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The Relocation of Russian Industry 1987-1993

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Appendix 1 Regions and Industries in Russia 1987-1993 – A Description

Foreword

The Russian forest sector is a topic which recently has gained considerable international interest. IIASA, the Russian Academy of Sciences, and the Russian Federal Forest Service, in agreement with the Russian Ministry of the Environment and Natural Resources, signed agreements in 1992 and 1994 to carry out a large-scale study on the Siberian forest sector. The overall objective of the study was to focus on policy options that would encourage sustainable development of the sector. The goals have been to assess Siberia's forest resources, forest industries, and infrastructure; to examine the forests' economic, social, and biospheric functions; with these functions in mind, to identify possible pathways for their sustainable development; and to translate these pathways into policy options for Russian and international agencies.

The first phase of the study concentrated on the generation of intensive and consistent databases for the total forest sector of Siberia and Russia. The second phase of the study encompassed assessment studies of the greenhouse gas balances, forest resources and forest utilization, biodiversity and landscapes, non-wood products and functions, environmental status, transportation infrastructure, forest industry and markets, and socio-economic problems.

This report, carried out by Drs. P. Huber, S. Nagaev, and A. Wörgötter from the Department of Economics of the Institute for Advanced Studies, Vienna, Austria, has employed the database developed by the IIASA Study. This report is a contribution to the analyses of the topics of forest industry and markets, and socio-economics.

0. Introduction

Industrial production fell by about 50% in Russia during the last decade. During the same time period prices increased by a factor of over 30000%. It is hardly credible that in a country the size of Russia, aggregate changes of this magnitude should occur without significant stratification across regions and industries. This study is about the effects reforms have had on industry's dispersion in Russia. We use data on regional production by industry reaching from 1987 to 1993 to consider to what extent the division of labor among regions has changed during this time period. In particular we address three issues on an industry by industry basis: Have there been significant changes in the localization of industries and have the changes been associated with concentration or diversification? Are there significant changes in the relative productivity's of industries in regions? Is there a connection between productivity changes and changes in localization?

Empirical work on Russia is abundant in the analysis of macroeconomic development and the separate fields of transformation policy, such as stabilization (Gavrilenkov and Koen (1994), Koen and Marresse (1995)) monetary policy, price liberalization and inflation (DeMasi and Koen (1995)), trade (Collins and Rodrick (1991)), industrial policy and privatization (Boycko, Schleifer and Vishny (1995); Joskow, Schmalensee and Tsukanova (1994), Stern (1996)) and has brought to light a number of developments and stylized facts that have substantial bearing on structural analysis. Work on the structural changes in the Russian Federation has taken the form of individual industry studies (Paterson (1995), Obersteiner (1994)) or it has considered regional development with an aim of comparing regions in risk characteristics (Nagaev and Wörgötter (1994), Lücke (1993)), political attitudes (Grigoriew, Nagaev and Wörgötter (1994)) and studies of individual regions (Nagaev, Huber and Wörgötter, 1994).

In contrast to all these contributions our study looks at a data set that breaks down the total industrial production of Russia into 12 industries for each of the 79 regions of the Russian Federation. Thus we can document the complete regional - industrial structure of the Russian economy from 1987 to 1993. We describe this data set in section 1.

The second section motivates three scenarios of, what one could realistically expect to happen to localization, in socialist economies, once they enter systemic transformation. The first is based upon the assumption that location of industrial production in socialist countries[1] was inefficient, that is generally production did not take place in those regions where returns would be highest, and that industry was overly localized, that is more concentrated on particular regions than optimal. The second scenario draws its inspiration from the fact that systemic transformation itself changes the "optimal location" of industry and changes in localization in socialist countries , in contrast to western economies, are to a large degree not due to investments of a particular

[1] In a slight abuse of the terminological debates we use the terms' socialist countries (in the sense of real socialism) and planned economies (rather than centrally planned economies) interchangeably

industry in a particular region but rather to differences in output decline of particular industries across regions. The third scenario is based upon the old finding, dating back at least to the writings of Alfred Marshall, that comparative advantages may be a side product of concentration. The claim is that, as industries concentrate in a single region, this may become a source of increasing returns to scale, since a) the local labor pool acquires industry specific skills, b) industry specific services may be provided in these regions and c) localization provides informational advantages.

In the light of these scenarios, section three considers the evolution of regional production from 1990 to 1993. We show that, although some relocation, which centers on the time after 1990, did take place, this relocation has no clear industrial pattern: The industries that are fastly relocating include heavily resource based industries such as non-ferrous metallurgy, as well as relatively more mobile (so called footloose) heavy industries - chemicals and machinery - and one consumer oriented industry (flour). Slowly relocating industries represent an equally heterogeneous group of the resource based ferrous metallurgy, fuel and forestry groups and the more consumer oriented light and food industries. We also show that relocating industries - with the exception of the power industry - have tended to concentrate rather than diversify. Furthermore there is no clear pattern which confirms that industries more affected by systemic transformation relocate more.

Section four looks at data concerning labor and capital productivity. We present a number of stylized facts: Throughout the time period relative productivity changed more rapidly than did output share. Furthermore, the correlation of contribution of output with relative productivity of a region in a particular industry has increased for all industries and the large producers of the industries have increased their productivity faster than small producers. Section five finally concludes the paper

1. Data

1.1. Data Definitions

The data we use comes from official Goskomstat sources and has kindly been provided to us by the International Institute of Applied Systems Analysis (IIASA) in Laxenburg. It consists of an annual panel of production reaching from 1987 to 1993 and panels of labor input and capital inputs measures for 12 industries across 79 regions of Russia for the period from 1991 - 1993. All these indicators are end of year data. The capital measure is a bookkeeping value, and thus is subject to many of the critiques usually brought forward against the use of such measures. Yet, from inspection, as well as from prior considerations, the data do not seem to suffer from lack of accounting for inflation, which is the problem that could be detrimental to our purposes. The reason for this is that by law in Russia firms are obliged to take into account inflation when evaluating the capital stock. This stipulation reduces the fictitious profit problems, which usually

arise in inflationary times, and thus reduces the tax burden for the entrepreneurs - in consequence Russian firms are provided with substantial incentives to account for inflation.

1.1.1. The System of Industrial Classification

The systems of statistical reporting and registration of the industrial information varies from country to country reflecting the historical peculiarities, as well as methodological viewpoints on the subject of statistics.[2] In consequence, as evidenced by Table 1, which illustrates the Goscomstat methodology for classifying industries, also Russian industrial statistics differ substantially from the standard western economic activities classification schemes (such as NACE statistics). Unfortunately the data available to us, due to insufficient disaggragtion does not allow a redefinition along western (NACE) lines. Thus below we use the methodology applied by the Russian State Statistical Committee (GOSCOMSTAT) and consider the following industries:

- Electric power industry (Power)
- Fuel Industry (Fuel)
- Ferrous metallurgy (Ferrous Metallurgy)
- Non-Ferrous metallurgy (non - ferrous metallurgy)
- Machine building and metal works industry (machinery)
- Chemical and Petro-Chemical industry (Chemical)
- Forestry, wood processing, paper and pulp industry (Forestry)
- Construction material industry (Construction Materials)
- Glass and china-pottery industry (Glass)
- Light Industry (Light)
- Food Industry (Food)
- Flour-grinding, grouts and mixed feed industry (Flour)

To avoid unnecessary complexity in definitions of titles, in the further discussion, we call all these industrial groups "industries", and assign to them the names given in brackets behind each group when making reference to them.

This classification is made in accordance with the recent publications of GOSCOMSTAT (See Goscomstat 1994 and 1995) and offers a number of advantages concerning alternative possible classification schemes. First, the GOSCOMSTAT publications suggest that these groups cover approximately 95-99% of the industrial output in Russia, so that the remaining industries do not have much practical importance. Furthermore, this data structure provides for relatively homogenous groups of industries in terms of size, while still providing a relatively large number of observations on industries.

Table 1: Structure of the Groups of Industries of the Russian Federation.

1. Heavy Industry
Energy and Fuel Group of Industries
Electric Power Industry Group
Fuel Industry Group
Fuel Industry
Oil Extracting Industry
Oil Processing Industry
Gas Industry
Coal Industry
Peat Industry
Schist Industry
Metallurgy
Ferrous metal Industry
Non-ferrous (color) metal industry
Machine Building and Metal Processing Industries
Machine Building
Metal Processing Industries
Chemical and Forestry Group of Industries
Chemical Group of Industries
Chemical Industry
Oil-chemical industry
Microbiological industry
Medicine Industry
Forestry Group of Industries
Forestry Industry
Paper and Pulp Industry
Construction materials Group of Industries
Construction materials industry
Glass and china-pottery industry
Light Industry
Textile Industry
Sewing Industry
Leader, furs and shoe industry
Local Industry
Food Industry
Meat and Milk Industry
Fish Industry
Food and flavoring Industry
Flour-grinding, grouts and mixed feed industry
Information Industry
Printing Industry
Other Industries
Music Instruments
Jewelry

Table two illustrates these features of the data set. Among the twelve industry groups considered there are five that may be considered relatively resource dependent (fuel, ferrous metallurgy, non-ferrous metallurgy, construction materials and forestry) whose location is thus to a large extent determined by natural preconditions. There are, however, also three less resource

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[2] Indeed even within one country different institutions may arrive at very different numbers of firms even when using the same classification scheme (see Ackerman and Morris (1993)). Our data, however, are not likely to suffer from such shortcomings since they were compiled by the same institution throughout.

dependent, so called footloose, heavy industries (machinery, chemical, glass) and three more consumer oriented industries (light industry, food and flour processing). In terms of size most industries range between 4% to 10% of national industrial output for most of the time period. This compares well to the expected share of 8.3%, if industries were completely homogenous. There are, however, also relatively large groups, in particular Machinery, which takes between 31% and 21% of the total industrial production, but also Food and Fuel. The glass industry, finally, takes an insignificant share of the total output.

Table 2: The Development of Output in Russian Industry (1987 - 1993) (% of total Industrial Output)*

	1987	1988	1989	1990	1991	1992	1993
Electric Power	4.45	4.30	4.32	4.44	4.14	6.55	9.31
Fuel	8.78	8.54	8.31	7.86	7.50	18.97	16.71
Ferrous Metallurgy	5.76	5.67	5.62	5.52	5.03	8.34	8.51
Non Ferrous Metallurgy	4.94	4.86	5.42	5.85	6.51	8.80	7.81
Machinery	31.01	31.99	31.33	31.59	25.69	20.51	20.69
Chemicals	7.27	7.23	7.16	7.07	6.73	8.19	7.02
Forestry	5.71	5.67	5.64	5.55	5.99	4.87	4.44
Construction Materials	3.84	3.79	3.79	3.66	3.84	3.33	4.35
Glass	0.32	0.33	0.34	0.34	0.35	0.34	0.36
Light industry	12.55	12.38	12.49	12.45	16.72	7.26	5.26
Food	12.87	12.79	13.11	13.14	14.78	10.51	13.33
Flour	2.55	2.44	2.47	2.54	2.71	2.34	2.21
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

* Shares of Total Production included in the sample of the data set (see section below)

A further advantage of the relatively broad industry groups used in this classification is that it avoids the notorious problem of assigning multi-product enterprises to an industry. This problem is of particular relevance in the Russian context since many firms in Russia are characterized by high integration (see: Joskov, Schmalensee and Tsukanonva (1994))

There are, however, also drawbacks to using such widely defined industry groups. In particular, since our industry groups are relatively large, the products of these groups will be extremely heterogeneous. In consequence our results are likely to understate the true changes in specialization, if more homogeneous industries were considered and in particular will understate the true amount of localization in industries.

Table two also gives a picture of those industries that have been most severely affected in terms of real output loss in the Russian Federation. According to the table the machinery and Light industries have lost most in transition, while electric power, fuel, ferrous metallurgy, nonferrous metallurgy - that is the resource dependent industries - have increased their share in output considerably, which indicates that their real output has been significantly more firm in the time period. Average output losses have been registered in chemicals, forestry, construction materials, food, flour and glass

1.1.2. Regional Grouping

An additional issue is the use of regional identities of this study. We use the "subjects of the republic" as definition of what will be understood as a region in this paper. Although meanwhile standard in regional analysis of Russia this regional breakdown suffers from the disadvantage that the average size of regions is relatively large in respect to population and area which is likely to understate the true extent of localization of industries, since in many territories especially in the peripheral regions of Siberia the production is concentrated in a single town. (Huber, Nagaev and Wörgötter, 1996). For instance the non-ferrous metal industry of Krasnoyarsk which produced over 20% of all non ferrous metals in Russia is to a large extent located in Norilsk, where about a quarter of all non-ferrous metals in Russia were produced in 1993. Thus our data is also likely to understate the true amount of localization in an industry due to the size of the regions. Furthermore, as shown by Table 3 heterogeneity is large across the subjects of the Republic in terms of GDP, Industrial Production, Area, Population and Land area.

Table 3: Regional Characteristics and their Dispersion in Russia in 1992

1992	units	mean	standard deviation
GDP	bil. rubles	364,420.32	361,312.99
Industrial output	bil. rubles	213,713.07	229,280.32
Land Area	thousand hectares	225.94	472.47
Population	Thousand Inhabitants	1,839.72	1,519.95
Road density	kilometers per 1000 km^2	142.47	109.76

1.2. Data Manipulations

The greatest problem arising in the data set are missing data problems. Table 4 reports the number of available observations in each industry on a year to year basis. The problem that arises from these missing data, is that we do not know whether zero values are due to the fact that no production in the respective region took place, whether the data has been omitted for other reasons or was just not available at the time of compilation.

Table 4: Number of Observations available by Industry and Year

	1987	1988	1989	1990	1991	1992	1993
Electric Power	76	76	76	76	79	79	78
Fuel	70	70	70	69	71	72	71
Ferrous Metallurgy	67	67	67	67	67	67	67
Non Ferrous Metallurgy	47	47	47	47	49	61	66
Machinery	76	76	76	76	76	76	76
Chemicals	69	71	71	71	71	72	74
Forestry	77	77	77	77	79	79	78
Construction Materials	77	77	77	77	79	78	78
Glass	52	52	52	52	52	52	52
Light industry	77	77	77	77	79	79	78
Food	77	77	77	77	79	79	78
Flour	74	74	75	75	78	78	77

There are, however, some indicators which can be used to infer about the nature of the problem. First, our data source also provides indicators concerning labor and capital inputs, thus in some instances, while labor or capital inputs are reported in the relevant industry - region cell no output data are reported, while in other instances no data is reported at all. This leads us to conclude that when neither output nor input data are reported there was no production in the relevant year in the particular industry and region, while otherwise data was not included for other reasons. Thus we exclude all observations no output but some inputs are reported, while we include all data where no output and no inputs are reported.

It seems that by applying this correction we do reasonably well in capturing the true output structure of industry in Russia. The occasional chances for cross references possible with other GOSCOMSTAT sources on aggregate industrial development, suggest that in our data set only approximately 0.5 to 1% of the total Russian output in the twelve industries is missing. Since this a small number, we believe that the data base used portrays a very accurate picture of the regional-industrial structure of Russia for the entire time period.

Along side with the output of every selected industrial group we also consider data for real assets in current prices, investments into the industry, number of employed and their average wages in the industries during 1991-93. On the basis of these data we construct two indicators of industry efficiency:

- Labor productivity of the industry in the region - defined as output of an industry in a particular region divided by the number of the employed in the same industry and region.

- Capital productivity of the industry in the region which is the ratio of regional industrial output to the real assets of the industry in the same region.

2. Theory

The distribution of economic activity over space has always been a concern of regional economics. The questions posed by this discipline in general are: Where is it optimal for an industry to locate, and why do industries tend to cluster in particular regions? In most market economies regional economists would agree, that location takes place where the costs of production (including transport costs), given the output, are smallest. Spatial concentration thus must rest on mechanisms, that explains, why as more and more producers locate in the same region, production becomes cheaper. Marshall (1920) has summarized three such effects. First, concentration of an industry in a particular region allows labor market pooling. That is, as one particular industry locates in one particular region, it becomes profitable for workers to acquire skills, that are particular to that industry. Second, as spatial concentration takes place non-traded inputs (such as infrastructure) specific to this industry become available. Third, since information flows faster over small distances than over large ones, localization generates technological spillovers.[3]

In contrast to this generally positive view that is taken by many researchers of both the efficiency of the choice of location and industrial concentration in space (which we refer to as localization) in mature market economies, in the context of planned economies, it has often been voiced that the location of industrial activity in socialism was ill-planned, even given the relative prices and the institutional setup of planned economies, and overly localized - i.e. industries were often concentrated on few regions only. The reason for this claim is usually given by the fact that the choice of location in socialism was the result of a political planning process rather than a market driven choice of profit maximizing entrepreneurs.

Hamilton (1973) has, however, rightly argued that socialist planners could not completely ignore the goal of efficiency, but that in addition to this the political decision process was characterized by taking into consideration additional goals such as: the goal of an even spread of economic activity, political influences of local governments, politicians, bureaucrats and managers and finally the military strategic importance of the planned project. Thus the locational decision in socialism was subject to many partly contradicting influences. The weighting of political influence and equality goals versus efficiency goals in regional planning varied over time - when the central government was weaker local influences had more of a chance of being considered - and over the industry under consideration. For instance, some industries such as mining by their very nature can only be located close to their resources.

Thus planning of location in the socialist system must be considered a weighting process between efficiency goals and other (ideological) aims of industry. In general, it can be expected that the differences in priority given to sectors led to efficiency weighing heavily in sectors with

[3] More recent and more formal statements of different aspects of this theory include Krugman (1991) and Kubo (1995)

high political priority (such as heavy industry), while in low priority sectors (such as consumer industries) efficiency was considered less important. As a result, one could expect that inefficiencies were largest in the more consumer oriented industries, (Food, Flour and Light industries in our sample) and least in the resource intensive industries (fuel, ferrous and non - ferrous metallurgy and forestry). This tendency, however, is counteracted by the fact that high priority sectors (heavy industry) were usually also close to the defence industry.

An additional feature of the socialist planning system was its tendency to generate large economic structures.[4] This tendency also had influences on the geographical structure of production: mono- enterprise towns and the fact that entire regions were often subjected to the production of a few goods only.[5] In consequence upon liberalizing the locational decision in a socialist economy - without liberalizing other aspects of the economy - one would expect to see a) massive relocation of industry that exhibits a clear sectorial pattern and b) a spatial deconcentration of industry.

But systemic transformation from a planned to a market economy of course, does not only imply a liberalization of the locational decision of enterprises, it also encompasses other important elements such as price liberalization, institution building, privatization, banking sector reform and foreign trade liberalization. It must be expected that these policy influences in systemic transformation have influences on the locational pattern of transition economies as well. Price liberalization for instance has changed relative prices dramatically (see DeMasi and Koen (1995)) which in turn may shift the optimal location of industries.[6] Institution building among other things has implied a decentralization of the economy, which means that decisions are taken locally and thus that factors, such as local policy and surroundings, are becoming more and more important in the locational decision. Banking Sector reform, to the degree that it varies in scope and speed across regions, will cause liquidity constraints of enterprises to be geographically unevenly dispersed.[7] Foreign trade liberalization finally will change optimal location, since the possibility to export implies new markets, that are located elsewhere.

In consequence changes in location in systemic transformation are not only driven by the fact that production is moving to the optimal locality, but also that - in all likelihood - the optimal locality is shifting in space.

Finally, systemic transformation also has been associated with substantial declines in industrial output. This process has led to a pecularity in the way in which the process of a changing

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[4] This tendency can be seen as a rational reaction to the necessity of reducing the control costs in planning (see Rühl, 1995) as well as a consequence to a strong ideological belief in returns to scale.

[5] It must, however, be noted that the data we use will not capture this excessive concentration in space because most of our regional units are larger than the geographical areas in which this concentration took place

[6] In particular the increase in relative transport prices should have a substantial effect on the optimal location of industry and should result in a move of industry closer to the markets.

[7] Indeed this is particularly important for newly founded enterprises

composition of output in space occurs during systemic transformation. All industries have experienced real output declines in Russia from 1987 to 1993. In consequence, most of the relocation activity we observe in our data stems from differences in output decline of industries across regions without new investments taking place, not from - as in mature market economies - new investments of firms in regions. To stress this difference we prefer to speak of changes in the regional composition of output rather than relocation in space.

What in consequence could be expected from a socialist systems' regional division of labor, when it embarks on systemic transformation? We cast our discussion in three hypothetical scenarios: The first, we term "undoing the legacies of the past". It assumes that that a) the locational inefficiencies of industry in socialism were vast and b) localization was to high: Substantial changes in the regional composition of output in particular of light and consumer industries in order to attain efficiency should thus be associated with rapid diversification of industry in space.

An alternative hypothesis on the relocation of industries in Russia assumes that rather than undoing the legacies of the past other elements of systemic transformation such as output declines, relative price changes and regional variations in liquidity constraints have been the source of changes in the regional composition of output. This would mean that the changes in regional composition of output lack a clear sectorial pattern - if anything then sectors with higher output declines should exhibit higher geographical changes - and should be associated neither with concentration nor with deconcentration.

The third scenario which we term "construction of comparative advantages", assumes that inefficiencies were less severe than expected and spatial concentration did reflect comparative advantages.[8] In this scenario we would not necessarily expect to see much relocation of industry, much rather we would expect that the productivity of large producers would rise much faster than that of small producers and relocation would be primarily associated with concentration of production rather than diversification.

[8] This scenario cannot be dismissed at first sight, after all relying exclusively on the fact of concentration to proof inefficiencies is not very convincing. Concentration of economic activity, is ubiquitous even in capitalist economies - that is under circumstances termed "normal" by many economists. Much of the empirical research in the field of regional economics has shown that industries everywhere in the world are highly localized. Among the most cited examples are the concentration of the United States automotive industry in Detroit (Kurre, (1986); Tybout, Mattila (1977); Voytek, Wolman (1990)) but also the concentration of innovative industries in special areas such as silicon valley (Bania, Eberts, Fogarty (1993), Harrison (1994)). But aside from these spectacular examples Krugman (1991) has argued that localization in most industries in the United States as well as in western Europe is very high.

3. Changes in the Regional Composition of Output

3.1. The extent of Changes in the Regional Composition of Output

The primary variable we consider when we talk about the regional composition of output is the share of a region in the total national output of a particular industry. We term this variable the regions contribution to national output. In this chapter we are interested in two questions: How much change has there been in the regional contributions to national output over time and has the regional division of output become spatially more concentrated? While few would criticize the use of regional contributions to national output as a mean to characterize the regional division of labor, the issue of when one region could be considered to be more concentrated than another has been tackled in different ways by different authors.[9] We say that an industry is maximally concentrated when the regions' contribution to national output is equal to one in a single region and zero in all other regions, while it is not concentrated when all regions' contributions to national output are equal.

Figures 1 through 3 plot the complete distribution of the shares of individual region's output in total output over the period from 1987 to 1993 for three selected industries: Chemicals, Fuels and Electric Power. These figures are organized in such a way, that the most important region - in terms of output shares - in 1987, is ranked as the first and the least important as the last observation. In consequences for 1987 this plot is monotonically decreasing. Changes in rank among the regions can be visualized by increasing segments in the plot in subsequent years, i.e. the more a plot oscillates up and down in years after 1987 the larger have been the rank changes among the regions.

The common trends that emerge with all three industries are that a) before 1989 very few wiggles - that is very few changes in rank - can be observed, b) the upper end and lower end of the distribution seem to be much more stable, than the middle segments and c) after 1989, the plots differ dramatically among industries. For the fuel industry changes in rank among the regions are rare and the plots seem to almost parallel each other. In the plot for the power industry the changes created after 1989 are much greater. Chemicals finally is an intermediate case where some changes in rank have occurred but the distribution seems to be much more stable than in the power industry.

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[9] Some authors (for instance Krugman (1991)) have suggested measures based on coefficients of localization i.e. the share of the output of an industry in a particular region in the industries total output relative to the share of the particular regions total output in the national employment. The difference between the coefficient of localization and the contribution to national output is that the coefficient of localization is a relative measure of location while the contribution to the output of an industry is an absolute measure of localization. We prefer to use an absolute measure for two reasons. First, using shares of production rather than coefficients of localization have their usual natural interpretations. Second, absolute measures take on a value between zero and one. The coefficient of localization in contrast could become infinite and could thus make comparisons impossible.

Figure 1: Chemicals - Share of Total Output of Regions (in %) 1987-1993

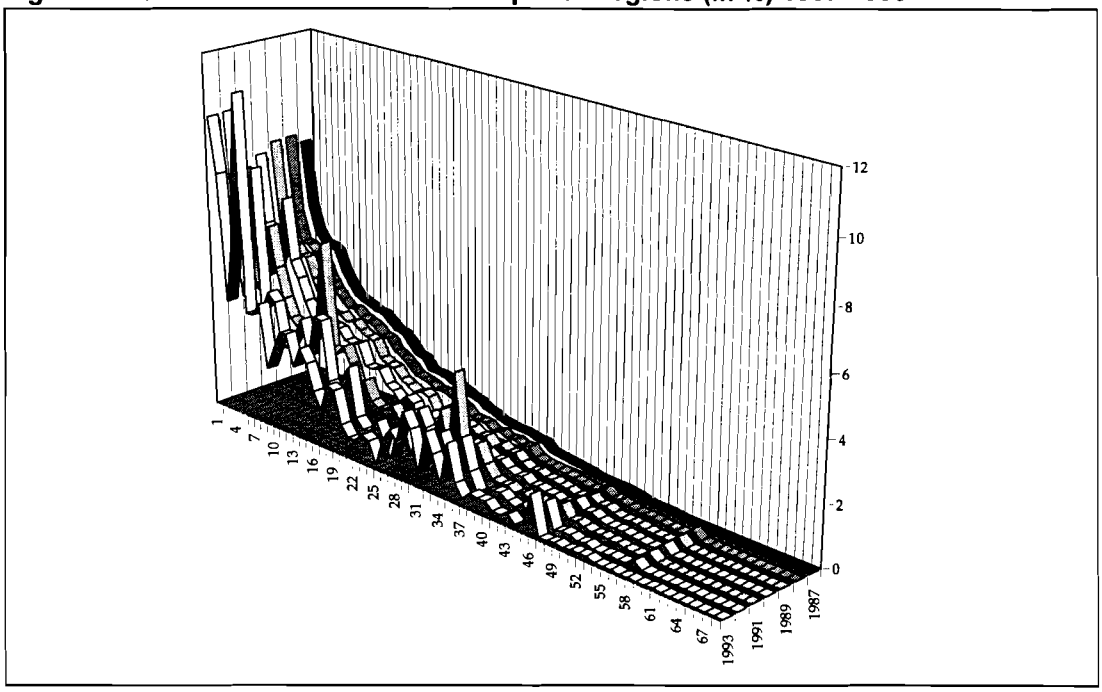


Figure 2: Fuel - Share of Total Output of Regions (in %) 1987-1993

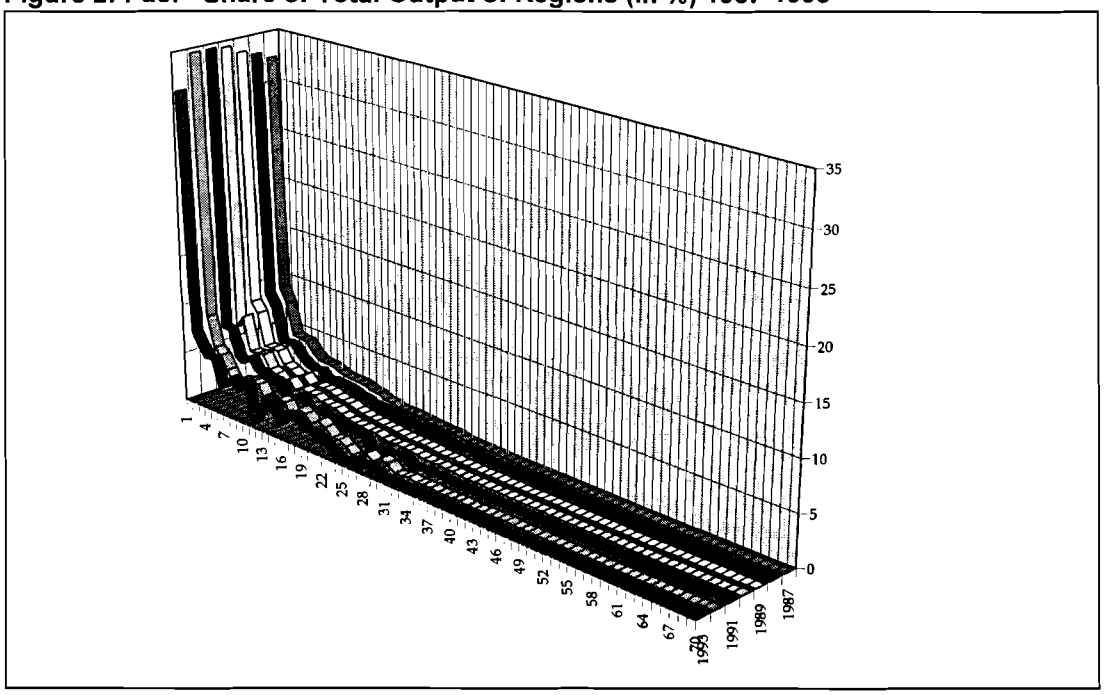
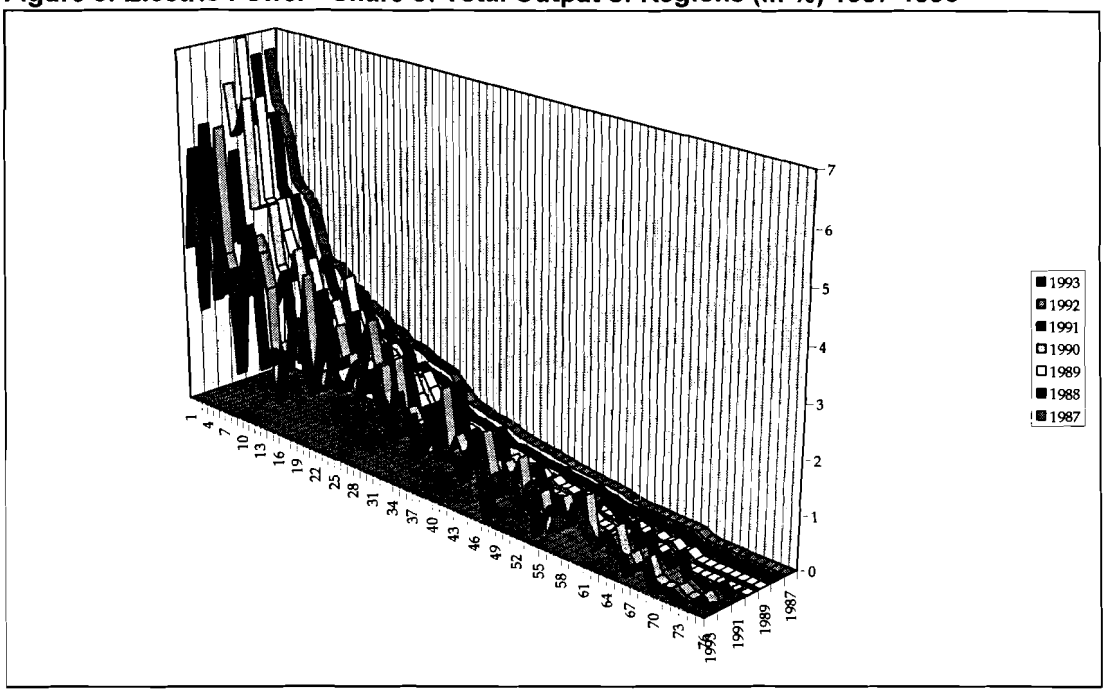


Figure 3: Electric Power - Share of Total Output of Regions (in %) 1987-1993



This suggests three interpretations: First, changes in the regional composition of output did not take off until 1990 (i.e. after the first serious market oriented reform steps of the Russian government). Second, in the period after 1990 the changes in the division of labor among regions vary strongly across industries. Third intermediate - sized producers are the ones that are most heavily affected by changes in the division of labor across regions.

