

## ECONOMIC INEQUALITY IN CROATIA IN 1998: LOWER THAN EXPECTED\*

Danijel Nestić\*\*

### Abstract

This paper challenges a widespread belief that income inequality in Croatia is significantly higher than generally observed in transition and market economies, and its results based on micro-data from the 1998 Household Budget Survey indicate no substantial departure from the average for other countries in transition. The decomposition of inequality reveals that education and labor force participation are the most important factors behind disparities in income and consumption. On the other hand, gender or age of a household head, settlement and household types seem to predict inequality rather poorly. Non-farm self-employment income is highly concentrated and accounts for more than one fifth of overall income inequality whereas pensions tend to be more equally distributed. Social assistance is generally well-targeted towards the poor and contributes negatively to the overall inequality.

---

\* *This paper was originally published in Economic Trends and Economic Policy (Privredna kretanja i ekonomska politika), 2002, No. 91, 27-69. Translated by Višnja Kukić.*

\*\* *Danijel Nestić, Institute of Economics, Zagreb.*

# 1

## INTRODUCTION

It is a widespread belief that inequality in the income distribution in Croatia is very high. The World Bank's study on poverty and economic inequality in Croatia has undoubtedly reinforced such a perspective: *"Inequality in Croatia is far higher than generally observed in transition and market economies"* (World Bank, 2001; page 15). This conclusion was almost unreservedly accepted by the professional community, and understandably so, since it resulted from the only empirical research on inequality in Croatia.

The World Bank's study reveals extremely high inequality in the distribution of income from self-employment. It shows (World Bank, 2001, page 13) that the average income from self-employment is 2.5 times higher than the average wage income, thus considerably exceeding premiums associated with this type of employment in Hungary (40 percent), Poland (70 percent) or the Czech Republic (90 percent). This suggests that there are high rents associated with entrepreneurial activity. It has been further stated that such high rents usually reflect entry barriers and corruption. Footnote 19 states that Croatia exhibits levels of rents in self-employment similar to those in Russia, a country notorious for a poor business environment. Such observations raise some embarrassing questions as to the possibility of conducting business legally and securing Croatia's economic growth<sup>1</sup>.

Are distribution trends in Croatia really diverging so widely from those in other Central European countries in transition? Is it possible that Croatia's high level of government spending on social transfers has not achieved any success whatsoever in cushioning the negative effects of transition on distribution? Search for the answers to these questions led to a more penetrating analysis of inequality in Croatia, the results of which are presented in this paper. At present, the available statistical data make such an analysis feasible only for 1998.

The results of the analysis have shed a new light on inequality issues in Croatia. They show that Croatia is not an atypical transition country after all, and that income inequality is generally at a lower level than it was originally reported in the World Bank's study. The differences in results arise primarily from different definitions of

---

<sup>1</sup> *The negative effects of high economic inequality and insecurity have been confirmed by numerous studies, such as Alesina and Perotti (1996), Alesina and Rodrik (1994), Bourguignon (1999), and Persson and Tabellini (1994).*

self-employment income, the World Bank's study endorsing the concept of revenue, rather than income. The data which were based on other concepts of welfare (consumption or expenditure) reveal no significant departures from those in the World Bank's study and they are consistent with the inequality assessment based on income distribution<sup>2</sup>.

This paper is divided into five sections. Section 2 provides a statistical basis for the analysis of inequality in Croatia. It describes the data sources, the methodology used to construct the basic variables of well-being, as well as problems related to weighting procedure and the choice of equivalence scale. Section 3 estimates the extent of inequality in Croatia, while the fourth section provides the results of inequality decomposition into different sub-groups of population and income components. Section 5 concludes the paper.

## 2

### THE STATISTICAL BASIS OF THE INEQUALITY ANALYSIS

#### 2.1 Household Budget Survey

The 1998 assessment of inequality in Croatia was based on a database compiled by the Croatian Bureau of Statistics, which comprised selected data from the 1998 Household Budget Survey (HBS). This paper also uses some results of the preliminary data analysis prepared by a joint World Bank-CBS team, such as factors correcting for regional price differences and imputed consumption flow of consumer durables<sup>3</sup>.

The HBS has provided a good basis for the analysis of inequality. It offers plentiful information about the living standards of the

---

<sup>2</sup> Interestingly, the official version of the World Bank's study (World Bank, 2001) was driven by the assumption of high inequality computed on the basis of income distribution, rather than on a relatively low consumption inequality. However, both approaches were considered on an equal footing in the accompanying technical papers (Luttmer, 2000b). Moreover, it is consumption inequality that has been widely accepted as a more reliable indicator of dispersion of material well-being, rather than inequality based on income distribution.

<sup>3</sup> The work of this team represented the initial stage of the research on poverty and inequality in Croatia undertaken by the World Bank. The members of the 1998 team for the assessment of poverty and inequality in Croatia were Ruslan Yemtsov (team leader) and Erzo Luttmer from the World Bank; Tihana Cukina, Dragan Goleš, Davorka Knežević and Marinela Kustura from the Croatian Bureau of Statistics; Zoran Šučur from the University of Zagreb Law School, Social Studies Dpt.; and the author of this paper from the Institute of Economics, Zagreb.

households, their assets, employment status of household members, their education, types of income they earn, as well as detailed information on household consumption (or expenditure) patterns, food consumption in particular<sup>4</sup>.

The HBS sample is a two-stage self-weighting sample, chosen from the inventory of inhabited apartments. The inventory was compiled prior to commencing the survey and it comprised data collected by pre-enumeration in selected segments (territorial units resulting from the grouping of several enumeration areas) for the purposes of constructing a sample frame for the Labor Force Survey and the HBS. This 'pre-enumeration' was conducted to make adjustments to the 1991 Census data, which were no longer reliable due to massive population migrations caused by the war. For this reason, the final sampling unit is actually an apartment, and the households surveyed were all those occupying apartments that were chosen for the sample. In 1998 3,123 households with the total of 9,433 members were surveyed. Their responses have provided the basis for all calculations.

The 1998 HBS did not cover the entire territory of Croatia. The sample frame excluded the areas most severely affected by the war, which account for about 10 percent. Population estimates for those areas range from 2 to 5 percent of total population. Although in normal circumstances this would probably not compromise representativity of the Survey, the fact remains that those are very poor areas, further devastated by the war. Estimates of inequality may therefore be expected to somewhat understate the actual inequality. However, due to a relatively small number of people living in those areas, this bias is not likely to discredit the final results.

## 2.2 Defining the basic variables

For the inequality analysis to be valid, it is necessary to choose an adequate indicator of the material well-being of the population. Well-being can be determined by taking into account either the receipt or the expenses of certain resources, in which case higher receipts/expenses should

---

<sup>4</sup> The Survey actually consists of 4 questionnaires: Household Members Questionnaire (gathering information on employment, education and income of household members), Household Questionnaire (comprising information on living standards, assets and consumption of the entire household), Diary (where detailed information on expenses for food, beverages and tobacco are recorded over the course of two weeks), and Consumption Questionnaire (for the households which have not kept a diary).

entail a higher level of economic well-being. Four basic indicators have been chosen, namely: income and money income on the side of receipts, and expenditures and consumption on the side of expenses<sup>5</sup>.

Income includes all current monetary and non-monetary incomes of household members, which are expressed as net values after deductions for social security contributions and income taxes. Total income includes the following categories:

- income from employment (wages and salaries, vacation pay, monetary remunerations, bonuses);
- income from self-employment (independent professions, author's royalties, income from student employment);
- retirement pensions and social assistance benefits (children's allowances, welfare allowances and other forms of social assistance);
- income from property (dividends, interests, income from renting property, income from patent, license or copyright royalties);
- income from social insurance benefits (sickness benefits, maternity and childbirth allowances, unemployment compensation, other insurance claims);
- other transfers (fellowships/scholarships, gifts and similar receipts, private transfers from abroad);
- income from self-employment in agriculture;
- income in kind (wages and salaries in kind, compensations in kind, consumption of own-produced goods and services from farming);
- imputed rent for owner-occupied housing.

Income, in accordance with internationally accepted definitions, excludes money received from lending of assets, selling property or reducing savings. These types of monetary proceeds are considered as sources for financing consumption surplus/deficit.

The issue of whether the imputed rent for owner-occupied housing should be included or excluded from income has been receiving a lot of attention. Imputed rent for owner-occupied housing is the amount of estimated rental rates which the homeowners would have to pay for their apartments were they to rent them. It is the value of the service provided by owner-occupied housing. The inclusion of the imputed rent for

---

<sup>5</sup> Although the division of household consumption on expenditures and consumption is rather uncommon in literature, it is convenient for the purposes of this paper. For the definitions, see later in the text.

owner-occupied housing makes it possible to get a more accurate comparison between the well-being of families occupying rented apartments and those living in their own apartments. For example, income of HRK 4,000, all else being equal, contributes to a higher level of well-being for the family living in its own apartment because a considerable portion of the other family's income is spent on the rent. A similar argument can be applied to in-kind consumption (consumption of home-produced goods). For this reason, rental and in-kind consumption has been incorporated in income, consumption and expenditure variables.

Proper estimation of imputed rent usually poses a considerable problem. One of the questions asked in the 1998 HBS concerned the amount of rent that household members expected to be paid if they were to rent out their apartment or to pay themselves were they to rent it. Their estimates are used in this paper as the amount of imputed rent. Although such a procedure is by no means flawless, it has provided an acceptable solution. As part of the World Bank's study, Luttmer (2000a) performed a regression analysis of imputed rent and 56 apartment characteristics, such as the type of apartment, the year structure was built, size, location, household amenities (e.g. type of heating, access to water, electricity, gas, etc.), public utilities and so on. The results adjusted  $R^2$  of 0.46 have revealed that the households estimated quite accurately the potential rental value with regard to apartment characteristics.

A comparison between the results of this paper and those of the World Bank's study (World Bank, 2000b) reveals a substantial difference in the size of total income, generated by self-employment incomes. The World Bank considered incomes from self-employment as "net revenue"<sup>6</sup>. One of the questions in the 1998 HBS Household Members Questionnaire addressed this exact variable and was formulated as follows: "Write down the net amount of your revenue earned through self-employment." The instructions given to the Survey supervisors and interviewers defined net revenue as "net earnings from selling goods or services over the last 12 months less taxes paid". The definition as such leads to the conclusion that net revenue is what is usually considered as 'income'. However, the very next question in the Questionnaire requires that operating costs be stated while the question after that requires an estimation of the value of goods produced within self-employment activity and consumed by the household itself. The summary line in the Questionnaire is labeled 'total

---

<sup>6</sup> Although there is no detailed explanation of income anywhere in the World Bank's papers (World Bank, 2000b, 2001), all published results point to this conclusion, which can be confirmed by repeating the analysis.

income from self-employment' and explicitly defined as 'net revenue' minus 'operating costs' plus 'in-kind' consumption. This alone indicates that the authors of the Questionnaire did not intend to equate net revenue with self-employment income. The World Bank apparently considered only the first part of the definition (i.e. net revenue), treated it as total turnover net of VAT, and then took it to represent the entire income from self-employment. The same can be said of income from self-employment in agriculture.

