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The Myth of Monopoly

A New View of Industrial Structure in Russia

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Very large firms are more prevalent in the United States than in Russia. And there is little evidence in Russia of industrial concentration in national markets. Instead, barriers to competition in Russia arise as a result of highly segmented product markets. Consequently, traditional policy remedies appropriate for problems of concentration (such as antitrust policy and import competition) may be ill-advised or inadequate for addressing problems of imperfect competition in the Russian economy. The prescription for healthier competition: improve Russia's distribution system and facilitate the entry of new firms.

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Summary findings

Discussions of economic reform in the Russian Federation are colored by the conventional view of Russia's industrial structure. Both in Russia and in the West, Russian industry is characterized as very large enterprises operating in highly concentrated industries.

Brown, Ickes, and Ryterman challenge the conventional view. They assess Russian industrial concentration by comparing the Russian industrial structure (as revealed in the 1989 Soviet Census of Industry) with that in the United States and other countries.

They find that very large firms are more prevalent in the United States than in Russia. This empirical fact suggests that *planners economized on the costs of central economic coordination not by building unusually large enterprises, but by not building very small enterprises.*

Their most important finding: That there is little aggregate or industry concentration at the national level in Russia. Monopolies and oligopolies actually account for only a small share of national employment and production.

Instead, *barriers to competition in Russia arise as a result of highly segmented product markets.* In large part, this segmentation can be viewed as a legacy of central planning. Under the prior regime, enterprises were highly isolated, divided along both ministerial and geographic lines. Presently, these barriers are reinforced by some features of the transitional environment that continue to undermine the efficient distribution of goods.

Brown, Ickes, and Ryterman conclude that the traditional policy remedies appropriate for problems of concentration (such as antitrust policy and import competition) may be ill-advised or inadequate for addressing problems of imperfect competition in the Russian economy.

They argue instead that *improving the distribution system and other market infrastructure that supports trade and facilitating the entry of new firms* should be the most critical elements of competition policy in Russia.

This paper — a product of the Transition Economics Division, Policy Research Department — is part of a larger effort in the department to understand the adjustment of enterprises in economies in transition. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Maxine Berg, room N11-054, extension 36969 (68 pages). August 1994.

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The Myth of Monopoly: A New View of Industrial Structure in Russia

1. Introduction

Discussions of economic reform in the Russian Federation are colored by the conventional view of Russian industrial structure. This view, held both in Russia and in the west, is that Russian industry is characterized by very large enterprises operating in highly concentrated industries. This perception of industrial structure has important implications for policy, and for the interpretation of developments in Russia.¹ For example, based on the view that Russian industry is dominated by monopoly enterprises, Russian policymakers have reintroduced price controls on a wide variety of commodities.

The conventional wisdom about Russian industrial structure is based on a generation of research on the Soviet system of central planning, research that appeared to be supported by available evidence. According to this view, planners economized on the costs of central planning by creating a highly concentrated industrial sector with a small number of very large enterprises in each industry. Before transition, the conventional costs associated with imperfect competition – higher prices and restricted output – could be overcome by the control of prices and the setting of output targets by central planners. Now, however, as the Russian economy adopts the market system, problems of industrial structure become important and affect the design of economic reform. Consequently, it is crucial that the conventional wisdom be re-examined.

In this paper, we challenge the conventional wisdom. We estimate Russian industrial concentration by examining the Soviet Industrial Census of 1989, and by comparing the Russian industrial structure to that in the United States and other countries. We find that the conventional wisdom about Russian industrial structure is seriously misleading. We find, for example, that very large firms are more prevalent in the United States than in Russia, as are very small firms. Our analysis suggests that *planners economized on the costs of central economic coordination, not by building unusually large enterprises, but by not building very small enterprises*. Because innovation was centrally directed, small firms did not play the role they play in a market economy, and thus industry evolved under a completely different process of economic selection.

Our most important finding is that there is little aggregate or industry concentration at the national level in Russia. Monopolies and oligopolies actually account for a very small share of national employment and production. Our analysis suggests instead that *the barriers to competition in*

¹A frequently offered explanation of the output drop that followed price liberalization is that monopolies reduced output to raise prices.

*Russia arise as the result of product markets that are highly segmented.*² In large part, this segmentation can be viewed as a legacy of the system of central planning. Nevertheless, some features of the transition environment continue to undermine the efficient distribution of goods, reinforcing these barriers. Based on our finding, we conclude that the traditional policy remedies appropriate for problems of concentration, such as anti-trust policy and import competition, may be ill-advised or inadequate for addressing problems of imperfect competition in the economy. We argue instead that *improving the distribution system and facilitating the entry of new firms* are the most critical elements of competition policy in Russia.

The remainder of the paper is as follows. In the rest of section 1, we focus on the process of industrial evolution under central planning. We also discuss the conventional wisdom, and explain why we think a further examination is warranted. Section 2 discusses data and methodology. In section 3, we present our findings in the form of a series of "myths" and "realities." We then turn, in section 4, to analyze the barriers to competition that do exist in Russia today. Section 5 discusses the implications of our findings for economic reform in Russia. Section 6 concludes the paper.