Of course Figures 1 through 3 apply to selected industries only. A more representative approach to measure the change in location, which has occurred across the regions, is to correlate the contribution of each region to national product in an industry of 1987, to the contribution of the subsequent years. Table 5 performs this experiment for the twelve industries under consideration. The general picture that changes in the localization of industry differ substantially among industries remains. The Electric Power industry, where the correlation between 1987 and 1993 is only 0.831, can claim the largest changes while the regional structure of the Fuel industry, with a correlation coefficient of 0.990, has remained almost constant from 1987 to 1993.

The other findings formulated at the hands of Figures 1 through 3 are also confirmed by this table. First, relocation picks up only after 1990. In the three years from 1988 to 1990 the regional division of labor in all industries has remained relatively stable, with correlation coefficients never falling below 0.9 for any industry. From 1991 to 1993, however, the correlation coefficients of all industries are falling. Second, changes in the regional composition of output rest on changes of intermediate producers. Evidence for this comes from comparing changes in the top 10 producers

(see the appendix) from 1987 to 1993: We cannot distinguish between fastly relocating and slowly relocating industries at the hands of counting the new entries into the top ten. Chemicals and Forestry both only have two new entries in the list of the ten most important producers, power 3 and construction materials as well as non-ferrous metallurgy have 4 each. The maximum is reached by Flour (5) while Fuel and ferrous metallurgy hold only a single new entry in the complete time period.

Based on the correlation coefficients reported in Table 5, we form three groups of industries: those where the regional composition of output is changing rapidly that is all industries, where the correlation coefficient in 1993 was lower than 0.899 and those regions the regional composition of output is changing less i.e. those with a correlation coefficient higher or equal to 0.950 in 1993. Finally, the group where the correlation coefficient is between 0.900 and 0.949 is left as a residual group. We term these groups of industries fast relocating, indeterminate relocating, and slowly relocating industries, respectively.[10]

Table 5: Correlation of Contribution to National Output in 1987 with the Contribution in Subsequent years (1988 - 1993)

	1988	1989	1990	1991	1992	1993
Electric Power	0.997	0.992	0.990	0.883	0.817	0.831
Fuel	1.000	0.999	0.996	0.995	0.992	0.990
Ferrous Metallurgy	1.000	1.000	0.999	0.996	0.978	0.974
Non Ferrous Metallurgy	0.997	0.961	0.919	0.927	0.934	0.887
Machinery	0.999	0.982	0.995	0.994	0.896	0.882
Chemicals	0.999	0.998	0.985	0.937	0.936	0.898
Forestry	1.000	0.998	0.997	0.990	0.975	0.980
Construction Materials	0.999	0.997	0.994	0.969	0.951	0.933
Glass	0.996	0.992	0.988	0.979	0.945	0.940
Light industry	1.000	0.999	0.999	0.985	0.979	0.984
Food	0.999	0.999	0.997	0.984	0.987	0.983
Flour	0.993	0.986	0.984	0.938	0.899	0.864

Proceeding in the way suggested, we isolate the Power, Non Ferrous Metallurgy, Machinery, Chemicals and Flour industries as the industries which are rapidly relocating. This category is well mixed in terms of sectors. Non ferrous metallurgy is a highly resource dependent sector, machinery, chemicals and power production were typically high priority sectors in the planning system. The only sector that comes from the low priority non-resource dependent industry is the flour production. A similar conclusion is reached when considering the industries that are slowly relocating (Food, Light, Forestry and Fuel, Ferrous Metallurgy industries). Again only three of these industries (Fuel, Forestry and Ferrous Metallurgy) accord with the hypothesis stated above that resource dependent industries are relocating less. The Food and Light industries, however, are typical low priority consumer goods industries.

[10] Note that the term "relocation" is used here as a short form for the changes in regional composition of output

At the same time, there seems to be very little correlation of relocation with the relative size of the real output loss of industries. Both the regions fastly changing their regional contributions as well as the slower industry groups are composed of industries that have been relatively more affected by the transition (machinery and light industry) as well as industries that have increased their share in total output (electric power, fuel, ferrous metallurgy and non ferrous metallurgy). Furthermore, the lack of a clear sectorial pattern suggests may be indication that the changes brough about by transformation policy (the factors summarized in scenario two) are important for changes in the regional contributions to output.

3.2. Diversification or Concentration

We measure spatial concentration by three indicators: the cumulative share of the ten smallest regions in terms of output (Table 8), the share of the 10 largest regions in terms of output (Table 7) and the Gini-coefficient (Table 6). While the share of the 10 largest and the ten smallest regions in a particular industry's output are self explanatory the Gini - coefficient is the ratio of the area under the Lorenz Curve and the 45° line. This takes on a value of one if the industry is completely evenly spread across the region and a value of zero if the industry is concentrated in one region only.

The data presented in tables 6 through 8 seems to point to the following interpretation: Industries that are highly dependent on the availability of natural resources are heavily localized in Russia, while industries that either produce ubiquitous inputs, such as the electric power industry, machinery and construction materials, or are more consumer oriented, such as food and flour, are more evenly distributed across the regions. This can be illustrated at the examples of the very high concentration reached in the Ferrous and non-ferrous metal industries in fuel and glass production.

With the exception of glass production concentration to a large degree rests upon one region taking an excessively large share in production (see Appendix 1). In the Ferrous Metal industry it is Chelyabinsk which takes over 20% of the share of total output throughout the time period considered, in fuel Tyumen holds an even more dominant position with a production of over 30% of total output, while in non-ferrous metal production of the two regions that shared over 40% of output in 1987 - Sverdlovsk and Krasnoyarsk - only Krasnoyarsk has continued to produce over 20% of total output. Only in the glass industry does the heavy concentration arise from the fact that a number of regions hold relatively high shares of production.

Table 6: Gini Coefficient

	1987	1988	1989	1990	1991	1992	1993
Electric Power	0.55	0.55	0.56	0.55	0.43	0.46	0.44
Fuel	0.79	0.79	0.79	0.78	0.80	0.80	0.80
Ferrous Metallurgy	0.80	0.80	0.80	0.80	0.80	0.81	0.82
Non Ferrous Metallurgy	0.70	0.69	0.70	0.71	0.69	0.78	0.80
Machinery	0.51	0.51	0.51	0.51	0.50	0.55	0.57
Chemicals	0.60	0.60	0.61	0.61	0.60	0.64	0.67
Forestry	0.53	0.53	0.53	0.53	0.56	0.61	0.57
Construction Materials	0.41	0.40	0.40	0.39	0.41	0.45	0.46
Glass	0.66	0.65	0.65	0.65	0.65	0.65	0.63
Light industry	0.59	0.58	0.58	0.58	0.61	0.60	0.58
Food	0.45	0.45	0.44	0.44	0.41	0.45	0.44
Flour	0.38	0.38	0.38	0.39	0.42	0.42	0.41

Table 7: Share of 10 largest

	1987	1988	1989	1990	1991	1992	1993
Electric Power	44.19	44.26	44.56	44.19	32.59	35.07	36.55
Fuel	73.47	73.44	73.55	72.94	74.12	73.20	73.59
Ferrous Metallurgy	78.83	78.61	78.53	78.33	77.84	81.34	82.94
Non Ferrous Metallurgy	76.00	75.99	77.68	79.13	74.83	77.26	78.15
Machinery	44.02	44.51	45.04	44.10	43.62	48.46	50.66
Chemicals	48.91	48.66	48.79	49.49	47.86	52.41	54.90
Forestry	44.93	44.68	44.35	44.08	45.95	52.22	47.93
Construction Materials	33.94	33.31	33.13	32.57	32.72	36.03	37.42
Glass	72.49	71.26	71.26	71.29	69.86	67.61	66.26
Light industry	52.34	51.90	51.40	51.10	53.66	51.46	49.87
Food	28.38	38.00	37.65	37.69	25.17	37.57	37.29
Flour	31.35	31.99	32.44	32.54	32.78	32.69	32.90

Table 8: Share of the 10 Smallest

	1987	1988	1989	1990	1991	1992	1993
Electric Power	0.37	0.36	0.41	0.40	0.75	0.36	0.62
Fuel	0.02	0.03	0.03	0.04	0.03	0.01	0.01
Ferrous Metallurgy	0.08	0.08	0.08	0.09	0.06	0.04	0.05
Non Ferrous Metallurgy	0.29	0.31	0.31	0.29	0.24	0.02	0.01
Machinery	0.79	0.78	0.81	0.63	0.84	0.69	0.68
Chemicals	0.08	0.05	0.05	0.05	0.07	0.02	0.02
Forestry	1.33	1.40	1.44	1.46	1.00	0.51	0.53
Construction Materials	2.88	3.02	3.07	2.91	2.60	1.71	1.70
Glass	0.59	0.63	0.66	0.69	0.67	0.52	0.66
Light industry	0.83	0.82	0.82	0.85	0.54	0.42	0.58
Food	2.30	2.40	2.41	2.49	2.28	1.62	1.78
Flour	2.12	2.21	1.89	1.73	1.29	1.14	1.12

In the least concentrated industries construction materials, food and flour no such dominant producer can be registered. In fact even the largest producers Moscow, Moscow region and Krasnodar hold shares of 8% or less in all these industries. However, less concentrated industries also have much higher shares in the lower end of the distribution. The cumulative share of the smallest ten producers in the more concentrated industries is well below 1%, while in the more diverse industries shares over 1% pertain throughout.

The startling feature of the data presented in Table 6 through Table 8, however, is that in general there is a trend to concentrate rather than to diversify. As with relocation, this process seems to gain speed after 1990. The Gini coefficient of all but four industries has been rising in the time period from 1987 to 1993 and of the four exceptions (Power, Construction materials, Glass and Light Industry) in three instances the reduction in Gini coefficient must be considered rather insignificant. Only the Power industry has diversified in a significant manner. This tendency towards increased concentration seems to hinge on the increase of the share of the very large producers as can be concluded from Table 7. The share of the ten largest regions has only fallen for two industries: power and light industry.

Small producers in the respective industries in contrast seem to be much harder hit by the reduction in industrial output. Again evidence for this comes from Table 8. Here, when comparing the cumulative shares of the ten smallest producers in 1987 to those of 1993, the contribution has fallen in all industries but power and glass.

The tendency of Russian industry to increase its localization is thus based on the increased share of the largest producers in the respective industries. This finding once more suggests, that whatever is happening to the regional division of labor in Russia, it does not resemble a process where alleged past mistakes are undone. Much rather large producers seem to lose less in industrial production than do the small producers. Thus they increase their share in production significantly. Small producers on the other hand suffer more than average and are reducing their shares.

3.3 Changes in Regional Composition of Output and Concentration Characteristics

Figure 4 shows the scatter plot of the correlation coefficients of regional contributions to output of 1987 to 1993 on the Y axis and change in Gini coefficient from 1987 to 1993 on the X axis. Hence this figure shows the connection between changes in the regional composition of output and changes in spatial concentration.

Inspection of this figure provides some evidence that fastly relocating industries tend towards concentrating production. The slowly relocating industries are located on the top middle and are signified by small dots, while the fastly restructuring industries shown by larger dots are clustered on the bottom left of the diagram. In between these extremes the two intermediate restructuring industries, marked by stars, are located. The only exception is the electricity industry, located on the right hand bottom of the diagram. In this industry relocation has been marked by substantial regional diversification.

Figure 4: Scatter Plot of Change in Gini - Coefficient from 1987 to 1993 to Correlation of Output Shares of Regions 1987 with those of 1993

Statistical testing provides further evidence that higher changes in regional composition of output have led to higher concentration everywhere except for in the electric power industry. While the correlation between the change in Gini - coefficient and the correlation coefficient of regional composition of output in 1987 with that of 1993 is 0.04 and insignificant when electricity is included, this coefficient becomes -0.64, when we exclude electricity from our considerations. This is a value that is significantly different from zero at the 5% interval with 11 observation. [11]

In consequence, the faster an industry changes its regional composition of output the stronger are the tendencies towards concentration. This finding once more suggests, that whatever is happening to the regional division of labor in Russia, it does not resemble a process where alleged past mistakes are undone. Much rather large producers seem to lose less in industrial production than do the small producers. Thus they increase their share in production significantly. Small producers on the other hand suffer more than average and are reducing their shares.

[11] The p-value is 2.4%

4. Analysis of Productivity

4.1. Changes in Relative Productivity

Tables 9 and 10 present some evidence of the kind of changes that have occurred in relative capital and labor productivity[12], by correlating the respective productivity in 1991 with that of subsequent years. In general relative productivity changes dwarf changes in localization of industries. The correlation of relative labor productivity over the time period 1991 to 1993 is lower than 0.9 in all of the industries. (In comparison the changes in the location of industry over the period of 1989 to 1993 have led to correlation coefficients in the range from 0.8 upwards.)

Furthermore, due to the legal framework, changes in relative capital productivity have been significantly more rapid than changes in relative labor productivity.[13] Only in the case of the Fuel, Gas, Light and Flour industries is the correlation of labor productivity in 1991 with the relative labor productivity 1993 lower than the correlation of capital productivity in 1991 with that of 1993. But even in these instances, with the exception of the light industry the differences in correlation coefficients amount to less than 0.2.

These changes, however, do not seem to be closely linked to the changes in the regional composition of output. Of the industries that are quickly relocating the Chemicals industry is experiencing rapid changes in relative capital productivity among regions but slow changes in relative labor productivity, electric power is experiencing slow changes in both productivity and machinery has high changes in both productivity. Similar cases can be found for the slowly relocating industries. For instance in the light industry the correlation coefficient is relatively low in both labor and capital productivity, but in the food industry correlation coefficients concerning both indicators are high.

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[12] This is defined as productivity of a particular region as a percentage of the overall average Russian productivity in the respective industry

[13] Until 1993 there were serious legal restrictions to dismissing labor. In consequence firms could not adjust their employment downward as quickly as they may have liked to

Table 9: Correlation of relative Productivity 1991 with Subsequent Years

	Labor Productivity 1991 with		Capital Productivity 1991	
	labor productivity 1992	Labor Productivity 1993	Capital Productivity 1992	Capital Productivity 1993
Electric Power	0.755	0.713	0.726	0.700
Fuel	0.919	0.867	0.909	0.928
Ferrous Metallurgy	0.669	0.619	0.144	0.522
Non Ferrous Metallurgy	0.474	0.315	0.928	0.153
Machinery	0.658	0.563	0.584	0.405
Chemicals	0.904	0.841	0.692	0.260
Forestry	0.765	0.729	0.387	0.425
Construction Materials	0.659	0.751	0.646	0.699
Glass	0.414	0.287	0.310	0.374
Light industry	0.743	0.575	0.546	0.121
Food	0.629	0.706	0.882	0.808
Flour	0.701	0.709	0.482	0.518

Table 10: Cross Correlation of Labor and Capital Productivity

	1991	1992	1993
Electric Power	0.596	0.706	0.748
Fuel	0.539	0.772	0.840
Ferrous Metallurgy	0.182	0.026	0.349
Non Ferrous Metallurgy	0.209	0.389	0.087
Machinery	-0.129	0.612	0.524
Chemicals	0.341	-0.033	-0.145
Forestry	-0.159	0.144	0.196
Construction Materials	0.335	0.531	0.545
Glass	0.438	0.419	0.547
Light industry	0.787	0.516	0.308
Food	0.588	0.358	0.341
Flour	0.223	0.183	0.181

Of course positive correlation coefficients of Output with labor productivity could also occur if large producers used a more capital intensive technology. In this case output per worker, that is labor productivity, would be higher in regions that produce a lot. However, in this case capital productivity should be negatively correlated to size and capital and labor productivities should be negatively correlated. Yet, capital efficiency tends to be high where labor efficiency is high as documented by the cross correlation. (The exceptions to this rule are the chemicals industry for 1992 and 1993 and the machine as well as the forestry industry in 1991). Furthermore the connection between these two measures of productivity is increasing slightly over the time period with the exception of the Chemicals, Light, Food and Flour industries, thus one could hypothesize that technological heterogeneity is becoming less important across Russia.

These "stylized facts" suggest the following three interpretations. First, productivity changes across regions are more important in Russia than are changes in location of production. That is within region restructuring rather than relocation seems to be the primary means by which efficiency is increased in Russian industry. Second, efficiency gains, due to the legal environment

in Russia prior to 1993, rest on changes in capital productivity rather than labor productivity and third, in general high labor productivity regions are also high capital productivity regions.

4.2. The Connection between Productivity and Changes in Regional Contribution to Output

Table 11 shows the contemporaneous correlation of contribution to output shares with labor productivity, and provides evidence that the connection between contribution to output and productivity has been increasing in all industries but the fuel, glass and flour industry over the time period from 1991 to 1993. In the case of the capital productivity the correlation has only been decreasing in the Chemicals, Glass and Food industries. In consequence of all industries only in the Glass industry, which represents the smallest share of output among all the industries considered, have both correlation reduced over the time period. In the electric power, ferrous and non -ferrous metallurgy, machinery, forestry, construction materials and light industry both the relative labor productivity as well as the relative capital productivity have been more and more closely associated with the regions contribution to national product in the respective industry.

Table 11: Correlation between Contribution to National Output and Relative Productivity (1991-1992)

	Labor Productivity 1991	Labor Productivity 1992	Labor Productivity 1993	Capital Productivity 1991	Capital Productivity 1992	Capital Productivity 1993
Electric Power	0.559***	0.636***	0.623***	0.150	0.354***	0.374***
Fuel	0.523***	0.487***	0.427***	0.024	0.112	0.124
Ferrous Metallurgy	0.404***	-0.129	0.541***	-0.071	-0.026	0.110
Non Ferrous Metallurgy	0.401***	0.362***	0.482***	-0.058	0.106	0.039
Machinery	0.279**	0.588***	0.594***	-0.217	0.309**	0.207*
Chemicals	0.091	0.276**	0.356***	-0.065	0.074	-0.071
Forestry	0.434***	0.632***	0.547***	0.270**	0.200*	0.226**
Construction Materials	0.162	0.469***	0.461***	-0.009	0.319**	0.293**
Glass	0.193*	0.236**	0.133	0.173	-0.050	-0.096
Light industry	0.230**	0.235**	0.251**	-0.090	0.104	0.115
Food	0.604***	0.739***	0.686***	0.052	0.082	-0.043
Flour	0.415***	0.304***	0.394**	0.323***	0.428***	0.430***

*** Null hypothesis that the correlation coefficient is zero can be rejected at the 1% confidence interval; ** Null hypothesis that the correlation coefficient is zero can be rejected at the 5% confidence interval; * Null hypothesis that the correlation coefficient is zero can be rejected at the 10% confidence interval

At the same time the connection between productivity and contribution to output shares has become stronger, irrespective of whether the industry is relocating fastly or slowly in the regions. The only difference between fastly and slowly relocating industries is that with fastly relocating industries the gain is larger. For example the in fastly relocating Machinery industry as well as the Chemicals industry the correlations of output with labor productivity have risen, but in the slowly restructuring ferrous metallurgy sector gains have been larger. The reason for this lies in the lower starting levels in particular with respect to labor productivity,. In all of the fastly restructuring

industries (except for power) the correlation between contribution to output and labor productivity was lower than 0.5 in 1991. In the slowly relocating industries the respective figure was above 0.5 throughout. The only exception to this is the Light industry, which has a relatively low correlation coefficient but has been relocating less fastly. By 1993 this gap has been closed and no apparent connection between these two figures can be found.

The correlations given in table 11, in consequence, provide evidence that changes in the geographical composition of output in Russia have been associated with increases in relative productivity. Yet, this analysis says very little about who are the winners in terms of relative labor productivity and relative capital productivity. To address this issue we correlate productivity changes from 1991 to 1993 with the original output in 1991. As can be seen from Table 12 the correlation coefficients are positive throughout for labor productivity, suggesting that large producers in 1991 also had larger increases in labor productivity than small producers. For capital productivity the correlation coefficients are much smaller and occasionally also negative correlation coefficients - which suggest that the small producers have profited more from capital productivity increases - are registered.

Table 12: Correlation of Productivity changes with output in 1991

	Change in Labor Productivity 92-91	Change in Labor Productivity 93-92	Change in Labor Productivity 93-91	Change in Capital Productivity 92-91	Change in Capital Productivity 93 -92	Change in Capital Productivity 93 -91
Electric Power	0.490***	0.480***	0.495***	0.051	0.146	0.149
Fuel	0.450***	0.332***	0.353***	0.119	0.045	0.055
Ferrous Metallurgy	0.325***	0.482***	0.482***	-0.036	0.109	0.145
Non Ferrous Metallurgy	0.229**	0.286**	0.293**	0.083	-0.040	-0.006
Machinery	0.381***	0.372**	0.379***	0.331***	0.004	0.095
Chemicals	0.186	0.297**	0.278**	0.124	-0.086	-0.076
Forestry	-0.431***	0.377***	-0.384***	-0.502***	0.255**	0.200*
Construction Materials	0.368***	0.402***	0.406***	0.151	0.190*	0.227**
Glass	0.081	0.023	0.029	-0.169	-0.058	-0.157
Light industry	0.231**	0.250**	0.248**	0.189	0.193*	0.210*
Food	0.671***	0.613***	0.636***	0.002	-0.005	-0.005
Flour	0.294**	0.104	0.133	-0.005	0.373***	0.333***

*** Null hypothesis that the correlation coefficient is zero can be rejected at the 1% confidence interval; ** Null hypothesis that the correlation coefficient is zero can be rejected at the 5% confidence interval; * Null hypothesis that the correlation coefficient is zero can be rejected at the 10% confidence interval

5. Conclusions

This paper has been concerned with the stylized facts of changes in the geographical composition of industrial output of Russia during the period from 1987 to 1993. Our findings suggest that there are a number of such "stylized facts" that warrant closer scrutiny. In particular we establish four facts

1. Changes in the geographical composition of industrial output lack a clear sectorial pattern. Industries that have changed their geographical composition of output fastly as well as those that have been slower in this process include all types of industries (resource dependent, heavy industry and consumer oriented industries). At the same time there is no clearly visible pattern that industries more affected by the overall output decline have experienced faster changes in geographical composition of output.

2. Changes in the geographical composition of output are typically associated with an increase in geographical concentration. Large producers are thus increasing their share of output

3. Relative productivity has changed more rapidly across regions than has the regional composition of output.

4. Large producers (regions) have managed to increase their productivity more than small ones.

These "stylized facts" contradict some of the conventional claims about regional Russian industrial development. Russian industries do change their contribution to national industrial output in a way that would be suggested by an economic model. High productivity is associated with large industrial output and relative labor productivity does change significantly.

At the same time, our results suggest that there is no simple story, that captures all the aspects of the changing regional composition of industrial output in Russia. In particular it seems that changes in the composition of output are to a large degree determined by newly created comparative advantages. The evidence that larger regions are increasing their efficiency while small regions (in terms of an industries output) are lets us expect that increased spatial concentration will be a feature of the years to come and throws up the question what forces have been working towards increased concentration.

This suggests that locational economies are an important aspect that influence regional industrial development. This suggests that policy makers should pay attention to these economies of location. In particular if the transitionary recession results in a complete errosion of the human and material capital base of an economy this can be expected to have a negative effect on the long run growth path of a region. Thus policy measures that preserve this capital base, while allowing for a maximum of flexibility with respect to the necessary restructuring, are justifyable in the light of our finding.

Two policy measures that could yield particularily high rewards in this respect are investments in infrastructure development and policies designed to develop vertical and horizontal links within the economy. Infrastructure development, first of all could reduce currently high transport costs - a factor which reduces competitiveness of more ressource bound Russian industries - and could thus increase competitiveness of industry across regions and second of all it could increase the communication flows within a region which in turn would increase locational economies.

Developing vertical and horizontal ties among local industries implies that local governments, rather than subsidizing industries, should provide institutions which facilitate the flow of information across enterprises.[14] Again this will increase beneficial localized externalities across industries. Recent experience with such policies in mature market economies (see Perry, 1995) have, however, shown that when these institutions are created with a focus on local markets, this will create conflicts of interest between large monopolistic producers and smaller enterprises - a conflict that is likely to be more severe in the Russian context. In consequence such institutions should be created primarily with the aim of increasing competitiveness on foreign markets.