Contrary to the World Bank's study, this paper treats income from self-employment as net revenue less operating costs - a difference which deserves closer attention.

We can start by checking how interviewers and respondents understood and interpreted the Survey's questions. None of the respondents reported negative net revenue from self-employment. Had the respondents interpreted net revenue as income (i.e. the amount remaining after all liabilities have been covered), it is only reasonable to assume that some of them would have reported negative business results (i.e. yearly losses) as they had normally done when filing their tax returns. Secondly, in all cases in the Survey (except one), the net revenue from self-employment was higher than the reported expenses. Had net revenue been seen as income, expenses would have even exceeded income in some cases, particularly when self-employment is conducted in retail sales, where receipts and expenses are usually relatively high in comparison with income. In individual farming, almost 300 households in the sample reported monetary expenses higher than monetary revenue. Understandably so, keeping in mind that a considerable portion of household production is normally consumed by the household itself (in-kind consumption), i.e. it is not intended for the market. After adding the value of in-kind consumption to the difference between monetary revenue and expenditure, all farming households recorded positive income, and there were no cases showing a significant negative differential between revenue and expenses/costs. All arguments presented here support the assumption that the respondents perceived net revenue as turnover (after deductions for taxes paid), and not as income, and that a correct income variable is calculated by deducting expenses from revenue.

This can be verified by examining the structure of the total household income. In the World Bank's study, total money income from self-employment (trades and crafts, individual farming, independent professions) accounted for about 2/3 of total wage bill. On the other hand, the CBS reported that income from self-employment accounted for less than 50 percent of income from wages and salaries (the value of in-kind consumption, which is significant in farming, being included in

self-employment income<sup>7</sup>). Income tax statistics (e.g. the Croatian Ministry of the Finance, 2000; 26) also seem to contradict the World Bank's assumption that income from self-employment takes up as much of total income as suggested in its study. If the 1998 HBS data were to be interpreted as net revenue, then everything points to the conclusion that income from self-employment has been overstated. In that case it is therefore warranted to define income as net revenue minus operating expenses of self-employment.

**Money income** is a part of income with an actual cash flow. It can be calculated by deducting in-kind income and imputed rent from the amount of total income. The variable is consistent with the international definition of income proposed by the Luxembourg Income Study (LIS)<sup>8</sup>, making this well-being aggregate thereby comparable with other countries for which there is available data based on the LIS definition. For the purposes of calculating the inequality index, the highest and the lowest incomes in the distribution of money income have then been adjusted according to the LIS. Low incomes were bottom coded at 1 percent of the equivalized mean income (income computed after applying the equivalence scale) while high incomes were top coded at 10 times the mean of non-equivalized income. When applied to the HBS data, top coding produced no effect, i.e. there were no incomes as high as to require downward adjustment.

**Expenditures** are all current monetary and non-monetary household expenses. They include the following categories:

- food (food, beverages, tobacco, meals outside home, received food gifts, home-produced food);
- other non-durable consumer goods (clothing/footwear, transportation, culture, recreation, education);
- durable consumer goods (household appliances, TV sets and similar equipment, furnishings, cars);
- home repairs and maintenance (cleaning agents and chemicals, etc.);
- imputed rent for owner-occupied housing.

Expenses for medications and health care are excluded from the expenditure aggregate as they are generally not viewed as a reliable measure of material well-being. Higher expenses for medications and health

---

<sup>7</sup> The CBS's Press Release no. 13.2.1. of July 24, 2001.

<sup>8</sup> The Luxembourg Income Study (LIS) is a joint research project endorsed by national institutions for scientific research from 25 countries around the world. The LIS research team harmonizes and standardizes disaggregated data from various surveys for comparative purposes. The database standardized following the LIS's recommendations is actually a set of household consumption surveys available, for example, on the website [www.lis.ceps.lu](http://www.lis.ceps.lu).



care hardly entail a higher level of well-being for the person who incurred them. Child care and kindergarten education expenses have been excluded as well since they are subsidized and as such do not indicate a higher level of service or well-being.

**Consumption** is a variable similar to the abovementioned definition of expenditures, but it also has some characteristic properties. It excludes the expenses for the purchase of consumer durables, but it includes estimated value of the service provided in the current year by utilization of a particular durable consumer good. For example, a refrigerator purchased a few years ago continues to provide the service of food preservation in the current year as well. The extent of well-being is greater in the household which owns such a refrigerator than in the one which does not, regardless of the fact that neither one of them incurred monetary expenses for the purchase of the refrigerator. Such a definition of consumption is consistent with the one in the World Bank's study. In Luttmer (2000a), there is a more detailed description of the regression analysis procedure used in estimating the consumption flow from durables. The flow depends on the type of goods, their purchasing value, age, estimated depreciation rate and maintenance costs. Other components of consumption remain the same as for expenditure.

The variables of material well-being can be expressed in nominal terms or be corrected for regional or inter-temporal price differences. Inter-temporal price differences arise from different periods during which the households were surveyed in 1998. It does make a difference whether consumption was measured in January or in December 1998. In order to solve this problem, the values of income and expenditures were deflated to the level of purchasing power in May 1998<sup>9</sup>. In addition, it was assumed that there were some regional differences in price levels so the factors of regional price adjustment described in Luttmer (2000a) had to be applied. These adjustment factors were computed from two sources. The first one are food price differences by region as reported in the household diaries designed for the 1998 HBS. The second source are price differences for other items in 12 regional city centers, as documented by the CBS. All expenditure amounts presented in this paper are calculated after the adjustment for regional price differences.

---

<sup>9</sup> A majority of the responses to the questions on income and consumption actually referred to the period around May 1998, which was therefore chosen for the base month.

## 2.3 Equivalence scales

In order to compare different household data, particularly those pertaining to the number and age of household members, an equivalence scale<sup>10</sup> has to be chosen. One of the simplest such scales, which normalizes disparities between households or differences in households' needs by the number of household members, is known as a *per capita* equivalence scale. Equivalized household income, designated by  $y_i(pc)$ , is hence derived from the following equation, which divides the total household income by the number of household members:

$$(1) \quad y_i(pc) = \frac{Y_i}{n_i}$$

where  $Y_i$  denotes the total household income/expenditure, and  $n_i$  the number of people in the household. The value of equivalized income thus computed is called '*per capita* household income'. Such an approach is not entirely satisfactory since it does not take account of positive economies of scale in multi-person households. Economies of scale arise by sharing certain expenditures such as expenditures on housing, heating, lighting, cars, TV set and similar resources among household members, each of them enjoying the benefits of these amenities at low extra cost.

Age composition of a household also affects the level of its material well-being. The OECD has devised its own equivalence scale, which is based on a widespread assumption that children have lower needs than adults. The scale assigns a weight of 1 to the first adult in the household (i.e. household head), a weight of 0.7 to each subsequent adult and 0.5 to each child. Household income is then computed as:

$$(2) \quad y_i(\text{OECD}) = \frac{Y_i}{0,3 + 0,7 * n_i^a + 0,5 * n_i^c}$$

where  $n_i^a$  is the number of adults in the household (over 15 years of age), and  $n_i^c$  the number of children in the household (15 years of age or younger). Equivalized household income thus computed is called '*household income per equivalent adult*'. The modified OECD scale, now commonly adopted within EU income studies, uses parameters that imply stronger economies of

---

<sup>10</sup> *Equivalence scale is a coefficient by which household income/expenditure is divided in order to adjust households' incomes to their potential needs and to obtain comparability between households of different type. As the coefficient considers parameters such as household composition, it is also known as equivalent household size or the number of equivalent adults. For more, see Nestić (2002; chapter 3).*

scale by assigning weights of 1, 0.5, and 0.3 to the household head, other adults and children, respectively.

Current literature identifies some possible advantages of using a one-parameter equivalence scale. Buhmann et al. (1988) found that most equivalence scales empirically used could be approximated quite closely by a one-parameter scale, in which equivalized household income is expressed as:

$$y_i(\theta) = \frac{Y_i}{(n_i)^\theta} \quad (3)$$

where  $\theta$  is the parameter representing economies of scale within the household, its values ranging from 0 (perfect economies of scale) to 1 (no economies of scale). With a  $\theta$  value of around 0.5-0.6 (Figini, 1998), the OECD scale is quite similar to the one-parameter scale that has been increasingly applied in empirical research. For example, Atkinson et al. (1995) used it to measure inequality in OECD countries (with  $\theta$  equal to 0.5), while the World Bank (World Bank, 2000a) used a  $\theta$  of 0.75 in its study on inequality and poverty in transition countries<sup>11</sup>.

Luttmer (2000a) considered several methods of evaluating equivalence scales possibly applicable to Croatia. Based on the 1998 HBS micro data, he came to the conclusion that the Engel equivalence scale for the poorer half of the population and the OECD scale would be most suitable. In this paper, the OECD scale has been chosen for baseline estimates because of its simplicity and its importance in international comparisons. The sole exception is money income, where a one-parameter equivalence scale with  $\theta=0.5$  is applied, as recommended in the LIS.

## 2.4 Weighting

It is necessary to distinguish between the two basic data weighting procedures. One of them is used to adjust sample data to make them representative of the entire population. In that case, certain correction factors are employed to adjust characteristics of each household in the sample to approximate average household characteristics of the population as a whole. These correction factors are called *elevation factors or population*

---

<sup>11</sup> It is interesting to note the difference between the values chosen for the  $\theta$  parameter in these two studies. The coefficient of the economies of scale for developed countries is higher than that for transition countries, reflecting a relatively higher share of housing costs in household budgets in developed countries.

*weights*’, and they are normally constructed by the sampling department within the institution designing the survey. In our case, elevation factors were prepared by the CBS in order to ensure that calculations, ratios and inequality measures provided estimates truly representative of the entire population. Thus, for example, mean income for the population,  $\mu(h)$ , is computed as:

$$(4) \quad \mu(h) = \sum_{i=1}^n \frac{w_i}{W} Y_i$$

where  $w$  stands for the elevation factor of the household  $i$ , and  $W = \sum_i^n w_i$ . Instead of using total household income ( $Y_i$ ), we can also use equivalized household income to compute this equation, by simply replacing  $Y_i$  with  $y_i(pc)$ . In either case, each household is treated equally and is counted as one, which is quite appropriate for an analysis of inequality in the distribution of income among households.

