Regional Inequality and Regional Polarization in Russia, 1990–99

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Summary. — This paper contributes to the growing debate on regional inequality and polarization in Russia. Using a consistent data series and applying a number of recently developed measures, it documents trends over the transition decade of 1990–99. It shows that while inequality and polarization increased rapidly during 1991–96, the increases leveled off and even reversed in the late 1990s. Using a polarization index based on inequality decomposition, it is shown that the main dimensions of increasing polarization are not so much the "West–East" or the "Ethnic Russian– National Republics" divides, but factors such as export shares of regions or the relative sizes of their capitals. This provides a different perspective on the causes of regional inequality and polarization, and suggests a research and policy agenda somewhat different from that, which is prominent in the current debate. © 2002 Elsevier Science Ltd. All rights reserved.

Key words — Europe, Russia, regional differences, regional inequality, regional polarization, income inequality

1. INTRODUCTION

Increasing regional inequality and regional polarization are becoming a serious policy concern in modern day Russia. A vast size, ethnic and natural diversity make Russia susceptible to disintegration if regional differences in standards of living continue to grow. As discussed below, literature indicates there have been several attempts to document trends in regional inequality and polarization in Russia. I argue that these studies, while very comprehensive in describing the overall picture of regional development, nonetheless lack consistent methodology for quantifying the degree of regional inequality and polarization in Russia. Quantitative estimation of trends in regional polarization will contribute a great deal to qualitative discussion on dimensions of regional polarization. It will allow identifying the most pronounced dimensions and monitoring trends in regional polarization.

The goal of the paper is twofold. First, it documents changes in regional inequality during 1990–99 in per capita monetary income and expenditures. Regional inequality can be understood by examining different variables. In the literature these variables range from gross regional product to access to utilities to per capita income. In this paper, I focus on per capita monetary income and expenditures,

since they are a reflection of an individual's welfare; and it is divergence in individuals' welfare that puts pressure on the federative system and most likely will cause political and social upheavals. Divergence in gross regional product or other indicators of production does not necessarily pose a problem, since regions in Russia may still experience transitional adjustments, and given the vastness and diversity of Russian economic space such divergence may even be justified.

While inequality is well discussed in economics, the recent literature has introduced the concept of "polarization" as distinct from inequality. The former has to do with clustering of the income distribution along key dimensions, which can have features that are quite distinct from inequality.[1] The second goal of this paper, therefore, is to introduce several recently developed measures of polarization, and to analyze empirically the most commonly proposed dimensions of regional polarization in Russia. These dimensions include West vs. East, national republics vs. ethnically Russian

regions, regions with large capitals vs. regions with smaller capitals, exporting regions vs. other regions. The rationale of using these particular dimensions is discussed in Section 2. For each dimension and each indicator I calculate polarization measures, and then by analyzing trends in these measures I conclude which dimensions are more pronounced and, thus require more policy and research attention. The originality of this part is that on the theoretical side, I attempt to introduce to the debate on regional inequality in Russia the need to distinguish between the concepts of inequality and polarization, and on the empirical side to actually document these differences and arrive at conclusions describing the pattern of regional polarization in Russia.

The paper is organized as follows. Section 2 discusses the debates in both English and Russian language literature on regional inequality and polarization in Russia. Section 3 addresses availability and limitations of the data. Section 4 presents trends in regional inequality. Section 5 reports trends in polarization and compares the measures of polarization for each studied dimension. Section 6 concludes by summarizing the major findings.

2. THE DEBATE ON REGIONAL INEQUALITY AND POLARIZATION IN RUSSIA

Until very recently there have been very few papers on regional inequality in Russia published both in English and in Russian language academic periodicals. Bradshaw and Treyvish (2000) in their literature review on the regional dimension of systemic transformations in Russia noted:

It is generally accepted that economic transition has widened the gap between the rich and the poor, both in terms of individuals in society and regions in the federation. Yet there has been a relative lack of academic research examining the relationship between transition and regional inequality. [2]

Other studies agree with this statement. Mikheeva (1999) noted:

little has been written on interregional economic inequality in Russia. The few recent studies of the unequal levels of development of Russian regions focus basically on their typology. [3]

Year 2000 had seen a significant increase in publications on this topic. The results of two

major studies of regional economies in Russia by Hanson and Bradshaw (2000) and Westlund, Granberg, and Snickars (2000) have been published in English, and the Russian language periodical *Regions: Economics and Sociology* took the lead in research on regional dimension of transition and published a series of papers on regional inequality and asymmetry. [4]

Increased academic attention to regional inequality is warranted. Understanding regional inequality in Russia is important. Enormous size and ethnic and natural diversity make Russia susceptible to disintegration if the regional differences in standards of living continue to grow. Russia is a federative state where regions have the right to exercise jurisdiction over their internal economic, social and political affairs. The constitution and the treaty between the federal center and the respective region determine which matters fall under federal or regional jurisdiction. Regions have a direct command over regional budgets. In general they have the right to levy local taxes, invest in local infrastructure, supplement pensions, and provide housing and utility subsidies to the households. At the same time authorities in some regions employ illegal methods of impeding free movement of goods, services and labor to protect their more successful regions from competition or influx of migrants.