1.1 Industrial Evolution Under Central Planning

The industrial structure that exists in the Russian Federation today was created mostly as a consequence of decisions made during the prior economic regime. Therefore, we begin our discussion of industrial concentration in Russia by considering the process of industrial evolution under central planning. Some of the confusion that arises over the present industrial structure is a direct consequence of differences in views over the important features of this process. We present these two views below.

Much of the *conventional view* about industrial evolution under central planning arises from a particular folk model (the "cookie cutter" model) of planner or ministerial decision making. In this model, a Stalinist minister is assigned the responsibility of building a new industry. The minister studies the set of technologies available to produce the product to identify the efficient scale of production within a centrally planned setting. After this efficient scale is identified, the minister uses the cookie cutter to carve a set of identical factories at this scale to satisfy industrial development needs.

²The predominant source of monopoly power under central planning was the sellers' market created by price controls. Price liberalization then is perhaps the most important element of competition policy in Russia and other countries of the former socialist world.

Clearly, the conventional model supports the view that Russian industry is very homogeneous. Each industry is populated by identical firms. Also, the model is often interpreted to suggest that industry is highly concentrated and dominated by very large firms. It is generally believed that, by building fewer and, thus, larger enterprises, the administrative costs of central planning could be economized.³ Moreover, Stalinist ministers are generally believed to have identified scales of production that were quite large, a phenomenon known as *gigantomania*.⁴ Eva Ehrlich [1985: 293] relates this bias quite simply, "In the socialist countries, large size and economic efficiency were thought to be synonymous." Stalin, especially, preferred large scales of production because such enterprises stood out as impressive examples of Soviet industrialization.⁵

An *alternative view* of industrial evolution under central planning is implicit in the more recent literature on ministerial decision-making under central planning. The older literature emphasizes the similarity of technologies within an industry among firms when they are first built; the newer literature emphasizes the differences between firms that become more pronounced as they age.

This newer literature presents models that stress the role of hidden information and hidden action in the behavior of decision makers under planning. In these models, industrial ministers must allocate production targets to enterprises with imperfect knowledge of their true productivity. To elicit information from enterprises about their potential productivity, the minister must provide enterprise directors with sufficient incentives to meet their targets.

These models provide several insights into the type of industrial structure that evolves as a consequence of this system of incentives. First, implicit in the model is the belief that enterprises in each industry are heterogeneous. They differ in productive potential, possibly because of differences in managerial skills or behavior, location, access to suppliers, or even technology. Second, over time, these differences may not be fully revealed. When the incentives directors face do not adequately reward them for fully revealing information, the directors of higher productivity

³Fewer enterprises makes it easier to construct the plan and also reduces the costs of monitoring its implementation.

⁴See, for example, Gregory and Stuart [1986: 143]. We note that, in early research on Soviet enterprises, *gigantomania* referred to the tendency of the Soviet ministers to build gigantic *plants*. More recently, however, this concept has been used to describe *enterprise* size.

⁵Discussing the fixation with large enterprises, Peter Wiles [1962: 304] writes: "There is something 'socialist' and 'progressive' about mere size, even if unaccompanied by lower costs. Gigantomania as such, then, reinforces the view that large capital expenditures are a good thing, even where smaller ones will do."

enterprises will choose to conceal the true potential of their enterprises, precisely because they know that ministers will use this information against them in designing future production targets. This dynamic incentives problem, the "ratchet effect," impairs economic performance because the threat of higher targets causes enterprise directors to demand greater rewards in return for full revelation. This makes it more costly for planners to obtain important information.⁶

Ickes and Ryterman [1993] use these observations to develop a model of industrial evolution under central planning. In most of the literature on managerial decision making, the number of enterprises is given. The problem considered in the Ickes-Ryterman model is the determination, by the relevant minister, of how many enterprises should be built in a given industry. In this model, planners provide industrial ministers with a stream of aggregate output targets to be met over time. The industrial minister, in turn, must disaggregate these targets and award them to specific enterprises in the ministry, building new enterprises and expanding existing enterprises to meet this goal. The minister cannot, however, shut down enterprises that are observed to be high cost because the absence of exit is one of the distinguishing features of centrally planned economies. Of course, the productive potential of new enterprises is learned only over time as the ministers observe the ability of enterprise directors to consistently meet production targets at low cost.

This model also provides important insights into the evolution of industry under central planning. Again, the model stresses the presence of heterogeneity within industry. Over time, as ministers observe the performance of enterprises, they naturally award larger targets to enterprises with a demonstrated ability to meet their production goals. Thus, the model predicts that a mature industry will be populated by a mixture of enterprises – larger more productive enterprises and smaller less productive ones. Thus, this and other more recent models raise the possibility that industry, in fact, is not dominated by very large enterprises and, consequently, may not be highly concentrated.

Ickes and Ryterman suggest that the maximum and minimum scales of enterprises in a centrally planned industry were determined by an interplay of technology and the costs of centrally planned production. All else equal, these administrative costs increase with the number of levels of hierarchy as well as with the span of control at each level. Therefore, these costs are viewed as favoring the creation of fewer larger enterprises than would be created in a market setting. We believe that diseconomies of scale that are created in very large enterprises quickly outweighed the administrative advantages of very large firms. Larger firms require more layers of hierarchy to

⁶The classic reference is Berliner [1957]. Keren [1993] provides a survey of this literature.

monitor production, quickly adding to costs. Moreover, small firms were not required to play the important role — in fostering innovation — that they play in market economies. In market economies, small firms enter the market, experiment with a new product or process, then grow or fail based on their success. Under central planning, a different process of economic selection was implemented, one in which product innovation was typically produced in larger science-production associations. Therefore, we believe that ministers economized on coordination costs predominantly by choosing not to build very small enterprises.