However, for a better understanding of inequality it is more important to examine inequalities in the income distribution among individuals in the population - an issue which leads us to the second method of weighting. The purpose of elevation factors is to make a sample representative of the entire population. But, when computing different statistical indicators such as averages or inequality indices, it is also necessary to have a discrete and well-defined unit of observation, i.e. to know precisely the level at which inequality is being analyzed, which is a rather separate issue from elevation and equivalence factors. In other words, it is possible to calculate the size of a household’s income by using, say, a *per capita* scale. When computing the mean or any other measure (with elevation factors known), each household will be attributed greater or lesser weight, depending on the representation of its particular household type in the population. But, should each household indeed be counted as one when computing the mean? The following example can help us get a better understanding of the dilemma. If the *per capita* income of a single-person household is HRK 2,000, and the *per capita* income of a four-person household is HRK 1,000, what would be the average income in a potential economy consisting of only these two households? If each of the households is attributed the same weight, the correct answer to the previous question would be HRK 1,500. But, why should it be that four persons with an average income of HRK 1,000 and one person with an average income of HRK 2,000 yield such average? In order to compute average income that would be relevant for the income distribution among individuals rather than households, it is necessary to weight each household. A weight equal to the number of household members seems to be an appropriate choice, and the

average income in our potential economy, computed by weighting each household by the number of persons living in it, would thus be HRK 1,200.

A combined application of elevation factors and household weights produces estimates of income distribution among all persons in a population. In that case, the unit of observation is the individual and the computation method employed is known as the *person weighting*<sup>12</sup>. The method is based on the assumption that all household members equally participate in their household's consumption and that each member of the household has the same elevation factor. In case where only elevation factors are employed, and each household is treated as a single unit, we obtain estimates of inequality in the income distribution among households.

Baseline estimates in this paper are calculated by weighting each household by the number of its members, which means that the equivalized income of a household consisting of  $n$  individuals is counted  $n$  times.

The formulae laid out in Table 1 describe the differences between the approaches mentioned above.

---

<sup>12</sup> In Atkinson et al. (1995), the application of elevation factors is called *population weighting*, while the application of household-size weights is called *person weighting* when each household is weighted by the number of people in it, or *household weighting* when every household is attributed a weight of 1.

Table 1

**EQUIVALENCE SCALES, ELEVATION FACTORS AND WEIGHTS**

Unit of observation	Equivalent income/ consumption $y_i$	Elevation factor $p_i$	Household weight $h_i$	Estimated population mean $\mu$
<b>Household:</b>				
Total income	$Y_i$	$\frac{w_i}{\sum_{j=1}^n w_j}$	1	$\sum_{i=1}^n \frac{w_i}{\sum_{j=1}^n w_j} Y_i$
Income per capita	$\frac{Y_i}{n_i}$	$\frac{w_i}{\sum_{j=1}^n w_j}$	1	$\sum_{i=1}^n \frac{w_i}{\sum_{j=1}^n w_j} \frac{Y_i}{n_i}$
<b>Individual:</b>				
Income per capita	$\frac{Y_i}{n_i}$	$\frac{w_i}{\sum_{j=1}^n w_j}$	$n_i$	$\sum_{i=1}^n \frac{w_i n_i}{\sum_{j=1}^n w_j n_j} \frac{Y_i}{n_i}$
Income per equivalent adult (OECD scale)	$\frac{Y_i}{0,3+0,7n_i^a+0,5n_i^c}$	$\frac{w_i}{\sum_{j=1}^n w_j}$	$n_i$	$\sum_{i=1}^n \frac{w_i n_i}{\sum_{j=1}^n w_j n_j} \frac{Y_i}{0,3+0,7n_i^a+0,5n_i^c}$

Note:  $Y_i$  stands for the total household income/consumption,  $n_i$  is the number of household members,  $w_i$  is the household elevation factor,  $n_i^a$  is the number of adults, and  $n_i^c$  is the number of children in the household.

### 3 INEQUALITY ESTIMATES

The passages that follow will provide details on basic inequality indicators used in our analysis of the distribution of income, expenditure and consumption in Croatia<sup>13</sup>. We shall start by generating distribution graphs to demonstrate the relationships among these variables and then proceed with a more detailed discussion of inequality measures.

<sup>13</sup> All calculations were done using the STATA® software (StataCorp. 1999. Stata Statistical Software: Release 6.0. College Station, TX: Stata Corporation).

### 3.1 Distribution graphs

Figure 1 shows the distribution of total income, expenditure, consumption and money income by ventiles (5% percentiles) of the population. It reveals that total household expenditure generally exceeds total household income, regardless of the size of that income. Since the values of in-kind consumption and imputed rent did not change, it is clear that they could not have generated such disparity between these two variables and that Survey respondents must have understated their incomes by, on average, 16 percent. Absolute deviation remains at approximately the same level regardless of income size, with the exception of the highest incomes, as expected. This is because savings of the wealthier segments of society are normally larger so expenditures tend to decrease towards the end of the distribution.

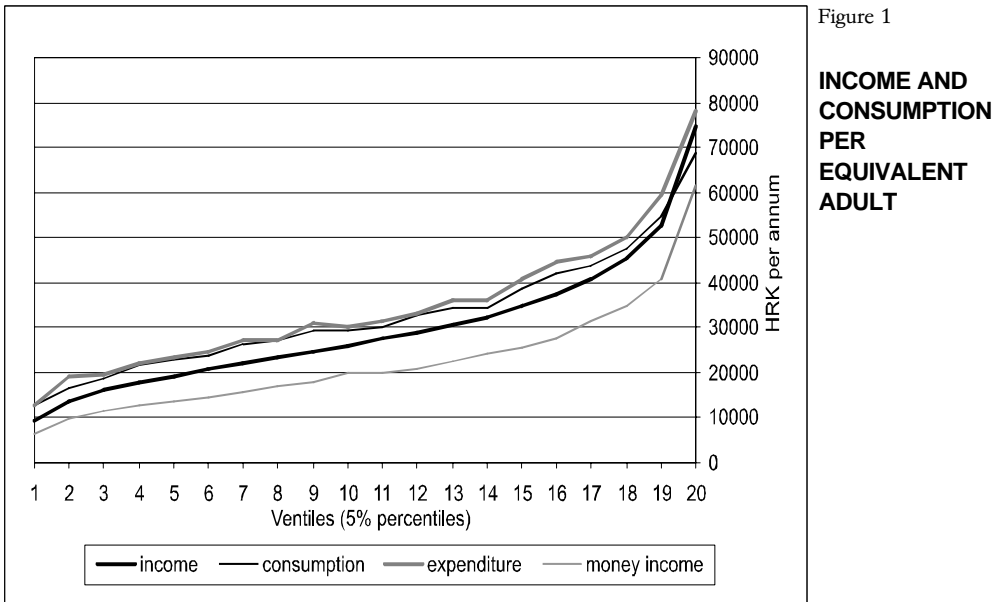


Figure 1

*Note: Individuals are ranked by income per equivalent adult. Income, consumption and expenditure were equivalized using the OECD scale, and money income using the scale with  $q = 0.5$ .  
Source: Author's estimates based on the 1998 HBS.*

In an effort to explain the disparity between income and expenditure, it was necessary to take into consideration other financial receipts besides income (loans, reduced savings, sale of assets, lending) that

might have contributed to higher expenditure levels. Therefore, a new variable had to be introduced - resources available for consumption, i.e. income plus net financial revenue. As the new variable produced no significant change, the previous assumption that incomes reported in the Survey had been understated was thus proven valid.

Figure 1 also reveals a significant similarity between the distributions of consumption and expenditure. Consumption of the wealthier segments of the population is lower than expenditure, as expected. These segments of the population obviously experience higher replacement ratios for consumer durables so their expenses for the purchase of these goods increase overproportionately to the flow of service provided by the utilization of those goods in current year. Besides, due to very low depreciation rates associated with the service flow from consumer durable goods, annual value of services provided by such newly-purchased goods (and consequently, the value of total consumption) is relatively low so it tends to be understated when it comes to the wealthier parts of the population, which would generally own a greater quantity of such goods.

As expected, money incomes are found to exhibit the lowest values. In the second half of the distribution (save at its very end), we observe a somewhat greater divergence between the money income and the total income, which suggests that the absolute values of in-kind consumption and imputed rent are above average for the upper-middle class of the population. Nevertheless, the living standards experienced by the wealthiest segments of the population are predominantly associated with their high money incomes.

The distribution of material well-being can be represented graphically by density or cumulative density curves, as shown in Figure 2. Since the distribution of expenditure is similar to the distribution of consumption, it has been omitted so as not to unnecessarily clutter up the diagram. All density estimates were computed using the so-called *kernel function*<sup>14</sup>. As can be seen, the highest density of income/consumption per equivalent adult, is at around HRK 20,000 a year. The cumulative density function shown in Figure 3 reveals, for instance, that about 25 percent of the population have incomes less than HRK 20,000 per equivalent adult, and about 91 percent less than HRK 50,000. As for consumption, cumulative percentages of the population are somewhat lower than the reference incomes, reflecting the fact that consumption tends to exceed reported incomes.

---

<sup>14</sup> A description of the procedure can be found in Cowell (1995; Appendix).



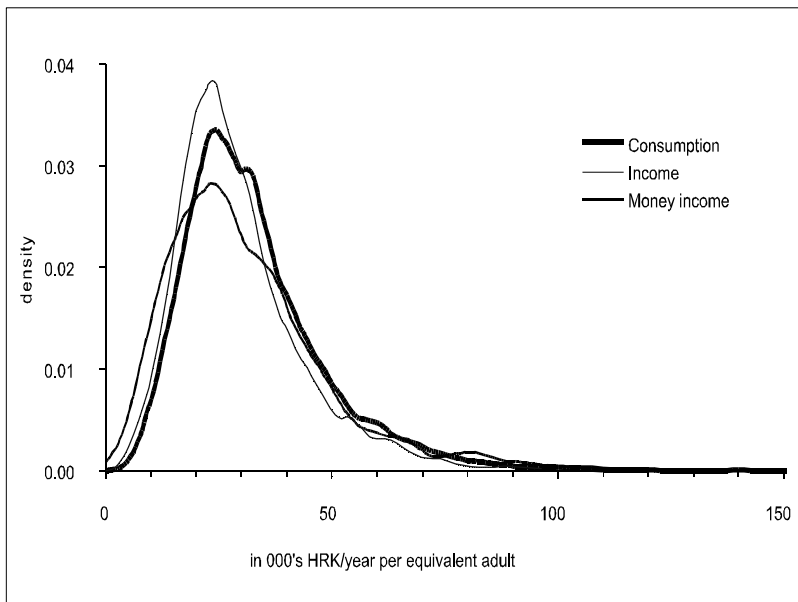


Figure 2

**DENSITY ESTIMATES: CONSUMPTION AND INCOME**

Note: Kernel density estimates.  
Source: Author's estimates based on the 1998 HBS.