[14] Such institutions may reach from Business Link Data Bases as have been established in Britain and elsewhere (see: Hutchinson, Foley and Otzel, 1996) to local employer Unions and Joint Activity Groups with the explicit aim of increasing exports as were established in Australia (see: Perry, 1995)

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Electric Power

1.Output

	Region	1987 (mil. rubles)	Share	Region	1993 (mil. rubles)	Share
1	Irkutsk Reg.	1 466 067.00	6.60	Tyumen Reg.	616 476.30	5.62
2	Sverdlovsk Reg.	1 245 153.00	5.61	Sverdlovsk Reg.	557 978.43	5.09
3	Moscow	1 196 199.00	5.39	Chelyabinsk Reg.	428 733.84	3.91
4	Tyumen Reg.	1 103 367.00	4.97	Bashkortostan Republic	420 404.76	3.84
5	Bashkortostan Republic	924 584.00	4.16	Tatarstan Republic	349 012.99	3.18
6	Tatarstan Republic	886 732.00	3.99	Irkutsk Reg.	337 044.36	3.07
7	Krasnoyarsk Territory	869 438.00	3.91	Perm Reg.	331 518.76	3.02
8	Samara Reg.	820 196.00	3.69	Kemerovo Reg.	326 688.48	2.98
9	Leningrad Reg.	702 106.00	3.16	Samara Reg.	321 277.29	2.93
10	Kemerovo Reg.	601 455.00	2.71	St.Petersburg	317 141.98	2.89

2. Labor Productivity

	Region	1991	Region	1993
1	Belgorod Reg.	159.46	Belgorod Reg.	36 137.65
2	Leningrad Reg.	143.49	Stavropol Territory	33 291.93
3	St.Petersburg	138.30	St.Petersburg	31 159.56
4	Kursk Reg.	130.39	Chelyabinsk Reg.	27 374.14
5	Stavropol Territory	128.54	Tyumen Reg.	26 320.40
6	Tatarstan Republic	127.10	Nizhny Novgorod Reg.	25 562.36
7	Kostroma Reg.	126.78	Tatarstan Republic	25 027.82
8	Kabardino-Balkar Republic	123.80	Samara Reg.	24 009.96
9	Tyumen Reg.	122.30	Sverdlovsk Reg.	23 456.30
10	Perm Reg.	115.40	Perm Reg.	22 890.20

3. Capital Productivity

	Region	1991	Region	1993
1	Belgorod Reg.	1.35	Chelyabinsk Reg.	10.58
2	Chechen and Ingush Republic	1.10	Belgorod Reg.	9.40
3	Udmurt Republic	1.08	Stavropol Territory	9.02
4	Bryansk Reg.	0.98	Mariy El Republic	7.36
5	Tula Reg.	0.98	Sverdlovsk Reg.	7.13
6	Nizhny Novgorod Reg.	0.95	Tula Reg.	7.08
7	Kaliningrad Reg.	0.92	Nizhny Novgorod Reg.	6.97
8	Vladimir Reg.	0.91	St.Petersburg	6.71
9	Republic Mordovia	0.90	Krasnodar Territory	6.53
10	St.Petersburg	0.89	Vladimir Reg.	6.30

Fuel

1. Output

	Region	1987 (mil. rubles)	Share	Region	1993 (mil. rubles)	Share
1	Tyumen Reg.	14 234 205.00	32.34	Tyumen Reg.	6 133 394.22	31.17
2	Bashkortostan Republic	3 980 090.00	9.04	Bashkortostan Republic	1 452 233.88	7.38
3	Kemerovo Reg.	3 292 937.00	7.48	Kemerovo Reg.	1 204 039.56	6.12
4	Samara Reg.	1 947 237.00	4.42	Irkutsk Reg.	1 039 722.83	5.28
5	Irkutsk Reg.	1 895 348.00	4.31	Samara Reg.	1 009 842.57	5.13
6	Orenburg Reg.	1 879 162.00	4.27	Perm Reg.	865 411.64	4.40
7	Komi Republic	1 506 153.00	3.42	Omsk Reg.	825 977.85	4.20
8	Omsk Reg.	1 220 864.00	2.77	Nizhny Novgorod Reg.	692 980.33	3.52
9	Tatarstan Republic	1 198 765.00	2.72	Komi Republic	642 383.63	3.26
10	Perm Reg.	1 186 320.00	2.70	Leningrad Reg.	613 081.00	3.12

2. Labor Productivity

	Region	1991	Region	1993
1	Tyumen Reg.	442.00	Ryazan Reg.	106 951.71
2	Ryazan Reg.	414.30	Omsk Reg.	94 689.65
3	Omsk Reg.	381.75	Moscow	93 379.23
4	Saratov Reg.	325.38	Nizhny Novgorod Reg.	87 090.65
5	Tomsk Reg.	287.07	Khabarovsk Territory	81 531.86
6	Arkhangelsk Reg.	284.91	Saratov Reg.	72 226.92
7	Orenburg Reg.	265.42	Tyumen Reg.	65 710.95
8	Khabarovsk Territory	249.98	Yaroslavl Reg.	60 589.28
9	Nizhny Novgorod Reg.	242.35	Leningrad Reg.	51 714.97
10	Yaroslavl Reg.	198.19	Volgograd Reg.	40 931.81

3. Capital Productivity

	Region	1991	Region	1993
1	St.Petersburg	5.40	Ryazan Reg.	38.77
2	Ryazan Reg.	5.34	Khabarovsk Territory	33.16
3	Khabarovsk Territory	4.48	Moscow	30.74
4	Moscow	3.67	Yaroslavl Reg.	30.48
5	Yaroslavl Reg.	3.62	Omsk Reg.	24.21
6	Nizhny Novgorod Reg.	3.48	Nizhny Novgorod Reg.	23.40
7	Leningrad Reg.	3.19	St.Petersburg	22.65
8	Omsk Reg.	2.92	Irkutsk Reg.	15.68
9	Irkutsk Reg.	1.92	Leningrad Reg.	14.50
10	Saratov Reg.	1.51	Saratov Reg.	11.06

Ferrous Metalutgy

1. Output

	Region	1987 (mil. rubles)	Share	Region	1993 (mil. rubles)	Share
1	Chelyabinsk Reg.	7 178 287.00	24.85	Chelyabinsk Reg.	2 168 420.33	21.65
2	Sverdlovsk Reg.	4 048 948.00	14.02	Sverdlovsk Reg.	1 446 451.23	14.44
3	Vologda Reg.	2 704 640.00	9.36	Vologda Reg.	1 067 680.28	10.66
4	Kemerovo Reg.	2 363 464.00	8.18	Kemerovo Reg.	1 056 948.62	10.55
5	Lipetsk Reg.	2 159 911.00	7.48	Lipetsk Reg.	894 835.12	8.93
6	Volgograd Reg.	1 122 879.00	3.89	Belgorod Reg.	632 867.53	6.32
7	Nizhny Novgorod Reg.	1 006 103.00	3.48	Orenburg Reg.	338 078.30	3.37
8	Moscow Reg.	738 290.00	2.56	Tula Reg.	260 028.10	2.60
9	Orenburg Reg.	726 054.00	2.51	Nizhny Novgorod Reg.	237 082.31	2.37
10	Belgorod Reg.	721 270.00	2.50	Volgograd Reg.	206 207.63	2.06

2. Labor Productivity

	Region	1991	Region	1993
1	St.Petersburg	128.89	Altai Territory	23 504.11
2	Altai Territory	118.92	Vologda Reg.	23 158.08
3	Vologda Reg.	118.65	Belgorod Reg.	20 573.03
4	Moscow	102.16	Lipetsk Reg.	19 986.49
5	Tatarstan Republic	96.43	Kaliningrad Reg.	18 299.39
6	Chelyabinsk Reg.	94.37	Komi Republic	16 972.12
7	Kaliningrad Reg.	93.81	Orenburg Reg.	15 656.85
8	Novosibirsk Reg.	92.44	Kemerovo Reg.	15 280.23
9	Saratov Reg.	87.32	Tula Reg.	15 154.92
10	Orel Reg.	86.69	St.Petersburg	15 063.67

3. Capital Productivity

	Region	1991	Region	1993
1	Ivanovo Reg.	6.12	Kaliningrad Reg.	22.71
2	Smolensk Reg.	4.14	Kostroma Reg.	20.15
3	North Ossetian Republic	3.35	St.Petersburg	16.95
4	Novosibirsk Reg.	3.18	Smolensk Reg.	16.09
5	Saratov Reg.	3.03	Leningrad Reg.	15.24
6	Tver Reg.	2.93	Ivanovo Reg.	13.51
7	Kostroma Reg.	2.79	Stavropol Territory	12.95
8	Kaliningrad Reg.	2.68	Rostov Reg.	11.25
9	Ryazan Reg.	2.65	Vologda Reg.	11.15
10	St.Petersburg	2.64	Orenburg Reg.	10.40

Non-Ferrous Metalurgy

1. Output

	Region	1987 (mil. rubles)	Share	Region	1993 (mil. rubles)	Share
1	Sverdlovsk Reg.	5 047 309.00	20.35	Krasnoyarsk Territory	2 380 579.72	25.87
2	Krasnoyarsk Territory	4 935 861.00	19.90	Sakha (Yakut) Republic	1 253 955.36	13.63
3	Moscow Reg.	1 601 861.00	6.46	Sverdlovsk Reg.	1 181 605.39	12.84
4	Murmansk Reg.	1 350 644.00	5.45	Irkutsk Reg.	570 328.68	6.20
5	Sakha (Yakut) Republic	1 320 948.00	5.33	Murmansk Reg.	528 285.65	5.74
6	Irkutsk Reg.	1 112 661.00	4.49	Magadan Reg.	448 978.72	4.88
7	Magadan Reg.	1 051 846.00	4.24	Khakass Republic	228 045.21	2.48
8	Samara Reg.	903 662.00	3.64	Novosibirsk Reg.	205 997.49	2.24
9	Moscow	873 786.00	3.52	Chelyabinsk Reg.	203 798.81	2.21
10	Orenburg Reg.	651 717.00	2.63	Kemerovo Reg.	189 630.16	2.06

2. Labor Productivity

	Region	1991	Region	1993
1	Moscow	693.95	Sakha (Yakut) Republic	46 148.81
2	Ryazan Reg.	305.03	Volgograd Reg.	34 679.49
3	Sakha (Yakut) Republic	266.72	Irkutsk Reg.	28 409.90
4	Republic Karelia	204.69	Krasnoyarsk Territory	27 156.35
5	Novosibirsk Reg.	202.76	Murmansk Reg.	24 925.01
6	Irkutsk Reg.	201.55	Magadan Reg.	23 472.33
7	St.Petersburg	194.22	Kamchatka Reg.	22 842.34
8	Amur Reg.	186.83	Khakass Republic	19 831.74
9	Kirov Reg.	174.25	Kemerovo Reg.	19 108.24
10	Orel Reg.	169.78	St.Petersburg	16 424.00

3. Capital Productivity

	Region	1991	Region	1993
1	Sakha (Yakut) Republic	29 937.41	Leningrad Reg.	23 503.65
2	Amur Reg.	9 880.43	Magadan Reg.	11 774.95
3	North Ossetian Republic	7 175.76	Kabardino-Balkar Republic	4 686.13
4	Kabardino-Balkar Republic	4 955.03	Amur Reg.	2 072.14
5	Samara Reg.	3 675.85	Samara Reg.	1 780.92
6	Ryazan Reg.	1 699.39	Krasnoyarsk Territory	1 587.52
7	Magadan Reg.	925.24	Vladimir Reg.	990.19
8	Vladimir Reg.	759.45	Ryazan Reg.	963.97
9	Leningrad Reg.	518.56	Maritime (Primorsky) territory	773.74
10	Maritime (Primorsky) territory	412.67	Buryat Republic	702.73

Machinery

1. Output

	Region	1987 (mil. rubles)	Share	Region	1993 (mil. rubles)	Share
1	Moscow	12 083 034.00	7.59	Samara Reg.	2 370 625.38	9.74
2	St.Petersburg	9 631 325.00	6.05	Moscow	1 829 266.30	7.52
3	Moscow Reg.	7 940 065.00	4.99	Nizhny Novgorod Reg.	1 768 936.65	7.27
4	Nizhny Novgorod Reg.	7 056 867.00	4.43	Moscow Reg.	1 298 744.63	5.34
5	Samara Reg.	6 406 383.00	4.02	Chelyabinsk Reg.	1 045 217.08	4.29
6	Sverdlovsk Reg.	6 249 344.00	3.93	St.Petersburg	944 601.38	3.88
7	Chelyabinsk Reg.	5 966 331.00	3.75	Sverdlovsk Reg.	934 155.41	3.84
8	Tatarstan Republic	5 939 983.00	3.73	Tatarstan Republic	750 066.60	3.08
9	Rostov Reg.	4 879 649.00	3.07	Ulyanovsk Reg.	713 407.60	2.93
10	Bashkortostan Republic	3 930 258.00	2.47	Yaroslavl Reg.	674 342.68	2.77

2. Labor Productivity

	Region	1991	Region	1993
1	Kamchatka Reg.	42.27	Samara Reg.	7 094.07
2	Magadan Reg.	39.59	Magadan Reg.	5 563.56
3	Moscow	39.01	Ulyanovsk Reg.	5 055.47
4	Kurgan Reg.	38.80	Kurgan Reg.	4 491.80
5	Arkhangelsk Reg.	38.74	Nizhny Novgorod Reg.	4 459.76
6	Khabarovsk Territory	38.44	Yaroslavl Reg.	4 253.64
7	Udmurt Republic	37.31	Juwish A.R.	4 173.05
8	Republic Mordovia	37.29	Kamchatka Reg.	3 968.82
9	Belgorod Reg.	37.07	Moscow	3 795.11
10	Bashkortostan Republic	37.04	Ivanovo Reg.	3 665.90

3. Capital Productivity

	Region	1991	Region	1993
1	Kalmyk Republic	5.70	Tuva Republic	14.90
2	Altai Republic	4.18	Magadan Reg.	10.83
3	Tuva Republic	3.86	Samara Reg.	10.55
4	Republic Mordovia	3.10	Tyumen Reg.	9.81
5	Tyumen Reg.	2.95	Ivanovo Reg.	9.30
6	Novgorod Reg.	2.86	Juwish A.R.	9.09
7	Chechen and Ingush Republics	2.74	Republic Mordovia	9.04
8	Karachai-Cherkess Republic	2.69	Kalmyk Republic	8.92
9	Tver Reg.	2.59	Nizhny Novgorod Reg.	8.77
10	Kursk Reg.	2.57	Tver Reg.	8.34

Chemicals

1.Output

	Region	1987 (mil. rubles)	Share	Region	1993 (mil. rubles)	Share
1	Tatarstan Republic	2 930 788.00	8.23	Bashkortostan Republic	867 242.96	10.50
2	Samara Reg.	2 165 009.00	6.08	Tatarstan Republic	786 552.12	9.52
3	Nizhny Novgorod Reg.	1 856 821.00	5.21	Samara Reg.	639 580.84	7.74
4	Perm Reg.	1 751 908.00	4.92	Perm Reg.	472 115.21	5.71
5	Bashkortostan Republic	1 742 496.00	4.89	Volgograd Reg.	324 207.30	3.92
6	Moscow Reg.	1 704 425.00	4.79	Krasnoyarsk Territory	301 511.89	3.65
7	Tula Reg.	1 486 227.00	4.17	Nizhny Novgorod Reg.	299 490.21	3.62
8	Volgograd Reg.	1 347 866.00	3.79	Tula Reg.	289 252.50	3.50
9	Altai Territory	1 236 236.00	3.47	Moscow Reg.	286 484.63	3.47
10	Sverdlovsk Reg.	1 195 899.00	3.36	Yaroslavl Reg.	269 750.50	3.26

2. Labor Productivity

	Region	1991	Region	1993
1	Sakhalin Reg.	841.73	Republic Mordovia	54 811.18
2	Republic Mordovia	774.93	Omsk Reg.	50 358.65
3	Omsk Reg.	677.73	Voronezh Reg.	41 383.96
4	Voronezh Reg.	466.67	Sakhalin Reg.	33 992.60
5	Chechen and Ingush Republics	357.01	Yaroslavl Reg.	30 435.57
6	Moscow	292.38	Tatarstan Republic	30 400.50
7	Karachai-Cherkess Republic	269.94	Bashkortostan Republic	29 493.04
8	Yaroslavl Reg.	257.38	Tyumen Reg.	23 267.46
9	Orenburg Reg.	241.41	Kostroma Reg.	21 168.24
10	Tatarstan Republic	212.53	Samara Reg.	19 481.00

3. Capital Productivity

	Region	1991	Region	1993
1	Moscow	7.88	Pskov Reg.	104.88
2	Ulyanovsk Reg.	6.66	Ulyanovsk Reg.	26.64
3	Kurgan Reg.	5.92	Yaroslavl Reg.	11.29
4	Kaluga Reg.	5.22	Sakhalin Reg.	9.75
5	Karachai-Cherkess Republic	4.22	Sverdlovsk Reg.	8.17
6	Chita Reg.	4.14	Orenburg Reg.	7.88
7	Chelyabinsk Reg.	4.03	Ryazan Reg.	7.31
8	Pskov Reg.	3.99	Chelyabinsk Reg.	7.19
9	Orenburg Reg.	3.35	Bashkortostan Republic	6.96
10	Kursk Reg.	3.29	Omsk Reg.	6.82

Forestry

1. Output

	Region	1987 (mil. rubles)	Share	Region	1993 (mil. rubles)	Share
1	Irkutsk Reg.	2 385 774.00	8.36	Irkutsk Reg.	482 749.90	9.24
2	Arkhangelsk Reg.	1 931 481.00	6.77	Arkhangelsk Reg.	394 155.46	7.54
3	Krasnoyarsk Territory	1 470 078.00	5.15	Republic Karelia	256 366.44	4.90
4	Perm Reg.	1 289 747.00	4.52	Krasnoyarsk Territory	226 530.64	4.33
5	Sverdlovsk Reg.	1 148 962.00	4.03	Perm Reg.	221 876.43	4.24
6	Komi Republic	1 103 248.00	3.87	Komi Republic	219 209.23	4.19
7	Republic Karelia	1 028 955.00	3.61	Moscow	201 500.60	3.85
8	Leningrad Reg.	841 154.00	2.95	Moscow Reg.	186 903.88	3.58
9	Moscow Reg.	835 568.00	2.93	Sverdlovsk Reg.	166 016.83	3.18
10	Nizhny Novgorod Reg.	786 458.00	2.76	Leningrad Reg.	150 021.92	2.87

2. Labor Productivity

	Region	1991	Region	1993
1	Sakhalin Reg.	84.98	Moscow	7 355.38
2	St.Petersburg	69.59	St.Petersburg	5 236.90
3	Moscow	68.14	Republic Karelia	4 989.71
4	Kursk Reg.	61.31	Moscow Reg.	4 647.27
5	Kaliningrad Reg.	60.61	Chukot A.T.	4 632.26
6	Leningrad Reg.	58.79	Irkutsk Reg.	4 338.66
7	Irkutsk Reg.	58.50	Kaliningrad Reg.	4 254.19
8	Rostov Reg.	52.92	Khabarovsk Territory	4 071.52
9	Moscow Reg.	50.93	Maritime (Primorsky) territory	3 976.14
10	Nizhny Novgorod Reg.	49.61	Arkhangelsk Reg.	3 966.62

3. Capital Productivity

	Region	1991	Region	1993
1	Altai Republic	18.65	Stavropol Territory	28.96
2	Stavropol Territory	9.71	Lipetsk Reg.	19.40
3	Lipetsk Reg.	5.94	Orel Reg.	18.84
4	Rostov Reg.	5.85	Moscow	18.65
5	Karachai-Cherkess Republic	5.06	Ivanovo Reg.	16.46
6	Orel Reg.	4.93	Novosibirsk Reg.	15.54
7	Kalmyk Republic	4.77	St.Petersburg	15.47
8	Ivanovo Reg.	4.70	Rostov Reg.	15.33
9	Republic Dagestan	4.63	Ryazan Reg.	14.68
10	Orenburg Reg.	4.50	Pskov Reg.	13.84

Contruction Materials

1. Output

	Region	1987 (mil. rubles)	Share	Region	1993 (mil. rubles)	Share
1	Moscow Reg.	1 152 640.00	6.03	Moscow Reg.	362 802.20	7.09
2	Sverdlovsk Reg.	954 053.00	5.00	Moscow	310 376.46	6.06
3	Moscow	741 509.00	3.88	Sverdlovsk Reg.	242 937.74	4.75
4	Tyumen Reg.	704 052.00	3.69	Samara Reg.	164 314.84	3.21
5	Krasnodar Territory	549 594.00	2.88	Perm Reg.	156 801.77	3.06
6	Irkutsk Reg.	528 273.00	2.77	Krasnodar Territory	141 904.53	2.77
7	Chelyabinsk Reg.	470 750.00	2.46	Tatarstan Republic	140 321.45	2.74
8	Maritime (Primorsky) territory	470 388.00	2.46	Chelyabinsk Reg.	140 273.50	2.74
9	St.Petersburg	460 087.00	2.41	Bashkortostan Republic	131 777.78	2.57
10	Tatarstan Republic	451 927.00	2.37	Krasnoyarsk Territory	124 206.31	2.43

2. Labor Productivity

	Region	1991	Region	1993
1	Kamchatka Reg.	98.47	Republic Karelia	2 984.59
2	Karachai-Cherkess Republic	62.05	Rostov Reg.	2 836.70
3	Sakha (Yakut) Republic	61.94	Kalmyk Republic	2 788.23
4	Sakhalin Reg.	60.72	Adygei Republic	2 716.81
5	Maritime (Primorsky) territory	57.54	Astrakhan Reg.	2 613.27
6	Tyumen Reg.	57.09	Kabardino-Balkar Republic	2 513.44
7	Magadan Reg.	57.02	Altai Republic	2 207.82
8	Komi Republic	56.49	Republic Dagestan	2 062.66
9	Chelyabinsk Reg.	55.82	North Ossetian Republic	1 870.73
10	Vologda Reg.	55.49	Tuva Republic	1 385.80

3. Capital Productivity

	Region	1991	Region	1993
1	Mariy El Republic	3.45	Tomsk Reg.	14.03
2	Kamchatka Reg.	3.20	Moscow	13.62
3	Tomsk Reg.	3.18	Murmansk Reg.	13.36
4	Kabardino-Balkar Republic	3.17	Khabarovsk Territory	12.97
5	Murmansk Reg.	3.09	Bashkortostan Republic	12.23
6	Moscow	2.87	Perm Reg.	11.75
7	St.Petersburg	2.78	Kabardino-Balkar Republic	11.27
8	Belgorod Reg.	2.74	Chuvash Republic	11.20
9	Ivanovo Reg.	2.73	Samara Reg.	11.15
10	Novgorod Reg.	2.71	Belgorod Reg.	11.14

Glass

1. Output

	Region	1987 (mil. rubles)	Share	Region	1993 (mil. rubles)	Share
1	Vladimir Reg.	244 630.00	15.19	Vladimir Reg.	47 527.15	11.51
2	Tver Reg.	127 708.00	7.93	Nizhny Novgorod Reg.	41 195.75	9.98
3	Nizhny Novgorod Reg.	124 191.00	7.71	Tver Reg.	37 172.17	9.00
4	Moscow	120 481.00	7.48	Bashkortostan Republic	33 785.84	8.18
5	Bashkortostan Republic	116 351.00	7.23	Moscow Reg.	29 242.05	7.08
6	Saratov Reg.	111 466.00	6.92	Saratov Reg.	25 802.80	6.25
7	Moscow Reg.	95 237.00	5.92	Sverdlovsk Reg.	16 313.62	3.95
8	Bryansk Reg.	87 578.00	5.44	Krasnodar Territory	14 445.12	3.50
9	Sverdlovsk Reg.	71 016.00	4.41	Bryansk Reg.	14 202.75	3.44
10	Krasnodar Territory	68 552.00	4.26	Kemerovo Reg.	13 938.83	3.38

2. Labor Productivity

	Region	1991	Region	1993
1	Ulyanovsk Reg.	67.55	Sakhalin Reg.	16 573.33
2	Moscow	65.94	Orel Reg.	14 591.24
3	Khabarovsk Territory	60.85	Khabarovsk Territory	7 788.48
4	Buryat Republic	48.04	Republic Karelia	6 974.55
5	Magadan Reg.	47.75	Volgograd Reg.	6 380.50
6	Rostov Reg.	44.47	Stavropol Territory	5 814.44
7	Amur Reg.	42.93	Nizhny Novgorod Reg.	5 478.89
8	Saratov Reg.	42.22	Udmurt Republic	5 279.41
9	Krasnodar Territory	41.43	Magadan Reg.	4 994.11
10	Stavropol Territory	38.49	Ulyanovsk Reg.	4 850.83

3. Capital Productivity

	Region	1991	Region	1993
1	Moscow	6.05	Altai Territory	19.69
2	Krasnodar Territory	4.77	Krasnoyarsk Territory	18.76
3	Voronezh Reg.	4.68	Astrakhan Reg.	18.17
4	Lipetsk Reg.	4.41	Kirov Reg.	16.83
5	Astrakhan Reg.	4.28	Volgograd Reg.	16.49
6	Buryat Republic	4.12	Khabarovsk Territory	13.51
7	Altai Territory	3.88	Krasnodar Territory	12.66
8	Orel Reg.	3.53	Ulyanovsk Reg.	12.52
9	Stavropol Territory	3.44	Perm Reg.	12.11
10	Khabarovsk Territory	3.43	Udmurt Republic	11.83

Light Industry

1. Output

	Region	1987 (mil. rubles)	Share	Region	1993 (mil. rubles)	Share
1	Moscow Reg.	7 841 657.00	12.45	Moscow Reg.	733 473.60	11.84
2	Moscow	6 045 236.00	9.60	Moscow	552 967.49	8.93
3	Ivanovo Reg.	5 880 763.00	9.34	Ivanovo Reg.	489 904.75	7.91
4	St.Petersburg	3 058 005.00	4.85	St.Petersburg	295 927.54	4.78
5	Vladimir Reg.	2 763 738.00	4.39	Vladimir Reg.	244 666.55	3.95
6	Tver Reg.	1 911 207.00	3.03	Bashkortostan Republic	183 600.25	2.96
7	Nizhny Novgorod Reg.	1 475 765.00	2.34	Tver Reg.	170 983.16	2.76
8	Stavropol Territory	1 371 178.00	2.18	Ulyanovsk Reg.	146 789.33	2.37
9	Ulyanovsk Reg.	1 317 867.00	2.09	Nizhny Novgorod Reg.	142 446.93	2.30
10	Krasnodar Territory	1 303 052.00	2.07	Volgograd Reg.	128 010.74	2.07

2. Labor Productivity

	Region	1991	Region	1993
1	Khakass Republic	230.29	Volgograd Reg.	5 338.67
2	Stavropol Territory	169.60	Moscow	5 235.69
3	Tambov Reg.	163.05	Altai Republic	5 054.38
4	Chita Reg.	162.56	Moscow Reg.	4 672.13
5	Buryat Republic	155.91	Ulyanovsk Reg.	4 590.61
6	Ivanovo Reg.	154.39	Orenburg Reg.	4 577.28
7	Ulyanovsk Reg.	145.57	Kirov Reg.	4 381.67
8	Vladimir Reg.	143.32	Khakass Republic	4 341.35
9	Moscow	128.02	Bashkortostan Republic	4 329.28
10	Moscow Reg.	126.72	Kursk Reg.	4 294.76

3. Capital Productivity

	Region	1991	Region	1993
1	Tambov Reg.	20.11	Lipetsk Reg.	30.72
2	Buryat Republic	19.36	Altai Republic	24.42
3	Stavropol Territory	19.18	Mariy El Republic	23.15
4	Omsk Reg.	15.82	Chelyabinsk Reg.	22.28
5	Khakass Republic	15.68	Irkutsk Reg.	19.73
6	Bryansk Reg.	15.15	Tatarstan Republic	19.16
7	Nizhny Novgorod Reg.	13.69	Sakhalin Reg.	19.14
8	Chita Reg.	13.26	Murmansk Reg.	19.05
9	Penza Reg.	13.23	Khabarovsk Territory	19.04
10	Tyumen Reg.	12.87	Belgorod Reg.	18.91

Food

1. Output

	Region	1987 (mil. rubles)	Share	Region	1993 (mil. rubles)	Share
1	Moscow	5 376 185.00	8.29	Moscow	1 372 876.39	8.75
2	Krasnodar Territory	4 190 971.00	6.46	Krasnodar Territory	948 200.04	6.04
3	Maritime (Primorsky) territory	2 891 841.00	4.46	Maritime (Primorsky) territory	765 969.74	4.88
4	St.Petersburg	2 587 430.00	3.99	St.Petersburg	472 609.38	3.01
5	Rostov Reg.	1 913 505.00	2.95	Rostov Reg.	409 551.60	2.61
6	Murmansk Reg.	1 736 199.00	2.68	Kamchatka Reg.	391 694.39	2.50
7	Voronezh Reg.	1 605 741.00	2.47	Bashkortostan Republic	388 458.74	2.47
8	Moscow Reg.	1 604 480.00	2.47	Sverdlovsk Reg.	375 607.32	2.39
9	Kamchatka Reg.	1 560 986.00	2.41	Moscow Reg.	372 778.29	2.37
10	Sverdlovsk Reg.	1 434 416.00	2.21	Murmansk Reg.	355 700.42	2.27

2. Labor Productivity

	Region	1991	Region	1993
1	Moscow	212.83	Moscow	19 259.79
2	St.Petersburg	148.49	Moscow Reg.	12 890.87
3	Moscow Reg.	148.44	Irkutsk Reg.	12 789.96
4	Krasnodar Territory	134.01	Samara Reg.	12 685.84
5	Chelyabinsk Reg.	131.97	Kamchatka Reg.	12 559.54
6	Sverdlovsk Reg.	131.24	St.Petersburg	12 217.50
7	Irkutsk Reg.	128.59	Belgorod Reg.	11 987.29
8	Kaluga Reg.	127.66	Magadan Reg.	11 977.92
9	Tatarstan Republic	127.18	Maritime (Primorsky) territory	11 895.05
10	Khakass Republic	126.94	Sverdlovsk Reg.	11 834.25

3. Capital Productivity

	Region	1991	Region	1993
1	Khakass Republic	10.51	Khakass Republic	27.38
2	Chelyabinsk Reg.	9.76	Krasnoyarsk Territory	24.23
3	Udmurt Republic	9.66	Kirov Reg.	22.88
4	Kirov Reg.	9.64	Moscow Reg.	22.54
5	Sverdlovsk Reg.	9.47	Sverdlovsk Reg.	22.32
6	Moscow Reg.	9.40	Omsk Reg.	22.22
7	Leningrad Reg.	9.30	Udmurt Republic	22.06
8	Krasnoyarsk Territory	9.01	Chelyabinsk Reg.	21.81
9	Orenburg Reg.	8.71	Perm Reg.	21.49
10	Tatarstan Republic	8.59	Komi Republic	20.08

Flour

1. Output

	Region	1987 (mil. rubles)	Share	Region	1993 (mil. rubles)	Share
1	Krasnodar Territory	611 859.00	4.92	Moscow Reg.	154 458.62	5.92
2	Rostov Reg.	469 136.00	3.78	Krasnodar Territory	95 776.17	3.67
3	Moscow Reg.	460 917.00	3.71	Bashkortostan Republic	88 441.12	3.39
4	Samara Reg.	406 513.00	3.27	Samara Reg.	88 334.38	3.39
5	Voronezh Reg.	365 043.00	2.94	Tatarstan Republic	84 541.74	3.24
6	Saratov Reg.	338 936.00	2.73	Sverdlovsk Reg.	82 099.08	3.15
7	Bashkortostan Republic	333 447.00	2.68	Moscow	74 082.23	2.84
8	Altai Territory	304 900.00	2.45	Kemerovo Reg.	63 759.45	2.44
9	Orenburg Reg.	301 637.00	2.43	Leningrad Reg.	63 410.23	2.43
10	Tatarstan Republic	301 394.00	2.43	Chelyabinsk Reg.	62 972.72	2.41

2. Labor Productivity

	Region	1991	Region	1993
1	Moscow Reg.	454.59	Karachai-Cherkess Republic	8 924.41
2	Moscow	431.73	Penza Reg.	8 497.24
3	St.Petersburg	380.25	Tuva Republic	8 195.41
4	Leningrad Reg.	368.94	Kirov Reg.	7 919.51
5	Krasnodar Territory	323.12	Ryazan Reg.	7 233.18
6	Vologda Reg.	306.33	Republic Mordovia	6 677.50
7	Udmurt Republic	304.23	Kalmyk Republic	6 547.64
8	Vladimir Reg.	302.52	Sakha (Yakut) Republic	3 526.67
9	Perm Reg.	298.40	Altai Republic	1 406.47
10	Tver Reg.	297.61	Magadan Reg.	337.50

3. Capital Productivity

	Region	1991	Region	1993
1	Kaliningrad Reg.	18.06	Rostov Reg.	55.50
2	Bryansk Reg.	17.04	Tatarstan Republic	39.97
3	Udmurt Republic	16.69	Kaliningrad Reg.	37.74
4	Kirov Reg.	13.67	Komi Republic	32.98
5	Tula Reg.	12.94	Lipetsk Reg.	31.93
6	Krasnodar Territory	12.34	Kemerovo Reg.	31.90
7	Orenburg Reg.	11.44	Sverdlovsk Reg.	31.75
8	Tomsk Reg.	11.35	Bashkortostan Republic	30.88
9	Adygei Republic	11.10	Perm Reg.	29.76
10	Lipetsk Reg.	10.89	Moscow Reg.	27.18

Appendix 1

The Relocation of Russian Industry 1987-1993 A Description

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Introduction

This study is on regional, industrial development in Russia. We look at the development of the output of 12 industry groups across 79 regions from 1987 to 1993 in Russia and compare the development of regions on an industry by industry basis. To focus our description of the industrial development we look at the aggregate development of the industries, at the development of the largest ten and smallest ten producers. Furthermore we look at which regions' output in a particular industry has grown and where the most severe output declines have been registered.