Industrial concentration, in turn, is determined by the interplay of technology and the costs of centrally planned production, on the one hand, and demand, measured by the size of output targets, on the other. For a given technology and costs of coordination, industrial concentration will be higher in industries that were presented with lower aggregate output targets. This feature suggests that, to some extent, important industries for which product demand was high are less likely to be concentrated than less important industries.⁷ More importantly, given the large size of the former Soviet Union, this feature suggests that industrial concentration in national markets is unlikely to exist.

1.2 Problems with the Conventional Wisdom

In part, the conventional view has been so compelling historically because some empirical evidence does appear to support it. In this section, we explain why we believe this evidence is misleading.

Heidi Kroll, in recent work [1991], presents some evidence for both large firm sizes and industrial concentration in the Soviet Union. Concerning enterprise size, she states that, since the 1960's, the size of Soviet enterprises has been increasing,

The average number of employees per enterprise rose to 813 in 1987-88, and 73.4 percent of the labor force now work in enterprises employing more than 1000 workers; indeed, enterprises with 10,000 workers or more employ 21.6 percent of the labor force, while those with 500 workers or fewer employ only 14.9 percent of the labor force...⁸

⁷However, we do recognize that some small industries may have strategic importance to an economy.

⁸Kroll [1991: 147].

She gives many of the conventional reasons to explain why Soviet enterprises were so large. While these numbers seem compelling, they are hard if not impossible to interpret without comparison with other countries.

Eva Ehrlich [1985: 267-295] does compare enterprise and establishment sizes between capitalist and socialist economies. While her survey does not include data from the Soviet Union, her methodology and conclusions are relevant to our study. She employs two measures to describe industrial structure: average employment and size distribution of firms. Her tables show quite clearly that average enterprise sizes in the socialist economies, especially Poland and Hungary, are greater than in even the "large-type" capitalist economies. The tables also show that size distributions of firms vary distinctly between the two types of economies: the socialist economies have a greater percentage of employment in the large firms and a lower percentage in the small firms than the capitalist countries do. Ehrlich relates the following metaphor for socialist industrial structure,

A Hungarian economist compares the size structure of the Hungarian economic system to a pyramid turned upside down, characterized not by large enterprises relying on a broad base of small- and medium-size firms but, on the contrary, by a preponderance of big enterprises and a significant lack of small and medium ones...⁹

Given their understanding of the distinct size distributions, what Ehrlich and Kroll fail to do is to weight or correct the averages they use according to the different size distributions and the different overall numbers of firms in these economies. We can illustrate this problem with a simple example. Consider two economies, each with 10 firms of different sizes, but distributed equally across the two economies so that the average firm size is the same. Now, give one economy, A, 10 more firms all of which are smaller than the smallest original firm, and leave economy B the same. The average firm size in A is now much smaller, but that does not mean that economy B has more large firms than A. In other words, this change does not "invert" B's pyramid, but rather just builds to the bottom of A's. In this paper, we try to draw a clear picture of size structure both by using country comparisons and by correcting or explaining our measures in terms of size distribution.

Kroll also provides evidence of industrial concentration.

According to Goskomstat SSSR, more than one-third of the most important types of machine-building products are produced by a single enterprise, and approximately the same share is produced by only two enterprises...According to Gosstab, 80 percent of the volume of output in machine building is manufactured by monopolists, and 77 percent of machine-building

⁹Ehrlich [1985: 294].

enterprises are monopolists...Another statistic from Gosstab is that about 2,000 enterprises in the country are the sole producers of a specific type of product...¹⁰

The World Bank [1992: 82] provides even more startling statistics. Under the former regime, the State Committee for Material Technical Supply, *Gosstab*, organized the delivery of 7,664 distinct product groups. According to the World Bank, 77 percent of these products were produced by single enterprises.¹¹

These statistics measure a specific type of concentration—*product* concentration—that is, they measure concentration in terms of the ability of the consumer to find alternative suppliers of the exact same product. Due to central planning, however, product categories in the former Soviet Union were defined very narrowly. In order for the planners to ensure that the input needs of each producer would be met, they (or the appropriate industrial minister) assigned very specific targets for each intermediate good. For example, in principle, the output target for one centimeter nails would be distinct from the target for two centimeter nails. As a consequence, the number of different product categories used by planners in the former Soviet Union was enormous. Moreover, enterprises specialized in production more highly than in the West.¹² Under central planning, there was no incentive, let alone authority, for the enterprise to diversify its production. Thus, while concentration measured in terms of products will naturally appear greater than concentration measured at a more aggregated level, this disaggregation effect is exaggerated in the Soviet case.¹³ In this context, the statistics quoted above are not all that surprising.

¹⁰Kroll [1991: 144-145].