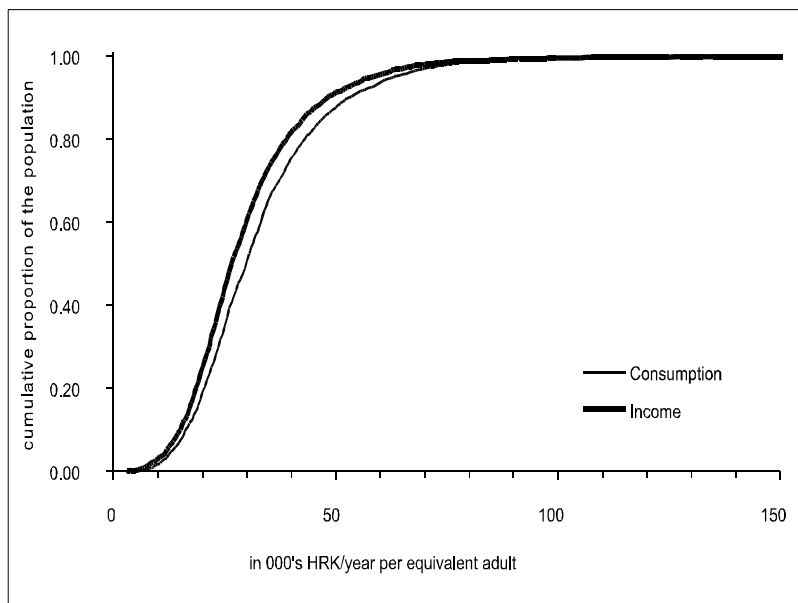


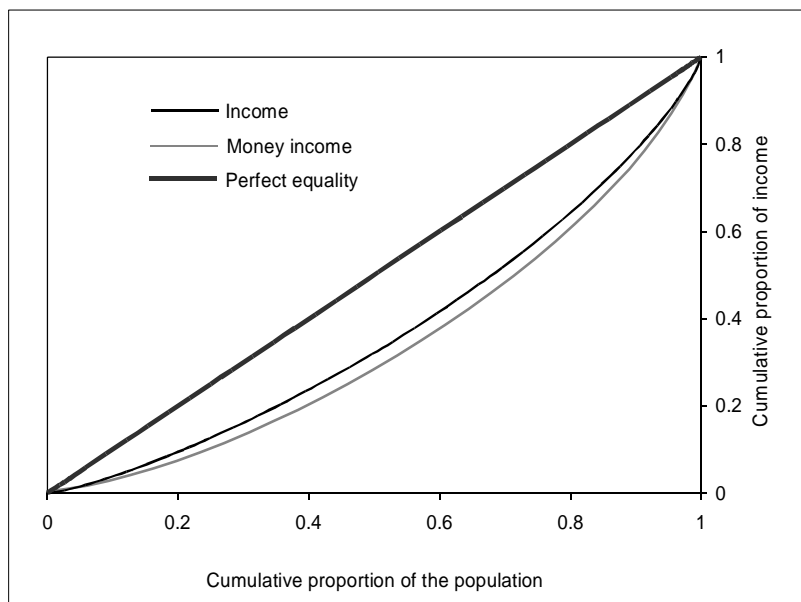
Figure 3

**CUMULATIVE DENSITY: CONSUMPTION AND INCOME**

Source: Author's estimates based on the 1998 HBS.

The Lorenz curve is one of the most commonly used graphical representations of inequality. Figure 4 plots the Lorenz curves for the distributions of the equivalized total income and money income, showing that the poorest 20 percent of the population receive around 9.5 percent of the total income. It is easily seen that the money income curve stays entirely below that for the total income, thus suggesting that those inequality measures based on the Lorenz curve (such as the Gini coefficient) are going to show a greater level of inequality in the distribution of money income. As the Lorenz curve for consumption is similar to that for income, it has been omitted from the diagram for the sake of clarity. In Figure 5, the Lorenz curve for the distribution of expenditure has been plotted against that for consumption. Although they are similar, the expenditure curve stays below that for consumption, thus diverging to a greater extent from the line of perfect equality and suggesting that inequality in the distribution of expenditure is higher than in the distribution of consumption.

Figure 4

**LORENZ  
CURVE  
FOR  
INCOME**

Source: Author's estimates based on the 1998 HBS.



Figure 5

**LORENZ  
CURVES FOR  
EXPENDITURE  
AND  
CONSUMPTION**

Source: Author's estimates based on the 1998 HBS.

## 3.2 Distributional characteristics by decile groups

Decile groups are composed by dividing the entire population into tenths, with each group comprising 10 percent of the population whose individuals were previously ranked by the size of their incomes or consumption. The first decile then represents the poorest 10 percent of the population, and the tenth decile refers to the wealthiest 10 percent<sup>15</sup>.

<sup>15</sup> In this case, decile groups do not correspond to statistical deciles where, for example, the income of the first decile would be attributed to the wealthiest individual among the poorest 10 percent of the population.

Table 2

**DISTRIBUTION OF INCOME AND CONSUMPTION BY DECILES**

Decile group	Income		Expenditure		Consumption		Money income	
	Mean	Share (%)	Mean	Share (%)	Mean	Share (%)	Mean	Share (%)
1	11,418	3.8	12,829	3.7	12,842	3.9	8,590	2.7
2	16,903	5.7	18,790	5.4	18,535	5.6	14,596	4.6
3	19,982	6.7	22,385	6.5	22,020	6.7	18,647	5.9
4	22,687	7.6	25,490	7.4	24,965	7.6	22,360	7.1
5	25,248	8.4	28,639	8.3	28,084	8.6	25,804	8.2
6	28,237	9.5	32,170	9.3	31,463	9.7	29,752	9.5
7	31,574	10.6	36,214	10.5	34,956	10.6	34,461	10.8
8	36,031	12.0	41,833	12.1	39,993	12.2	39,689	12.8
9	43,082	14.4	50,884	14.7	47,459	14.5	47,698	14.9
10	63,756	21.3	77,290	22.3	67,557	20.5	74,555	23.6
<b>Total</b>	<b>29,887</b>	<b>100.0</b>	<b>34,641</b>	<b>100.0</b>	<b>32,768</b>	<b>100.0</b>	<b>31,590</b>	<b>100.0</b>

*Note: Income, expenditure and consumption are per equivalent adult, using the OECD equivalence scale. Money income is based on the LIS definition of equivalent income and calculated using  $\theta=0.50$ . Prices (HRK) are from May 1998, adjusted for regional differences. The unit of observation is the individual.*

*Source: Author's estimates based on the 1998 HBS.*

Table 2 shows the average incomes/expenditures/consumption/money incomes per equivalent adult for each decile group and their corresponding shares in the total income/expenditure/consumption/money income, respectively. Generally speaking, while there are no considerable differences among the distributions of income, expenditure and consumption (which is reflected in the similarity of their Lorenz curve shapes), the money income distribution diverges to a certain extent - the poorest 10 percent of the population receive 2.7 percent of the population's total money income while the wealthiest 10 percent receive as much as 23.6 percent.

Income sources of the poor differ in some important respects from those of the wealthier population. Table 3 shows the structure of the equalized incomes for each decile group, revealing that the share of wages in the total money income ranges from 20 - 40 percent, depending on the decile group. This share is lowest for the poorest segment of the population - hence the implication that the poor are often economically inactive, unemployed or poorly paid. When it comes to middle-class incomes, however, wages account for 40 percent of the total money income or slightly

more for the upper-middle income group. The wealthiest segments of the population rely less on wages and salaries, and much more on incomes from self-employment or/and property. Incomes from self-employment in agriculture generally account for as little as 1 - 4 percent of the total money income, their share in the total income being lowest for the poorest tenth of the population and a bit higher for the second decile, i.e. the lower middle-class. This suggests that incomes from agriculture can improve the prospects of avoiding the most severe poverty and deprivation.

Table 3

**INCOME STRUCTURE BY DECILES (total income=100)**

Decile group	Wages and salaries	Income from agriculture	Income from self-employment	Transfers	Income from property	In-kind consumption	Imputed rent
1	20.8	1.1	2.1	44.8	0.5	12.1	18.5
2	30.0	3.9	2.9	33.2	1.2	10.3	18.5
3	33.9	3.2	3.2	28.8	0.5	9.7	20.6
4	41.5	3.3	2.1	24.6	1.3	8.3	19.0
5	37.5	3.0	4.1	27.8	2.2	6.4	18.9
6	37.7	2.7	4.2	25.8	2.3	6.2	21.2
7	39.3	2.9	5.8	24.4	1.6	6.3	19.8
8	40.1	3.1	7.1	21.2	2.1	5.8	20.5
9	40.3	2.8	10.8	20.5	2.6	4.0	19.1
10	34.1	2.8	20.9	16.3	6.3	3.1	16.5

*Note: Income is per equivalent adult, using the OECD scale. The unit of observation is the individual. Source: Author's estimates based on the 1998 HBS.*

As the total income increases so does the share of income from self-employment, which is highest for the wealthiest individuals. Social transfers tend to play the most important role for the poorest, and their importance normally declines with the increase in total income. The poorest segments of the population receive around 45 percent of their incomes from transfers, suggesting the existence of some socio-economic characteristics closely linked to the poor, such as economic inactivity or unemployment<sup>16</sup>. Incomes from property play a significant role only for the wealthier individuals, as do incomes from self-employment. Just the opposite is the case with in-kind consumption, i.e. gifts, compensations in kind and consumption of own-produced items. In-kind consumption is relatively highest for the

<sup>16</sup> World Bank (2000b, 2001) gives a detailed analysis of the poverty profiles in Croatia.

poorest individuals, and tends to decline with the increase in income. The share of imputed rent in the total income remains relatively constant across different income groups (with the exception of the wealthiest tenth), suggesting that the housing standards can be taken to reflect the overall material well-being of the population quite adequately.

Income can be calculated on either a net or a gross basis. Gross incomes (i.e. incomes before deductions for income taxes and social insurance contributions) reflect a potential economic power of households, i.e. their economic power unburdened by taxation or government-imposed contributions. Table 4 shows the size of the burden, which is given as the average income tax rate for each decile group. It is clear that the Croatian system of income taxation is basically progressive, i.e. the rate of tax proportionally increases as the amount of the individual's taxable income rises<sup>17</sup>. The poorest tenth of the population must set aside, on average, 6.3 percent of their gross money incomes for taxes and mandatory contributions, while this percentage rises to 24 percent in the top decile. This should come as no surprise considering the already mentioned income structure, in which the poor tend to rely heavily on largely non-taxable government transfers. Interestingly, the penultimate decile pays higher taxes and contributions than the last, and the wealthiest, decile. Considering the fact that the last decile of the population obtains the most substantial part of its incomes from self-employment and property, a lower share of taxes payable by the wealthy may reflect a (presumably) more preferable tax policy for incomes from self-employment and property (which are generally exempt from mandatory contributions, except for salaries paid to business owners) and/or from proceeds of informal economy and tax evasion<sup>18</sup>.