In order to determine how different size groups have behaved in the transition period, based on these findings, for each industry we devide the regions into six classes by a "histogram rule", that is we divide the difference between the maximal output share and minimal output share of regions into six intervals of equal size. We refer to those regions that are located in the top interval as regions with great output, the next interval is referred to as large regions and the other regions are called moderate, average, small and trifling output cases in order of falling importance in the industry's output, respectively.

The results of this experiment are startling. In most industries only one to two great producers can be found, and only a small number of large producers. Indeed most regions are "trifling" in most industries. Since the regional breakdown we use in this paper is composed of relatively large regions, the dominance of only a few regions points to higher importance of relatively few localities (mono-enterprise or respectively mono - industry towns) even within the regions.

Furthermore, we look at output dynamics by size. Here we devide the universe of Russian regions into subgroups that are growing and that are declining in terms of real output. At the same time we consider regions with an above average share in industrial output of a particular industry and regions with below average output. In consequence we refer to growing regions, that hold an above average share of output as "stars", while above average output regions with declining real term production are termed "declining giants". Regions with a below average output level finally, are termed growing midgets if they have increased their real output over the period from 1987 to 1993, if their output has fallen, however, these regions are grouped under a "residual" group. Again the results suggest that overall the residual regions, that is small declining regions, are the most prevalent type of regions, followed by declining giants and growing midgets.

The paper is organized as follows: Section 1 presents the distribution of industrial output among the regions of the Russian Federation. Sections 2 through 13 then describe the distribution of industrial output and its dynamics across the regions of Russia on an industry to industry basis. Section 14 finally concludes the paper.

1. Industrial Production and its Location in Russia

Two aspects characterize the industrial production in the Russian Federation over the time period from 1987 to 1993. First, since 1991 - that is with the introduction of price reforms in Russia - until 1993 industrial output in aggregate has been on a steady decline. More than 50% of real industrial production disappeared throughout the transition process in Russia. Second, when considering industrial production only a few regions in Russia account for most of the industrial production. This finding contradicts Ickes and Ryterman (1992) who do not find a peculiar size or market structure for Russian industry.

Table 1: The Top ten Russian Regions in Industrial Production in 1987 (nominal values in million Rubles

Position	Region Name	Output	Cumulative output	Share of total	Cumulative share
1	Moscow	30.726.608,00	195.853.153,00	5,99	38,21
2	Moscow Reg.	25.297.898,00	165.126.545,00	4,94	32,21
3	Sverdlovsk Reg.	22.721.349,00	139.828.647,00	4,43	27,28
4	Tyumen Reg.	19.527.105,00	117.107.298,00	3,81	22,85
5	St.Petersburg	18.868.697,00	97.580.193,00	3,68	19,04
6	Chelyabinsk Reg.	18.144.436,00	78.711.496,00	3,54	15,36
7	Nizhny Novgorod Reg.	15.785.347,00	60.567.060,00	3,08	11,82
8	Bashkortostan Republic	15.016.302,00	44.781.713,00	2,93	8,74
9	Samara Reg.	15.010.733,00	29.765.411,00	2,93	5,81
10	Tatarstan Republic	14.754.678,00	14.754.678,00	2,88	2,88

Table 2: The Top ten Russian Regions in Industrial Production in 1993 (nominal values in billion Rubles)

Position	Region Name	Output	Cumulative output	Share of total	Cumulative share
1	Tyumen Reg.	7.577.441,18	49.882.646,18	6,28	41,35
2	Moscow	6.017.114,40	42.305.205,00	4,99	35,06
3	Sverdlovsk Reg.	5.720.667,62	36.288.090,60	4,74	30,08
4	Samara Reg.	5.165.477,24	30.567.422,98	4,28	25,34
5	Chelyabinsk Reg.	4.590.862,74	25.401.945,74	3,81	21,05
6	Bashkortostan Republic	4.455.543,30	20.811.083,00	3,69	17,25
7	Krasnoyarsk Territory	4.451.465,09	16.355.539,70	3,69	13,56
8	Nizhny Novgorod Reg.	4.022.937,09	11.904.074,61	3,33	9,87
9	Moscow Reg.	4.006.478,55	7.881.137,52	3,32	6,53
10	Kemerovo Reg.	3.874.658,97	3.874.658,97	3,21	3,21

Table 3. Correlation of Regional Share of Nominal Industrial Output (1987 - 1993)

	1988	1989	1990	1991	1992	1993
1987	1,000	0,998	0,996	0,990	0,887	0,915
1988		0,999	0,997	0,991	0,884	0,913
1989			0,999	0,993	0,874	0,906
1990				0,994	0,860	0,895
1991					0,853	0,885
1992						0,990

Tables 1 and 2 document this second feature. In 1987 the ten largest regions produced over a third of the country's industrial output. In 1993 this share had risen to over 40%. Changes in

rank among the top ten have accompanied much of the restructuring process in transition. The most spectacular instance of this is the Tyumen - the largest oil producing region in Russia - which has moved from 4th place in 1987 to first place in 1993. Moscow region, that is the region surrounding the capital city, has lost its position moving from second to ninth position. Nonetheless, the production structure across region has remained relatively stable. The correlation of output structure of 1987 to 1993 is still very high, as shown in table 3. A further theme that emerges when looking at table 3 is that relocation, that is shifts in industrial production across space, started to take of after 1991 only. While the correlation coefficients of the share of industrial production of regions in 1987 with subsequent years remains relatively high until 1991, in 1992 there is a marked decrease. In 1993 the regional distribution of nominal industrial output remains rather unchanged relative to 1992. What we observe here therefore is mainly linked to the very unequal impact of price liberalisation in 1992 on Russian industry.

2 Electric Power Industry.

2.1 General remarks

The nominal output of Russia's electric power industry in 1993 grew by a factor of 490, since 1987 and by the factor of 464 since 1990. Electric power production in physical terms increased slightly by 2% from 1986 to 1993. However, this represents a fall relative to 1990. The output of 1993 was only 93% of the 1990 output. In average the growth rate of the physical volume of electric power output over regions was positive - 36% after 1986 and 14% after 1990, respectively. Power generation's output thus has been hit much less by transition than industry in average.

2.2 Regional contributions

The analysis of the nominal output distribution of the electric power industry over the Russian Federation for the time interval between 1987 and 1993 shows remarkable variation given, that the industrial infrastructure of this branch is mainly based on imobile plant equipment (Table 4 and Table 5) The largest ten regions in terms of production contributed 44,2% to the branch output in 1987. In 1990 this share was practically the same, but after this a shift in the contribution could be registered. In 1991 the share of production of the ten largest regions was down to 32,6%. Since then this share has slightly recovered to achieve 36,5% in 1993. The contribution of the smallest ten regions remains insignificant throughout; it increased only slightly from 0,32% in 1987 to 0,62% of the total branch output in 1993.

Table 4: The development of the Electric Power Industry (1987-1993)

	1987	1988	1989	1990	1991	1992	1993
Nominal output (bln. Rubles)	22,333	22,624	22,981	23,645	47,577	1,106,199	10,961,810
Real Output Index (% of previous year)	105.2	101.3	101.2	102	100.3	96.6	96.1

Table 5. Correlation of Regional Share of nominal output of the Power Industry (1987-1993).

	1988	1989	1990	1991	1992	1993
1987	0.997	0.992	0.990	0.883	0.817	0.831
1988	1.000	0.997	0.995	0.895	0.830	0.842
1989		1.000	0.995	0.892	0.835	0.845
1990			1.000	0.901	0.838	0.854
1991				1.000	0.923	0.926
1992					1.000	0.939
1993						1.000

Table 6. Top Ten Russian Regions in Output of the Electric Power industry in 1987 and 1993 (nominal values in billion rubles)

1987

Position	Region Name	Output	Cumulative output	Share of total	Cumulative share
1	Irkutsk Reg.	1,466.07	9,815.30	6.60	44.19
2	Sverdlovsk Reg.	1,245.15	8,349.23	5.61	37.59
3	Moscow	1,196.20	7,104.08	5.39	31.98
4	Tyumen Reg.	1,103.37	5,907.88	4.97	26.60
5	Bashkortostan Republic	924.58	4,804.51	4.16	21.63
6	Tatarstan Republic	886.73	3,879.93	3.99	17.47
7	Krasnoyarsk Territory	869.44	2,993.20	3.91	13.48
8	Samara Reg.	820.20	2,123.76	3.69	9.56
9	Leningrad Reg.	702.11	1,303.56	3.16	5.87
10	Kemerovo Reg.	601.46	601.46	2.71	2.71

1993

Position	Region Name	Output	Cumulative output	Share of total	Cumulative share
1	Tyumen Reg.	616,476.30	4,006,277.19	5.62	36.55
2	Sverdlovsk Reg.	557,978.43	3,389,800.89	5.09	30.92
3	Chelyabinsk Reg.	428,733.84	2,831,822.46	3.91	25.83
4	Bashkortostan Republic	420,404.76	2,403,088.62	3.84	21.92
5	Tatarstan Republic	349,012.99	1,982,683.86	3.18	18.09
6	Irkutsk Reg.	337,044.36	1,633,670.87	3.07	14.90
7	Perm Reg.	331,518.76	1,296,626.51	3.02	11.83
8	Kemerovo Reg.	326,688.48	965,107.75	2.98	8.80
9	Samara Reg.	321,277.29	638,419.27	2.93	5.82
10	St.Petersburg	317,141.98	317,141.98	2.89	2.89

Table 7. Distribution of number of regions and mean nominal output in billion Rubles by scale and dynamic groups in 1993

	Trifling	Small	Moderate	Average	Large	Great	Total
	Number of Regions						
Declining	15	17	3	6	2	2	45
Growing	21	8	2				31
Total	36	25	5	6	2	2	76
	Nominal Output in billion Rubles						
Declining	53,532	161,297	228,379	330,447	424,569	587,227	183,032
Growing	51,942	133,117	261,015				86,379
Total	52,605	152,279	241,433	330,447	424,569	587,227	143,608

As could be expected, the regions are rather stable in their ranking in terms of production, i.e. the large producers remain relatively large and the smallest persist to produce only little of the industry's output. The correlation between yearly output shows this stable situation in the output ranking of the Russian regions for the time period from 1987 to 1990. After 1990, however, the statistics decreases by 10%, which implies significant changes in regional contributions into electric power industrial output.

The results of histogram classification are presented in the map in the appendix. The leading group consists of two regions: Tyumen and Sverdlovsk, we call this group the "greatest output" group. It contributed 10,7% of the output together. Furthermore two regions with large output (7,5%), six regions with rather average output (18,1%), five regions with moderate output (11,2%), twenty five with small output (34%), and 37 regions producing together 17,7% with a negligible individual contribution were found.

Since 1991 Tyumen takes the leading position in the branch. In real terms it's production reached only 73% of the volume of 1990 in 1993. This represents a fall to the production levels of 1986. The same picture can be observed in the cases of Sverdlovsk and Samara. These produced 78% and 79% of their 1990 volume in 1993, respectively. The leader until 1990 was Irkutsk. In 1993 this region, however, produced only 86% of the 1987 volume. exhibiting a continuous decline along with Sverdlovsk, which took the second position after 1990.

The physical volume of output grew in thirty one regions and reduced in forty five. Generally, growth occurs in regions with low production levels, i.e. in regions such as Astrakhan, Tuva Republic and Bryansk (where the output increased by a factor of 2,5 after 1986 and 2 after 1990), but despite this substantial growth, these small producers remain negligible in absolute terms.

Saratov region, shows an exceptional development. There the volume of production of 1993 was higher than in 1987 by a factor of 1,6 which allowed this region to take the 6^{th} position in the country in 1992. If one considers regions with a nominal output of electric power industry above the country average (which was 140,536.04 bln. Rubles in 1993) then it becomes apparent that the large producers are most affected in this industry: Only Khabarovsk (by 16%) and Krasnoyarsk (5%), Voronezh (2%) along side with the above mentioned Saratov (22%) grew. All other twenty one regions with an above average output level reduced their production since 1990. In contrast, real growth was observed in 27 regions with a less than average output. Here the leading position is taken by Pskov where output increased by a factor of

10.22 since 1990. In Table 7. we present some data characterizing the peculiarities of the scale and dynamic of the regional output[1].

2.3 Summary

The Electric Power Industry of the Russian Federation went through a period, when the distribution of its output is growing above the levels of the late Soviet times. The absolute leaders of the Soviet epoch, generally, still preserve their positions, but the many small producers managed to raise their shares.

3. Fuel Industry

3.1 General remarks

The fuel industry of the Russian Federation takes the second position in its contribution to the country's industrial output. The share of the industry dropped from 8.65% in 1987 to 7.28% in 1991 and then jumped to 18.54% in 1992, due to price liberalisation. In 1993 it remained at the level of 16.3%. The nominal output of the branch grew by a factor of 446.3 since 1987, and 470 since 1990. The physical volume of production was approximately 71% of the year 1987 and 72% of the year 1990, in 1993. Fuel demmand has declined because of the transitionary recession in industry, income compression of private households and first steps of energy saving.

3.2 Regional Contributions

The location of fuel industry crucially depends on natural deposits of oil, gas, coal and peat, and hence it is concentrated around the sources of these raw materials. The dominant contributor to the branch output, with the leading position throughout the time period, is Tyumen. This region, due to its riches, also takes the leading position in the country's industrial output. Its prosperity is based on rich oil and gas deposits. The second position belongs to Bashkortostan Republic (oil and gas processing). The third in the "production hierarchy" is Kemerovo with rich deposits of coal. Generally, the fourth position is taken by Irkutsk Region (coal), Samara (gas and oil processing) usually ranks 4 to 6 in the country's rating. The Top ten regions contribute between 72-73% of the branch output.

The correlation matrix shows a very high correlation between the yearly outputs for the considered time interval. It is never less than 0.99. This points to the fact of a high stability of the regional rating due to the resource dependence of the industry.

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[1] Karachai-Cherkess Republic was not considered in this analysis as we have no data for its output growth. The nominal output figures allow us to consider this region in the context of the electric power industry as an "trifling case".

Histogram classification, yields evidence of the extremely high concentration in this industry and leads to the following set of groups: there is only one leader which can be termed a producer with "great" output - Tyumen - which produces 31.2% of the country's output in this industry, one "large" producer- Bashkortostan Republic (7.4%), three "average producers" (16.5%), four "moderate" (15,4%), nine "small" producers (21%), and 42 "trifling cases" with 8.5% of the output.

The growth rate of real output in 83% of the regions, including all significant producers, was negative: Their production dropped in average to 70% of the output of 1990. The absolute leader (Tyumen) lost 31% of its output. Twelve regions demonstrated some growth, in particular Kamchatka which tripled its output. But the absolute volume of production in all growing regions is insignificant and has practically no effect on the industry's output.

The distribution of the regions by scales (over mean or under countries mean) and dynamic groups (less or greater than 1 growth) shows that there are 18 "declining giants", 12 "growing midgets", and 42 "trifling regions". The average speed of decline among "giants" (with a fall of 22%) is slower than in "trifling" regions (32%). There is no "star" among the regions for the fuel industry.

3.3 Summary

Although the fuel industry experienced a continuos fall of output in real terms for all significant producers, this branch is getting more and more important in the country scales during transition. The structure of the branch output by regions remains stable. The strengthening of the energy carrier production oriented regions in the Russian industry leads to its output structure becoming noticeably more oriented towards unprocessed goods than it was in 1987-1988. Shifts in concentration measures and dynamic characteristics point to the possibility that large producers in the fuel industry can take a more and more influential roll in the country's economy.

4 Ferrous Metallurgy

4.1 General Remarks

Currently ferrous metallurgy holds the fifth position in the country's industrial output with a contribution of 8.3%. The nominal output of the industry grew by a factor of 347 since 1987 and 341 fold after 1990. The real production of the ferrous metallurgy dropped by 31% since the year 1987 and 33.5% since 1990.

Table 8: The development of the Fuel Industry (1987-1993)

	1987	1988	1989	1990	1991	1992	1993
Nominal Output (bln. Rubles)	44,092	44,891	44,233	41,907	86,189	3,205,543	19,678,175
Real Output Index (% to previous year)	102.2	101.8	98.6	96.7	94	87.5	88.1

Table 9. Correlation of Regional Share of nominal output of the Fuel Industry (1987-1993)

	1987	1988	1989	1990	1991	1992	1993
1987	1.000	1.000	0.999	0.996	0.995	0.992	0.990
1988		1.000	1.000	0.997	0.996	0.993	0.990
1989			1.000	0.998	0.997	0.993	0.991
1990				1.000	0.998	0.991	0.990
1991					1.000	0.995	0.992
1992						1.000	0.995
1993							1.000

Table 10. Top Ten Russian Regions in Output of the Fuel Industry in 1987 and 1993, in billion Rubles.

		1987			
Position	Region Name	Output	Cumulative output	Share of total	Cumulative share
1	Tyumen Reg.	14,234.21	32,341.08	32.34	73.47
2	Bashkortostan Republic	3,980.09	18,106.88	9.04	41.14
3	Kemerovo Reg.	3,292.94	14,126.79	7.48	32.09
4	Samara Reg.	1,947.24	10,833.85	4.42	24.61
5	Irkutsk Reg.	1,895.35	8,886.61	4.31	20.19
6	Orenburg Reg.	1,879.16	6,991.26	4.27	15.88
7	Komi Republic	1,506.15	5,112.10	3.42	11.61
8	Omsk Reg.	1,220.86	3,605.95	2.77	8.19
9	Tatarstan Republic	1,198.77	2,385.09	2.72	5.42
10	Perm Reg.	1,186.32	1,186.32	2.70	2.70
		1993			
Position	Region Name	Output	Cumulative output	Share of total	Cumulative share
1	Tyumen Reg.	6,133,394.22	14,479,067.51	31.17	73.59
2	Bashkortostan Republic	1,452,233.88	8,345,673.29	7.38	42.42
3	Kemerovo Reg.	1,204,039.56	6,893,439.41	6.12	35.04
4	Irkutsk Reg.	1,039,722.83	5,689,399.85	5.28	28.92
5	Samara Reg.	1,009,842.57	4,649,677.02	5.13	23.63
6	Perm Reg.	865,411.64	3,639,834.45	4.40	18.50
7	Omsk Reg.	825,977.85	2,774,422.81	4.20	14.10
8	Nizhny Novgorod Reg.	692,980.33	1,948,444.96	3.52	9.90
9	Komi Republic	642,383.63	1,255,464.63	3.26	6.38
10	Leningrad Reg.	613,081.00	613,081.00	3.12	3.12

Table 11. Distribution of the number of regions and mean output of the regions in billion Rublesby Scale and Dynamics groups in 1993

	Number of Regions						
	Trifling	Small	Moderate	Average	Large	Great	Total
Declining	42	9	4	3	1	1	60
Growing	12						12
Total	54	9	4	3	1	1	72
	Mean Output in billion Rubles						
Declining	31,958	460,771	756,688	1,084,534	1,452,233	6,133,394	322,586
Growing	26,677						26,677
Total	30,784	460,771	756,688	1,084,534	1,452,233	6,133,394	273,268

4.2 Regional Contribution

The branch infrastructure is based on a small number of regions, since the industry needs a very high concentration of industrial assets located in the neighborhood of the ferrous ore deposits and energy suppliers. The absolute and permanent leader is the region of Chelyabinsk with a contribution of 21.7-24% to branch output. The second position belongs to Sverdlovsk with 14-15.5%. Vologda region takes the third position (8-10.6%), and the region of Kemerovo (8-10.5%) is on fourth place throughout. The share of the top ten is usually very high, ranging from 78.6% to 83%. The bottom ten's share is less than 0.01% of the total industry's output.

The year 1992 was the time of fast changes in branch output structure. That year ferrous metallurgy lost nearly 17% of its real output, and substantial shifts in rank occurred in the top ten. For example, Nizhny Novgorod and Volgograd lost 17% and 36.5% of their output. The industry's leader Chelyabinsk, lost nearly 27% of its production volume. One can also see some changes in the correlation coefficient of regional ferrous metallurgy output from 1991 to 1992. Prior to 1992 output had been completely stable.

Histogram classification shows that there is a very significant gap between leading Chelyabinsk which is the only region with "great output" and contributes 21.7% to the total industrial production and Sverdlovsk, which is classified as the only "large" output region, contributing 14.5% to regional output. There are no "average" producers, while modest producers include the Vologda, Kemerovo and Lipetsk regions, which together contribute 30% to overall output. Belgorod region is the only element of the "small" producers group (6.3%). The rest of the regions produce 17.5% of the output.

Grouping of the regions by the scale and dynamic groups gives only four regions with slightly growing output in real terms. Only one of them can be considered a "star" - the Orenburg region (3.37%), but even this region only preserved its level of production at approximately the level of 1990. This allowed the region to move from the 9th to the 7th position in the output rating for the country. The leader Chelyabinsk lost nearly 41% of its output after 1990. The other growing regions (North Ossetian Republic (with a real growth rate of 26%), Ulyanovsk (2%) Kurgan (1.9%)) together produce 0.04% of the branch output. Hence, they may be termed "growing midgets". The 6 "declining giants" in average lost nearly 31% of their production volumes, but small producers lost even more in average (41%), the extreme case being the Komi Republic which lost nearly 75% of its ferrous metallurgy branch output.

Table 12: The development of the Ferrous Metallurgy Industry (1987-1993)

	1987	1988	1989	1990	1991	1992	1993
Nominal Output (bln. Rubles)	28,910	29,801	29,921	29,420	57,832	1,408,706	10,023,294
Real Output Index (% to previous year)	102.8	103	100.2	98.1	92.6	83.2	86.4

Table 13. Correlation of Regional Share of nominal output of the Ferrous Metallurgy (1987-1993)

	1987	1988	1989	1990	1991	1992	1993
1987	1	1.000	1.000	0.999	0.996	0.978	0.974
1988		1	1.000	0.999	0.997	0.980	0.977
1989			1	1.000	0.997	0.981	0.977
1990				1	0.998	0.984	0.979
1991					1	0.979	0.977
1992						1	0.994
1993							1

Table 14. Top Ten Russian Regions in Output of the Ferrous Metallurgy in 1987 and 1993 in billion Rubles.

1987

Position	Region Name	Output	Cumulative output	Share of total	Cumulative share
1	Chelyabinsk Reg.	7,178,287.00	22,769,846.00	24.85	78.83
2	Sverdlovsk Reg.	4,048,948.00	15,591,559.00	14.02	53.98
3	Vologda Reg.	2,704,640.00	11,542,611.00	9.36	39.96
4	Kemerovo Reg.	2,363,464.00	8,837,971.00	8.18	30.60
5	Lipetsk Reg.	2,159,911.00	6,474,507.00	7.48	22.42
6	Volgograd Reg.	1,122,879.00	4,314,596.00	3.89	14.94
7	Nizhny Novgorod Reg.	1,006,103.00	3,191,717.00	3.48	11.05
8	Moscow Reg.	738,290.00	2,185,614.00	2.56	7.57
9	Orenburg Reg.	726,054.00	1,447,324.00	2.51	5.01
10	Belgorod Reg.	721,270.00	721,270.00	2.50	2.50

1993

Position	Region Name	Output	Cumulative output	Share of total	Cumulative share
1	Chelyabinsk Reg.	2,168,420.33	8,308,599.45	21.65	82.94
2	Sverdlovsk Reg.	1,446,451.23	6,140,179.12	14.44	61.30
3	Vologda Reg.	1,067,680.28	4,693,727.89	10.66	46.86
4	Kemerovo Reg.	1,056,948.62	3,626,047.61	10.55	36.20
5	Lipetsk Reg.	894,835.12	2,569,098.99	8.93	25.65
6	Belgorod Reg.	632,867.53	1,674,263.87	6.32	16.71
7	Orenburg Reg.	338,078.30	1,041,396.34	3.37	10.40
8	Tula Reg.	260,028.10	703,318.04	2.60	7.02
9	Nizhny Novgorod Reg.	237,082.31	443,289.94	2.37	4.43
10	Volgograd Reg.	206,207.63	206,207.63	2.06	2.06

Table 15. Distribution of number of regions and means of regional output in billion Roubles groups by scales dynamic

Number of Regions

	Trifling	Small	Moderate	Average	Large	Great	Total
Declining	64	1	3		1	1	70
Growing	4						4
Total	68				1	1	74

Regional Output in billion Rubles

Declining	37,719.12	632,867.53	1,006,488.01	1,446,451.23	2,168,420.33	138,303.24
Growing	85,521.08					85,521.08
Total	40,531.00	632,867.53	1,006,488.01	1,446,451.23	2,168,420.33	135,450.15

4.3 Summary

Ferrous metallurgy as one of the most concentrated industrial branches of the Russian Federation has suffered substantially during transition. The unevenness of the output over the regions is growing, but the rating of regions regarding their contribution to the country's nominal output remains stable. The small producers feel the crisis more strongly than the group of large producers. The branch has only one significant producer, which managed to retain its production volume. The fall of production of ferrous metallurgy can be partially explained by the considerable decline of the demand from the machine building industry as well as the transport and finance problems.