¹¹Kahn and Peck [1991: 62-67] also discuss the prevalence of monopoly in Soviet industry.

¹²Granick [1967] is the classic reference on the forces that went into the design of enterprises and factories in the Soviet metal fabricating industry. One of his important insights was the link between product specialization and scale [1967: 36]: "If each plant were to limit its output to a single product - or to a small range of products if its output of one item would exceed the total planned consumption of the entire USSR - and concentrate all its facilities on such production, then each plant could gain economies of scale."

¹³This point is illustrated, albeit unwittingly, by the IMF-World Bank-OECD-EBRD joint study on the Soviet economy [1991: 16]: "Industrial production in most sectors tends to be highly concentrated in one or a few enterprises. For example, in almost two-thirds of the 38 product groups included under sledge-press machines, the largest enterprise accounted for 75 percent or more of total production in 1988..." The key point, however, is that with the demise of central planning enterprises that produce different types of sledge-press machines can compete against each other.

The other type of concentration one can measure is *industry* concentration, that is, concentration measured in terms of the ability of the producer to supply substitute or directly competing products in the short term. This measure is a broader measure than the one above, requiring enterprises to be classified and compared based on their industry rather than the specific products they produce. It is based on the assumption that enterprises compete by producing the same products, producing substitute products, or by being able to easily alter production in order to make the same or substitute products.

In a market setting, where an enterprise's choice of product mix is not centrally determined, this approach more correctly measures *potential competition* between firms that produce similar types of products. Potential competition is an important feature of an industrial structure. In a decentralized environment, the threat of entry, most easily from other firms producing similar products, often serves to discipline existing firms in a particular product market. If existing firms set prices too high (or quantities too low), the incentive for near competitors to enter the product market and share in oligopoly rents is raised. Thus, if a market is *contestable*, competitive conditions may exist even if only one or a few firms produce a product.

The question, then, is which measure is most appropriate for this analysis. During the Soviet period, there was no competition and little opportunity for enterprise directors to choose their product mix. Now, with enterprise reform, decisions about product mix are decentralized, and there is the potential for competition. In fact, evidence from an assortment of surveys on enterprise behavior suggests that some enterprises, both state-owned and privatized, are adapting their product mix in order to survive. Thus, we believe that measures of industry concentration more accurately reflect the incentives related to competition in the economy. Furthermore, from a practical perspective, studies of market economies typically use industry measures rather than product measures to discuss concentration and competition. Not only does this suggest that industry measures are more appropriate; it means that by using industry measures, we are able to compare Russia to other countries.

Kahn and Peck [1991] also find that measures of product concentration exaggerate the role of monopoly and oligopoly in the Russian economy. They provide data on the number of industries in Russia that appear to be concentrated, and compare these statistics to similar ones for the United States. They find, as we do, that a larger *number* of industries in Russia appear to be concentrated. The problem with their analysis, however, is that it fails to take into account the *importance* of these

industries.¹⁴ As we demonstrate, below, this correction is critical to understanding the degree of industrial concentration that actually exists in the Russian economy.

2. Data and Methodology

We compile statistics on industrial concentration in the Russian Federation using data collected for the 1989 *Soviet Census of Industry*. This data set includes all civilian enterprises engaged in production activities defined by the Soviets as industrial. For a summary of the characteristics of enterprises in the data set, see Table 1.

The enterprises in this data set are classified based on the primary commodity they produce and, correspondingly, are assigned a U.S. Standard Industrial Classification (SIC) code.¹⁵ As our primary concern is industrial concentration, we focus our attention at the four-digit SIC level.¹⁶ Further disaggregation would take us into the realm of product concentration which, as we have argued above, is of less interest.

Typically, in studies such as ours, *sales* are used as the principal measure of a firm's size. Unfortunately, in countries such as the former Soviet Union, data measured in value terms do not provide useful measures of a firm's activity. Aggregate measures of economic behavior that are expressed in value terms have ambiguous meaning because prices were determined by administrative fiat, and not by market interactions. Thus, although we provide some statistics based on sales, we primarily use *employment* to measure the market position of firms within an industry.

Our choice of 1989 was dictated by circumstance; that is the year for which we have the data. There are, however, some distinct advantages to this year. The survey methodology used by

¹⁴Kahn and Peck [1991: 65] acknowledge this problem, but did not have the data needed to properly weight industries according to their importance in the economy.

¹⁵Unfortunately, we do not know the industrial code assigned to the enterprises by *Goskomstat* (the State Statistical Office). Consequently, we cannot aggregate our data into the standard branch divisions used in Soviet publications, which are quoted often in western analyses. Thus, for example, we are not able to look at machine building as a separate branch.

¹⁶Although many enterprises are assigned codes at the five-digit level, we use four-digit codes in our analysis. We base our decision on two factors. First, comparison at the four-digit level reveals evidence of competition and potential competition within an industry, while comparison at the five-digit level would reveal information about product competition only. Moreover, this type of analysis is nearly always conducted at the four-digit level for the U.S. and other western countries. Thus, analysis at the four-digit level allows us to evaluate industrial concentration in the Russian Federation in a broader context.

