.9	10.7	12.8	14.2	13.6	8.6	-0.9	-1.7	17.7
Total	100	100	100	100	100	100	100	100	100
<i><b>Theil decomposition</b></i>									
Market incomes	88.6	112.4	99.6	101.3	100.2	104.4	130.5	132.4	107.5
Transfer components	11.4	-12.4	0.4	-1.3	-0.2	-4.4	-30.5	-32.4	-7.5
Total	100	100	100	100	100	100	100	100	100

Source: Own calculations on LIS database.

Market incomes net of direct taxes.

Looking at the Shorrocks decomposition we notice that:

- Transfer components decrease (increase in absolute value) their positive (negative) impact everywhere during the first half of the decade;
- While in Russia the diminishing trend continued until 2000, Poland and mainly Hungary carried out a rapid increase in (positive) transfer contributions.

The picture implied by the Theil-based method nearly follows (in patterns) what has been shown by the former procedure. Despite this, some conflicting elements arise:

- In Poland, the negative total contribution of -12% in 1995 denotes a high degree of discrepancy with the positive finding shown by the Shorrocks application;
- Looking at the Russian results, transfer contributions result always negative and with lower absolute incidence;
- Hungary is the country where the Theil decomposition points out the biggest negative contribution for aggregated transfer components, even if with a considerable fall in 1999. Note that this last evidence partially differs from the analysis of Table 1: in that case the redistribution effect on Hungarian income inequality (as measured by before-after indices computation) was always very strong in magnitude, but decreasing until 1994 and increasing afterwards.

This last example clearly confirms how sensitive and extremely different these kinds of analysis are, the multiplicity of “admissible” results which the existing theoretical literature does not allow to overcome, and consequently, the importance which assumes a clear identification of procedures and their related implications at the beginning of each empirical application.

#### 5.4. Transfers and tax impact on Polish inequality.

All the previous analysis have been performed taking into account market incomes *net of direct taxes*. This choice has been taken in order to allow homogenous comparisons between States. In fact, while the lack of information on gross incomes in Russian and Hungarian surveys is extended to the entire period, in the Polish case direct taxes and gross incomes are consistently reported in 1999<sup>36</sup>.

In the table that follows, a full “three steps” analysis of redistribution impact on inequality is proposed for Polish distribution of market, gross and disposable income in 1999. The inequality decomposition by factor components is explored following, as carried out so far, Shorrocks and Theil-based approaches.

**Table 5** – Proportional contributions on market/gross/disposable income inequality. Poland, 1999.

	Poland 1999								
	Source Shares			Shorrocks decomposition			Theil decomposition		
	MI	GI	DI	MI	GI	DI	MI	GI	DI
Gross wages and salaries	75.9	50.6	56.6	59.3	54.7	52.5	58.2	65.8	62.2
Farm self-empl. income	12.7	8.4	9.4	24.4	23.0	29.8	22.9	25.4	34.2
Non-farm self-empl. income	11.1	7.4	8.3	15.7	14.0	18.1	18.4	17.2	23.8
Cash property income	0.3	0.2	0.2	0.5	0.6	0.6	0.4	0.7	0.8
Social retirement benefits		17.7	19.8		7.6	6.7		6.1	4.1
Child or family allowances		0.4	0.5		-0.3	-0.3		-1.2	-1.3
Unemployment Compensation		1.2	1.3		-0.7	-0.8		-2.8	-3.1
Other social transfers		7.8	8.7		0.2	0.2		-6.1	-6.7
Other cash income		0.3	0.3		0.4	0.4		0.5	0.6
Privati		3.6	4.0		2.0	2.6		0.4	1.2
Meansi		2.3	2.5		-1.4	-1.4		-6.1	-6.3
Income taxes			-11.7			-8.6			-9.5
Total	100	100	100	100	100	100	100	100	100
<i>Total inequality</i>	MI	GI	DI						
$G(\cdot)$	0.373	0.291	0.287						
$T(\cdot)$	0.239	0.147	0.145						
<i>Relative (percentage) differences</i>									
$\delta G$	.	28.0	1.6						
$\delta T$	.	62.5	1.3						

Source: Own calculations on LIS database.

$G(\cdot)$  = Gini index;  $T(\cdot)$  = Theil index.

MI=Market income; GI=Gross total income; DI=Disposable income.

Taking into account market income factors, we notice that:

- Shorrocks decomposition indicates that gross wages and salaries continuously reduce their contribution moving from market to disposable income, while the Theil-based procedure shows highest influence on gross income and a relatively lower impact on disposable definition;
- Incomes from autonomous (farm and non-farm) jobs result in contributing around 40% to market and gross inequality, but over 50% when considering disposable income.