Virtually all authors agree that the transition period has been characterized by rapidly growing economic inequality among Russia's regions as can be seen from the following citations. An Expert Institute and Center for Russian and East European Studies (1996) document argues:

While in the 1980's there had been a steady decline in household income inequality in Russia, since the beginning of the 1990s there has been a sharp increase in regional household income inequality. [5]

Mikheeva (1999) argues:

Regions are most likely to continue drifting apart and gravitate to two polar groups: a small number of high-income regional economies and regions growing poor. [6]

Becker and Hemley (1996) states:

The difference in per capita incomes between Moscow and a few other wealthy cities, on the one hand, and poorer agricultural and mountainous areas, on the other, reflects disparities quite large by developed country standards. [7]

Studies by Lavrovsky (1999a) and Treyvish (1999) attempted to empirically document these changes.

Lavrovsky (1999a) used the coefficient of variation as an inequality measure and applied it to several economic and social indicators including industrial output, housing availability and consumption of several food items. He found that the coefficient of variation in the regional volumes of industrial output increased 2.5 times over 1990–97, while in housing availability it decreased from 1.0 in 1990 (baseline) to 0.88 in 1995, and in consumption of meat, garden vegetables, milk and sugar it increased during 1990–97 by 25, 50, 85 and 127%, respectively.

Treyvish (1999) also reports increases in the coefficient of variation for gross regional product and per capita monetary income during 1990–96, although the magnitudes of the changes were not reported.

One can note two problems common to these studies. The first one is a statistical calculations problem, while the second one is conceptual.

When considering welfare indicators, such as per capita income, food consumption, etc., neither studies take into account the total number of population in the regions. Thus they fail to weigh the average value of an indicator for a particular region by the population of that region. Regions with larger population should account for more of the distribution, thus the overall inequality measures must be calculated over the adjusted by population weight distribution.

Both studies interchangeably use the term "asymmetry" to refer to both regional inequality and regional polarization. Regional inequality and regional polarization, while related to one another, are in fact two different concepts. While regional inequality addresses issues of the overall distribution of a particular regional indicator, regional polarization requires assigning those regions to a specific category based on some common characteristics of the regions and then measuring differences between those categories. The coefficient of variation adjusted by population weights can be used to measure regional inequality, although it cannot be employed to measure polarization without explicitly specifying what is meant by polarization in a particular context.

Identifying dimensions along which polarization occurs is not an easy task in Russia. Pozdnyakov, Lavrovsky, and Masakov (2000) noted that classification of regions depending on the typical problems facing them has not been thoroughly studied. Several authors proposed ways of categorizing Russian regions into different strata.

The types of classification range from a simple assignment of regions into rich and poor categories, i.e., with gross regional product per capita above and below Russian average respectively, to more elaborate ones depending on particular development processes.

Treyvish (1999) conjectures that polarization in Russia occurs along east–west axis as well as along ethnically Russian regions–national republics dimension. Vardomskii and Samburova (1995) draw upon similarities and differences of regional processes in Russia and China and conclude that while in China polarization occurs along two dimensions, urban–rural and inland–coastal, in Russia it occurs along the east–west dimension. They also argue that large cities with population over one million develop differently from medium and small-sized cities and rural areas. DeBardeleben and Galkin (1997) argue that development processes in natural resource-rich regions, industrialized regions and agricultural regions are different from one another. There is, however, consensus neither on the most pronounced dimension of regional polarization nor any conjectures about these dimensions have been empirically justified.

The discussed literature above indicates that regional inequality in Russia is indeed growing and becoming an important policy issue. [8] The problem of regional inequality is not unique to Russia. It is quite common to all large and diverse countries where unequal economic conditions in different regions lead to a build up of social tensions and threaten to undermine the federative structure. It appears, however, that in Russia this problem has not been yet addressed properly. The lack of consistent methodology for quantifying the degree of inequality and polarization in Russia calls for developing and implementing a comprehensive framework to study inequality and polarization between regions in Russia.

3. DATA

The subject of this study is a region in the Russian Federation. The federative structure of the Russian Federation is somewhat peculiar. It consists of 89 politically equal members of the federation, but some of these members

are not considered as economically distinct entities. The Russian Federation comprises 21 national-territorial entities, *republics*, 55 administrative-territorial entities, *krais* and *oblasts*, two cities of federal significance, Moscow and St. Petersburg, and 11 smaller national-territorial entities, autonomous *okrugs* and *oblasts*. The autonomous *okrugs* and *oblasts*, while enjoying some degree of political independence, economically, geographically and for statistical purposes are parts of the respective *krais* or *oblasts*. Data in Chechen Republic were not collected during the studied period. Thus the total number of economically distinct regions for which data are available is 77.

The data used in this paper are drawn from official publications of the Russian State Statistical Agency (Goskomstat).[9] The publications report regional averages of per capita monetary income, per capita monetary expenditures and population numbers for 1990–99. They also provide a brief explanation of the methods used in calculating these indicators, which can be summarized as follows.

Monetary income of population includes wages and salaries of all categories of population, pensions, stipends, and other social transfers, property income in the form of interests and dividends, incomes of self-employed, insurance payments, loans, income from sales of foreign currencies and other income of all residents of the region. Per capita monetary income is calculated by dividing total monetary income by the number of population in the region. Monetary expenditures of population are the sum of consumption expenditures (expenditures on food, nonfood items and payments for services), payments of taxes and other mandatory fees, and other household expenditures not associated with consumption (purchases of land, real estate, precious metals, expenditures on construction and repairs of housing). Monetary expenditures exclude investment expenditures, purchases of stocks and bonds, and bank deposits. Again per capita values are calculated by dividing by the number of population. The number for population in a region is calculated on the basis of the most recent census. The census numbers are adjusted annually by adding the number of newborns and the number of persons who established residence in the region during that year, and subtracting the number of deceased and the number of persons who moved out during that year.