---

<sup>17</sup> For the progressive income tax system in Croatia, see Kesner-Škreb (2001).

<sup>18</sup> Tax rates presented here differ from those computable from the tax statistics, e.g. Mađarević (2001) reported that the average tax rate for 1998 was 27.5 percent. This is because the Croatian tax system adopted the individual as the taxation unit (although there are some family-based tax deductions), while this paper uses the household income for its base unit (equivalized to take account of the number of the individuals living in the household, though).

Table 4

**GROSS AND NET MONEY INCOMES  
AND AVERAGE TAX RATES BY DECILES**

Decile group	Net money income	Gros money income	Share of taxes and contributions in gross income (%)
1	8,590	9,432	6.3
2	14,596	16,842	10.9
3	18,647	22,460	14.7
4	22,360	27,914	18.0
5	25,804	32,856	19.7
6	29,752	38,275	20.6
7	34,461	45,246	22.2
8	39,689	51,839	22.0
9	47,698	63,931	24.1
10	74,555	100,460	24.0
<b>TOTAL</b>	<b>31,590</b>	<b>40,889</b>	<b>18.2</b>

*Note: Money income is per equivalent adult, based on the one-parameter scale with  $\theta = 0.50$ .  
Source: Author's estimates based on the 1998 HBS.*

Differences in economic circumstances of the population are clearly mirrored in the structure of consumption. The second column in Table 5 shows the share of food consumption in the total consumption by deciles. In the first decile, i.e. the poorest 10 percent of the households, food consumption constitutes, on average, 46 percent of the total consumption (imputed rent included). As it tends to decrease with an increase in total consumption level, food consumption of the wealthiest 10 percent drops to an average of 31.5 percent of the total consumption.

Table 5

**CONSUMPTION STRUCTURE AND  
HOUSEHOLD DEMOGRAPHIC CHARACTERISTICS BY DECILES**

Decile group	Consumption (HRK/year)	Share of food consumption (%)	Average number of members	Average number of children (<=15)	Average number of elderly	Share of inactive members (%)
1	12,744	46.0	2.76	0.49	0.92	51.2
2	18,418	45.0	2.91	0.55	0.76	45.2
3	22,037	39.7	3.28	0.66	0.71	41.8
4	24,972	38.2	3.25	0.70	0.65	41.8
5	28,035	38.9	3.03	0.58	0.69	41.9
6	31,496	36.8	3.01	0.56	0.52	36.1
7	34,978	36.6	3.05	0.59	0.47	34.9
8	40,043	33.7	2.90	0.49	0.44	32.0
9	47,594	32.9	2.73	0.41	0.40	29.8
10	68,905	31.5	2.58	0.42	0.26	26.2
<b>TOTAL</b>	<b>30,402</b>	<b>37.8</b>	<b>2.93</b>	<b>0.54</b>	<b>0.58</b>	<b>38.1</b>

*Note: Consumption is per equivalent adult, using the OECD scale. Prices (HRK) are from May 1998, corrected for regional differences. The unit of observation is the household. Elderly are men over 65 and women over 60. Economically inactive members are children and the elderly.*

*Source: Author's estimates based on the 1998 HBS.*

Well-being is largely interconnected with household demographic characteristics. Judging by the consumption indicators per equivalent adult, poor households in Croatia tend to have few members, they are mainly made up of elderly people and have a below-average number of children. Although wealthy households tend to have just as few members and just as few children, they also have a small number of elderly individuals. This suggests that poverty in Croatia is more strongly associated with elderly or single elderly households than with those households with many children.

The number of working-age individuals also highly influences the level of a household's material well-being. Drawing on data for average number of children and elderly per household, it is possible to construct a variable for the share of inactive individuals in a household. In our case, that variable shows that there is a negative correlation between the number of household members of inactive age and wealth - in the bottom 10 percent of all households, more than 50 percent of individuals belong to the economically inactive age group, while in the top decile that share drops to 26 percent.



### 3.3 Inequality measures

Inequality is usually defined in terms of several commonly used measures. Table 6 shows summary measures of inequality for each of the four variables of economic well-being - income, money income, expenditure and consumption.

Table 6

#### INEQUALITY MEASURES FOR CROATIA (1998)

	Income	Consumption	Expenditure	Money income
Decile ratio (d9/d1)	3.20	3.26	3.51	4.39
Share of population with income or consumption < 50% of median (in %)	7.05	7.12	8.30	12.93
Gini coefficient	0.261	0.254	0.276	0.313
Theil entropy index	0.116	0.106	0.130	0.165
Mean log deviation	0.115	0.107	0.127	0.178
Coefficient of variation	0.521	0.485	0.565	0.617
Atkinson index ( $\epsilon = 0.5$ )	0.056	0.052	0.062	0.081
Atkinson index ( $\epsilon = 1$ )	0.108	0.102	0.119	0.163
Arithmetic mean	29,887	32,768	34,641	31,590
Median	26,549	29,810	30,438	27,525

*Note: Income, expenditure and consumption are per equivalent adult, using the OECD equivalence scale. Money income is based on the LIS definition of equivalent income and calculated using  $\theta=0.50$ . Prices (HRK) are from May 1998, adjusted for regional differences. The unit of observation is the individual.*

*Source: Author's estimates based on the 1998 HBS.*

Our first measure, the ratio of the ninth to the first decile of the distribution, shows that the equalized income attributed to the poorest person in the last decile is at the level of 320 percent of the income of the wealthiest person in the first decile<sup>19</sup>. While the ratio remains similar for the distribution of consumption, the measure yields a slightly higher value for the distribution of expenditure and a value of 4.39 for the distribution of

<sup>19</sup> In this case, a decile is the income value which divides the population ranked by income into  $d$  tenths of the population with incomes lower than or equal to the decile income and  $1-d$  tenths of the population with incomes higher than the decile income. In other words, the  $d$ -th decile represents the income value of the person who is ranked last in the first  $d*10$  percent of the population.

money income (as defined in the LIS). Such a departure of the money income distribution from other aggregates can be accounted for by the absence of equalizing effects of imputed rent and in-kind consumption, which have both been excluded from the 'money income' variable.

The share of the population with incomes less than 50 percent of the median income is another frequently used measure of relative inequality and poverty. About 7 percent of the Croatian population live in households with incomes per equivalent adult below half the median, i.e. less than HRK 13,274 a year per equivalent adult. The measure yields a similar result for the distribution of consumption, a slightly higher value for the distribution of expenditure and the highest one for the money income distribution.

The Gini coefficient is the most commonly applied measure of inequality. The results reported in Table 6 show the values for this coefficient ranging from 0.254 (for the distribution of equalized consumption) to 0.313 (for the money income distribution), the Gini for the distribution of income being estimated at 0.261.<sup>20</sup> The value assigned to the Gini for the money income distribution is the highest value observed and it corresponds to the relatively largest area between the Lorenz curve and the 45 degree equality line, as shown earlier in Figure 4.

While the Gini coefficient is relatively sensitive to changes in the middle of the distribution, the Theil entropy index is more sensitive to changes at the lower end of the distribution. On the other hand, the mean log deviation index, and especially the coefficient of variation, are sensitive to changes at the upper end of the distribution<sup>21</sup>. However, regardless of the differences in their sensitivities, all these inequality measures have ranked the four selected variables similarly - the lowest inequality is found in the consumption distribution and the highest is in the distribution of money income. Similar results are obtained when using the Atkinson index, with the inequality aversion parameter  $\theta$  set to 0.5 or 1.

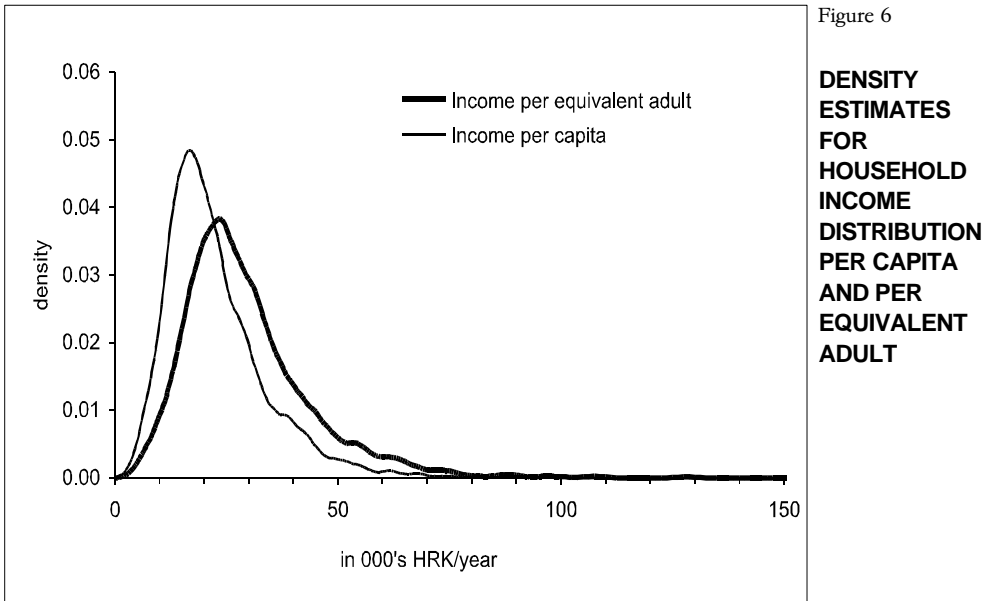
---

<sup>20</sup> The World Bank, for example, reported the Gini coefficient of 0.320 (Luttmer, 2000b).

<sup>21</sup> For a general discussion of inequality measures and their properties, see Cowell (1995).

### 3.4 Sensitivity of the results to the choice of estimation method

Inequality estimates may be significantly affected by alternative choices for well-being variables, equivalence scales and weighting procedures, and the ensuing passages provide an insight into these differences.



Source: Author's estimates based on the 1998 HBS.

One of the most prevalent choices in inequality analyses is the *per capita* equivalence scale and, occasionally, the omission of adjustment for economies of scale. Choices such as those inevitably result in different inequality estimates, as shown in Figure 6 which represents the density function for the 1998 distribution of equivalized income in Croatia applying the OECD and per capita equivalence scales. Table 7 compares inequality estimates based on three different equivalence scales - the OECD scale, *per capita* scale, and without adjustment for economies of scale within households.