5. Output of Non-ferrous metallurgy

5.1 General remarks

Non-ferrous metallurgy took the sixth position among the industrial branches of the Russian Federation in 1993. Its contribution to the country's industrial output was 7.6%. Its share has been growing from 4.9% in 1987 (tenth position) to 8.6% in 1992 (the fourth position). In 1993, however, it lost its position and was passed by electric power and ferrous metallurgy. The nominal branch output grew by a factor of 371 and 295 since 1987 and 1990, respectively. In 1993 the physical volume of the industrial branch output plunged to 60% of 1987 and 58% of the 1990 level.

5.2 Regional Contribution

The non-ferrous metallurgy of the Russian Federation is an example of an industrial branch with fastly changing regional contributions. The share of the top ten which ranges from 75% to 79.1% over the time period is stable, though. Thus, until 1992 the branch had two leading regions: Sverdlovsk and Krasnoyarsk, with very similar contributions of 16-20% to the branch output. Sverdlovsk was the first in 1987, 1988, 1990 and 1991. Krasnoyarsk was the leader in 1989, but after the year 1992 it took the leading position again with 25% to 26% of the total branch output, and Sverdlovsk plunged to 12.8% being passed by the Sakha (Yakut) Republic (5-13%). During the years 1987 to 1993 the following regions were always in the top ten: Irkutsk (4-4.7%), Murmansk (3.5-7.5%) and Magadan (2.8-5.6), but they took different positions. The third place was taken by Moscow during 1988 to 1990, but the capital was on the sixth position in 1992, and found itself on the 14th position the year after. The share of the bottom ten regions was 0.31% in 1988-89 and fell to 0.01 in 1993.

The analysis of the correlation matrix for the output of the non-ferrous metallurgy industry, as with other industries, suggests that the major shift in location was registered in 1990. 1993 was, however, also characterized by a smaller but significant shift.

Table 16. The development of the Ferrous Metallurgy Industry (1987-1993)

	1987	1988	1989	1990	1991	1992	1993
Nominal Output (bln. Rubles)	24,802	25,549	28,831	31,166	74,877	1,487,697	9,202,140
Output Index (% of previous year)	101.9	103.1	101.1	97.6	91.3	73.2	86.6

Table 17. Correlation of Regional Share of nominal output of the Non-ferrous Metallurgy (1987-1993)

	1987	1988	1989	1990	1991	1992	1993
1987	1	0.997	0.961	0.919	0.927	0.934	0.887
1988		1	0.963	0.917	0.921	0.928	0.889
1989			1	0.988	0.975	0.897	0.848
1990				1	0.979	0.849	0.796
1991					1	0.882	0.838
1992						1	0.985
1993							1

Table 18. Top Ten Russian Regions in Output of the Non-ferrous industry in 1987 and 1993, bln. Rubles.

1987

Position	Region Name	Output	Cumulative output	Share of total	Cumulative share
1	Sverdlovsk Reg.	5,047.31	18,850.30	20.35	76.00
2	Krasnoyarsk Territory	4,935.86	13,802.99	19.90	55.65
3	Moscow Reg.	1,601.86	8,867.13	6.46	35.75
4	Murmansk Reg.	1,350.64	7,265.26	5.45	29.29
5	Sakha (Yakut) Republic	1,320.95	5,914.62	5.33	23.85
6	Irkutsk Reg.	1,112.66	4,593.67	4.49	18.52
7	Magadan Reg.	1,051.85	3,481.01	4.24	14.03
8	Samara Reg.	903.66	2,429.17	3.64	9.79
9	Moscow	873.79	1,525.50	3.52	6.15
10	Orenburg Reg.	651.72	651.72	2.63	2.63

1993

Position	Region Name	Output	Cumulative output	Share of total	Cumulative share
1	Krasnoyarsk Territory	2,380,579.72	7,191,205.19	25.87	78.15
2	Sakha (Yakut) Republic	1,253,955.36	4,810,625.47	13.63	52.28
3	Sverdlovsk Reg.	1,181,605.39	3,556,670.11	12.84	38.65
4	Irkutsk Reg.	570,328.68	2,375,064.72	6.20	25.81
5	Murmansk Reg.	528,285.65	1,804,736.04	5.74	19.61
6	Magadan Reg.	448,978.72	1,276,450.39	4.88	13.87
7	Khakass Republic	228,045.21	827,471.67	2.48	8.99
8	Novosibirsk Reg.	205,997.49	599,426.46	2.24	6.51
9	Chelyabinsk Reg.	203,798.81	393,428.97	2.21	4.28
10	Kemerovo Reg.	189,630.16	189,630.16	2.06	2.06

Table 19. Distribution of regions and mean values of output in billion Rubles by scale-dynamic groups 1993

Number of Regions

	Trifling	Small	Moderate	Average	Great	Total
Declining	47	3	1	1	1	53
Growing	14					14
Total	61	3	1	1	1	67

Output in billion Rubles

Declining	41,327.39	515,864.35	1,181,605.39	1,253,955.36	2,380,579.72	156,719.26
Growing	64,023.95					64,023.95
Total	46,536.44	515,864.35	1,181,605.39	1,253,955. 36	2,380,579.72	137,350.09

Histogram classification suggests that Krasnoyarsk, which is the only region with "great output", has left Sakha (Yakut) republic far behind by 1993 making it an average producer. Sverdlovsk is the single "modest" producer. Irkutsk, Murmansk and Magadan are "small" producers. The 61 "trifling" regions produced 31% of the output only in 1993.

The growth of physical volume of production was positive in 14 regions with a total output share of 9.7% of production. Tuva republic increased its production 7.8-fold, but it produced less than 0.01% of the branch output. Among the growing regions one can point to Buryat Republic (which grew by 91%); Khabarovsk Territory (66%); Leningrad (65%); Voronezh (40%); Kaluga (38%); Tambov (37%); Amur (33%); Kostroma (29%); Tatarstan Republic (25%); Khakass Republic (18%); Yaroslavl (7%); Novosibirsk (5%); Volgograd (0.39%). The other 53 regions with any development of non-ferrous metallurgy suffered declines. The leader, Krasnoyarsk, lost nearly 37% of its 1990 output. The Sakha (Yakut) Republic lost 29% and Sverdlovsk 64%. The highest decline in real production volumes was observed in Moscow - down by 85.3%, and Sakhalin (89%).

Analysis of the regions in the scale and dynamic groups (less or greater than country's mean, growing or declining) allows us to pick up the two "stars": Khakass Republic 18% growth (228045.21 bln. Rubles output, 7th position), Novosibirsk -5% of real term growth (205997.49 bln. rubles output, 8 th-position) both located on the border between West and East Siberia. All other 12 growing regions can be considered "growing midgets" with aggregate production of 5.03% of the country's output. Eleven "Giants" producing 79% of the output show decline with the average value down to 63%. The 42 "residual" regions fell in average to 60% of the 1990 output.

5.3 Summary

Although non-ferrous metallurgy experiences a continuos fall in the physical volume of output in branch scales, the respective development of the industry over regions looks very different. The fall of production can be explained by the deteriorating conditions in the three to four most producing regions (especially in the city of Norilsk, the largest non-ferrous producer of the world). These regions totally define the situation in the non-ferrous metal market in the country. In contrast, one can point to some remarkable producers, who managed to increase their output volume even under conditions of the economic crisis. The distribution of the output by regions has a tendency to become more and more uneven.

6 Machine Building and Metal Cutting

6.1 General Remarks

Despite the economic crisis and a significant fall of production the machine building and metal cutting industry of the Russian Federation remains the largest contributor to the country's net product. The share of this industry in the industrial output of the country dropped from 31.2% in 1988 to 20.1% in 1993. The nominal output of the industry grew by a factor of 156.5 since 1987 (and 145 since 1990). The physical volume of production of the industry plunged to 89% and 77% of the corresponding production volume of 1987 and 1990, respectively.

6.2 Regional Contribution

The infrastructure of the machine building and m,etal cutting industry in the Russian Federation is traditionally concentrated in the North-West, Center, Ural and Povolzhsky economic regions, where many enterprises exist since the pre-world war time. The members of the top ten contributing regions stayed rather stable (see Table 22). One can always find the following regions in the top ten: Moscow, Chelyabinsk, Moscow Reg., Nizhny Novgorod, Samara, St.Petersburg, Sverdlovsk and the Tatarstan Republic. Changes in rank in the top ten can easily be explained by the growth of car producing regions. Here a typical example is given by Samara, which took the leading position as of the year 1992.

The share of the top ten regions in industrial output of the branch increased, during the considered time interval (from 40% up to 51%), and the contribution of the bottom ten decreased (from 0.8% down to 0.69%). Analysis of the correlation matrix for the output displays the fact that principal changes in the regional contribution were observed in the year 1992, when the branch lost nearly 14% of its production volume. The former leader of the branch, the capital Moscow, moved to the second place; at the same time the oldest Russian machine building center - St. Petersburg - fell from the second to the eightth position. Histogram classification highlights the scale differences between regions in machine building and metal cutting industrial output in 1993 (See the map in the appendix). The leader with "great output" produces 9.74%, the group with of "large output" regions consists of two regions which together produce 14.8% of the total output. Only one "average output" region with a share of production of 5,33%, could be identified. The "moderate output" group of regions consist of three regions with aggregated output of 14,8%; nine "small" regions produce 22% of the output, and the remaining 62 regions, with 36.3% of the output, all have a very small individual contribution.

Table 20. The development of the Machine Building and Metal Cutting Industry (1987-1993)

	1987	1988	1989	1990	1991	1992	1993
Nominal Output (bln. Rubles)	155,694	168,187	166,787	168,412	295,340	3,466,036	24,362,815
Growth Rate (% to previous year)	105.3	104.8	101.6	101.1	103.8	86.5	87.6

Table 21. Correlation of Regional Share of nominal output of the Machine Building and Metal Cutting Industry (1987-1993)

	1987	1988	1989	1990	1991	1992	1993
1987	1	0.999	0.982	0.995	0.994	0.896	0.882
1988		1	0.985	0.998	0.993	0.890	0.878
1989			1	0.984	0.973	0.863	0.861
1990				1	0.991	0.881	0.871
1991					1	0.926	0.912
1992						1	0.991
1993							1

Table 22. Top Ten Russian Regions in Output of the Machine Building and Metal Cutting Industry in 1987 and 1993 in billion Rubles.

		1987			
Position	Region Name	Output	Cumulative output	Share of total	Cumulative share
1	Moscow	12,083,034.00	70,083,239.00	7.59	44.02
2	St.Petersburg	9,631,325.00	58,000,205.00	6.05	36.43
3	Moscow Reg.	7,940,065.00	48,368,880.00	4.99	30.38
4	Nizhny Novgorod Reg.	7,056,867.00	40,428,815.00	4.43	25.40
5	Samara Reg.	6,406,383.00	33,371,948.00	4.02	20.96
6	Sverdlovsk Reg.	6,249,344.00	26,965,565.00	3.93	16.94
7	Chelyabinsk Reg.	5,966,331.00	20,716,221.00	3.75	13.01
8	Tatarstan Republic	5,939,983.00	14,749,890.00	3.73	9.27
9	Rostov Reg.	4,879,649.00	8,809,907.00	3.07	5.53
10	Bashkortostan Republic	3,930,258.00	3,930,258.00	2.47	2.47
		1993			
1	Samara Reg.	2,370,625.38	12,329,363.71	9.74	50.66
2	Moscow	1,829,266.30	9,958,738.33	7.52	40.92
3	Nizhny Novgorod Reg.	1,768,936.65	8,129,472.03	7.27	33.40
4	Moscow Reg.	1,298,744.63	6,360,535.38	5.34	26.13
5	Chelyabinsk Reg.	1,045,217.08	5,061,790.75	4.29	20.80
6	St.Petersburg	944,601.38	4,016,573.67	3.88	16.50
7	Sverdlovsk Reg.	934,155.41	3,071,972.29	3.84	12.62
8	Tatarstan Republic	750,066.60	2,137,816.88	3.08	8.78
9	Ulyanovsk Reg.	713,407.60	1,387,750.28	2.93	5.70
10	Yaroslavl Reg.	674,342.68	674,342.68	2.77	2.77

Table 23. Distribution of regions and Mean values of output in billion Rubles by scale-dynamic groups of Machine Building and Metal Cutting Industry in 1993

				Number of Regions			
	Trifling	Small	Moderate	Average	Large	Great	Total
Declining	58	8	3	1	1	1	72
Growing	4	1			1		6
Total	62	9	3	1	2	1	78
				Output in billion Rubles			
Declining	147,480	576,864	974,657	1,298,744	1,829,266	2,370,625	299,880
Growing	72,263	713,407			1,768,936		461,899
Total	142,628	592,035	974,657	1,29,8744	1,799,101	2,370,625	312,343

In six regions real output has grown: Sakha (Yakut) Republic increased its output by 66%, but its absolute volume remains negligible on country scales. Large producers, however, grew as well; Nizhny Novgorod, taking the third position in the contribution to national output, registered a growth of its production volume by 17% after 1990. Ulyanovsk managed to grow by 15%. All other considered regions experience a considerable decline.

51 regions were found to be declining with individual output less than the country's branch mean, that is "residual cases". Two regions are growing and are over the mean value. ("stars"). Furthermore there were 21 declining regions with an above average output ("declining giants"), and four "growing midgets" could be identified. The increase among the "growing midgets" is in average higher than among "stars" (33% versus 16%), and "declining giants" are dropping more slowly in average than the "residual" regions (with an index value of 0.76 and 0.71, respectively).

6.3 Summary

The machine building and metal cutting industry of the Russian Federation experienced a deep fall of production volume over all of the country (93% of all regions). It is an example of a branch, where only some traditionally strong producers with market oriented output can survive the transition period. This causes the growth of heterogeneity among the Russia's regions. Some growth is observed in the peripheral regions, where the growing local demand can be explained by the difficulties in inter-regional co-operation and transportation.

7. Chemical and Petro-chemical Industry

7.1 General Remarks

The chemical and petro-chemical industry used to take the sixth to eighth position regarding its contribution to the country's industrial output. In the year 1993 the industry took the 7th place, with an overall share of 6.85%. The nominal output growth was rather equal since the years 1987 and 1990 - 213 and 212-fold respectively. In terms of these years the industry lost 41 and 43.5% of its real output by 1993.

Table 24. The development of the Chemical and Petro-chemical Industry (1987-1993)

	1987	1988	1989	1990	1991	1992	1993
Nominal Output (bln. Rubles)	25,440	26,645	26,660	25,556	54,134	885,426	5,401,747
Growth Rate (% to previous year)	103.7	104.7	100	96.7	91.7	74.9	82.3

Table 25. Correlation of Regional Share of nominal output of the Chemical Industry (1987-1993)

	1988	1989	1990	1991	1992	1993
1987	0.999	0.967	0.991	0.877	0.909	0.886
1988		0.967	0.991	0.883	0.914	0.892
1989			0.965	0.868	0.861	0.864
1990				0.899	0.924	0.903
1991					0.860	0.838
1992						0.969

Table 26. Top Ten Russian Regions in Output of the Chemical Industry in 1987 and 1993 in billion Rubles.

		1987			
Position	Region Name	Output	Cumulative output	Share of total	Cumulative share
1	Nizhny Novgorod Reg.	1,844.77	12,157.54	7.60	50.11
2	Moscow Reg.	1,584.60	10,312.77	6.53	42.51
3	Perm Reg.	1,448.77	8,728.170	5.97	35.98
4	Samara Reg.	1,374.23	7,279.40	5.66	30.01
5	Tula Reg.	1,162.10	5,905.16	4.79	24.34
6	Bashkortostan Republic	1,011.58	4,743.06	4.17	19.55
7	Kemerovo Reg.	973.28	3,731.48	4.01	15.38
8	Tatarstan Republic	942.70	2,758.20	3.89	11.37
9	Saratov Reg.	916.50	1,815.50	3.78	7.48
10	Altai Territory	899.00	899.00	3.71	3.71
		1993			
1	Samara Reg.	451,062.81	2,734,525.30	8.35	50.62
2	Perm Reg.	402,535.96	2,283,462.49	7.45	42.27
3	Nizhny Novgorod Reg.	299,205.27	1,880,926.53	5.54	34.82
4	Moscow Reg.	268,535.36	1,581,721.26	4.97	29.28
5	Tula Reg.	244,742.48	1,313,185.90	4.53	24.31
6	Bashkortostan Republic	242,631.49	1,068,443.42	4.49	19.78
7	Kemerovo Reg.	224,219.58	825,811.93	4.15	15.29
8	Krasnoyarsk Territory	220,502.70	601,592.35	4.08	11.14
9	Tatarstan Republic	195,539.93	381,089.65	3.62	7.05
10	Volgograd Reg.	185,549.72	185,549.72	3.43	3.43

Table 27. Distribution of number and mean output (in billion Rubles)of regions by scales and dynamic groups in 1993

				Number of Regions			
	Trifling	Small	Moderate	Average	Large	Great	Total
Declining	46	12	7	4		2	71
Growing	3						3
Total	49	12	7	4		2	74
				Output in billion Rubles			
Declining	17,433.26	110,393.05	194,230.42	263,778.65		426,799.39	75,985.53
Growing	2,258.41						2,258.41
Total	16,504.18	110,393.05	194,230.42	263,778.65		426,799.39	72,996.59

7.2 Regional Contributions

The rating of the regions of the Russian Federation in terms of the nominal output of the chemical and petro-chemical industry is very unstable. The regions change their order every year, and in contrast to most other industries, one can not point to a constant leader. The leader of 1993, Samara which contributed 8.4% to the nations output, took the 4th position from 1987 to 1990 (with a share of production of 5-5.8%), 6th position in 1991 (4.3%), and 3rd position in 1992 (5.6%). Perm was the second in 1993 (7.5%). This region took the third position from 1987 to 1990 (5.7-6.2%), fourth position in 1991 (5.2%), and the first in 1992 with 7.5%. One can always find the following regions in the top ten: Nizhny Novgorod (leader of 1987-88 with 7.2-7.3%), Moscow Reg. (leader of 1989 with 6.9%), Tula (usually 4th position with 4.5-5.3%). The capital of Moscow took the first place in 1991 with 6.9% and then left the top ten, dropping to the 18th position in 1993. The aggregate share of the top ten is always around 49% to 51% of the total branch output and is slightly growing the last years. The contribution of the bottom ten regions is negligible and fell from 0.09% down to 0.01%.

Correlation analysis detects significant changes in the regional contribution rating in 1991 and especially in 1992, when the industry lost 25% of its output relative to 1991. The average fall of regional output was 28%.

Histogram grouping for 1993 reveals a group of 2 regions with "great output" - Samara and Perm with 15.8% of the branch output, no "large producer", four "average" scale regions: Nizhny Novgorod, Moscow, Tula, Bashkortostan Republic with 19.5% of the total output, and twelve small producers with altogether 37.4% of the output. The impact of the remaining 49 regions is 27.3%.

Growth of output in physical terms was observed in 3 regions only: Kabardino-Balkar Republic increased its otput by over three-fold but its share of production was only 0.014%, Penza and Ulyanovsk which also had shares of production below 0.01%. A fall in production was observed in 71 regions with an average reduction of 48% of the output in terms of 1990. The largest reductions were detected in Moscow (77%), Bryansk (78%) and Sakhalin (88%). The group of leaders lost in average 36% of their output. The lowest decline among significant producers was seen in Volgograd with a fall of 8% production in 1993 and Tomsk which lost 12%.

Scale and dynamic grouping displays only three " growing midgets" mentioned above, 25 "declining giants" and 46 "residual" regions. The average loss in the latter group is 48%, however, in the "giant" group this indicator runs at a loss of 37%. There are no "star" cases.

7.3 Summary

The Chemical and petro-chemical industry is one of the most depressed branches in the Russian economy. The branch output structure is experiencing permanent changes and only few regions retain their positions. Despite this, the regional fall was rather evenly distributed with some exception in the case of the moderate producers. This implies that these producers lost less than the giants and, especially, small ones. The concentration of the industrial output has been rising, i.e. the mentioned moderate producers in the top ten are more resistant to the crisis than the others. One can expect a very noticeable re-distribution in the regional structure of the chemical and petro-chemical industry.

8. Forestry, Wood Processing and Paper Pulp

8.1 General remarks

The share of the forestry, wood processing and paper pulp industry in the country's industrial output, with the exception of 1991, has been declining since 1987. Its 1987 share was 5.62% (7^{th} position), and in 1993 it was 4.76% (9^{th} position). 1991 showed a sudden shift in the industry's position in the Russian economy, and its share achieved its peak at the level of 5.82% (7^{th} position). Since 1987 the nominal output of the industry increased by a factor of 182, and since 1990 by a factor of 176.6. In 1993 the physical volume of production reduced to 75.7% of the 1987 and 71.8% of the 1990 level, respectively.

8.2 Regional Contribution

From 1987 to 1990 the rating of the nine leading contributors to branch output was absolutely stable: Irkutsk contributed 8 to 8.3% to branch output during those years, Arkhangelsk held a share of 6.3 to 6.7%, Krasnoyarsk was third throughout, with a contribution of 5.1-5.2%, Perm (4.2-4.5%), Sverdlovsk(3.8-4.1%), Komi Republic (3.8%), Republic Karelia (3.4%), Leningrad (3-3.5%) and Moscow Reg. (2.9-3.1%) followed. The aggregate production of these regions contributed 41% to 42% of the branch output.

In 1991 the shares of Komi Republic and Republic Karelia rose to the fifth and sixth position, and the share of Sverdlovsk dropped to the seventh, but the leaders preserved their order. Moscow region fell to the tenth place, and the ninth position was taken by Nizhny Novgorod. In 1992 the Karel Republic entered on the fourth position between Archangelsk and Krasnoyarsk. The order in the leading group remained practically the same. Next year

Table 28. The development of the Chemical and Petro-chemical Industry (1987-1993)

	1987	1988	1989	1990	1991	1992	1993
Nominal Output (bln. Rubles)	28,657	29,809	30,014	29,598	68,874	822,633	5,227,134
Growth Rate (% to previous year)	101.9	104	101	98.8	91	89.4	88.1

Table 29. Correlation of Regional Share of nominal output of the Forestry, Wood Processing and Paper Pulp Industry (1987-1993)

	1987	1988	1989	1990	1991	1992	1993
1987	1	1.000	0.998	0.997	0.990	0.975	0.980
1988		1	0.999	0.998	0.990	0.973	0.980
1989			1	0.999	0.990	0.970	0.978
1990				1	0.988	0.966	0.977
1991					1	0.973	0.974
1992						1	0.978
1993							1

Table 30. Top Ten Russian Regions in Output of the Forestry, Wood Processing and Paper Pulp Industry in 1987 and 1993 in billion Rubles.

			1987		
Position	Region Name	Output	Cumulative output	Share of total	Cumulative share
1	Irkutsk Reg.	2,385.77	12,821.43	8.36	44.93
2	Arkhangelsk Reg.	1,931.48	10,435.65	6.77	36.57
3	Krasnoyarsk Territory	1,470.08	8,504.17	5.15	29.80
4	Perm Reg.	1,289.75	7,034.09	4.52	24.65
5	Sverdlovsk Reg.	1,148.96	5,744.35	4.03	20.13
6	Komi Republic	1,103.25	4,595.38	3.87	16.10
7	Republic Karelia	1,028.96	3,492.14	3.61	12.24
8	Leningrad Reg.	841.15	2,463.18	2.95	8.63
9	Moscow Reg.	835.57	1,622.03	2.93	5.68
10	Nizhny Novgorod Reg.	786.46	786.46	2.76	2.76
			1993		
1	Irkutsk Reg.	482,749.90	2,505,331.33	9.24	47.93
2	Arkhangelsk Reg.	394,155.46	2,022,581.43	7.54	38.69
3	Republic Karelia	256,366.44	1,628,425.97	4.90	31.15
4	Krasnoyarsk Territory	226,530.64	1,372,059.53	4.33	26.25
5	Perm Reg.	221,876.43	1,145,528.89	4.24	21.92
6	Komi Republic	219,209.23	923,652.46	4.19	17.67
7	Moscow	201,500.60	704,443.23	3.85	13.48
8	Moscow Reg.	186,903.88	502,942.63	3.58	9.62
9	Sverdlovsk Reg.	166,016.83	316,038.75	3.18	6.05
10	Leningrad Reg.	150,021.92	150,021.92	2.87	2.87

Table 31. Distribution of number and Mean output in billion Rubles of regions by scale and dynamic groups in 1993

				Number of Regions			
	Trifling	Small	Moderate	Average	Large	Great	Total
Declining	47	7	6	1	1	1	63
Growing	13	2					15
Total	60	9	6	1	1	1	78
				Output in billion Rubles			
Declining	25,885.84	129,046.71	203,672.94	256,366.44	394,155.46	482,749.90	71,036.04
Growing	39,848.29	116,852.92					50,115.57
Total	28,911.03	126,336.98	203,672.94	256,366.44	394,155.46	482,749.90	67,012.88

the capital Moscow jumped from the 5th position up to the 3rd, Moscow region stayed on the eighth place, and the rest in the top ten moved down. Irkutsk and Arkhangelsk region always took the first and the second positions, respectively, with shares 8-11.2% and 6-9.2% of the country's branch output. The top ten in the forestry, wood processing and paper pulp industry produced 44-52% of the branch production.

Correlation analysis points to some changes after 1991, but these changes remain small due to the resource dependence of this industry. Following the histogram principle, we have one leader with "great" output - Irkutsk. Arkhangelsk region is the only "large" producer. Karel finally is the only member of the "average" output regions. The group of moderate producers consist of 9 regions with overall production of 31.6%. There are two small producers with 5.2% of the branch output. All others produce nearly 35% of the branch output.

Thirteen regions of the federation experienced some growth of production with an average value of 11% since 1993. These are: Voronezh 38%, Tatarstan Republic 0.26%, Volgograd 25%, Kemerovo 16%, Stavropol Territory 14%, Novosibirsk 14%, Altai Territory 14%, Ryazan 8.5%, Chelyabinsk 3.6%, Krasnodar Territory 2.9%, Samara 2.7%, Nizhny Novgorod 2.1%, Orel 2%. Of these regions, however, only Kemerovo, Chelyabinsk and Nizhny Novgorod had shares of production above 1% of the country. Tomsk and Vladimir preserved their branch output volume at the 1990 level. The contribution of the regions with some growth to the branch output is about 14.4%.

The Physical output growth rate since 1990 was negative in 63 regions. The average reduction of production was nearly 22% among these regions. The leader, Irkutsk, lost nearly 30%, Arkhangelsk followed with a loss of 24%.

The analysis of scale-dynamic groups gives two "stars" for the industry: Nizhny Novgorod and Krasnodar Territory with the average growth rate of 2.5%. There are 13 "growing midgets" in the industry rising in average with 13%. The 19 regions were considered as "declining giants". The average fall in this group is about 19%. Forty four regions can be considered as "residual cases" with a mean decline of production of 24% level. The smallest reduction was observed in the group of "moderate producers" - 13%.

8.3 Summary

In conditions of economic crisis, the branch experiences continued decline in its real output volume. There is no serious redistribution of the output among regions, i.e. all significant producers are loosing volumes of the output to the same extent. One can detect a tendency of the central (in a geographical sense) regions of the country to loose slightly more than those close to the sea-ports and communication links. This is due to transport dependence of the industry, the lack of the high enough local demand and absence of processing capacities necessary to provide the output of high value added production.

Table 32. The development of the Construction Materials Industry (1987-1993)

	1987	1988	1989	1990	1991	1992	1993
Nominal Output (bln. Rubles)	19274	19938	20190	195144	44151	562338	5124816
Growth Rate (% of previous year)	103.3	104.8	102.4	99.1	97.6	83.2	87.6

Table 33. Correlation of Regional Share of nominal output of the Construction Materials Industry (1987-1993)

	1988	1989	1990	1991	1992	1993
1987	0.999	0.997	0.994	0.969	0.951	0.933
1988		0.999	0.994	0.970	0.952	0.935
1989			0.995	0.970	0.953	0.933
1990				0.982	0.956	0.937
1991					0.962	0.957
1992						0.978

Table 34. Top Ten Russian Regions in Output of the Construction Materials Industry in 1987 and 1993 in billion Rubles.