Beginning with 1992 Goskomstat reports regionally disaggregated consumer price indices. Thus, for 1992–99 per capita monetary income and expenditures are adjusted to real values with 1991 being the base year. There are no data on regional CPIs for 1990 and 1991. Since in 1990–91 the prices were still under state control the assumption is made that regional price variations in that period were not significant.

The major limitation in using Goskomstat's indicators of per capita income and expenditures is that the data are derived from banking and trade statistics, which is not directly comparable to household survey statistics. Moreover, since these indicators are monetary, they do not take into account income from and expenditures on activities, which are not directly expressed in monetary terms. Home production is an example of such an activity. In Goskomstat's statistics the value of home-produced items is included neither as income of producers nor as expenditures of consumers. Thus, regionally aggregated monetary income and expenditures tend to underestimate total income and total consumption expenditures. To overcome such a limitation one may use data, which are collected on the household level, and construct consumption or income aggregates imputing the value of home production and other non-market activities, and then average them to arrive at regional averages. Another benefit of using regionally representative household survey data is that it allows examining inequality and polarization within regions, according to Granberg (2000) growing inequality within regions also poses a policy concern.

Two household level data sets are compiled to this date. One is the Russian Longitudinal Monitoring Survey (RLMS). The survey has been designed and implemented by the Carolina Population Center at the University of North Carolina at Chapel Hill with the assistance from the World Bank and several Russian government and research agencies. During 1992–2000 the survey collected detailed information from households on income, expenditures, housing and land use. The survey has been conducted in two phases with each phase representing a panel. During Phase I data were collected in 21 regions of Russia from approximately 6000 households and Phase II covered 3700 households from 38 regions.[10] Unfortunately, this survey does not cover all 89 regions, and thus cannot be used to answer questions

about inequality and polarization between all Russia's regions.

The other household level data set is the Goskomstat's Household Budget Survey. It is conducted annually in all 89 regions of the Russian Federation and as of 1997 it covers 49,200 households. It also collects detailed data on household incomes and expenditures including home production and other non-market activities. Unfortunately, the Household Budget Survey is for internal use only and not available to the academic community at large.

Given the limitation in regional representativeness of the RLMS and unavailability of the Household Budget Survey, I am confined to using the monetary income and expenditures variables from the Goskomstat publications. One may argue that since the purpose of this paper is to analyze regional inequality and polarization, which are both relative notions, the underestimation of absolute magnitudes of incomes and expenditures will have no effect on inequality and polarization measures. This is true if the degree of underestimation is the same for all regions. If it is not the case, however, then the inequality measures calculated for monetary income and expenditures will be biased. One may try to determine at least the direction of such bias by imposing certain assumptions. For example, if the following two assumptions are made: (a) home production accounts for the bulk of the underestimated income, and (b) home production is larger in poorer regions, then inequality in "true" income will be smaller than inequality in monetary income. It is not clear, however, whether these assumptions are plausible. If the first-best solution is to use the household-level data and the second-best solution is to impose empirically provable assumptions and adjust the Goskomstat's aggregate data, then the third-best solution would be to use the regional Goskomstat's data as is, since they are the only available data at the regional level, which cover the entire transition period, and collected with a certain degree of consistency and credibility.

4. REGIONAL INEQUALITY

Trends in regional inequality are analyzed by calculating two Lorenz-consistent inequality measures, namely the Gini coefficient (Cowell, 1995) and the Generalized Entropy (Shorroks, 1980, 1984). The Gini coefficient is used here because it is the most commonly referred to measure of inequality and, therefore, can provide good benchmarking values. In regional inequality framework it can be written as

$$G = \frac{1}{\mu} \sum_{i=1}^{K} \sum_{j=1}^{K} f(y_i)f(y_j)|y_i - y_j|,$$

where y_i is the value of an indicator in region i, μ is the average value of the indicator for the whole country, $f(y_i)$ represents the population share of region i in total Russia's population and K is the number of regions.

The Generalized Entropy (GE) measure is used here because one of the polarization measures discussed later is derived from the GE and, therefore, can be used for comparison between inequality and polarization. For the purposes of regional inequality analysis it can be written as

$$GE = \begin{cases} \sum_{i=1}^{K} f(y_i)\left(\left(\frac{y_i}{\mu}\right)^c - 1\right), & c \neq 0, 1, \\ \sum_{i=1}^{K} f(y_i)\left(\frac{y_i}{\mu}\right)\log\left(\frac{y_i}{\mu}\right), & c = 1, \\ \sum_{i=1}^{K} f(y_i)\log\left(\frac{\mu}{y_i}\right), & c = 0, \end{cases}$$

where the variables are defined as in the Gini equation.

Accounting for population shares, $f(y_i)$, in calculations of both Gini and GE allows me to eliminate the inconsistency found in previous studies where regions with different population size were treated equally in the overall distribution.