Table 7

**SENSITIVITY OF RESULTS TO THE CHOICE OF EQUIVALENCE SCALE**

Variable: Equivalent scale:	Income			Consumption		
	OECD	Per capita	No adjustment	OECD	Per capita	No adjustment
Gini coefficient	0.261	0.274	0.293	0.254	0.268	0.305
Theil entropy index	0.116	0.129	0.142	0.106	0.120	0.154
Mean log deviation	0.115	0.126	0.156	0.107	0.119	0.168
Coefficient of variation	0.521	0.559	0.555	0.485	0.525	0.581
Atkinson index ( $\epsilon=0.5$ )	0.056	0.061	0.071	0.052	0.058	0.077
Atkinson index ( $\epsilon=1$ )	0.108	0.118	0.144	0.102	0.112	0.155
Arithmetic mean	29,887	22,979	88,309	32,768	25,208	80,935

*Note: The unit of observation is the individual. Prices (HRK) are from May 1998, corrected for regional differences.*

*Source: Author's estimates based on the 1998 HBS.*

Mean income and consumption per capita are lower than mean income and consumption per equivalent adult (the OECD scale). When there is no adjustment for household size, each household is treated as a single unit, which results in average household income and consumption higher than those in previous two cases. All inequality measures presented here yield consistent results - estimates based on total household income and consumption are generally higher than those based on *per capita* or OECD scales, and inequality estimated on *per capita* basis is higher than that estimated using the OECD scale.

The one-parameter equivalence scale used for money income provides the means of comparison among inequality estimates computed using different values of the parameter theta ( $\theta$ ). One such comparison has been made between the Gini and Theil indices, as illustrated in Figure 7. Once again, the highest inequality estimate has resulted from household incomes unadjusted for the economies of scale (i.e.  $\theta=0$ ), and it corresponds to the Gini of 0.349. Both of these inequality measures result in estimates which tend to decrease with the increase of the parameter theta. As this parameter more nearly approaches the value of 1, though, there is an observable increase in inequality ( $\theta=1$  corresponds to the *per capita* scale).

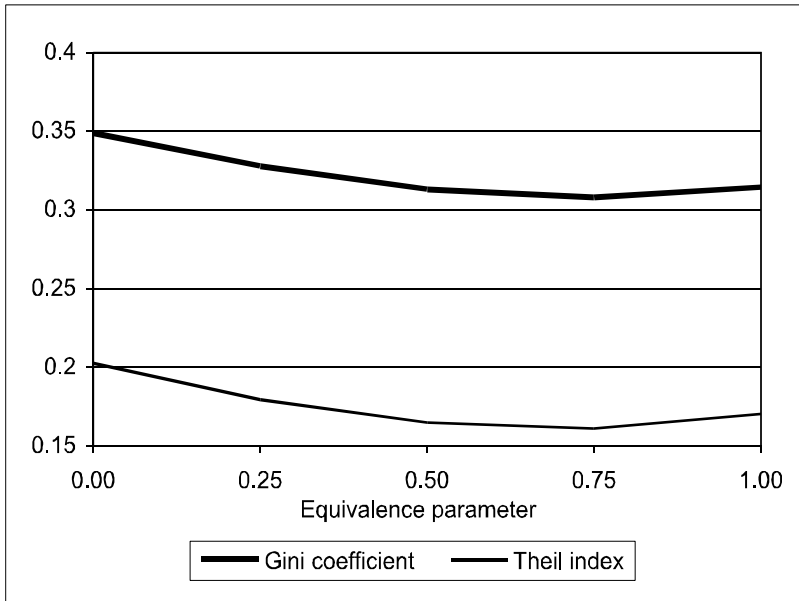


Figure 7

**SENSITIVITY  
OF INEQUALITY  
MEASURES TO  
CHANGES IN  
THE  
EQUIVALENCE  
PARAMETER  
FOR THE  
MONEY  
INCOME  
DISTRIBUTION**

Source: Author's estimates based on the 1998 HBS.

However, there is one inconsistency that needs to be pointed out, about those estimates which were calculated using incomes unadjusted for household size ( $\theta=0$ ). All results have been obtained weighting each household by the number of persons living in it, i.e. multiplying each household's income by the number of its members in order to calculate average unadjusted household income. Surely, averages and inequality measures would have been slightly lower had each household been counted as one, but there would have been little point in doing so. In order to isolate the sole impact of choice of scale on inequality, other components of estimates, such as weights, have not been changed.

Table 8 demonstrates the very impact of weights on inequality estimates. Those estimates tend to be lower when using person weights than when using household weights, regardless of the variable in question.

Table 8

**SENSITIVITY OF RESULTS TO DIFFERENT WEIGHTS**

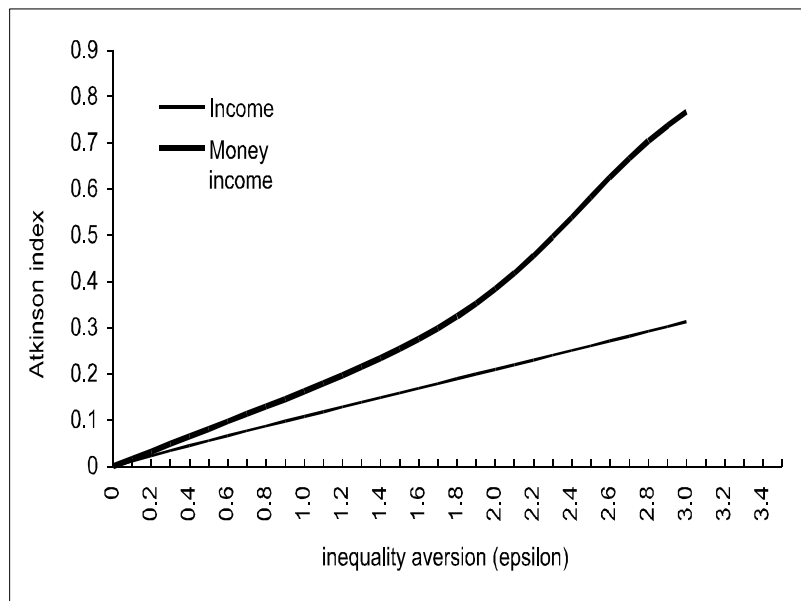
Weight:	Income		Consumption		Expenditure	
	Number of persons	Household	Number of persons	Household	Number of persons	Household
Gini coefficient	0.261	0.273	0.254	0.266	0.276	0.285
Theil entropy index	0.116	0.127	0.106	0.116	0.130	0.139
Mean log deviation	0.115	0.126	0.107	0.118	0.127	0.135
Coefficient of variation	0.521	0.549	0.485	0.511	0.565	0.582
Atkinson index ( $\epsilon = 0.5$ )	0.056	0.061	0.052	0.057	0.062	0.066
Atkinson index ( $\epsilon = 1$ )	0.108	0.119	0.102	0.111	0.119	0.127
Arithmetic mean	29,887	30,402	32,768	33,581	34,641	35,348

Note: Income, expenditure and consumption are per equivalent adult, using the OECD equivalence scale. Prices (HRK) are from May 1998, corrected for regional differences.

Source: Author's estimates based on the 1998 HBS.

Figure 8

**SENSITIVITY OF ATKINSON INDEX TO INEQUALITY AVERSION PARAMETER**



Source: Author's estimates based on the 1998 HBS.

Figure 8 demonstrates the relationship between the Atkinson index and the inequality aversion parameter ( $\epsilon$ ). While low parameter values seem to yield no fundamental differences between inequality in the distribution of income and inequality in the money income distribution, higher values of the inequality aversion parameter, on the other hand, create substantial differences.

Table 9

### SENSITIVITY OF INEQUALITY MEASURES TO IMPUTED RENT

Imputed rent:	Income		Expenditure	
	Included	Excluded	Included	Excluded
Gini coefficient	0.261	0.281	0.276	0.296
Theil entropy index	0.116	0.136	0.130	0.151
Mean log deviation	0.115	0.134	0.127	0.146
Coefficient of variation	0.521	0.575	0.565	0.621
Atkinson index ( $\epsilon = 0.5$ )	0.056	0.065	0.062	0.071
Atkinson index ( $\epsilon = 1$ )	0.108	0.125	0.119	0.136
Arithmetic mean	29,887	24,209	34,641	28,276

*Note: Income and expenditure are per equivalent adult, using the OECD equivalence scale. The unit of observation is the individual. Prices (HRK) are from May 1998, corrected for regional differences. Source: Author's estimates based on the 1998 HBS.*

Distribution of well-being largely depends on whether imputed rent was included or not in the variable under consideration. Its inclusion, for example, tends to decrease inequality estimates, making it extremely important to consider the question of imputed rent when comparing different inequality measures. In Croatia, the fact that a majority of households own their homes clearly plays an equalizing role in the distribution of material well-being, as can be seen in Table 9.

The preceding discussion has shown how the results vary considerably with the choice of estimation method. Thus the Gini estimates range from 0.25 for the consumption distribution based on the OECD scale (with person weights and imputed rent included), to 0.35 for the distribution of money income unadjusted for economies of scale. Although our baseline estimates (calculated using the OECD scale, person weights and imputed rent) produce slightly lower inequality measures for Croatia than some alternative choices, there is no reason to discredit them as, in our opinion, they do adequately reflect inequalities in the distribution of economic well-being in Croatia. Cross-time and cross-national comparisons of

inequality, made in the section that follows, can provide a further insight into inequality trends in Croatia.

### 3.5 Cross-national comparisons of inequality

The previously mentioned variations call for extreme caution in making cross-national comparisons. In order to make meaningful comparisons of inequality estimates, it is of vital importance to ensure that the methodology is as comparable as possible, if not identical. However, international inequality data made available in various statistical publications, such as the World Bank's annual World Development Report, tend to be based on rather inconsistent and largely country-specific methods of calculating inequality. Hence, the cross-national comparison presented here is based on only two sources - those for which there is a sufficient degree of certainty as to the method of computing estimates.

Since money income (our operating variable) is consistent with the definition of disposable income given in the LIS, inequality estimates for the distribution of money income in Croatia can thus be compared to the corresponding LIS-based estimates for other countries, as shown in Figure 9.