For what concerns transfer components, major contributions are shown by social retirement benefits (which account for 4% and 7%, respectively on disposable and gross inequality); other social transfers have trivial impact when the Shorrocks approach is employed, but results with a modest negative

<sup>36</sup> Polish dataset in 1995 and Russia 1992 report taxes but not gross wages and salaries, so that gross total income is not perfectly defined as a consistent addition of sub-components. Nevertheless, net wages allow to derive (net) market and disposable income.

influence with the Theil-based decomposition; finally, the Meansi aggregated source constantly shows negative contribution, even if with higher absolute values when using Theil procedure.

In conclusion, let us explore how direct taxes contribute to define disposable income inequality. With a share of -11,7% on total disposable income, its proportional contribution (clearly inequality decreasing) is of -8.6% and -9.5% applying, respectively, Shorrocks and the Theil decomposition. Observe that using relative differences, the redistribution impact of transfers and taxes drastically varies: transfer components resulted in having reduced market inequality of 28% and 62% (values which are largely higher than those detected, on average, by decomposition procedures), while direct taxation accounts for 1.5% (instead that 9%) in damping gross income inequality .

## 6. Conclusion

This paper has examined the Nineties inequality patterns of three important transition economies. Using LIS micro data information on incomes and its composition of factors, an extensive empirical analysis has been conducted for Poland, Hungary and Russia. Several estimations have been carried out using three different definitions of total income and two ordinary measures of inequality. Moreover, the implementation of two rules of inequality decomposition by income sources has allowed us to detect the contributions arising from important market and State factors.

Table 1 shows total inequality increasing in each country between 1990 and 2000, either in the case of market income or disposable income. Independently of the inequality measure adopted, Russia shows the most unequal market and disposable income distribution, followed in order by Hungary and Poland. In particular, while market inequality of Poland and Russia increased until 1995 and decreased afterwards, in the Hungarian case it resulted continuously increasing for both the indices. More homogeneity of findings arose considering disposable income. In this case, all countries showed an increasing trend at the beginning of the Nineties and a decreasing one in the following half of the decade, still consistently among different measures. Using relative differences between market and disposable inequality, Table 1 also let us conclude that redistribution policies played a key role during the transition period, allowing authorities to contain total inequality during the fundamental period of implementation of profound economic and social reforms. The inequality decreasing effect of transfers resulted to be widely robust with respect to the inequality measure adopted, continuously increasing during the nineties, and more vigorous in Poland and Hungary (i.e. for countries with relatively low market inequality).

The first general empirical analysis was followed by a detailed application concerning the decomposition of total inequality by income components. Tables from 2 to 4 summarise the results coming from the application of the Shorrocks and Theil-based procedures, distinguished for market and disposable definition of total income. Regularly, net wages and salaries have shown a significant impact on total income inequality, mainly because of their considerable relative weight on total income. Despite this, incomes coming from autonomous jobs also assumed a central role in defining overall patterns. For what concerns disposable income disaggregation, State transfers have often proven to be inequality diminishing, showing negative proportional contributions. Despite this, in several years components such as Retirement benefits, Child or family allowances, the Privati aggregated source (i.e. alimony received from non-household members and other regular cash private transfers) have registered positive influence, meaning that they had contributed positively to increase income differences.

Finally, a full three steps redistribution-effect analysis was conducted for Poland in 1999. Only for that country and year, among those considered in this application, LIS furnishes consistent information on direct taxation and gross income. The first result, illustrated in Table 5, concerns the negative (even if not huge) effect of taxes, which is estimated constantly among procedures, around 9%. Using relative differences, transfers (II column) and tax (III column) redistribution-effect appreciably varies with respect to the decomposition approach and among indices. If on one hand direct taxation results in reducing gross income inequality of 1.5% on average (very different from the

9% observed above), the redistribution effect arising from transfers varies from 28% to 62.5% dependently of the inequality global measure adopted. After all, both these values differ enormously from the modest contributions furnished (in aggregated terms) by both Shorrocks and the Theil-based decompositions.

In conclusion, let us observe that looking for inequality causes, using a source-based approach, is no trivial matter. The important role that such an analysis assumes when monitoring, evaluating and planning policy interventions should recommend that researchers take caution and make use of accuracy in their empirical applications (least but not last, pursuing “robust” findings as done this in paper). Full acceptance of the Shorrocks decomposition procedure could completely fill the actual lack of consistent results, but some unsatisfactory proprieties implied by its use lead to reconsider “natural” decomposition as proper alternatives. The Theil-based decomposition implemented in this paper seems to complete this objective in a suitable way. It is surely “victim” of its strict dependence of the choice of the global measure, but at the same time satisfies (differently from the Shorrocks axiomatic approach) very reasonable and useful proprieties: *i*) it implies a negative contribution for equally distributed and positive factors (i.e. satisfies the *property of uniform addition*); *ii*) it can be exactly decomposed by population subgroups.

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