Table 1 and Figure 1 present results of calculations of the Gini coefficient and the GE measure with parameter $c = 0$ for per capita monetary income and expenditures. [11] Both inequality measures calculated for both indicators unambiguously agree on the trends in regional inequality for the most of the periods. They both show that the transition period has been accompanied by sharply increasing regional inequality. The increase had started in 1991—the first year of transition—and lasted until 1996, after 1996 regional inequality began to level out, and even declined slightly in 1998.

The magnitude of the increase has been also quite profound: the Gini coefficient for income rose from 0.11 in 1991 to 0.29 in 1996, and for expenditures it went up from 0.12 in 1991 to 0.37 in 1996. According to The World Bank (2000) for the same time period household income inequality rose from 0.26 to 0.47 Gini points; and the dynamics of it were very similar

Table 1. *Regional inequality*

Year	Income		Expenditures	
	Gini	GE (0)	Gini	GE (0)
1990	0.1061	0.0215	0.1286	0.0326
1991	0.1072	0.0206	0.1160	0.0248
1992	0.1854	0.0578	0.1749	0.0544
1993	0.2143	0.0751	0.2935	0.1542
1994	0.2586	0.1085	0.3206	0.1749
1995	0.2790	0.1256	0.3395	0.1974
1996	0.2894	0.1363	0.3677	0.2360
1997	0.2928	0.1399	0.3685	0.2334
1998	0.2845	0.1314	0.3320	0.1867
1999	0.2870	0.1338	0.3247	0.1784
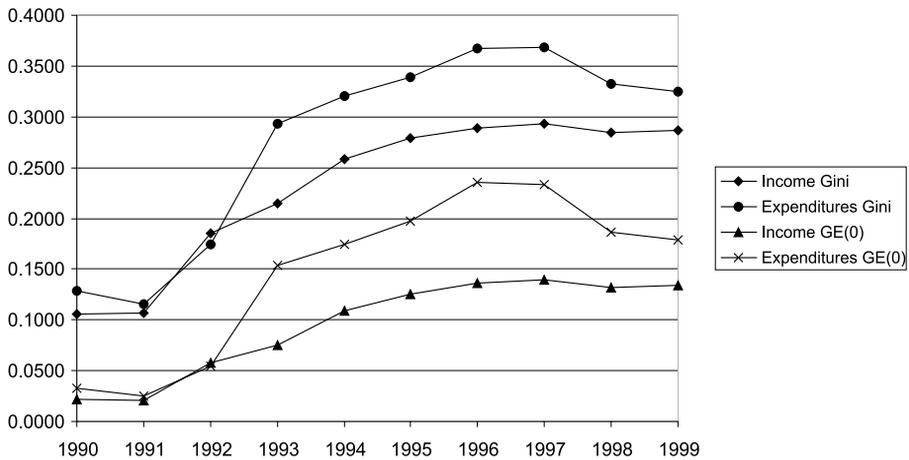
Figure 1. *Regional inequality.*

to regional inequality: sharp increase during 1991–96 and then leveling out.

These results show that transition period had affected differently not only different groups of the population, but also regions. Given these results one may conjecture that there are some fundamental differences between regions, which affect welfare of the residents differently.

5. REGIONAL POLARIZATION

When studying regional polarization and polarization in distribution in general one should understand that inequality and polarization are in fact two different concepts, while the former is concerned with the overall distribution, the latter implies the existence of some sort of clustering in the distribution. One could think of polarization as a distributional phenomenon when population is becoming grouped into clusters, such that within each cluster members are very similar, but between clusters members are different. Inequality does not impose a condition of such clustering within distribution. Therefore, neither of traditionally used inequality measures including Gini and GE can be used as valid measures of polarization. Specifically designed measures of polarization should be used instead. Below I present two relatively recently developed polarization measures, the Esteban and Ray (1994) index and the Wolfson (1994) index, and apply them to the regional data on income and expenditures. [12]

The Esteban–Ray index can be written as follows:

$$ER = A \sum_{i=1}^{K} \sum_{j=1}^{K} \pi_i^{1+\alpha} \pi_j \lfloor y_i - y_j \rfloor,$$

where π_i is the number of population in region i, K is the number of regions, y_i is the mean value of an indicator in region i, and A is a normalization scalar. α represents the degree of polarization sensitivity, and is in the range of [0, 1.6]. I use $\alpha = 1.5$; and $A = 100/\mu$, i.e, normalizing by the mean and multiplying by 100 to make the magnitude of ER comparable to Gini.

The Wolfson index makes use of the Gini coefficient and can be written as

$$W = 2(2T - \text{Gini})/(m/\mu),$$

where $T = 0.5 - L(.05)$ and $L(0.5)$ denotes the income share of the bottom half of the population; Gini is the Gini coefficient of the overall distribution; m is the median income; μ is the mean income.

Numerical values of ER and W indices for Russian regions are in Table 2. Figures 2 and 3 present the dynamics of ER and W polarization indices and Gini and GE inequality indices. As ER and W indices also show regional polarization in Russia has been increasing since the beginning of transition. One striking feature of the polarization trends, however, is that they are remarkably similar to the trends in inequality: polarization was increasing during 1991–96 and after that it was more or less constant for income and declined slightly for expenditures. Moreover, if year-to-year changes in ER are considered, one can see that ER shows exactly the same direction of changes as GE and Gini. The same is almost true for W index, except for 1995–96, when inequality increased, but W index of polarization had gone down, and in 1998–99 when the reverse had occurred.