With the Gini of 0.31, the 1998 level of economic inequality in Croatia was approximately the same as in the Netherlands in 1994 or Poland in 1995, slightly lower than in Hungary in 1994 and higher than in Slovakia or the Czech Republic. These results shed a new light on Croatia's place in the World Bank's cross-national analysis of inequality. That is, Luttmer (2000b) computed the Gini of 0.386 for the distribution of money income (LIS-defined), which placed Croatia among countries whose inequality is higher than that in the USA, and only slightly lower than in Turkey or Russia. Our estimates, on the other hand, show that Croatia's level of inequality is not so unusually high when compared with other Western or Central European countries. As mentioned earlier in this paper, the discrepancy stems largely from the World Bank's different treatment of income from self-employment. Besides, comparative results for other countries pertain to the period which was 3-6 years earlier than the reference period of the analysis for Croatia, a fact that also has to be taken into consideration, especially in light of the 1990s global trend of growing inequalities.



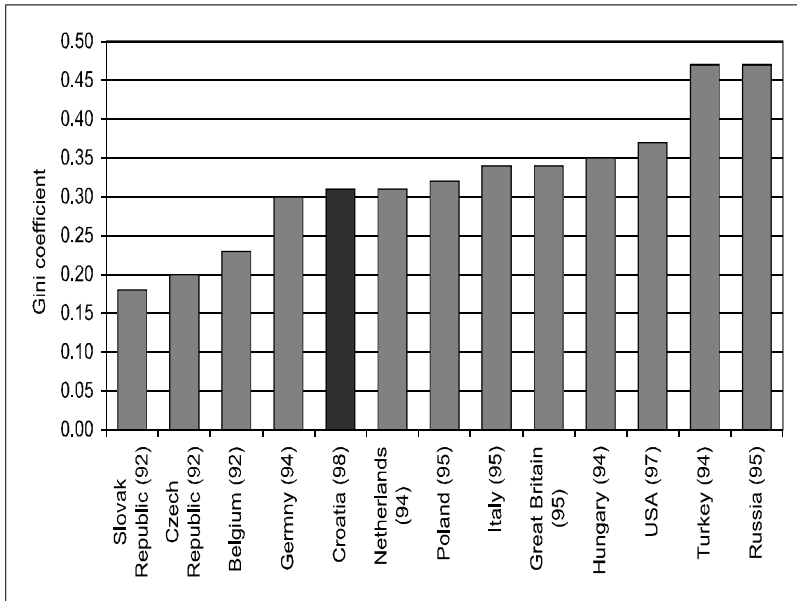


Figure 9

**CROSS-NATIONAL COMPARISON OF INEQUALITY IN THE DISTRIBUTION OF MONEY INCOME (LIS-DEFINED)**

Source: Luttmer (2000b) and author's estimates for Croatia.

The second comparison is based on the results of an extensive research on poverty in transition countries, which was conducted by the World Bank (World Bank, 2000a). Since there is a considerable degree of consistency in the definitions of consumption aggregates and estimation methods applied in different transition countries, it is possible for us to draw some meaningful comparisons<sup>22</sup>. Table 10, for example, shows the Gini coefficient and the Theil entropy index for the distribution of consumption.

According to the World Bank's estimates (the Gini of 0.30), Croatia has somewhat higher inequality in consumption than other transition countries of Central or South Eastern Europe. However, a closer look at the World Bank data reveals certain differences in the definitions of the consumption aggregate, such that may be of consequence for Croatia's ranking in the comparison. That is, the consumption variable for Croatia does not include imputed rent or home maintenance costs, and consumer durables are considered on the basis of their actual cost, not the flow of service (World

<sup>22</sup> Since the World Bank's definition of income (World Bank, 2000a) varies by country more than it does in the case of consumption, comparisons of income inequality have not been drawn.

Bank, 2000a; Table C.6 in the Appendix). It has already been demonstrated in this paper how such a definition normally yields higher estimates of inequality. In this paper, the consumption aggregate for Croatia actually corresponds to the 'expenditure' variable without housing costs (i.e. imputed rent). Yet, consumption aggregates for other transition countries in the World Bank's study (except Romania and Estonia) included imputed rent.

Table 10

### COMPARISON OF INEQUALITY IN CONSUMPTION DISTRIBUTION IN TRANSITION COUNTRIES

Country	Survey Year	Gini coefficient	Theil index
Czech Republic	1996	0.25	0.11
Slovenia	1997/98	0.26	0.11
Hungary	1997	0.26	0.12
Bulgaria	1995	0.27	0.13
Romania	1998	0.27	0.14
<b>Croatia (author's estimates)</b>	<b>1998</b>	<b>0.28</b>	<b>0.13</b>
Belarus	1999	0.29	0.15
Poland	1998	0.29	0.16
<b>Croatia (World Bank's estimates)</b>	<b>1998</b>	<b>0.30</b>	<b>0.16</b>
Macedonia	1996	0.31	0.17
Ukraine	1999	0.31	0.17
Latvia	1997/98	0.32	0.18
Lithuania	1999	0.32	0.19
Estonia	1998	0.37	0.24
Moldova	1997	0.39	0.28
Russia	1998	0.46	0.42

Source: World Bank (2000a) and author's estimates for Croatia.

The inclusion of the imputed rent for owner-occupied housing in the consumption variable for Croatia produces the Gini coefficient of 0.28, which is similar to that in Poland or Bulgaria, and slightly higher than in the Czech Republic, Slovenia or Hungary. The Theil index produces a broadly similar ranking, with one exception though - Romania and Croatia have switched places. Therefore, it is evident that Croatia should not be seen as a country experiencing economic inequalities atypically high for other Central European countries in transition.

## 4

## DECOMPOSITION OF INEQUALITY

We have already touched upon some of the basic drivers of inequality in Croatia in our earlier discussion of the distribution of income/consumption by decile groups. Decomposition<sup>23</sup> procedures employed in this section provide a more detailed analysis of the impact of various income sources and socio-economic characteristics of the population on overall inequality.

Table 11

## THEIL DECOMPOSITION BY POPULATION SUBGROUPS

Characteristics	Number of sub-groups	Share of inequality between subgroups in overall inequality (%)			
		Consumption	Expenditure	Income	Money income
Gender of household head	2	0.04	0.00	0.05	0.78
Age of household head	4	3.62	3.10	3.27	7.11
Household type	6	3.16	2.69	2.76	7.81
Settlement type	3	3.27	2.45	3.72	3.02
Education of household head	5	17.75	15.81	15.97	16.99
Number of income recipients	4	4.88	5.16	7.56	22.81

*Note: Gender of household head - male/female; age of household head - 16-30/31-49/50-64/ 65+; household type - single parent + child(ren)/other household members + child(ren)/single elderly-male/single elderly- female/non-single elderly/ other households with no children; settlement type - urban/rural/the city of Zagreb; education of household head - uncompleted primary/primary/ technical secondary/general secondary/ higher; number of income recipients (wages and salaries or income from self-employment) - 0/1/ 2/ 3+.*

*Source: Author's estimates based on the 1998 HBS.*

Table 11 shows the results of the Theil decomposition by selected subgroups of the population. It reveals that inequalities are largely a product not so much of differences between different subgroups of the population as of differences among individuals *within* the same subgroup. Gender-related inequalities, for instance, can almost entirely be attributed to inequalities within the same subgroup and much less to inequalities between the two gender subgroups. Similarly, if we talk about education of the household head or the number of income recipients, only about 20 percent

<sup>23</sup> For details on decomposition techniques, see e.g. Cowell (1995).

of inequality is explained by between-group differences. Generally speaking, it is evident that only a small percentage of overall inequality can be accounted for by some specific characteristics of the population, and that they tend to be much more relevant for 'explaining' inequalities in the distribution of money income than in the distribution of other variables of material well-being. Clearly, imputed rent or in-kind consumption (as components of income, expenditure and consumption variables, but not of money income) can hardly be analyzed and explained in terms of the selected characteristics.

The household head's gender *per se* does not appear to contribute significantly to inequality in any of the well-being variables. Age, household and settlement types may help explain inequalities in income, consumption and expenditure distributions only to limited extent, while they appear to be more useful in accounting for inequalities in the distribution of money income. Differences in education contribute to about 16-17 percent of total income/consumption inequality, which makes education the number one factor affecting inequalities in the distribution of total income and consumption. The number of income recipients is an indicator of the households labor force participation and a vital factor in explaining income dispersion (especially when it comes to money income), accounting for about 23 percent of inequality. A higher level of economic activity (i.e. employment) of household members clearly increases the possibility of higher income and consumption. In short, socio-economic household characteristics such as educational or labor market status apparently more adequately account for income disparities than demographic or geographic characteristics do.

Decomposition of inequality by type of income provides an equally interesting insight as to the sources of inequality<sup>24</sup>. Table 12 shows the results of the Gini decomposition for the distribution of income. Since wages comprise the largest part of total income, inequality in their distribution accounts alone for as much as 40 percent of overall inequality. Another substantial part of income distribution inequality is associated with income from self-employment<sup>25</sup> whose contribution to overall inequality, with the concentration index of 0.63, is over 21 percent. If we add income

---

<sup>24</sup> The Gini decomposition method is based on Fei et al. (1978).

<sup>25</sup> The concentration coefficient is another summary measure of inequality, similar to the Gini coefficient. However, it ranks people by the size of total income, not by the size of a particular type of income for which the index is being computed. The concentration coefficient incorporates inequality in the distribution of a particular component of total income, and the correlation between the component and total income (Pyatt, et al., 1980). Its values range from -1 (when the total amount of a particular component is attributed to the poorest person in the distribution of total income) to 1 (when that amount is attributed to the wealthiest individual in the distribution).

from agriculture, then incomes from wages and self-employment account for a remarkable 64 percent of the overall inequality.