Goskomstat (the State Statistical Office) was based on central planning institutions. As those institutions began to deteriorate, the quality of the survey frame and data also began to deteriorate. Analysts are thus faced with a tradeoff. Earlier years most likely provide more accurate data, but are of less interest for their implications about the transition. In our assessment, 1989 was the last year in which *Goskomstat* was able to conduct a survey at an sufficient level of quality for this analysis. Fortunately, 1989 constitutes a good base year to assess the initial conditions of reform.

The statistics for the Russian Federation are presented in context of statistics for the U.S. and, to a lesser extent, for the O.E.C.D. We chose the U.S. as the dominant country for comparison because of its size and level of industrial development. The statistics on industrial structure in the U.S. are based on U.S. Census Bureau data¹⁷, usually from 1987, although we do make some comparisons which use other years; we specify when 1987 is not the comparator.

2.1 The Unit of Analysis

Conducting comparisons of industrial structure between the Russia and the United States raises issues of the proper unit of comparison. The U.S. Census Bureau collects data at the company and establishment levels, where an establishment is defined as all plants owned by a company that are engaged in similar activities at one location. Russian data, however, are collected at the enterprise level. Technically, an enterprise is a company. However, it differs from a western company in an important way.

Unlike companies, enterprises are seldom multi-divisional firms in the western sense. Although they may produce several products for sale, these products are typically in closely related product groups. However, in addition, many enterprises produce products that do not reach the market. Often, enterprises are vertically integrated, producing output that they consume as inputs. Also, many enterprises engage in side activities such as farming to provide food for workers. Thus, in practice, Russian enterprises might be quite diversified.¹⁸ Many enterprises are made up of several

¹⁷We use data from both the *Census of Manufacturers, Concentration Ratios in Manufacturing, 1987* and the *1987 Enterprise Statistics*.

¹⁸A good example is the production of machinery. According to Hewett [1988: 172]: "Some departments in nonmachinebuilding enterprises also produce machinery. Forty-five percent of all metalworking equipment in the Soviet Union can be found there, a stock that by itself exceeds in value the entire capital stock of the U.S. machinebuilding sector."

plants (*zavody*), often in different cities (and, during the Soviet period, even in different republics). Hence, in certain respects, an enterprise is less than a company, but more than an establishment.¹⁹

For evaluating firm size and aggregate concentration, we compare Russian enterprises to U.S. companies, where U.S. companies are measured by their *domestic* employment. Very large enterprises in Russia are almost always multi-plant enterprises and, consequently, are more like companies than establishments. Moreover, for the discussion of policy implications related to firm size and aggregate concentration, company is a more insightful measure. In contrast, for evaluating industry concentration, we compare Russian enterprises to U.S. *establishment-groups*. Establishment-groups are all domestic establishments in a single company that are classified with the same 4-digit SIC code.²⁰ The U.S. Bureau of the Census uses this unit to partition the company and allocate its activities to different industries. This partition enables Census to compute concentration statistics that reflect the ability of domestic producers to supply substitute or directly competing products in the short term. To the extent that Russian enterprises are like establishments (in that their primary products for sale are closely related), this comparison is direct. To the extent that Russian enterprises are, in fact, diversified companies, concentration measures will overstate the level of concentration in the Russian economy. Consequently, using the enterprise data actually biases the Russian statistics against our case.

The use of enterprise data does raise an important issue, however. Beginning with a decree of Brezhnev in 1973, Soviet enterprises were organized into associations (*obyyedineniya*).²¹ The enterprises that comprise an *obyyedineniye* were operated under a single management.²² Hence, when

¹⁹The extreme vertical integration of enterprises presents an important additional source of potential competition in the Russian economy. In our analysis, we measure concentration based on the industry to which the enterprise belongs. To the extent that the enterprise produces products that belong to a different SIC code, we are *understating* the potential for competition.

²⁰These statistics are based on establishment level data which are then aggregated into the establishment-group unit of measure. The concentration ratios that we present at the *two-digit* level are based on company data with company as the unit of measure. The bias is not great here since few companies will have establishments in two different two-digit industries.

²¹The primary purpose of the reform was to reduce the administrative burdens on the planners, as discussed above.

²²According to Conyngham [1982: 228] the average number of enterprises in an *obyyedineniye* varied across sectors: "in the machine-building industries, the production unions average five or six enterprises. In light industry, the average is nine...in the chemical, coal, and other extractive industries, however, (associations) usually incorporate twenty-five or more enterprises."

we examine enterprise data, we may be treating units that belong to a single, larger structure as if they were independent units. It is important to keep in mind, however, that our purpose in this paper is to examine industrial structure in Russia as it pertains to the development of a market economy. In this context, enterprises seem to be the appropriate unit of analysis, because these are the units that are typically being privatized.

2.2 The Military Industrial Complex (MIC)

The primary difference between the Russian and the U.S. data sets is the fact that the Russian data set includes data on the civilian sector only. The military-industrial complex (MIC) in Russia is very important. Consequently, we cannot simply ignore its presence in our analysis. To deal with this problem, we have assumed that the industrial structure of the MIC closely resembles that of heavy industry in the civilian sector. We then use the observed distributions of heavy industry in the civilian sector to produce estimates of the industrial structure of the MIC. We base our choice on the observation that the process of industrial evolution in the MIC closely resembled the process of evolution of heavy industry in the civilian sector. In fact, our calculations suggests that the mean size of firms in the military-industrial sector is *smaller* than the mean size of firms in civilian heavy industry.²³ In our analysis, we estimate the total number of firms in the military-industrial complex²⁴ and assume the distribution of these firms by size resembles the distribution in civilian heavy industry. Although this process produces an *upward* bias in the distribution of firms in the military-industrial complex (toward larger firms than is statistically evident), we feel this more conservative approach is necessary to persuade readers to our point of view.