Position	Region Name	Output	Cumulative output	Share of total	Cumulative share
		1987			
1	Moscow Reg.	1,152,64	6,483,27	6.03	33.94
2	Sverdlovsk Reg.	954,05	5,330,63	5.00	27.91
3	Moscow	741,51	4,376,58	3.88	22.91
4	Tyumen Reg.	704,05	3,635,07	3.69	19.03
5	Krasnodar Territory	549,59	2,931,02	2.88	15.35
6	Irkutsk Reg.	528,27	2,381,43	2.77	12.47
7	Chelyabinsk Reg.	470,75	1,853,15	2.46	9.70
8	Maritime (Primorsky) territory	470,39	1,382,40	2.46	7.24
9	St.Petersburg	460,09	912,01	2.41	4.77
10	Tatarstan Republic	451,93	451,93	2.37	2.37
		1993			
1	Moscow Reg.	362,802.20	1,915,716.58	7.09	37.42
2	Moscow	310,376.46	1,552,914.38	6.06	30.33
3	Sverdlovsk Reg.	242,937.74	1,242,537.92	4.75	24.27
4	Samara Reg.	164,314.84	999,600.18	3.21	19.53
5	Perm Reg.	156,801.77	835,285.34	3.06	16.32
6	Krasnodar Territory	141,904.53	678,483.57	2.77	13.25
7	Tatarstan Republic	140,321.45	536,579.04	2.74	10.48
8	Chelyabinsk Reg.	140,273.50	396,257.59	2.74	7.74
9	Bashkortostan Republic	131,777.78	255,984.09	2.57	5.00
10	Krasnoyarsk Territory	124,206.31	124,206.31	2.43	2.43

Table 35. Distribution of number and mean output in billion Rubles of regions by scales and dynamic groups in 1993

	Trifling	Small	Moderate	Large	Great	Total
			Number of Regions			
Declining	48	18	5	1	2	74
Growing	1		3			4
Total	49	18	8	1	2	
			Output in billion Rubles			
Declining	30,091.56	89,094.70	138,797.11	242,937.74	336,589.33	62,948.67
Growing	32,472.55		142,967.00			115,343.39
Total	30,140.15	89,094.70	140,360.82	242,937.74	336,589.33	65,635.58

9. Output of Construction Materials Industry

9.1 General Remarks

The construction materials industry usually takes the 10-th position among the twelve industrial groups considered. The share of the industry in the country's industrial output slightly varies between 3.25% (1992) and 4.25% (1993). The nominal output grew by a factor of 265.9 as compared to 1987 and 262.6 after 1990. The physical output of the industry in 1993 was 78% and 71% of the output volume of these years, respectively. The average fall of physical output over the regions since 1990 was 30%.

9.2 Regional Contributions

Although the industry is broadly spread over the country, due to rather stable demand for construction materials almost everywhere, it has a constant leader: the region of Moscow (which contributes 6.0% to 7.9% to national output). The second position is taken alternately by Sverdlovsk(3.7%-5%) and the capital Moscow (3.8%-6%). One can also point to some regions, such as Krasnodar Territory and Tatarstan Republic, which were always in the top ten during 1987-93. The regions of Siberia: Tyumen, Irkutsk and Maritime (Primorsky) Territory dropped from the leading ten in 1992-93, and their positions were taken by the regions from the Ural and Pre-Volga zones: Samara, Perm, Chelyabinsk, Bashkortostan Republic entered the top ten. The top ten contribute 32%-37% of the branch output.

Correlation analysis points to the fact, that those changes that did take place in the regional contributions, occurred during 1992 and 1993. The analysis of the scales of the regional output volumes of construction materials over regions allows us to define two "great output", regions located around the capital Moscow, with an aggregated annual output of 13.2% of the country's production in 1993. Sverdlovsk can be considered a "large" producer. No "average" producer was found in the branch. Eight regions belong to the "moderate" group with 22% of the branch output. The group of "small" producers consists of 18 regions (31.3%), and the other 49 regions represent residual cases with a total output of 28.9%.

Three regions exhibited real growth since 1990. All these three regions belong to the "moderate" scale group. They are: Perm with a growth of 17.5% (156801.77 bln. output and 3.6% of the branch output, 5-th position), Tatarstan Republic 3% (140321.45 bln., 2.73%. out., 7-th), Bashkortostan Republic 2% (131777.78 bln., 2.6%. out., 9-th), and one very small producer preserved its level -Udmurt Republic 0.4% (32472.55 bln., 0.6%. out., 53-th). All other regions experienced a decline of the real volume of production. Thus, the leader the region of Moscow, lost 32% of its output, the capital Moscow lost 12%. The average loss over regions was 32%. However, the industry in the regions of Khabarovsk lost 57% of its production volume, in Adygei republic 59%, in Tuva republic nearly 70%. One can see, that the moderate producers lost in average 14% and the residual group 35% (in average).

Joint scale-dynamics analysis points to 3 "stars" in the industry and one "growing midget". It is interesting to remark that all are located close to each other. 25 regions can be called "declining giants". The average fall of production volume in this group is 27%, which is less than the fall among the residual producers. In the latter group the volume of the real output dropped in average by 35%.

9.3 Summary

The construction materials industry remains one of the most broadly distributed branches. Its regional production volume is the most homogeneous over the country. Despite the continuos fall of the physical volume of production in the branch, some regions in the Po-volzhski and Ural zones managed to raise their output. The "moderate" producers remain the most resistant to crisis, however, the leaders and outsiders are loosing two times more. The loss of the extreme cases and the increase in shares of intermediate producers causes redistribution of the regional production shares in the branch output toward growing concentration.

10 Glass and China-pottery Industry

10.1 General remarks

The glass and china-pottery industry makes the smallest contribution to the industrial output among the considered branches. Its share varies between 0.31%- 0.35% of total industrial output in the Russian Federation. Since 1987 the nominal output of the industry grew by a factor of 265.8, and since 1990 by 233.8. This is the only industry where the physical volume of the output in 1993 grew (by 22% after 1987 and by 3.8% since 1990). This positive development occurred due to the sharp increase of the physical output volume by 6.5% in 1991.

10.4 Regional Contribution

The region of Vladimir is the constant leader in the industry, with shares of 10-15% in the branch output, due to traditional production of the high fidelity crystal articles with high value added. The share of the region in the branch output is declining, though. In 1987-89 the second position was taken by Tver (7.3-7.4%), in 1990-91 by Moscow (9.1%) and in 1992 as well as 1993 by Nizhny Novgorod (9.8-9.9%). During 1987-93 one can consistently find the following regions in the top ten: Bashkortostan Republic (5.5-9%), Moscow Reg. (5.9-7.2%),Saratov (5.3-7.3%), Bryansk (3.4-5.2%), Sverdlovsk (3.2-4.8%). In 1987 the contribution of the top ten was 72.49% of the branch output, and it consequently dropped to 66.26% in 1993.

Correlation analysis shows that the year of 1992 was the turning-point in the industry, both in terms of the physical volume of industrial output, as well as in the rating of the regional con-

tributions. In this year the industry stopped its growth, the share of the leader dropped from 14.6% to 10.5%. Although the slump in 1993 was still more serious than in 1992, there were fewer changes in the ranking of the regions with respect to their output.

There are 66 regions where the glass and china-pottery industry is developed. They can be divided into 6 size classes in the following way: there are two "great" producers: Vladimir and Nizhny Novgorod (nearly 21% of the branch output). Two "large" producers- Tver and Bashkortostan Republic (16.7%) , two "average" - Moscow and Saratov (nearly 13%), one "moderate" - Sverdlovsk, nine "small" producers with 24.6%, and the other 50 with 21.1%.

There are 25 regions with growing physical output. The Glass and China-pottery industry is the only industry, where the leader is growing (by 1% in physical units). The region of Sverdlovsk (a "moderate" producer taking the 7th position) increased its physical production by 248% the region of Volgograd by 40.73%, Moscow - 34.74% , St.Petersburg - 27.53%, Kemerovo - 18.53%. Declines were registered in 41 regions, the average decline over regions being 29%. The second largest producer Nizhny Novgorod lost 6%. In Kostroma, Sakhalin and in the Khakass Republic production dropped by 66%, but the absolute scales of the regions (0.01% of the branch output) show that this fall is not very important for the industry.

Following our division one can state that Glass and China-pottery has nine "stars": Vladimir 1% growth, Sverdlovsk 3.5%, Volgograd 40.73%, Moscow 34.74%, St.Petersburg 27.53%, Kemerovo 18.53%, Irkutsk 3.47%, Amur 31.59%, Chelyabinsk 6.62%. These regions produce 54.43% of the branch output. Sixteen regions can be considered as "growing midgets", ten as "declining giants", and 31 regions are constitute the "residual" group. One can see that "midgets" are growing nearly 1.8 faster than "stars" (by 83% versus 46%), and "giants" are declining more slowly than "residual" regions - 7% in average versus 35%.

10.3 Summary

The glass and china-pottery industry is the smallest industry in Russia's economy. Under conditions of the economic crisis this is the only branch that hasgrown in physical output volume. It is an industry with average concentration of output and a slight tendency to become more evenly distributed. One can say that the situation in the branch is better than in all other eleven branches considered in this work.

Table 36. The development of the Glass and China-pottery Industry (1987-1993)

	1987	1988	1989	1990	1991	1992	1993
Nominal Output (bln. rubles)	1,595	1,723	1,783	1,813	4,056	57,517	424,136
Growth Rate (% to the previous year)	103.8	106.9	104.3	102.2	108.7	99.7	95.8

Table 37. Correlation of Regional Share of nominal output of the Glass and China-pottery Industry (1987-1993)

	1988	1989	1990	1991	1992	1993
1987	0.996	0.992	0.988	0.979	0.945	0.940
1988		0.998	0.994	0.983	0.929	0.931
1989			0.997	0.987	0.918	0.923
1990				0.991	0.916	0.917
1991					0.905	0.904
1992						0.985

Table 38. Top Ten Russian Regions in Output of the Glass and China-pottery Industry in 1987, mln. Rubles.

Position	Region Name	Output	Cumulative output	Share of total	Cumulative share
1	Vladimir Reg.	244,630.00	1,167,210.00	15.19	72.49
2	Tver Reg.	127,708.00	922,580.00	7.93	57.30
3	Nizhny Novgorod Reg.	124,191.00	794,872.00	7.71	49.37
4	Moscow	120,481.00	670,681.00	7.48	41.66
5	Bashkortostan Republic	116,351.00	550,200.00	7.23	34.17
6	Saratov Reg.	111,466.00	433,849.00	6.92	26.95
7	Moscow Reg.	95,237.00	322,383.00	5.92	20.02
8	Bryansk Reg.	87,578.00	227,146.00	5.44	14.11
9	Sverdlovsk Reg.	71,016.00	139,568.00	4.41	8.67
10	Krasnodar Territory	68,552.00	68,552.00	4.26	4.26

Table 39. Top Ten Russian Regions in Output of the Glass and China-pottery Industry in 1993, bln. Rubles.

Position	Region Name	Output	Cumulative output	Share of total	Cumulative share
1	Vladimir Reg.	47,527.15	273,626.08	11.51	66.26
2	Nizhny Novgorod Reg.	41,195.75	226,098.93	9.98	54.75
3	Tver Reg.	37,172.17	184,903.18	9.00	44.78
4	Bashkortostan Republic	33,785.84	147,731.01	8.18	35.78
5	Moscow Reg.	29,242.05	113,945.17	7.08	27.59
6	Saratov Reg.	25,802.80	84,703.12	6.25	20.51
7	Sverdlovsk Reg.	16,313.62	58,900.32	3.95	14.26
8	Krasnodar Territory	14,445.12	42,586.70	3.50	10.31
9	Bryansk Reg.	14,202.75	28,141.58	3.44	6.81
10	Kemerovo Reg.	13,938.83	13,938.83	3.38	3.38

Table 40. Distribution of regions by scale-dynamic groups of Glass and China-pottery Industry.

	Trifling	Small	Moderate	Average	Large	Great	Total
Declining	31	5		2	2	1	41
Growing	19	4	1			1	25
Total	50	9	1	2	2	2	66

Table 41. Mean values of Glass and China-pottery Industry output in scale-dynamic groups.

	Trifling	Small	Moderate	Average	Large	Great	Mean
Declining	1,419.02	11,659.88		27,522.43	35,479.00	41,195.75	6,572.87
Growing	2,402.14	11,507.79	16,313.62			47,527.15	6,220.50
Total	17,92.61	11,592.28	16,313.62	27,522.43	35,479.00	44,361.45	6,439.40

Table 42. The development of the Light Industry (1987-1993)

	1987	1988	1989	1990	1991	1992	1993
Nominal Output (bln. Rubles)	62,996	65,100	66,495	66,350	192,250	1,226,764	6,193,436
Growth Rate (% to prev. year)	101	103.5	102.3	99.9	91	79	83.3

Table 43. Correlation of Regional Share of nominal output of the Light Industry (1987-1993)

	1988	1989	1990	1991	1992	1993
1987	1.000	0.999	0.999	0.985	0.979	0.984
1988		1.000	0.999	0.986	0.980	0.984
1989			1.000	0.988	0.980	0.983
1990				0.988	0.979	0.983
1991					0.981	0.959
1992						0.978

Table 44. Top Ten Russian Regions in Output of the light industry in 1987 and 1993 in billion rubles.

		1987			
Position	Region Name	Output	Cumulative output	Share of total	Cumulative share
1	Moscow Reg.	7,841.66	32,968.47	12.45	52.34
2	Moscow	6,045.24	25,126.81	9.60	39.89
3	Ivanovo Reg.	5,880.76	19,081.58	9.34	30.29
4	St.Petersburg	3,058.01	13,200.81	4.85	20.96
5	Vladimir Reg.	2,763.74	10,142.81	4.39	16.10
6	Tver Reg.	1,911.21	7,379.07	3.03	11.71
7	Nizhny Novgorod Reg.	1,475.77	5,467.86	2.34	8.68
8	Stavropol Territory	1,371.18	3,992.10	2.18	6.34
9	Ulyanovsk Reg.	1,317.87	2,620.92	2.09	4.16
10	Krasnodar Territory	1,303.05	1,303.05	2.07	2.07
		1993			
1	Moscow Reg.	733,473.60	3,088,770.34	11.84	49.87
2	Moscow	552,967.49	2,355,296.74	8.93	38.03
3	Ivanovo Reg.	489,904.75	1,802,329.25	7.91	29.10
4	St.Petersburg	295,927.54	1,312,424.50	4.78	21.19
5	Vladimir Reg.	244,666.55	1,016,496.96	3.95	16.41
6	Bashkortostan Republic	183,600.25	771,830.41	2.96	12.46
7	Tver Reg.	170,983.16	588,230.16	2.76	9.50
8	Ulyanovsk Reg.	146,789.33	417,247.00	2.37	6.74
9	Nizhny Novgorod Reg.	142,446.93	270,457.67	2.30	4.37
10	Volgograd Reg.	128,010.74	128,010.74	2.07	2.07

Table 45. Distribution of regions and mean production in billion Rubles by scale-dynamic groups in 1993

			Number of regions			
	Trifling	Small	Moderate	Large	Great	Total
Declining	57	7	2	2	1	69
Growing	9					9
Total	66	7	2	2	1	78
			Output in billion Rubles			
Declining	45,316.22	146,287.49	270,297.05	521,436.12	733,473.60	85,854.73
Growing	29,939.94					29,939.94
Total	43,219.45	146,287.49	270,297.05	521,436.12	733,473.60	79,403.03

11. Light Industry

11.1 General remarks

In the years 1987 to 1993 the light industry of the Russian Federation sequentially lost its position in the structure of the country's industrial output and dropped from the third position with 12.4% in 1987 to the eighth position in 1993 (with 5.1% of the total output). The year 1991 was an exception for the industry, it reached the second position with 16.25% in industrial output. The growth of nominal output of the industry was very modest: 98.3% since 1987 and 93.3% since 1990. The physical volume of the light industry's output in 1993 was 64% and 60% of the output of these years, respectively.

11.2 Regional Contributions

The main contributors to the output of the light industry remained stable - as in most industries: the leading five regions Moscow Region, Moscow, Ivanovo, St.Petersburg and Vladimir change places in the country rating, but always take one of the first five places. Their contribution to the branch production was 39.5-40.7% during 1987-92, and slightly dropped to 37.5% in 1993. Usually, the regions of Tver (2.7-3% of the branch output) and Nizhny Novgorod (2.16-2.35%) are also in the top ten. The other regions found in the top ten in 1993 leave and come back during the considered time interval and display more variance in their shares of branch production. The top ten in the light industry constantly produced 49.8-53.3% of the total branch output in 1993.

Correlation analysis points to the beginning of changes in 1991, and the correlation coefficients in subsequent years continued to fall. Analysis of the scales of the regional light industry outputs by the histogram rule gives us one "great" producer - Moscow region, two "large" ones: the capital Moscow and Ivanovo region with a total share of production of 12.7%, no "average" producers but two "moderate" regions (St.Petersburg and Vladimir) which together produced 8.7% of the branch output in 1993, 7 relatively "small" producers with a joint output of 16.5% and all other 66 individually trifling regions producing nearly 50% of the industry' output together.

Some growth of production was detected in 9 regions: Orenburg (58% growth), Astrakhan (14%), Altai Republic 1.12%, Khabarovsk Territory 12%, Kurgan 12%, Belgorod 9%, Sakhalin 3%, Sakha (Yakut) Republic 2.5% and the Udmurt Republic 1.5% (28714.22 bln. and 0.46%). As in many other industries, these growing regions tend to have rather small contributions to the national output of the industry. The most significant decline of the physical volume of light industry output was registered in: Amur - 61%; Republic Dagestan - 62% ; Maritime (Primorsky) territory - 65%; and Chita Reg. -68%.

The scale-dynamic division reveals that only one region - Orenburg - taking the 14th - position in the nominal output rating, can be considered a "star" in the industry. The other 8 growing regions are "growing midgets", all leaders taking the first to thirteenth position contribute to a group of 24 "declining giants", the group of "residual cases" consists of 45 regions. The industry is the only large branch where the "star" is growing faster than the "midgets" - 58% versus the average rate of 8% and where the average decline of the "giants" 28% is not as fast as the average fall of the "trifling" regions (37%). The fastest reduction in output of a single region, however, was registered among the "large" producers (43%), and the slowest in the "moderate" producer group (24%).

11.3 Summary

Due to the considerable fall of the production level of the leading producers in the light industry since 1990, the rise of the overall branch nominal output was considerably less than in other industries. The industry suffers from the rising inflow of the imports of cheap foreign consumer production. The "residual principle" of financing the consumer oriented branches in the USSR set the scene for the current deep crisis of the branch. The concentration of output in regions is stable with the largest producers evidently reducing their share in the market.

12. Food Industry

12.1 General remarks

The contribution of the food industry to federal industrial output has varied strongly over the time period between 1987-1993. Its share of total industrial production ranges from 12.8% in 1987 (second place) to 14.4% in 1991. In 1993 it was 13% of the Russian Federations total industrial production. Now this branch finds itself in the third position behind the constantly growing fuel industry and the declining leader machine building and metal cutting. The branch's nominal industrial output jumped by a factor 243 since the year 1987 and 224 compared to 1990. The physical production dropped to the level of 78% and 68.5% of these years, respectively.

12.2 Regional Contribution

In the time interval this industrial branch has a permanent leader in output, the capital Moscow with a rather stable contribution of 7.5-8.7%. The leading position of Moscow is explained by the high attention that was paid by Soviet authorities to the food industry, and in particular, to the food supply in the capital. In consequence in Moscow one can find the

Table 46. The development of the Food Industry (1987-1993)

	1987	1988	1989	1990	1991	1992	1993
Nominal Output bln. Rubles	64,606	67,259	69,813	70,051	169,940	1,776,510	15,696,810
Growth Rate (% to prev. year)	104.5	104.2	104.2	100.4	90.5	82.3	92.1

Table 47. Correlation of Regional Share of nominal output of the Food Industry (1987-1993)

	1988	1989	1990	1991	1992	1993
1987	0.999	0.999	0.997	0.984	0.987	0.983
1988		0.999	0.997	0.984	0.988	0.985
1989			0.999	0.984	0.989	0.983
1990				0.985	0.990	0.982
1991					0.976	0.982
1992						0.988

Table 48. Top Ten Russian Regions in Output of the Food industry in 1987 and 1993 in billion Rubles.

Position	Region Name	Output	Cumulative out-put	Share total	of Cumulative share
		1987			
1	Moscow	5,376,18	24,901,75	8.29	38.38
2	Krasnodar Territory	4,190,97	19,525,57	6.46	30.10
3	Maritime (Primorsky) territory	2,891,84	15,334,60	4.46	23.64
4	St.Petersburg	2,587,43	12,442,76	3.99	19.18
5	Rostov Reg.	1,913,51	9,855,33	2.95	15.19
6	Murmansk Reg.	1,736,20	7,941,82	2.68	12.24
7	Voronezh Reg.	1,605,74	6,205,62	2.47	9.56
8	Moscow Reg.	1,604,48	4,599,88	2.47	7.09
9	Kamchatka Reg.	1,560,99	2,995,40	2.41	4.62
10	Sverdlovsk Reg.	1,434,42	1,434,42	2.21	2.21
		1993			
1	Moscow	1,372,876.39	5,853,446.31	8.75	37.29
2	Krasnodar Territory	948,200.04	4,480,569.92	6.04	28.54
3	Maritime (Primorsky) territory	765,969.74	3,532,369.88	4.88	22.50
4	St.Petersburg	472,609.38	2,766,400.14	3.01	17.62
5	Rostov Reg.	409,551.60	2,293,790.76	2.61	14.61
6	Kamchatka Reg.	391,694.39	1,884,239.16	2.50	12.00
7	Bashkortostan Republic	388,458.74	1,492,544.77	2.47	9.51
8	Sverdlovsk Reg.	375,607.32	1,104,086.03	2.39	7.03
9	Moscow Reg.	372,778.29	728,478.71	2.37	4.64
10	Murmansk Reg.	355,700.42	355,700.42	2.27	2.27

Table 49. Distribution of the regions and Mean output values in billion Rubles by scales and dynamic groups in 1993

	Trifling	Small	Moderate	Average	Large	Great	Total
			Number of Regions				
Declining	54	18	1	1	1	1	76
Growing	2						2
Total	56	18	1	1	1	1	78
			Output in billion Rubles				
Declining	115,733	318,385	472,609	765,969	948,200	1,372,876	204,476
Growing	78,295						78,295
Total	114,396	318,385	472,609	765,969	948,200	1,372,876	201,241

technically most developed enterprises operating in the market with the highest solvent demand in the country. Krasnodar territory used to take the second position with 5.8-6.8% share of the branch output. This region, located on the banks of the Black See has a climate, which favors the production of the raw materials for the industry. Thus, the production of fruits and vegetables is the base for development of the canning industry. The maritime region takes the third place in the country rating. Its the greatest producer of tined ocean fish and sea products (accompanied by Kamchatka and Murmansk regions). The fourth position belongs to St. Petersburg where the food processing tradition dates back to the nineteenth century. The fifth position is taken by the region of Rostov, which is also characterized by a good climate and seaside position. The top ten regions produce 35-38.4% of the total branch output. The food industry is represented in different scales in all regions of the Russian Federation, but the share of the ten smallest producers dropped from 2.4% in 1990 down to 1.78% in 1993.

Correlation analysis shows that some slight shift took place in 1991 and 1992, but these changes were less significant than for the bulk of the other industries. The changes in the physical output of the branch on a country scale, points to the fact, that the industry lost nearly 19% of its output in 1991 and further 17.7% in 1992, when, for example, one of the largest former producers - Voronezh region left the group of the top ten and dropped to the 13th position.

Analysis by histogram classification suggests that the absolute leader, Moscow, is the sole representative of the class with "great output", there is also one region with "large output" - Krasnodar territory, one region that can be called "average" - Maritime (Primorski) territory, and a single "moderate" producer - St. Petersburg. The group of individually small producers consist of 18 regions producing altogether 36.5% of the branch output. The rest of 54 regions produce 40%.

Only two regions of the Russian Federation showed a slight increase in the physical volume of output: Ulyanovsk region by 8% and Karachai-Cherkess republic by 1.5%. The production of all other 76 regions fell in average by 35% since 1990, and in some regions like Khabarovsk territory by 50% or more. Other spectacular examples are Dagestan which lost 52% of its output, Sakhalin with a loss of 54%, Tuva Republic - 55%, Jewish A. Reg. 73%. The absolute leader, Moscow, lost nearly 20% of its production volume.

The division into scale-dynamic group gives a sad result. We have 30 "declining giants", 2 "growing midgets", and 46 residual regions with negligible and declining output. This last group has the highest value of the average losses (38%), giants lost in average 31%. The most successful "growing midget" group has an average growth of 5%, but they produce less than 1% of the branch output together. There are no stars in the industry.

12.3 Summary

The food industry of the Russian Federation experienced a deep crisis in the transition period. Physical output level losses are distributed rather evenly across the regions, but the small producers suffer from the crisis more seriously than the large ones. The downfall was "programmed by the whole development of Soviet industry, where the producers of consumption oriented goods were financed and developed by the residual principle. Hence, the industry with the old and exhausted machinery and archaic technology. In consequence it can not resist to the inflow of the cheap and modern import production.

13. Flour-grinding, Grouts and Mixed Feed Industry

13.1 General remarks

As could be expected, the flour-grinding, grouts and mixed feed industry takes a very modest position in Russia's industrial landscape. During the time interval 1987-1993 its share of the output in the current prices never surpassed 2.7% of the country's output. Thus, during the last Soviet years 1987-1990, the share of this branch was rather stable, ranging between 2.4-2.5%. In the crisis year 1991 it increased its share (as did all industries of the food group) up to 2.63%. After this it has experienced a continuos fall to 2.16% in 1993. The growth of the nominal branch output since 1987 was 204-fold, and 192-fold since 1990. In 1993 the physical volume of industrial production dropped down to the level of 82% of 1987 year and 74% of 1990. The strongest fall was experienced in 1992, when the industry lost nearly 14% of its output.

13.2 Regional Contributions

Regional output volumes of the industry seem to be small relative to the production of the other industries. Branch development crucially depends on the climatic conditions. Hence, the members of the top ten, regardless of their exact position in the contemporary country's rating, are regions from the south of the country, located on the belt stretching from the North-West of European Russia toward the South-East parts of West Siberia. However, there are also some industrially developed regions with dominant processing features.

Thus, the rating of leading top four regions was very stable from 1987 to 1991: Krasnodar Territory (4.9%-5.2%), Moscow Reg. (3.7%-4.8%), Rostov (3.6-3.9%) and Samara (3.4-3.8%) took these four positions. The rest of the "top ten" consisted of regions very similar in terms of the nominal output: their shares slightly varied between 2.4%-3% of the branch output. Here one can point to Voronezh, Tatarstan Republic, Sverdlovsk, Stavropol Territory, Saratov, Orenburg, Nizhny Novgorod, Chelyabinsk, Bashkortostan Republic. Since 1991 the leading position belongs to Moscow Reg., and changes in position among the leaders are

regular. Thus the second position belonged to Krasnodar or Samara, and next year they drop three to four positions down. This happened under a situation, when the individual shares of the leading regions in the branch output were growing. Due to the homogeneity of the output of the regions taking the 6th to 15th positions, the use of contribution of the top ten becomes less reliable than for other industries. In spite of that, this index varies between 31.3-32.9 with slight tendency to grow. However, the branch output remains the most homogeneous among the respective characteristics of other industries.

The most significant changes in the regional distribution of output occurred in 1991 as is evidenced by the correlations displayed in Table 62. 1992 displays a more stable rating relative to 1991 although it was the year of the most drastic reduction in output volumes.

There is only one great producer, the region of Moscow, no "large" producer (simply because Moscow Reg. produces 1.6 times more than the next follower - the region of Krasnodar), five average producers producing 16.84% of the branch output. Twelve regions constitute the group of moderate producers with the cumulative share 27.77%. Twenty one regions must be considered small producers. They produce 30.06% of the production. All other considered regions produce 19.4% of the branch output and are "residual" cases.

There are only nine regions with some production growth in the branch. The most significant growth was exhibited by negligible producers in absolute scale: Altai Republic with a growth of 122% (47.82 bln. 0.0018% of the branch output and 76th position in the rating), Sakha (Yakut) Republic 121% (105.8 bln., 0.004% of. out., 75th). Other growing regions are more significant St.Petersburg with a groeth of 29.6% held the 29th place in production shares. Kemerovo which grew by 12.58% was 8th), Tatarstan Republic with 3.28% increase in production 5-th, Bashkortostan Republic the third in output ranking grew by 11% and the Altai Territory ranked 12th in 1993 and grew by 10.38%. Other less important regions include Astrakhan with a 10% growth, Murmansk (5.35%). The aggregate share of production for this group is 13.87%. All other regions experienced a strong reduction of the output in physical terms. Thus, the leading Moscow region lost 18% after 1990, Krasnodar Territory even lost 38%. The average fall in declining region is 31%. The worst situation was registered in Volgograd where 64% of the physical output was lost. The latter is a record drop over the country.