Table 12

### GINI DECOMPOSITION BY INCOME TYPE

Type of income	Income structure (%)	Concentration Index	Percentage share in total inequality
Wages and salaries	36.7	0.286	40.2
Income from self-employment	8.8	0.630	21.3
Income from agriculture	2.9	0.245	2.7
Pensions	14.4	0.115	6.3
Social assistance	0.4	-0.468	-0.7
Income from property	2.8	0.575	6.1
Income in kind	6.0	0.035	0.8
Imputed rent	19.0	0.239	17.4
Other sources of income	8.9	0.167	5.7
<b>TOTAL INCOME</b>	<b>100.0</b>	<b>0.261</b>	<b>100.0</b>

*Note: Total income is per equivalent adult (using the OECD scale), and it includes imputed rent and income in kind. The unit of observation is the individual.*

*Source: Author's estimates based on the 1998 HBS.*

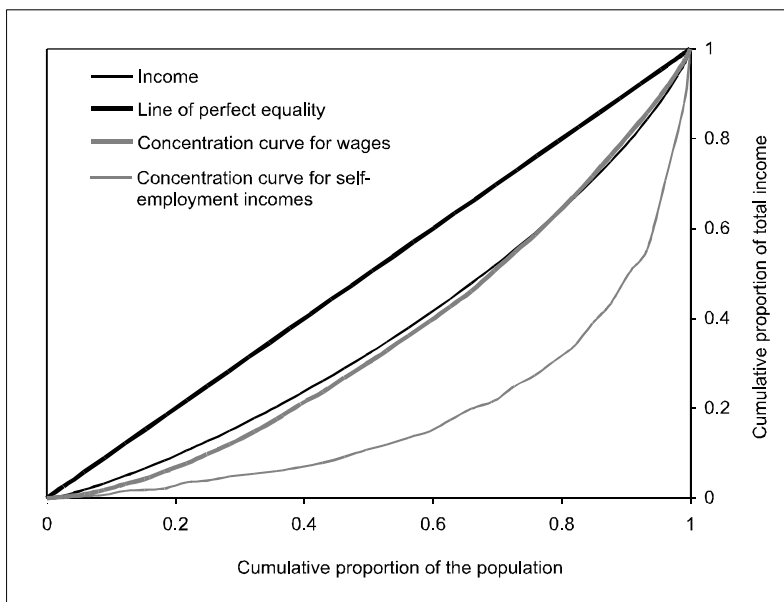
Although pensions are distributed more evenly than is the total income, pensions of the wealthy still exceed those of the poor, thus positively contributing with 6.3 percent to total inequality. Social assistance is the only component of total income which is higher for the poor households and, as such, tends to decrease the level of overall inequality. However, as it takes up only a fraction of total income, the decrease is a humble 0.7 percent. While incomes from property are highly concentrated in the hands of the wealthy households, incomes in kind, on the other hand, are quite evenly distributed across the entire population. The concentration of imputed rent basically resembles that of total income and accounts for a substantial 19 percent of income, which translates into a contribution to total inequality of a significant 17.4 percent. Although other types of income (especially private and state transfers) tend to be more evenly distributed than the total income, they still positively contribute to total inequality with 5.7 percent.

The correlation between the total income inequality (measured by the Gini coefficient) and inequality by income components (measured by the concentration coefficient) can be adequately represented

by the Lorenz and concentration curves, as demonstrated in Figures 10 and 11. The Lorenz curve shows that the poorest 10 percent of the population receive around 4 percent of the total income, while the concentration curve reveals that they receive only 1 percent of the total self-employment income. On the other hand, the top 10 percent of the population receive around 20 percent of the total income, and as much as 50 percent of the total self-employment income (Figure 10). However, the poorest 10 percent also receive about 6 percent of total pensions and over 40 percent of total social assistance (Figure 11).

Figure 10

**LORENZ  
CURVE  
FOR TOTAL  
INCOME AND  
CONCENTRATION  
CURVES FOR  
SELF-  
EMPLOYMENT  
INCOMES**



Source: Author's estimates based on the 1998 HBS.

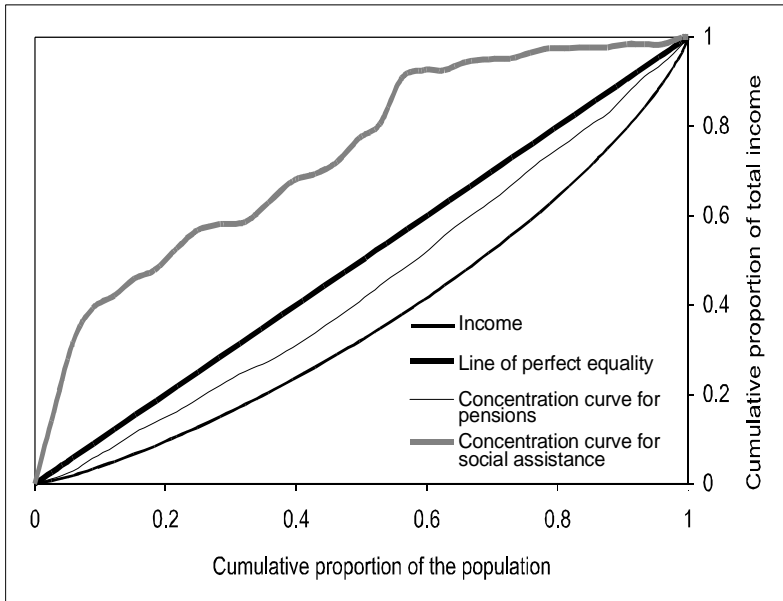


Figure 11

**LORENZ  
CURVE FOR  
TOTAL  
INCOME AND  
CONCENTRATION  
CURVES FOR  
PENSIONS AND  
SOCIAL  
ASSISTANCE**

Source: Author's estimates based on the 1998 HBS.

The decomposition results presented in this paper seem to somewhat contradict those reported in the World Bank's study (Luttmer, 2000b), where income from self-employment (income from agriculture included) made the largest single contribution to total inequality (48 percent); income from self-employment contributed more to total inequality than did wages (whose contribution was 27 percent), due to its high share in total income (21 percent) and a high concentration coefficient of 0.73<sup>26</sup>. As mentioned before, these differences are mainly driven by discrepancies between the two different views on the issue of self-employment income. However, both analyses undoubtedly point to the conclusion that there are considerable inequalities in the distribution of income from self-employment and that the significance of their contribution to total inequality certainly cannot be disputed.

<sup>26</sup> If we added income from self-employment to that from agriculture (as it was done in the World Bank's study), the share of income from self-employment in the total income would be 11.7 percent, the concentration coefficient 0.534, and the contribution to total inequality would be 24 percent.

## 5 CONCLUSION

The empirical evidence presented in this paper suggests that Croatia's level of overall inequality is not dissimilar to that in Western or Central European countries - a rather unexpected result given the general perception in Croatia that inequality is rather high. Such a public opinion reflects the society's relatively strong preference for equality (or aversion to inequality), which tends to exaggerate its perception of national inequality. Possible causes or economic and political consequences of such a perception could be the subject matter of a separate analysis, the one that would extend beyond the scope of a purely economic discussion.

The professional community views high inequality as a major obstacle to economic development. The results published in this paper, therefore, can be used to conceptualize such economic and social policy agenda that would seek to eliminate undesirable characteristics of the income distribution in Croatia and foster economic growth. For example, if it is found that a high concentration of income from self-employment results from administrative and financial barriers to self-employment, then those barriers should be eliminated. Of course, a part of self-employment income most certainly comes from the 'gray' economy - a fact that puts other sectors at a disadvantage and creates an unwarranted rise in inequality, making the need for regulatory action all the more pressing. The results also show that some promising opportunities for the poor can be created by taking effective action to increase their educational levels and create incentives to encourage their employment, as means of reducing inequality and alleviating poverty. Social assistance spending seems to be well-targeted to the poor and its increase would undoubtedly improve the living standards of our country's most needy citizens.



## REFERENCES

Alesina, Alberto and Roberto Perotti, 1996, "Income Distribution, Political Instability, and Investment", *European Economic Review*, 40(6), pp. 1203-1228.

Alesina, Alberto and Dani Rodrik, 1994, "Distributive Politics and Economic Growth", *Quarterly Journal of Economics*, 109(2), pp. 465-490.

Atkinson Anthony B., Lee Rainwater and Timothy Smeeding, 1995, "Income Distribution in OECD countries: Evidence from Luxembourg Income Study", *Social Policy Studies*, no. 18, Paris: OECD.

Bourguignon, François, 1999, "Crime, Violence, and Inequitable Development" paper prepared for the Annual World Bank Conference on Development Economics, Washington, D.C., April 28-30, 1999.

Buhmann Brigitte, Lee Rainwater, Günther Schmaus and Timothy Smeeding, 1988, "Equivalence Scales, Well-being, Inequality and Poverty: Sensitivity Estimates across Ten Countries using the Luxembourg Income Study Database" *Review of Income and Wealth*, 34(1), pp. 115-142.

Cowell, Frank A., 1995, *Measuring Inequality*, London: Prentice Hall/Harvester Wheatsheaf.

Fei John C. H., Gustav Ranis and Shirley W. Y. Kuo, 1978, "Growth and the Family Distribution of Income by Factor Components", *Quarterly Journal of Economics*, 92, pp. 17-53.

Figini, Paolo, 1998, "Inequality Measures, Equivalence Scales and Adjustment for Household Size and Composition", *LIS Working Paper*, no. 185.

Kesner-Škreb, Marina (ed.), 2001, "Progresivnost poreza na dohodak u Hrvatskoj u razdoblju od 1995. do 1999." (Progressivity of Income Tax in Croatia from 1995 to 1999), *Financijska teorija i praksa*, 25 (2), pp. 139-260.

Luttmer, Erzo, 2000a, "Methodology", in World Bank, 2000, *Croatia: Economic Vulnerability and Welfare Study, Volume II: Technical Papers*, Document of the World Bank, Washington D.C.; The World Bank, Poverty Reduction and Economic Management Unit, Europe and Central Asia Region.

Luttmer, Erzo, 2000b, "Poverty and Inequality in Croatia", in World Bank, 2000, *Croatia: Economic Vulnerability and Welfare Study, Volume II: Technical Papers*, Document of the World Bank, Washington D.C.; The World Bank, Poverty Reduction and Economic Management Unit, Europe and Central Asia Region.

Mađarević-Šujster, Sanja, 2001, "Mjerenje progresivnosti poreza na dohodak u Hrvatskoj od 1995. do 1999. godine (Progressivity of Income Tax in Croatia from 1995 to 1999)", *Financijska teorija i praksa*, 25 (2), pp. 220-238.

The Ministry of the Finance of the Republic of Croatia, 2000, *Godišnje izvješće Ministarstva financija za 2000. godinu* (2000 Annual Report), Zagreb: Ministry of the Finance of the Republic of Croatia.

Nestić, Danijel, 2002, *Ekonomске nejednakosti u Hrvatskoj* (Economic Inequality in Croatia), doctoral thesis, Zagreb: University of Zagreb, Faculty of Economics.

Persson Torsten and Guido Tabellini, 1994, "Is Inequality Harmful for Growth?" *American Economic Review*, 84, pp. 600-621.

Pyatt, Graham, Chau-nan Chen and John Fei, 1980, "The Distribution of Income by Factor Components", *Quarterly Journal of Economics*, 94, pp. 451-473.

World Bank, 2000a, *Making Transition Work for Everyone: Poverty and Inequality in Europe and Central Asia*, Washington, D.C.: The World Bank.

World Bank, 2000b, *Croatia: Economic Vulnerability and Welfare Study, Volume II: Technical Papers*, Document of the World Bank, Washington D.C.: World Bank, Poverty Reduction and Economic Management Unit, Europe and Central Asia Region.

World Bank, 2001, *Croatia: Economic Vulnerability and Welfare Study*, Report No. 22079-HR, Washington D.C.: World Bank, Poverty Reduction and Economic Management Unit, Europe and Central Asia Region.