Specifically, to estimate the size distribution of enterprises in the military-industrial complex, we computed the size distribution of enterprises in the following civilian branches: chemicals, industrial machinery and equipment, electronics, transport equipment, and instruments. We selected these branches based on our belief that enterprises in the military-industrial complex produce similar

²³The average firm size for our proxy group of branches (chemicals, industrial machinery and equipment, electronics, transport equipment, and instruments) is 1,750. We know that adding the MIC to our data would add 5,309 enterprises and 7,979,161 workers. This implies an average firm size of 1,503 for the MIC. The largest enterprise in Russia, for example, is *Autovaz*, a civilian, not a military enterprise.

²⁴Including fuels and energy production.

types of products.²⁵ Then, we applied this distribution to the number of enterprises that are known to exist in the military-industrial sector.²⁶ See Table 2 for more detailed information.

Although this method is useful in correcting biases introduced in estimates of enterprise size, we do not use it in calculations of industry concentration. While omission of enterprises that are part of the military-industrial complex may bias statistics related to firm size *downward* (for example, the average size of the 100 largest firms), it is unlikely to do so in the case of measures of industrial concentration. Enterprises in the military-industrial complex are of two types. Some produce products that compete with those produced by enterprises in the civilian sector. In these cases, our (unadjusted) statistics *overstate* the level of concentration in Russia, a bias that only strengthens the force of our conclusions. Alternatively, some enterprises in the military-industrial complex produce products that are *not* produced in the civilian sector. In these cases, we suggest the reader look to levels of concentration that are measured in heavy civilian industry for a prediction of the levels of concentration in these industries.

3. Myths and Reality

In this section, we discuss some of the most commonly held myths concerning firm size and concentration in the Russian economy. We begin with a discussion of the size distribution of enterprises. We then turn to industrial concentration at the national level, and finally to concentration at the industry level.

3.1 Size Distribution of Enterprises

The conventional view of industrial evolution in Russia emphasizes the dominant role played by very large firms in the economy. As a result, it views Russian industry as highly concentrated. In

²⁵We did not adjust the implicit weights assigned to any of the civilian branches in the computation of the size distribution. We base this decision on the observation that the military-industrial complex may have been fairly autarkic; as a consequence, its structure should reflect an industrial balance not unlike that observed in the remainder of the economy.

²⁶We note that the mean size of enterprises in heavy civilian industry is larger than the mean size of enterprises in the military-industrial complex. As a consequence, when we use the size distribution of firms in heavy civilian industry to approximate the size distribution of the military-industrial complex, we unavoidably inflate the number of workers employed in this sector. Specifically; official data suggests that 7,979,161 workers are employed in the military-industrial complex; however, when we use the distribution of employment in heavy civilian industry to estimate the size of firms in the military-industrial complex, we estimate that 9,289,726 workers are employed in the sector.

contrast, the more recent work on industrial evolution suggests that Russian industry is fairly heterogeneous in terms of size, opening the possibility that industry is not dominated by very large firms and, in fact, may not be highly concentrated. Clearly, then, the size distribution of enterprises is at the very heart of our discussion of industrial concentration in Russia. Thus, we begin by presenting evidence related to the size distribution of firms.

Myth 1: Many Russian enterprises are very large. The Russian economy suffers from *gigantomania*.

Reality 1: In fact, Russia's largest enterprises are actually smaller than the largest firms in many O.E.C.D. countries.

In Table 3, we compare the size of the largest firms in O.E.C.D countries with that of Russia. The ten largest civilian firms in Russia employed an average of 62,649 workers. We estimate that the ten largest firms, including those in the military-industrial complex, employed an average of approximately 92,698 workers (table 8).²⁷ We can compare these average-employment statistics to those for the top ten firms in a sample of other countries using 1985 statistics found in Scherer and Ross [1990: 63]. Table 3 shows that these statistics for Russia are *notably* smaller than those for the United States, Japan, West Germany, the United Kingdom, and France, and, on average, about the same as that for Holland. The result is similar when one compares the average firm sizes of the top 20 firms in these countries; that is, the average-employment of the top 20 Russian enterprises is notably smaller. In fact, there are only 113 civilian and approximately 217 total industrial enterprises in Russia that have 10,000 workers or more.