Findings about the similar behavior of ER and W polarization measures relatively to inequality measures were also reported in Zhang and Kanbur (2001) for China. They found that in China during 1983–95 regional polarization in per capita expenditures as measured by ER and W followed the same trends as regional inequality as measured by GE and Gini. Given the empirical evidence from two countries one may question the ability of ER and W polarization indices to capture changes in the distribution, which conventional inequality measures cannot capture.

In many cases questions are asked about dynamics of polarization between some exogenously given clusters, e.g., urban/rural, black/white, North/South, etc. This study, for example, is concerned with polarization between exogenously defined groups of regions. Unfortunately, ER and W polarization measures cannot be used to answer this type of questions. Both measures address the phenomenon in the distribution analysis known as "clustering around extremes." They take a distribution of an indicator, e.g., income, and attempt to identify the presence of clustering without drawing any conclusions about the nature of such clustering. For the purposes of this study, while these indices in theory can detect the presence of polarization, they cannot establish along which dimension polarization occurs.

To overcome this limitation Kanbur and Zhang (1999), and Zhang and Kanbur (2001) developed a polarization index, which by requiring an *a priori* specification of clusters (groups of regions), measures the extent of inequality between these clusters, and hence, polarization in the overall distribution. It is derived from the GE index by decomposing it by population, in this context by regional, groups into within-group and between-group inequality and, then, taking a ratio of between and within components. For K exogenously

Table 2. *Esteban–Ray and Wolfson indices of polarization*

Year	Income		Expenditures	
	ER	W	ER	W
1990	0.0975	0.0999	0.1365	0.1239
1991	0.0955	0.1227	0.1132	0.1333
1992	0.1244	0.2502	0.1328	0.2770
1993	0.1861	0.3021	0.3297	0.3516
1994	0.2646	0.3191	0.3827	0.3548
1995	0.2781	0.3854	0.3961	0.4341
1996	0.3021	0.3657	0.4539	0.3982
1997	0.3077	0.3737	0.4455	0.4355
1998	0.2866	0.3958	0.3781	0.4411
1999	0.2894	0.4035	0.3615	0.4894
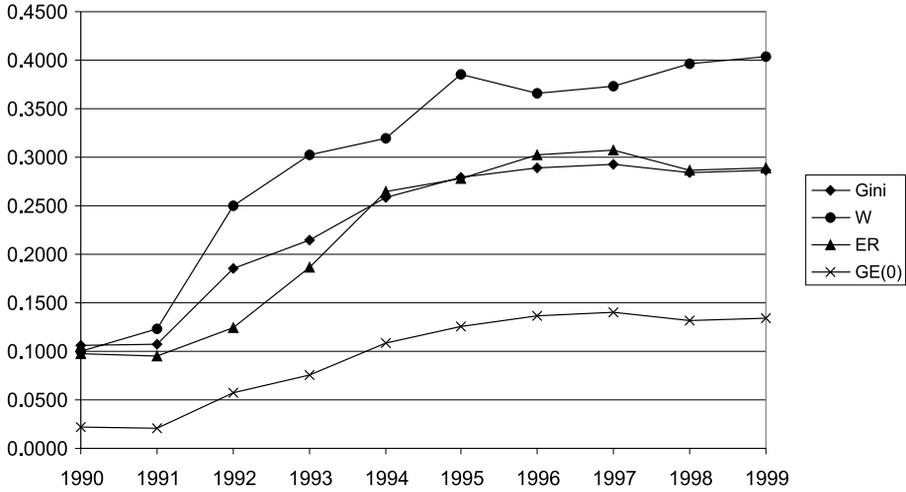
Figure 2. *Inequality and polarization for income.*
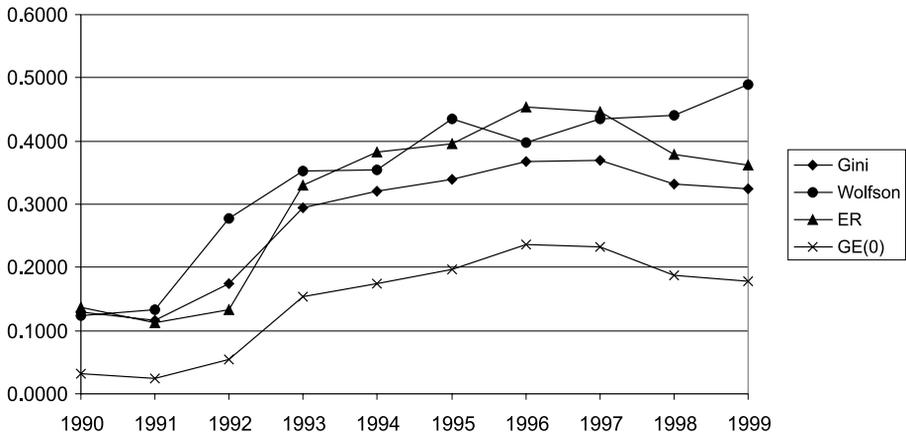
Figure 3. *Inequality and polarization for expenditures.*

given groups the GE can be decomposed into within-group and between-group components as:

$$\text{GE} = \sum_{g=1}^{K} w_g I_g + I(\mu_1 e_1, \ldots, \mu_K e_K),$$

where

$$w_g = \begin{cases} f_g(\mu_g/\mu)^c, & c \neq 0, 1, \\ f_g(\mu_g/\mu), & c = 1, \\ f_g, & c = 0, \end{cases}$$

and I_g is inequality in gth group (cluster), μ_g is the mean of the gth group and e_g is a vector of