Following our methodology, grouping regions by scales and dynamics detects five "stars" : St.Petersburg, Kemerovo, Bashkortostan Republic, Altai Territory, Tatarstan Republic; four "growing midgets", 25 "declining giants" and 44 "residual" regions. Due to very small sizes and outstanding high growth of the above mentioned Altai Republic and Sakha (Yakut)

Table 50. The development of the Food Industry (1987-1993)

	1987	1988	1989	1990	1991	1992	1993
Nominal Output (bln. Rubles)	12,781	12,846	13,169	13,521	31,096	396,219	2,607,846
Growth Rate (% to prev. year)	103.4	100.7	103.1	102.6	95.1	86.4	90.3

Table 51. Correlation of Regional Share of nominal output of the Flour-grinding, Grouts and Mixed Feed Industry (1987-1993)

	1988	1989	1990	1991	1992	1993
1987	0.993	0.986	0.984	0.938	0.899	0.864
1988		0.993	0.989	0.939	0.886	0.856
1989			0.997	0.935	0.884	0.856
1990				0.938	0.889	0.864
1991					0.961	0.920
1992						0.966

Table 52. Top Ten Russian Regions in Output of the Flour-grinding, Grouts and Mixed Feed Industry in 1987, mln. Rubles.

			1987		
Position	Region Name	Output	Cumulative output	Share of total	Cumulative share
1	Krasnodar Territory	611,859	3,893,782.00	4.92	31.34
2	Rostov	469,136	3,281,923.00	3.78	26.42
3	Moscow	460,917	2,812,787.00	3.71	22.64
4	Samara	406,513	2,351,870.00	3.27	18.93
5	Voronezh	365,043	1,945,357.00	2.94	15.66
6	Saratov	338,936	1,580,314.00	2.73	12.72
7	Bashkortostan Republic	333,447	1,241,378.00	2.68	9.99
8	Altai Territory	304,900	907,931.00	2.45	7.31
9	Orenburg	301,637	603,031.00	2.43	4.85
10	Tatarstan Republic	301,394	301,394.00	2.43	2.43
			1997		
1	Moscow Reg.	154,458.62	857,875.74	5.92	32.90
2	Krasnodar Territory	95,776.17	703,417.12	3.67	26.97
3	Bashkortostan Republic	88,441.12	607,640.95	3.39	23.30
4	Samara Reg.	88,334.38	519,199.83	3.39	19.91
5	Tatarstan Republic	84,541.74	430,865.45	3.24	16.52
6	Sverdlovsk Reg.	82,099.08	346,323.71	3.15	13.28
7	Moscow	74,082.23	264,224.63	2.84	10.13
8	Kemerovo Reg.	63,759.45	190,142.40	2.44	7.29
9	Leningrad Reg.	63,410.23	126,382.95	2.43	4.85
10	Chelyabinsk Reg.	62,972.72	62,972.72	2.41	2.41

Table 53. Distribution of number and mean output in billion Rubles of regions by scales and dynamic groups in 1993

			Number of Regions			
	Trifling	Small	Moderate	Average	Great	Total
Declining	34	20	10	3	1	68
Growing	4	1	2	2		9
Total	38	21	12	5	1	77
			Output in Billion Rubles			
Declining	14,152.03	37,256.85	59,924.70	88,736.33	154,459.00	33,032.66
Growing	6,236.25	38,781.00	62,458.00	86,491.50		40,180.56
Mean	13,318.79	37,329.43	60,346.92	87,838.40	154,459.00	33,868.13

Republic, the "growing midgets" show the highest figures for the growth rate with a plus of 65% in average, stars in contrast grow by only 13% in average. But the five "stars" produce nearly 13% of the branch output. The "declining giants" are loosing their production volumes more slowly than the "residual" regions- 25% in average versus 34%.

13.3 Summary

Flour-grinding, grouts and mixed feed industry is a very modest branch. Its production volumes remain rather homogeneous over regions relative to other more significant industries. Despite, the overall physical output of the branch continues to fall, some significant producers managed to raise their output under the current crisis conditions. This promises the crucial re-transpositions in the regional output rating.

14 Conclusion

This study has looked at the industrial development of Russian regions on an industry by industry basis. Our results suggest that in order to trace the development of industries in the Russian Federation a focus on a few large producers in the industry will usually capture most of the development of industries. However, the classification of regions by dynamic and size considerations also seems to indicate that substantial differences exist between industries in the Russian Federation. To summarize our findings in table 64 we show the percentage share of "stars", "declining Giants", "growing midgets" and residual group in each industry. This table gives considerable evidence of the differences in industrial development across industries in the Russian regions. Overall the most prevalent configuration that can be found is that of small producers that are declining. These make up 55.36% of the total cases, followed by declining Giants which make up 29.69% of all cases. The rarest cases are those of regions which have an increasing output and an above average output level - stars - they contribute only 3.24% of all cases.

Table 54:"Stars", "Growing Midgets" and Declining Giants by Industry Groups

Description	Declining Giants	Growing Midgets	Rest	Stars
Electric Power Industry	27,63	35,53	31,58	5,26
Fuel Industry	25,00	16,67	58,33	0,00
Ferrous Metallurgy	16,22	4,05	78,38	1,35
Non-ferrous Metallurgy	16,42	17,91	62,69	2,99
Machine Building and Metal Cutting Industry	26,92	5,13	65,38	2,56
Chemical and petro-chemical Industry	33,78	4,05	62,16	0,00
Forest, Wood-processing and Paper-Pulp Industry	56,41	16,67	24,36	2,56
Construction Materials Industry	32,05	1,28	62,82	3,85
Glass-and China-pottery Industry	15,15	24,24	46,97	13,64
Light Industry	30,77	10,26	57,69	1,28
Food Industry	38,46	2,56	58,97	0,00
Flour-grinding, Grouts and Mixed Fodder Industry	32,47	5,19	55,84	6,49

There are, however, also significant differences between the individual industries. The electric power and glass industries have the largest shares of "growing midgets", but also of stars, while in the more concentrated ferrous and non ferrous metallurgy the residual group i.e. declining regions with below average production volumes are predominant. The same characteristics apply to machine building and to chemicals.

Literature:

Ickes,-Barry-W.; Ryterman,-Randi (1992) The Interenterprise Arrears Crisis in Russia, Post-Soviet-Affairs; 8(4), Oct.-Dec. 1992, pages 331-61.

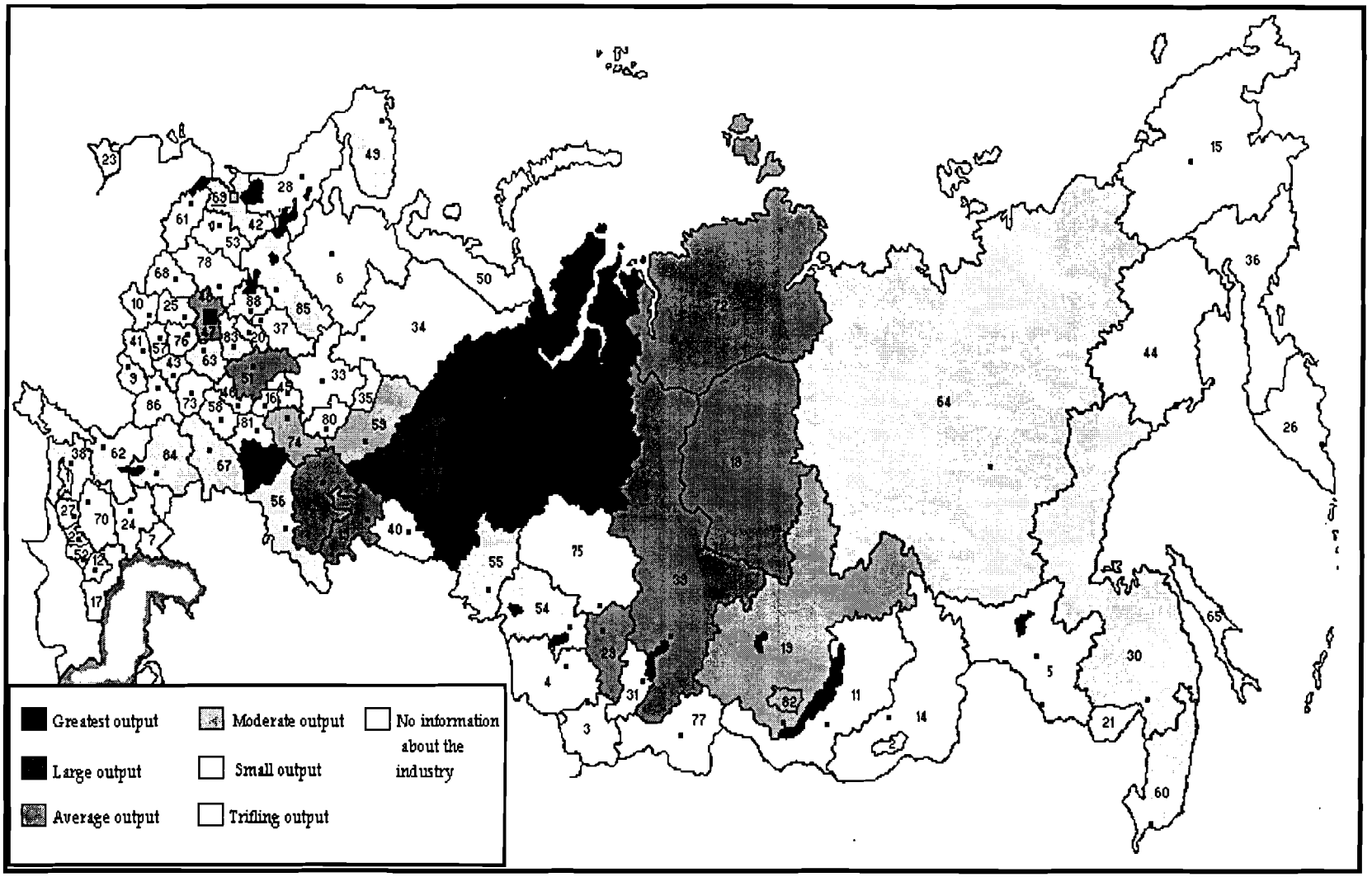
Appendix: Stars, Declining Giants and Growing Midgets by Russian Regions

Rating	Region Name	Stars	Declining Giant	Growing Midget	Output, bln. rubles	Output rating
1	Nizhny Novgorod Reg.	2	6	0	4022937	8
2	Voronezh Reg.	2	2	3	1280923	35
3	Perm Reg.	1	7	1	3269232	12
4	Tatarstan Republic	1	6	3	3265581	13
5	Bashkortostan Republic	1	6	1	4455543	6
6	Krasnoyarsk Territory	1	6	0	4451465	7
7	Orenburg Reg.	1	5	2	1863603	22
8	Khabarovsk Territory	1	4	3	1356731	32
9	Saratov Reg.	1	4	0	1668430	23
10	Yaroslavl Reg.	1	3	2	1879118	20
11	Novosibirsk Reg.	1	3	1	1437286	29
12	Komi Republic	1	2	1	1217823	37
13	Arkhangelsk Reg.	1	2	1	931379,1	44
14	Smolensk Reg.	1	2	0	817532,2	45
15	Ulyanovsk Reg.	1	1	3	1261791	36
16	Tomsk Reg.	1	1	3	656789,2	49
17	Khakass Republic	1	0	2	596038,9	54
18	Moscow	0	9	1	6017114	2
19	Moscow Reg.	0	9	0	4006479	9
20	Sverdlovsk Reg.	0	8	1	5720668	3
21	Kemerovo Reg.	0	7	3	3874659	10
22	Volgograd Reg.	0	7	3	2067323	17
23	Samara Reg.	0	7	2	5165477	4
24	Irkutsk Reg.	0	7	1	3414662	11
25	Chelyabinsk Reg.	0	6	2	4590863	5
26	Rostov Reg.	0	6	0	2191415	15
27	St.Petersburg	0	5	2	2718408	14
28	Krasnodar Territory	0	5	1	2084267	16
29	Tula Reg.	0	5	1	1498419	25
30	Omsk Reg.	0	5	0	1881415	19
31	Murmansk Reg.	0	4	3	1463558	28
32	Altai Territory	0	4	2	1418053	31
33	Tyumen Reg.	0	4	1	7577441	1
34	Vologda Reg.	0	4	1	1878900	21
35	Ryazan Reg.	0	4	1	1347970	33
36	Kirov Reg.	0	4	0	1036287	40
37	Kursk Reg.	0	4	0	977819,9	42
39	Sakha (Yakut) Republic	0	3	3	1889253	18
38	Belgorod Reg.	0	3	3	1495251	26
40	Lipetsk Reg.	0	3	1	1533155	24
41	Maritime (Primorsky) territory	0	3	1	1468790	27
42	Stavropol Territory	0	3	1	1051907	39
43	Tver Reg.	0	3	0	944279,1	43
44	Vladimir Reg.	0	2	3	1290676	34
45	Udmurt Republic	0	2	3	1095601	38
46	Ivanovo Reg.	0	2	2	980068,6	41
47	Penza Reg.	0	2	2	711710,4	47
48	Orel Reg.	0	2	2	556996,1	56
49	Leningrad Reg.	0	2	1	1432938	30
50	Bryansk Reg.	0	2	1	559460,9	55
51	Astrakhan Reg.	0	1	5	389079,9	65
52	Kurgan Reg.	0	1	4	619641,1	50
53	Kaluga Reg.	0	1	3	453288,9	63
54	Magadan Reg.	0	1	2	686687,4	48
56	Tambov Reg.	0	1	2	599203,3	53
55	Kamchatka Reg.	0	1	2	540903	57

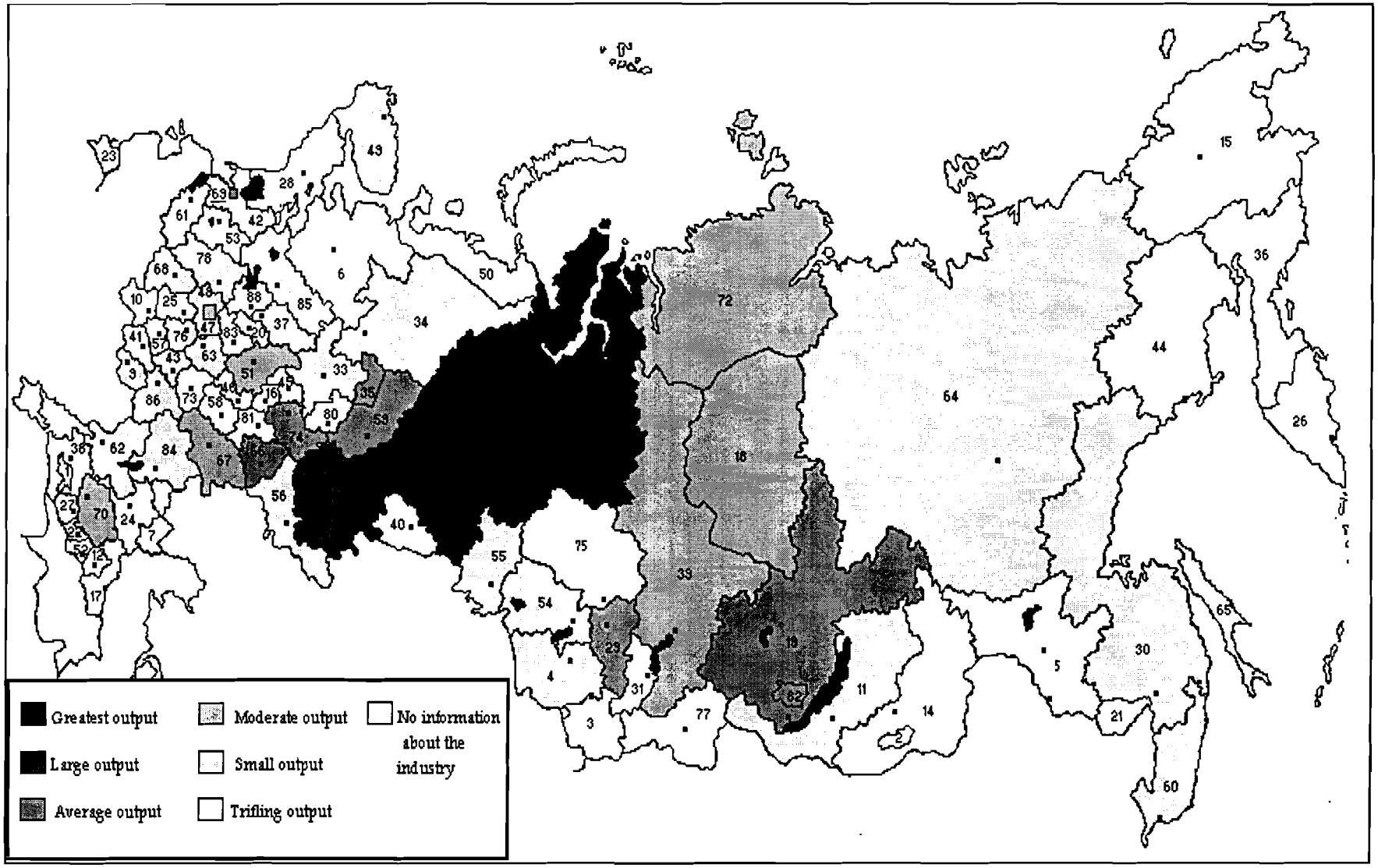
Appendix continued

Rating	Region Name	Stars	Declining Giant	Growing Midget	Output, bln. rubles	Output rating
57	Novgorod Reg.	0	1	2	462186	61
58	Sakhalin Reg.	0	1	1	617155,9	51
59	Republic Karelia	0	1	1	603400,7	52
60	Pskov Reg.	0	1	1	351976,1	67
61	Chuvash Republic	0	1	0	739905,2	46
62	Republic Mordovia	0	1	0	509597,5	58
63	Kaliningrad Reg.	0	1	0	422275,5	64
64	Buryat Republic	0	0	3	459171,9	62
65	Kabardino-Balkar Republic	0	0	3	203325,6	69
66	Amur Reg.	0	0	2	493560,4	59
67	Chita Reg.	0	0	2	354743,6	66
68	North Ossetian Republic	0	0	2	179685,7	71
69	Tuva Republic	0	0	2	38039,14	77
70	Altai Republic	0	0	2	25018,8	78
71	Kostroma Reg.	0	0	1	468156,4	60
72	Mariy El Republic	0	0	1	315723,1	68
73	Republic Dagestan	0	0	0	183130,8	70
74	Chukot A.T.	0	0	0	173648,9	72
75	Karachai-Cherkess Republic	0	0	0	123180,3	73
76	Adygei Republic	0	0	0	122555,6	74
77	Jewish A.R.	0	0	0	91427,8	75
78	Kalmyk Republic	0	0	0	48705,29	76

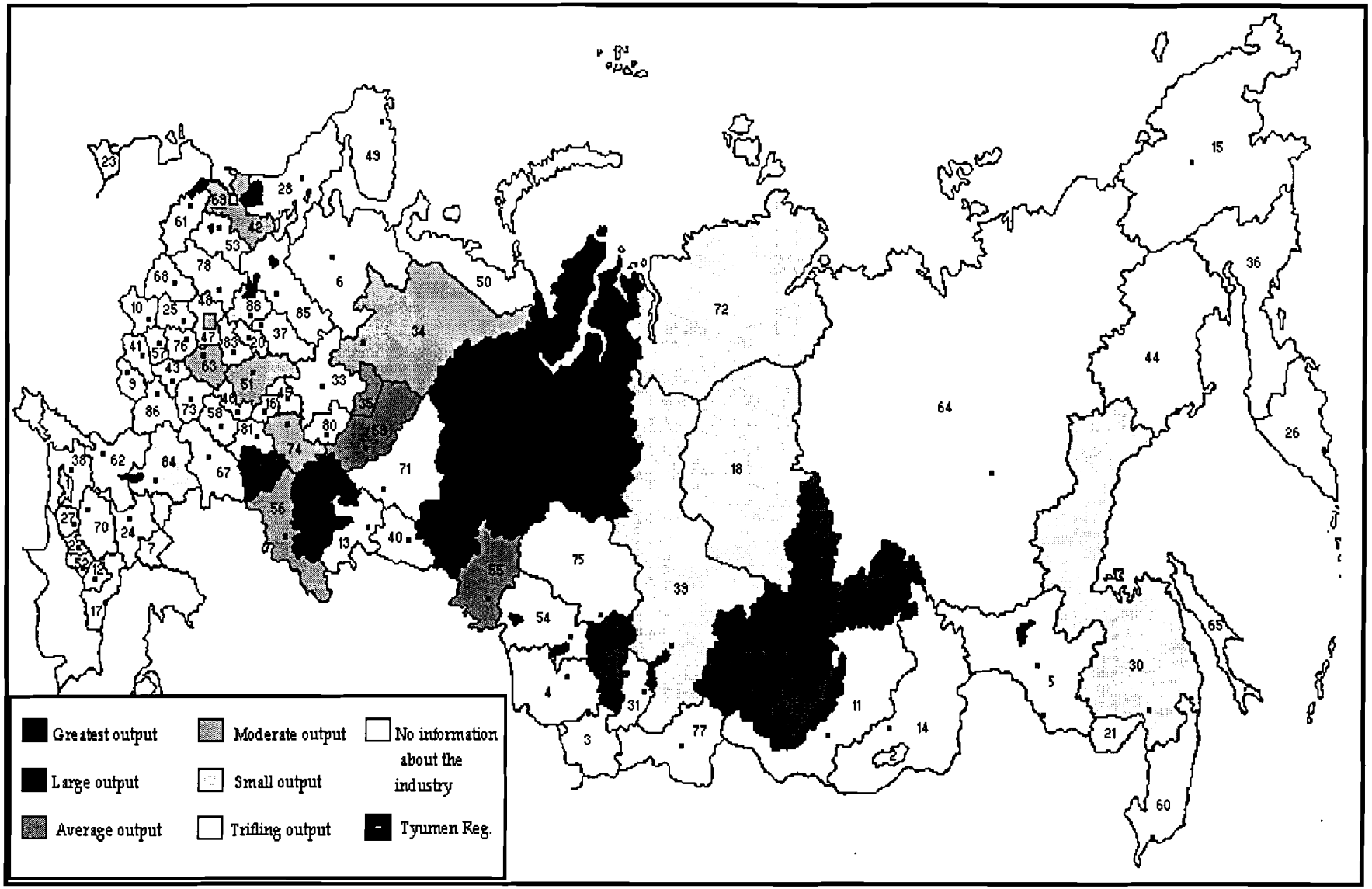
Output of Russian Regional Industry in 1993



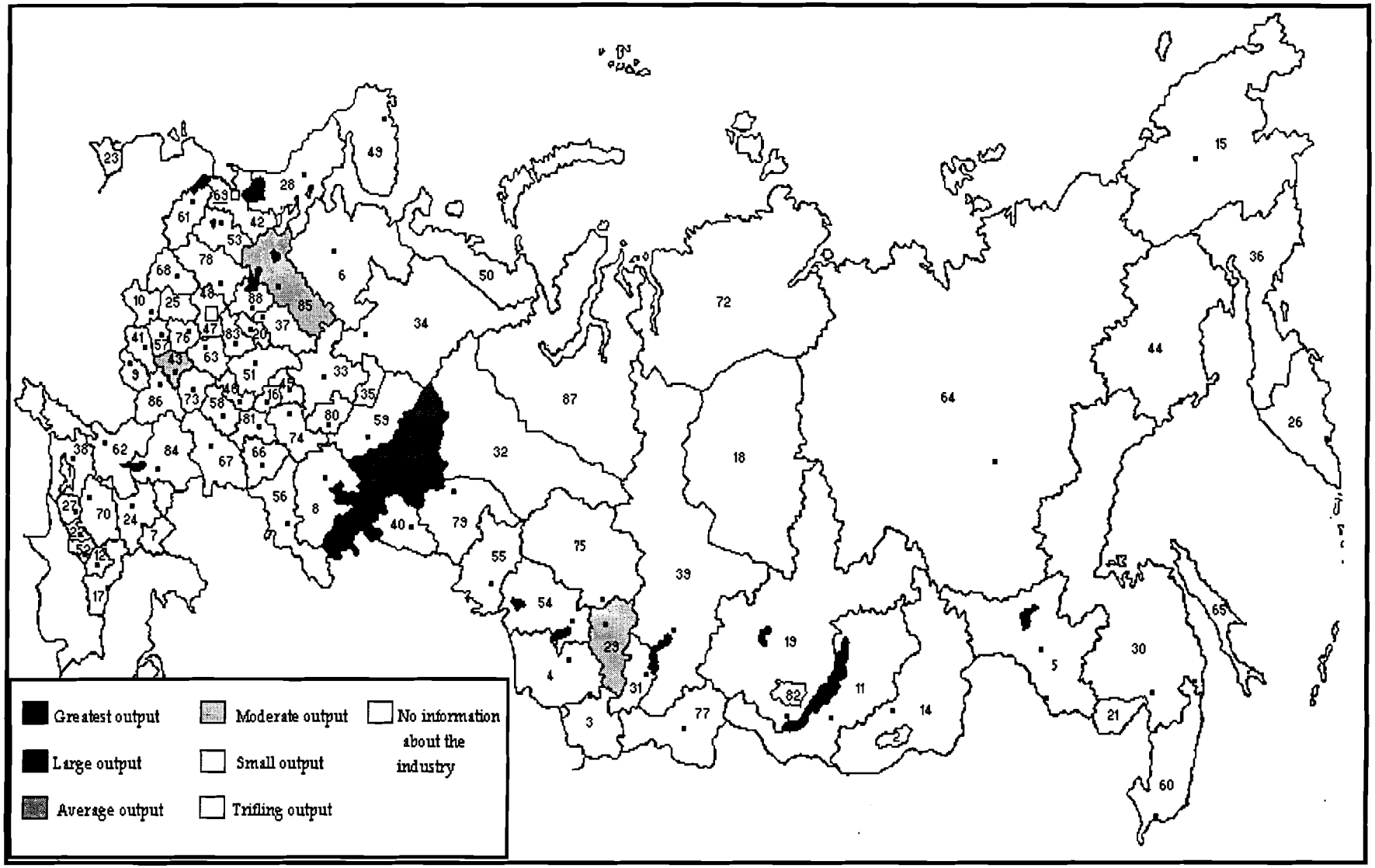
Nominal Output of Electric Power Industry by Russian Regions in 1993



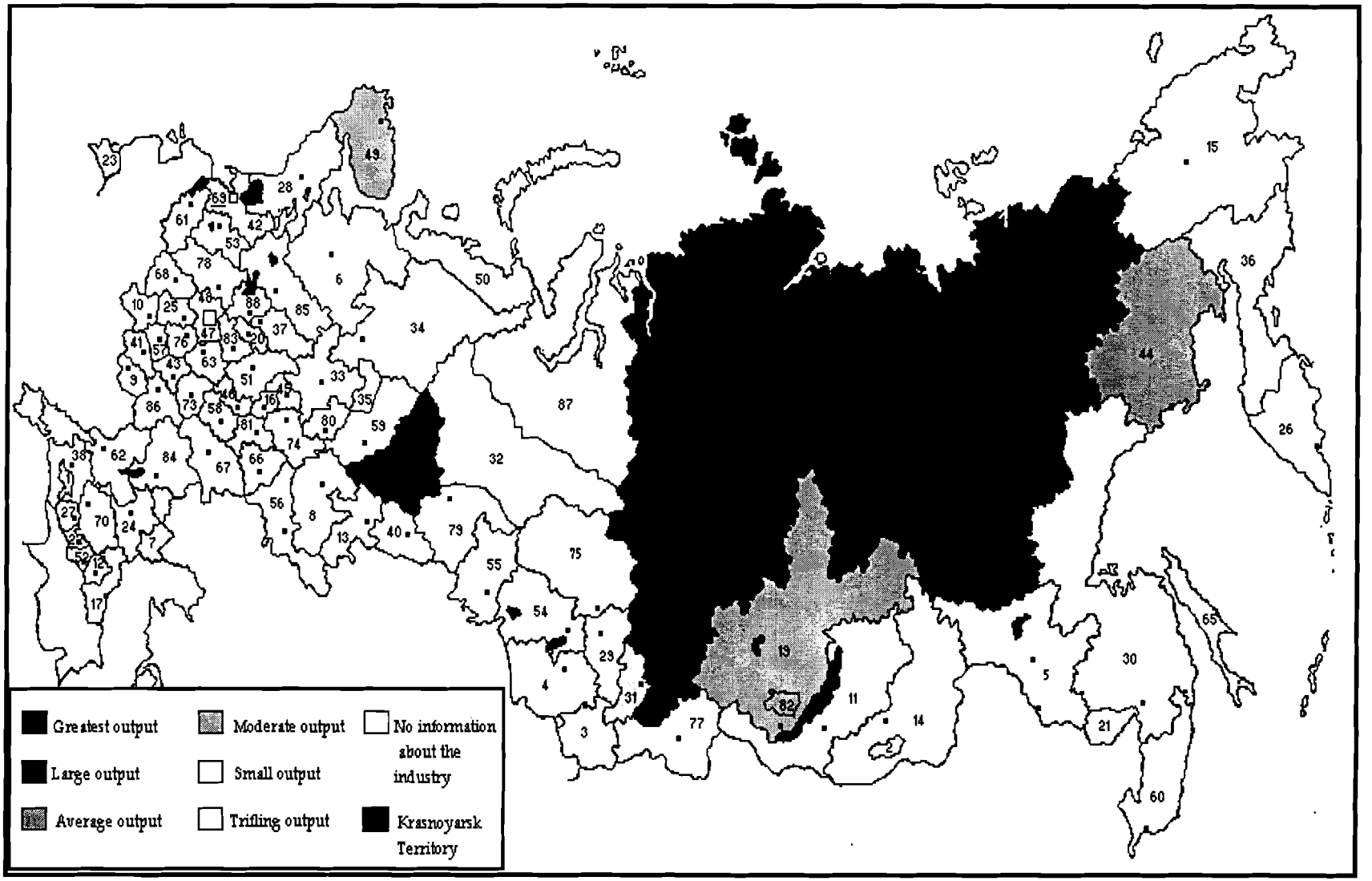
Nominal Output of Fuel Industry by Russian Regions in 1993