These findings are actually not that surprising. Most of the very large companies in the O.E.C.D. countries are multinational enterprises that have both multinational labor markets -- they

²⁷To estimate the number of enterprises in the military-industrial complex that employ 10,000 workers or more, we calculated the percent of civilian enterprises in heavy industry that employed 10,000 to 19,999 workers, 20,000 to 29,000 workers, ..., 90,000 to 100,000 workers, and more than 100,000 workers and applied these percents to the number of enterprises in the military-industrial complex. To estimate the size of the enterprises in the military-industrial complex, we calculated the mean size of civilian enterprises in each size class and assigned the mean to all the non-civilian enterprises within the class. We note that, due to the small number of firms involved in the calculation of the ten largest firms in the economy (cited above), the particular estimate is subject to large potential error.

employ people at home and abroad -- as well as multinational product markets for their goods. They tend to operate in environments in which communication and other infrastructure facilitating large-scale organization is good. Thus, their large size can represent an efficient scale of production. Large Russian enterprises, on the other hand, cannot be considered conventional multi-national firms. While they were often built to serve the C.M.E.A. market, they rarely located production outside national boundaries. But, there is no reason to conclude *a priori* that their sizes are too large for their national and regional markets.

The conventional belief, or myth, that Russian firms are unnaturally large is often used to suggest that they must, in fact, be inefficiently large. This conclusion then supports the position of those who favor breaking up Russian enterprises during transition. Our evidence shows, however, that it is incorrect to assume that Russian enterprises are inefficient based on size alone. If Russian enterprises are inefficient, their inefficiency likely comes from internal organization rather than from scale of production. The internal organization of many Russian firms reflects historic circumstances, rather than market conditions. The assertion that Russian enterprises are "too large" is really an assertion about the shape of the cost functions of these units. Without such data one cannot really address the issue. But the comparison with other O.E.C.D. countries does provide some perspective on the size of Russian enterprises. Organizational inefficiencies can be found in firms of all sizes and require a much different set of remedies than simply breaking up large firms into their constituent plants.

Myth 2: The size distribution of Russian enterprises can be represented by an *inverted pyramid*. There are many large enterprises and very few medium or small enterprises.

Reality 2: The size distribution is better represented by an *upright pyramid*. The significant difference between the industrial structure of market economies and that of Russia is that Russia lacks the myriad of very small firms found in market economies.

Tables 4, 5, and 6 show the distributions of Russian and U.S. manufacturing enterprises²⁸ by enterprise employment.²⁹ In table 4, we see that, while Russia does have more large firms and the U.S. has dramatically more small firms, for both countries the number of firms as a percentage of total firms in a size class decreases as the size of firms in the class increases. Thus, the image created by the industrial structure in both Russia and the U.S. is an upright pyramid, in which many smaller firms support fewer larger firms. In table 5, we see that an inverted pyramid is present in the Russian case, but it describes the distribution of small firms only. That is, the number of firms as a percentage of total small firms in a size class increases with the size of firms in the class in the case of Russia, but decreases in the case of the U.S. We consider this observation very important. It supports the conclusion from the historical evidence that there was, in effect, a lower bound on enterprise size in the former Soviet Union.

The relative absence of small enterprises in Russian industry suggests that comparing Russia and the United States by looking at average firms size for industry as a whole may be misleading. If we take the arithmetic mean, for example, we find that manufacturing firms in Russia employ an average of 670 workers in the civilian sector and an estimated average of 925 workers when firms in the military-industrial complex also are considered. In contrast, manufacturing firms in the U.S. employ an average of 70 workers. We can correct for the small-firm bias by computing average employment per firm for all manufacturing firms employing above a lower bound of 249 employees. In Russia, these firms employ an average of 1,297 workers in the civilian sector and an estimated average of 1,621 workers in both sectors, while, in the U.S., these manufacturing firms employ

²⁸Manufacturing enterprises are a subset of industrial enterprises. See table-1 for a breakdown of all industrial enterprises in the Census into one-digit SIC codes.

²⁹We base the size categories on the current Russian definitions, with one exception. In tables 4 through 6, we define small enterprises based on the U.S. definition of 1 to 249 workers. (Consequently, medium firms begin with 250 workers.) The "very small" categories are based on the categories in U.S. tables. In further tables which just present Russian data, small is 1 to 199 employees.

To estimate the number of non-civilian firms in each size class, we calculated the share of enterprises in heavy civilian industry in each size class and applied these shares to the total number of firms in the military-industrial complex. Similarly, we used mean employment by enterprises in heavy civilian industry in each size class as the approximate employment of non-civilian firms assigned to the class.

2,103 workers.³⁰ Average employment by manufacturing firms with 50 workers or more is 761 workers in the civilian sector in Russia, an estimated 1,025 workers in both sectors, and 498 workers in the U.S.³¹

The distribution of employment (rather than firms) across size categories presents a more striking difference between the two countries (the lower panel of table 4). In Russia 91.5 percent of civilian employment and an estimated 94.5 percent of total employment in manufacturing is provided by enterprises with employment of 250 or greater, while only 73.1 percent of U.S. manufacturing employment is provided by similar firms. But, these statistics obscure the dominant role of extra-large firms in the provision of employment in the U.S. A closer examination of the size distribution of firms in the two countries reveals this role. Three-fourths of Russian manufacturing employment falls in the middle of the distribution, that is, in medium and large enterprises. In contrast, two-thirds of U.S. manufacturing employment falls in the tails, in small and extra-large firms. Strikingly, 40.2 percent of the U.S. employment is provided by extra-large firms, while only 15.3 percent of Russian civilian employment and an estimated 20.5 percent of total manufacturing employment are provided by similar firms. Thus, in comparison with the U.S., the Russian economy is not dominated by gigantic firms and Russian employment is not dominated by employment in very large firms.