1's of length n_g, where n_g is the population of the gth group. The first term on the right side of the above equation represents within-group inequality and the second term is between-group inequality. The Kanbur–Zhang index is the ratio of the latter to the former

$$\text{KZ} = \frac{I(\mu_1 e_1, \ldots, \mu_K e_K)}{\sum_{g=1}^{K} w_g I_g}.$$

A modification of Kanbur–Zhang index where it is defined as a ratio of between-group inequality to total inequality may serve better as a polarization index for the following two reasons. [13] First, if within-group inequality is

small, then even small changes in within-group inequality from one period to another will lead to large swings in the values of the KZ index. Second, the modified KZ index has an intuitive interpretation as the share of between-group inequality in total inequality.

If one suggests several possible polarization dimensions, i.e., regional groupings, then the KZ index (or the modified KZ index) can be used to determine along which dimension the regions are becoming more polarized.

Four dimensions of polarization are analyzed in this paper. In the "West–East" dimension regions are grouped into two subgroups according to their geographic location: 54 regions in European Russia, which includes Central, Northwestern, Southern and Volga federal districts, are in "West" subgroup, and 23 regions from Ural, Siberian and Far Eastern federal districts are in "East" subgroup. The "national republics–ethnically Russian regions" dimension groups regions into two categories according to their political-administrative status. Since autonomous *oblasts* and *okrugs* are economically a part of the respective *oblasts* and the data on them are aggregated into the regional average, only republics are considered. It should also be mentioned here that non-ethnic Russians are not the majority in all national republics. In fact, out of 21 republics only 10 have a non-Russian majority.

Classifying regions as "regions with large capitals–regions with small capitals" and "exporting regions–other regions" is not that straightforward since it involves some arbitrariness. Certain criteria need to be applied to classify a regional capital as large or a region as an exporting region. For 1997 the population of regional capitals is reported in Goskomstat

(1998). The analysis of distribution of capitals' population reveals that the population of capital cities is distributed rather unevenly: 18 cities have a population over 800,000, the remaining 59 cities have a population less than 700,000 and no city has a population in the range of 700,000–800,000. This suggests a possible grouping: one group includes regions with capitals of more than 800,000 inhabitants as of 1997 and the other group includes the rest of the regions.

In order to determine exporting regions, the following technique is employed. Goskomstat's data on total volumes of regional export to CIS countries and to the rest of the world in 1997 are used to calculate the shares of each region in total country's export. Two prominent exporting leaders emerge: the share of Moscow City in total Russian export in 1997 was 29.3% and the share of oil and natural gas exporting Tyumen *oblast* was 13.5%. The third place is taken by Kransnoyarsk *krai* with 4.3% of total country's export. [14] The arbitrary cutoff point is 1% and regions with export shares greater than 1% are grouped as exporting regions. Twenty-two regions fall into this category. Details on the assignment of regions into a particular group along the four dimensions are given in Table 4 in Appendix A.

The modified Kanbur–Zhang index of polarization is calculated for each of the four dimensions and results are presented in Table 3. Figures 4 and 5 show trends in polarization indices. In interpretation of these numbers and trends, I should caution that values of indices are not comparable across dimensions due to the differences in numbers of regions in each subgroup. Trends in indices along a particular dimension, however, can reveal the dynamics of