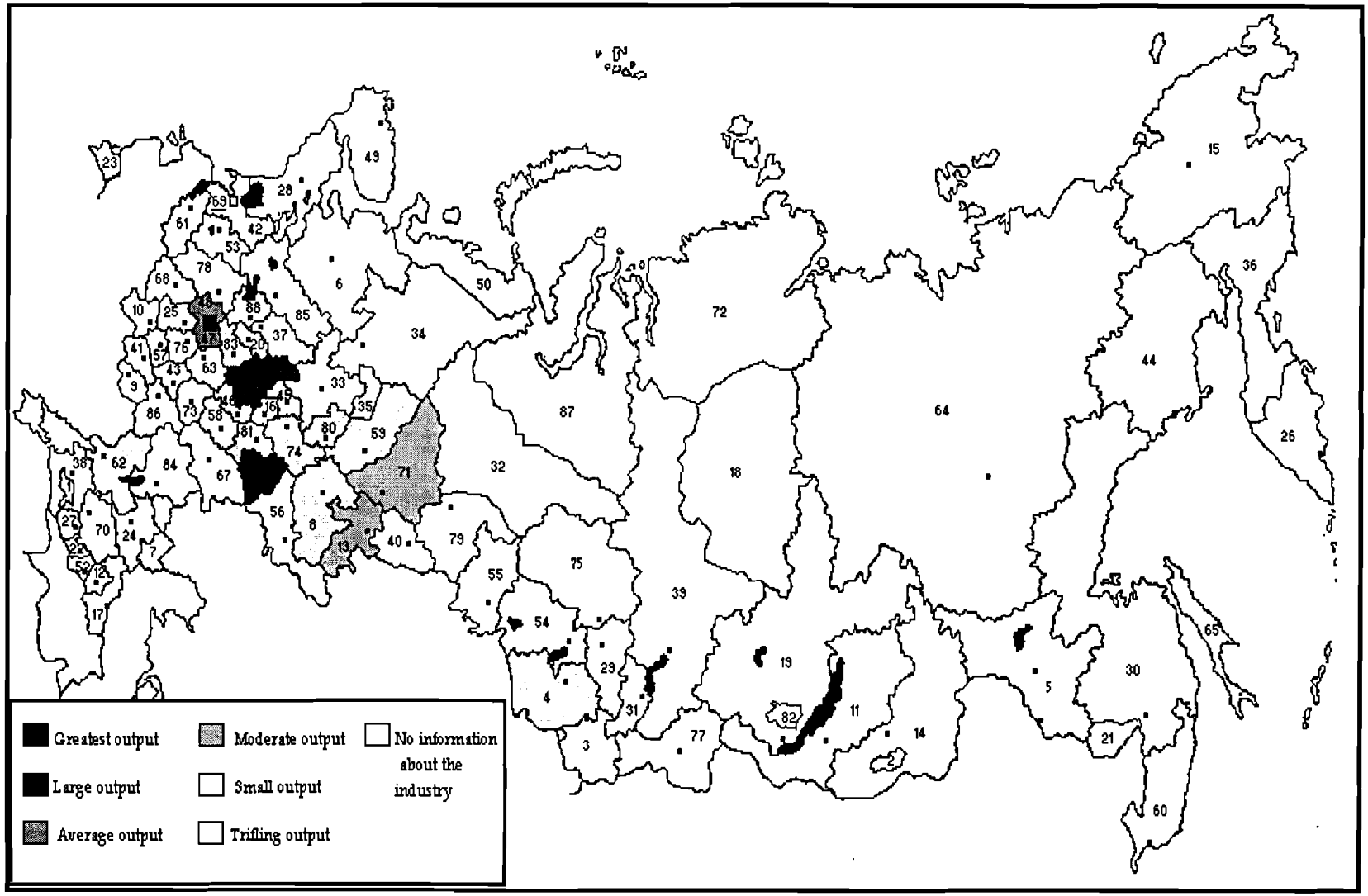
Nominal Output of Ferrous Metallurgy by Russian Regions in 1993



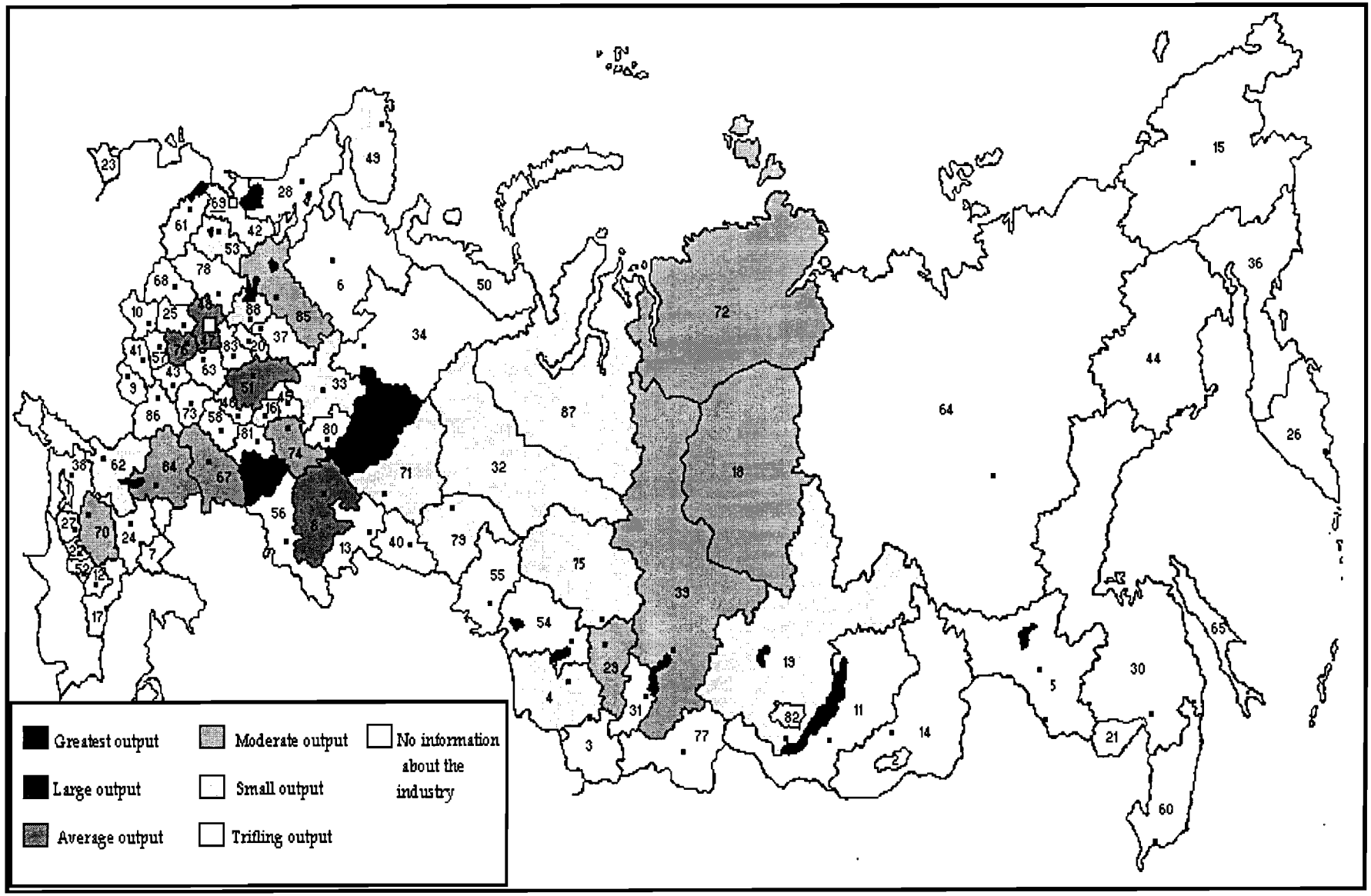
Nominal Output of Non-Ferrous Metallurgy by Russian Regions in 1993



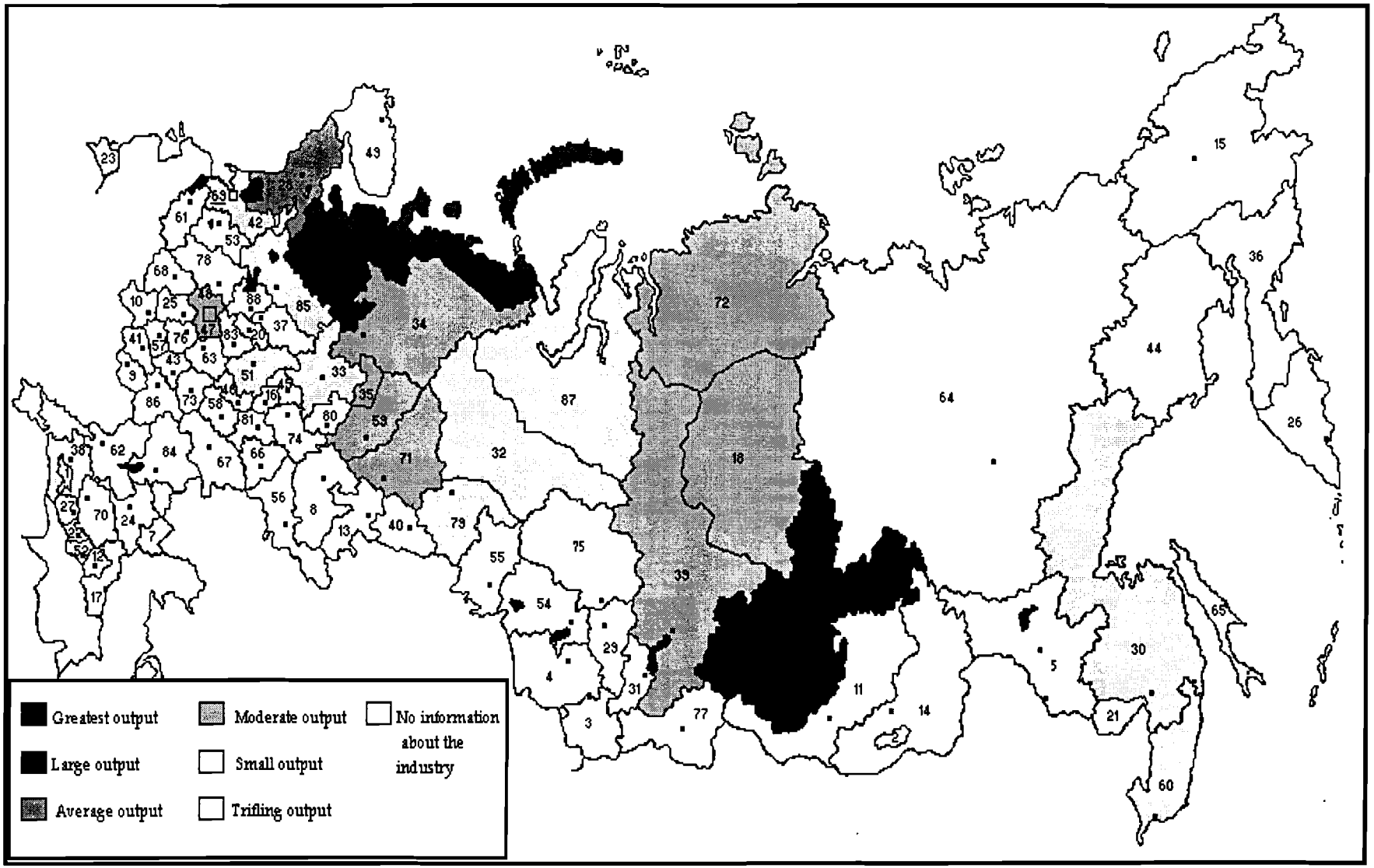
Nominal Output of Machine Building and Metal Cutting Industry by Russian Regions in 1993



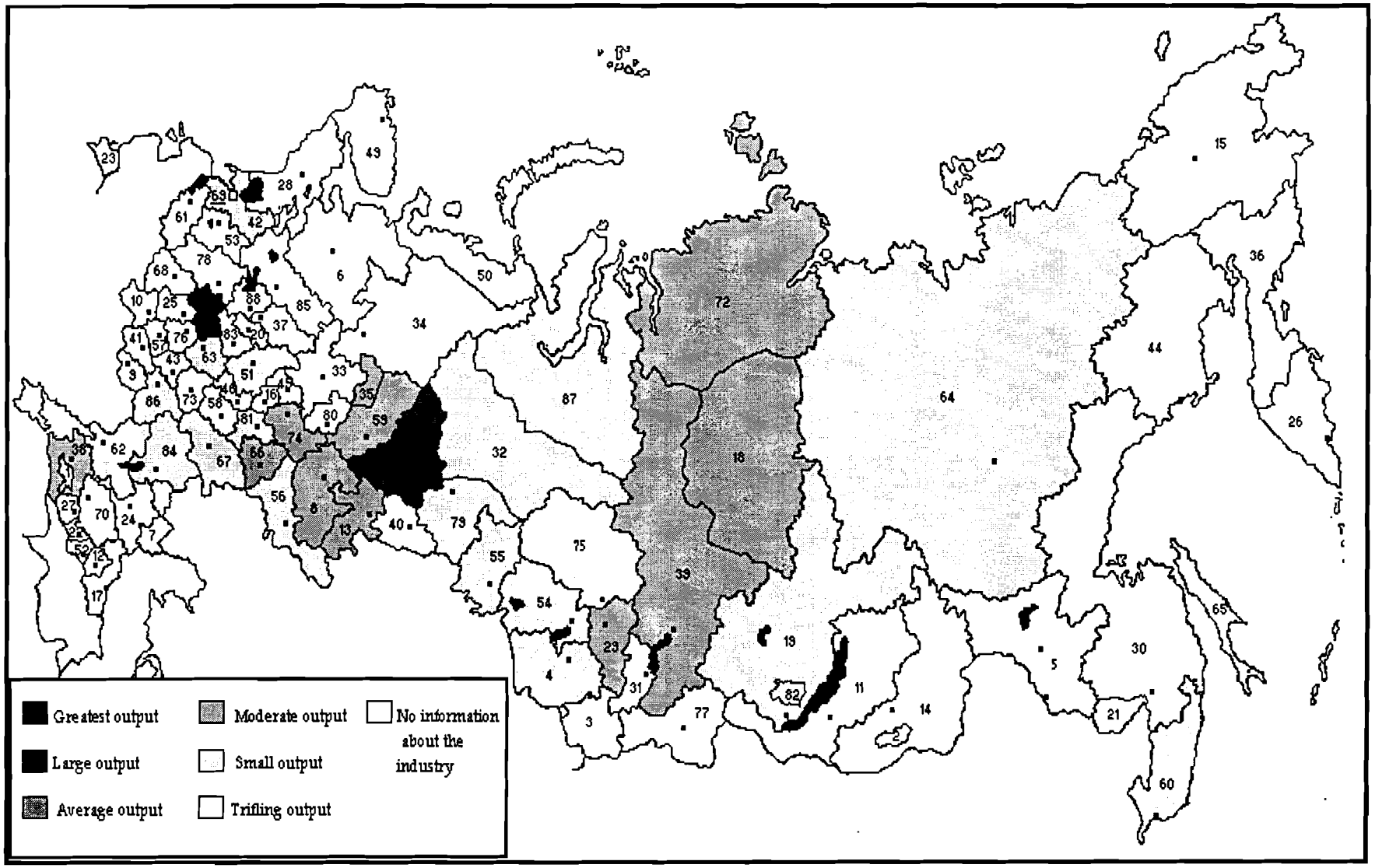
Nominal Output of Chemical Industry by Russian Regions in 1993



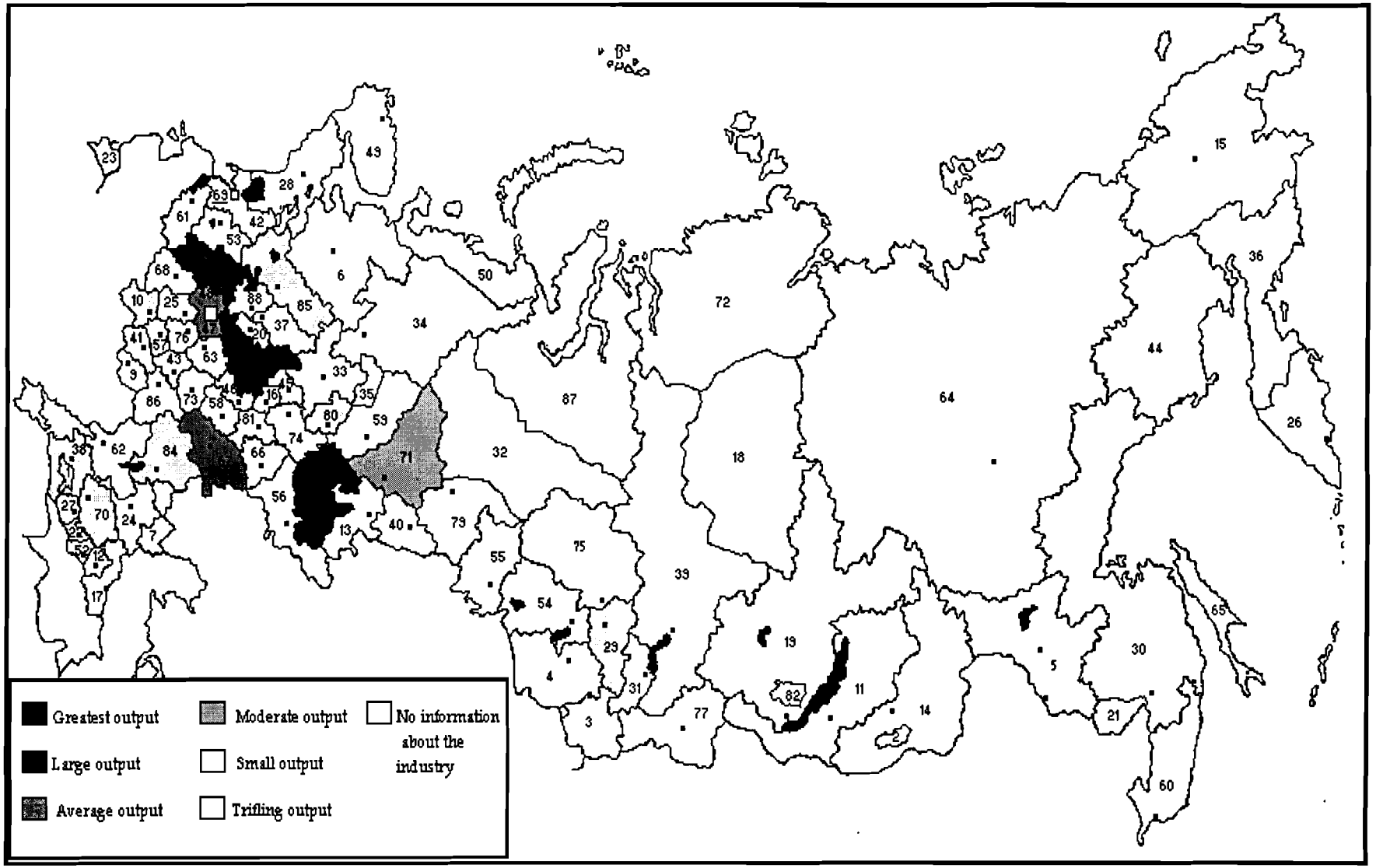
Nominal Output of Forestry, Wood Processing and Paper-Pulp Industries by Russian Regions in 1993



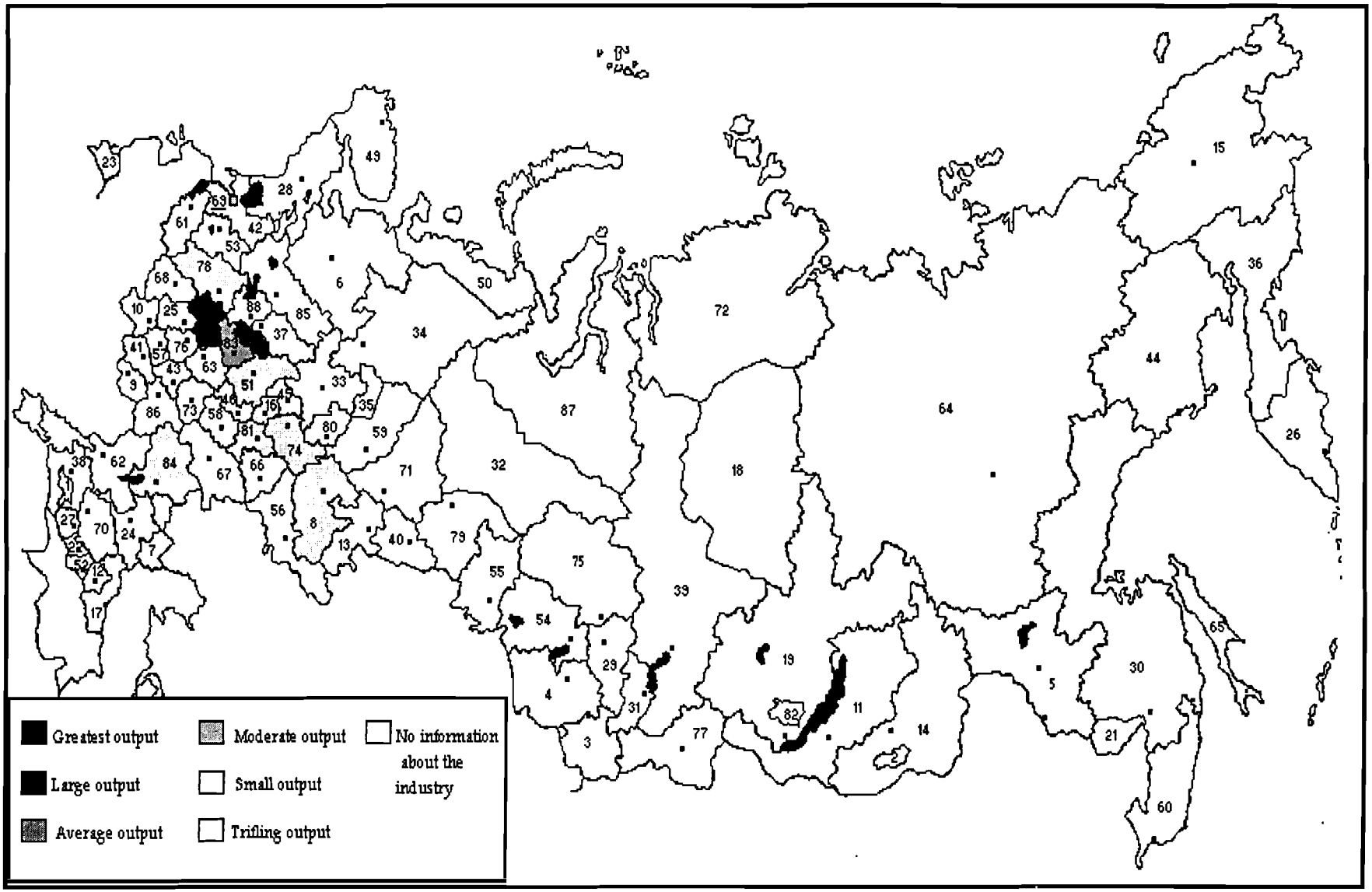
Nominal Output of Construction Materials Industry by Russian Regions in 1993



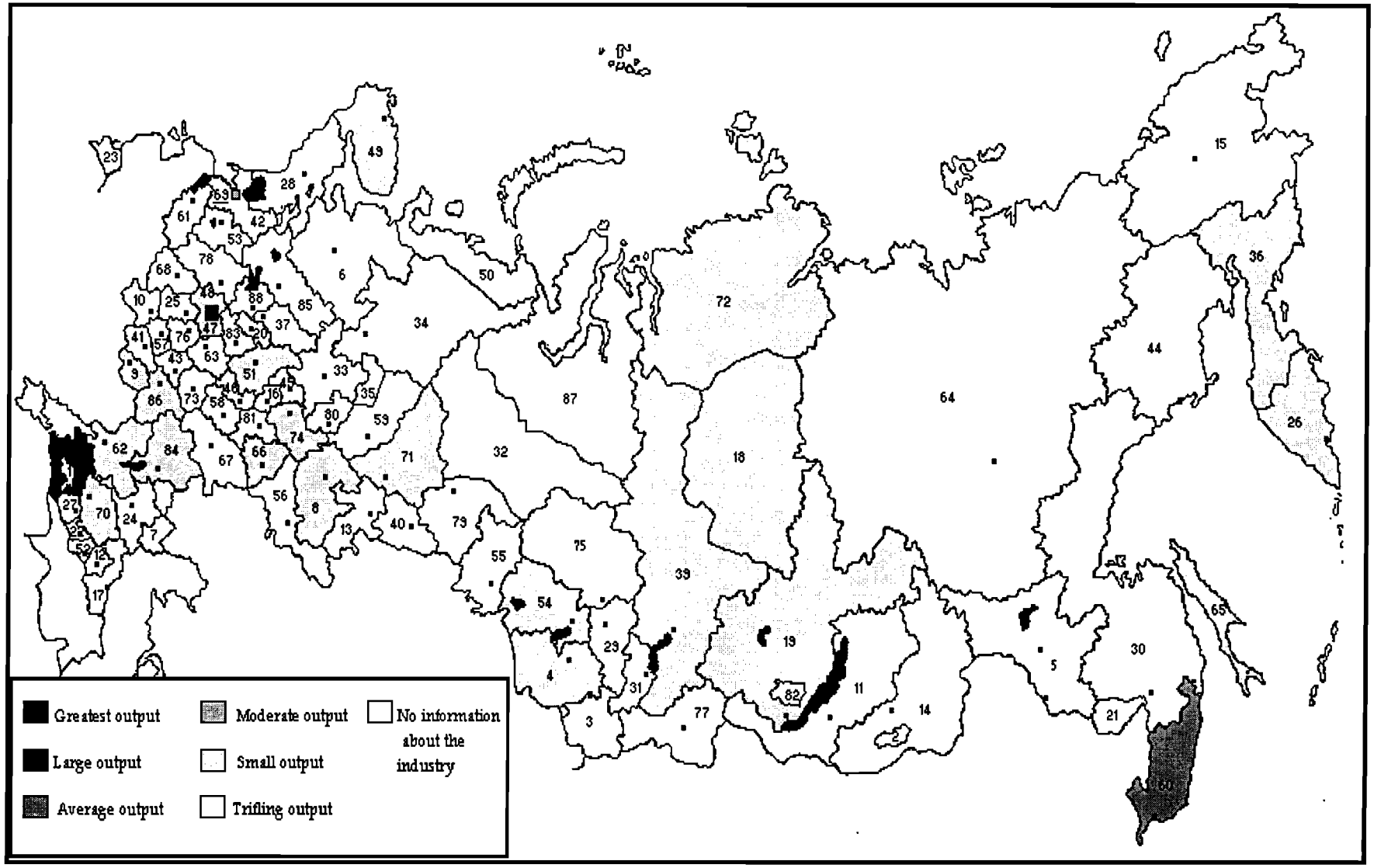
Nominal Output of Glass and China-Pottery Industry by Russian Regions in 1993



Nominal Output of Light Industry by Russian Regions in 1993



Nominal Output of Food Group of Industries by Russian Regions in 1993



Nominal Output of Flour-grinding, Groats and Mixed Feed Industry by Russian Regions in 1993