Table 3. *Kanbur–Zhang indices of polarization*

Year	Income				Expenditures			
	West–East	National status	Capital city size	Export share	West–East	National status	Capital city size	Export share
1990	0.0637	0.0534	0.0102	0.1055	0.0126	0.0671	0.0491	0.1263
1991	0.0544	0.0821	0.0087	0.1117	0.0061	0.1095	0.0380	0.1139
1992	0.0755	0.0549	0.0002	0.1151	0.0006	0.0993	0.0338	0.1247
1993	0.0134	0.0623	0.1119	0.2228	0.0697	0.0802	0.2177	0.2622
1994	0.0174	0.0335	0.1418	0.2461	0.0569	0.0633	0.2469	0.2927
1995	0.0059	0.0480	0.1682	0.3064	0.0375	0.0864	0.2845	0.3328
1996	0.0107	0.0494	0.1736	0.2906	0.0459	0.0877	0.3027	0.3144
1997	0.0078	0.0482	0.1848	0.3257	0.0335	0.0885	0.3220	0.3371
1998	0.0116	0.0374	0.1820	0.3201	0.0409	0.0682	0.3043	0.3166
1999	0.0094	0.0324	0.1952	0.3271	0.0361	0.0667	0.3141	0.3213
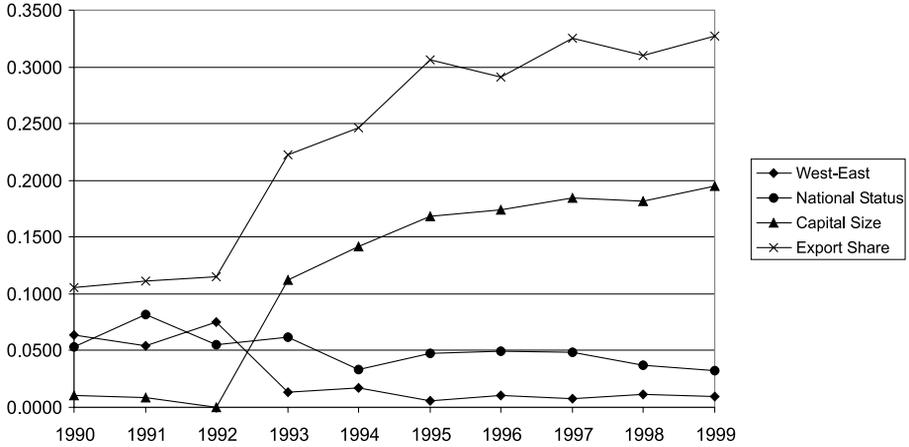
Figure 4. *Kanbur–Zhang index of polarization for income.*
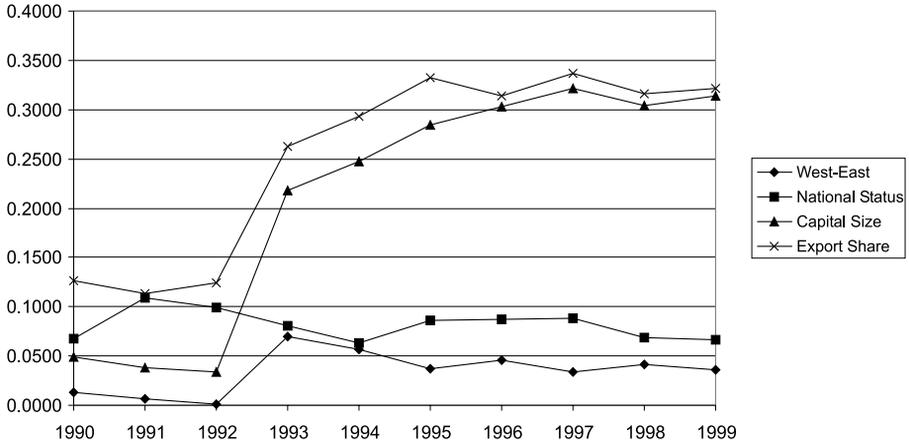
Figure 5. *Kanbur–Zhang index of polarization for expenditures.*

polarization in that dimension. It is immediately clear from Figures 4 and 5 that while polarization in both income and expenditures along "West–East" and "national status" dimensions remained fairly constant over the entire period, polarization along "capital city size" and "export share" dimensions increased sharply during 1992–95.

Trends plotted in Figures 4 and 5 allow me to conclude that over the course of transition, in terms of per capita income and expenditures, regions with large capitals have been drifting apart from regions with small capitals; and regions with higher export share have been diverging from regions with lower export share. On the contrary, geographic location ("West–East") and political-administrative status of regions did not seem to play an important role in determining the differences in income and expenditures between regions.

This suggests that driving forces behind regional polarization in Russia have been more structural rather than geopolitical. As the Russian economy became more open and decentralized, regions that were better structurally adapted to these changes have benefited more. Regions with large capitals have probably had better infrastructure, and a higher share of marketable services and industrial output. Exporting regions have enjoyed their privileged position directly as foreign exchange earners, and indirectly as they had more power in bar-

gaining with the federal government over other resources.

These conclusions are in line with the findings by Sutherland *et al.* (2000) who suggested that "two main types of regions have adapted best to the new circumstances: major natural resource regions and regions containing the new commercial hubs." [15] The evidence of increased polarization along the "capital city size" dimension supports the importance of urban agglomeration effects also noted by Sutherland *et al.* (2000).

Similar patterns of polarization are found in the EU and China. According to Dunford and Smith (2000) the most successful regions are "metropolitan economies clustered around an axis extending from Greater London through Belgium and the Netherlands along the Rhine and into the Lombardy and Emilia Romagna in the north of Italy." [16] Kanbur and Zhang (1999) showed that in China since the opening up of the economy regional polarization has also increased in favor of commercial metropolitan coastal regions.

The importance of the urban agglomeration factor in the regional development process in Russia and its similarity to the experience of other large economies suggests possible ways to theoretically model Russia's regional development within the spatial economics framework of Fujita, Krugman, and Venables (2000). On the empirical side further research is needed to determine exactly what factors may explain increased regional polarization along "capital city size" and "export share" dimensions.

6. CONCLUSION

By using population-weighted values of per capita income and expenditures I have found that since the beginning of transition, regional inequality in Russia has increased significantly. Even though the upward trend in regional inequality seemed to level out in 1996–97 and even slightly decline in 1998–99, the magnitude of 0.29 Gini points for income and 0.37 Gini points for expenditures at its peak was quite large.

Polarization measures of Esteban–Ray, and Wolfson exhibit almost the same dynamics as conventional measures of inequality, thus they cannot give us better insight into the pattern of regional polarization in Russia.

Trends in Kanbur–Zhang polarization index reveal that the transition period saw a dramatic increase in polarization along "capital city size" and "export share" dimensions. Contrary to the commonly discussed in the literature proposition about a significant increase in polarization along "West–East" and "national status" dimensions, I have found no evidence to support it. In fact polarization along these two dimensions has decreased over the course of transition.

These findings allow us to conclude that regional polarization is driven by structural differences between regions rather than geographic or political. Further research must focus on these structural differences and attempt to determine driving forces behind regional inequality and polarization.

NOTES

1. See Esteban and Ray (1994).

2. Bradshaw and Treyvish (2000, pp. 24–25).

3. Mikheeva (1999, p. 514).

4. Papers by Kournishev (1999), Lavrovsky (1999b), and Treyvish (1999).

5. Expert Institute and Center for Russian and East European Studies (1996, p. 43).

6. Mikheeva (1999, p. 514).

7. Becker and Hemley (1996, p. 63).

8. One should not discount the policy significance of inequality within regions. According to Sutherland, Bradshaw, and Hanson (2000) inequality within regions is quantitatively more important than inequality between regions.

9. Goskomstat (1998), Goskomstat (2000a), Goskomstat (2000b).

10. More information on the RLMS can be found at the Carolina Population Center website: http://www.cpc.unc.edu/projects/rlms/rlms_home.html.

11. The results for $c = 1$ are similar and not presented here for brevity.

12. See also Esteban, Gradin, and Ray (1999) and Wolfson (1997).

13. Modified $KZ = \dfrac{I(\mu_1 e_1, \ldots, \mu_K e_K)}{\sum_{g=1}^{K} w_g I_g + I(\mu_1 e_1, \ldots, \mu_K e_K)}.$

14. Moscow's high share in Russia's exports can be explained by the fact that some companies record the value of exports in Moscow where they are registered rather than where the export production takes place.

This should not affect the results, since it would not change the relative to each other shares of regions other than Moscow in total country's exports and their subsequent groupings into high and low export share categories.

15. Sutherland *et al.* (2000, p. 67).

16. Dunford and Smith (2000, p. 180).

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APPENDIX A

Table 4. *Regional inequality—four dimensions*

	Geographic location	National status	Capital city size	Export share
	West—1 (54) East—0 (23)	Republics—1 (20) Ethnically Russian—0 (57)	Over 800,000—1 (18) Below 700,000—0 (59)	Over 1%—1 (22) Below 1% —0 (55)
Adygea	1	1	0	0
Altai Region	0	0	0	0
Amurskaya	0	0	0	0
Arkhangelsk	1	0	0	0
Astrakhan	1	0	0	0
Bashkortostan	1	1	1	1
Belgorod	1	0	0	0
Bryansk	1	0	0	0
Buryatia	0	1	0	0
Chelyabinsk	0	0	1	1
Chita	0	0	0	0
Chuvash	1	1	0	0
Dagestan	1	1	0	0
Ingushetia	1	1	0	0
Irkutsk	0	0	0	1
Ivanovo	1	0	0	0
Kabardino-Balkaria	1	1	0	0
Kaliningrad	1	0	0	0
Kalmykia	1	1	0	0
Kaluga	1	0	0	0
Kamchatka	0	0	0	0
Karachevo-Cherkessia	1	1	0	0
Karelia	1	1	0	0
Kemerovo	0	0	0	1
Khabarovsk	0	0	0	0
Khakassia	0	1	0	0
Kirov	1	0	0	0
Komi	1	1	0	1
Kostroma	1	0	0	0
Krasnodar	1	0	0	0
Krasnoyarsk	0	0	1	1
Kurgan	0	0	0	0
Kursk	1	0	0	0
Leningrad	1	0	1	1
Lipetsk	1	0	0	1
Magadan	0	0	0	0
Mari-El	1	1	0	0
Mordovia	1	1	0	0
Moscow City	1	0	1	1
Moscow region	1	0	1	1
Murmansk	1	0	0	1
Nizhni Novgorod	1	0	1	1

Table 4—*continued*

	Geographic location	National status	Capital city size	Export share
	West—1 (54) East—0 (23)	Republics—1 (20) Ethnically Russian—0 (57)	Over 800,000—1 (18) Below 700,000—0 (59)	Over 1%—1 (22) Below 1% —0 (55)
Novgorod	1	0	0	0
Novosibirsk	0	0	1	0
Omsk	0	0	1	1
Orenburg	1	0	0	1
Oryol	1	0	0	0
Penza	1	0	0	0
Perm	1	0	1	1
Primorski	0	0	0	0
Pskov	1	0	0	0
Republic of Altai	0	1	0	0
Rostov	1	0	1	0
Ryazan	1	0	0	0
Saint-Petersburg City	1	0	1	1
Sakhalin	0	0	0	0
Samara	1	0	1	1
Saratov	1	0	1	0
Severnaya Osetia	1	1	0	0
Smolensk	1	0	0	0
Stavropol	1	0	0	0
Sverdlovsk	0	0	1	1
Tambov	1	0	0	0
Tatarstan	1	1	1	1
Tomsk	0	0	0	1
Tula	1	0	0	0
Tuva	0	1	0	0
Tver	1	0	0	0
Tyumen	0	0	0	1
Udmurtia	1	1	0	0
Ulyanovsk	1	0	0	0
Vladimir	1	0	0	0
Volgograd	1	0	1	0
Vologda	1	0	0	1
Voronezh	1	0	1	0
Yakutia	0	1	0	0
Yaroslavl	1	0	0	0

Note: Number of regions is in the parentheses.