The importance of medium and large enterprises in Russian industry is also evident in table 7, where we break down the size distribution of firms for separate branches of civilian industry in Russia.³² This table also shows that production by very large firms is mostly concentrated in a few industrial branches. Just four branches contain 84 of the 113 extra-large enterprises in the civilian sector, and one of these, mining, is a non-manufacturing branch. The other three are industrial machinery and equipment, primary metals, and transportation equipment. These branches not only have a large share of their employment in extra-large enterprises — an average of 45 percent — they also represent a large share of industrial employment — an average of 8.7 percent each. The results from table 7 suggest that, for some branches, restructuring, especially reorganization of the large enterprises, will have a significant effect on their relevant labor markets. But, this is clearly not true

³⁰The total numbers of firms used for these calculations are 8,131 for civilian manufacturing in Russia, 12,131 for total manufacturing, and 7,454 for the U.S.

³¹The total numbers of firms used for these calculations are 15,066 for civilian and 20,233 for total manufacturing in Russia, and 37,604 for manufacturing in the U.S.

³²The branch distinctions for the manufacturing enterprises are 2-digit SIC categories. The other branches are 1-digit groups, except for construction and mining which have been divided into two.

for all branches of industry, nor even for branches with large shares of industrial employment. The other branches with high shares of national industrial employment – Food and Kindred Products, Lumber and Wood Products, Stone, Clay, and Glass, and Textile Mill Products – have zero to little employment in extra-large firms. Thus, while restructuring in the industries in these branches will significantly impact the economy, the issues involved will be somewhat different.

3.2 Industrial Concentration

There are several measures of industrial concentration that are commonly utilized. Ownership concentration measures how diffuse is the ownership of industry. Russian industry in 1989 was entirely state-owned, leaving little to study.³³ Product concentration measures the degree to which products are produced by few or many enterprises. This measure, however, says very little about potential competition, because it disaggregates markets too finely, especially given the very distinct product categories used in Soviet planning. Moreover, given the fact that central planners determined the assortment plans of enterprises, product concentration says very little about what enterprises can produce. Rather, it is more a measure of the assortment planners and ministers chose.

Consequently, we focus our attention on measures of concentration both in the aggregate and by industrial branch. The former essentially measures how large enterprises are relative to the size of the economy. The latter is a measure of market power. We consider these in turn.

3.2.1 Aggregate Concentration

Perhaps the most salient component of the conventional wisdom is the belief that the Russian economy is dominated by large enterprises.

Myth 3: The largest Russian enterprises account for an unusually large share of national production and employment.

Reality 3: The largest enterprises account for only a moderate share of national production and employment.

³³The Russian privatization plan, since it gives advantages to insiders, will most likely lead to a rather diffuse ownership at least in the first stages. It will be interesting to study what happens to ownership concentration in the future.

Table 8 presents statistics describing the role of the largest enterprises in industrial employment and production. The ten largest enterprises by employment account for 4.6 percent of national civilian employment; the top 100, 16.3 percent. Our estimates suggest, that if enterprises in the military-industrial complex were included in our sample, the top 100 enterprises in the entire economy would account for a smaller share, approximately 14.3 percent of total employment. Scherer and Ross present aggregate concentration shares for the United States for 1982³⁴; table 9 is a supplemented version of their table. They show that, in the U.S., the largest 100 manufacturing corporations accounted for 23.8 percent of total U.S. employment. In Russia, sales of the largest 100 civilian firms accounted for 21.6 percent of total sales, while sales of the largest 100 firms in the U.S. accounted for 31.8 percent of total sales of civilian goods. The comparisons for the largest 200 firms offer the same conclusions.

Table 10 compares aggregate concentration in the U.S. and Russia at higher levels. In spite of the fact that Russia has 1/18 the number of manufacturing firms as the U.S., the manufacturing four-firm concentration ratio for Russia is three percentage points lower than for the U.S., and this margin persists in the other groupings as well. Thus, aggregate concentration in Russia is less than in the market economy of the U.S. These results relate to those above which show that enterprises are not as gigantic as we once presumed.

Table 8 also shows how aggregate civilian concentration is distributed across industries and regions. The top 10 civilian firms only represent four branches; in fact, these firms represent only four industries at the 4-digit S.I.C. level. This concentration of Russia's major enterprises in a few number of branches and industries is also true when examining the top 25, 50, or 100 civilian enterprises. These major enterprises seem to be rather broadly distributed across *oblasts* (provinces), however. Seven different *oblasts* have enterprises in the top 10, and these fall in six different economic regions. Thirty-nine out of the 78 *oblasts* in Russia contain enterprises with 10,000 workers or more, and these fall in all 12 of the economic regions. Thus, the major enterprises are not geographically concentrated. Only one *oblast*, Kemerovskaya, stands out as having a large share

³⁴Scherer and Ross [1990: 59]. Scherer and Ross explain that aggregate concentration in the U.S., in terms of domestic manufacturing activities alone, has risen insignificantly since the 1960's. Thus, the use of 1982 data for the U.S. in comparison with 1989 data for Russia does not present a significant problem.

of the major civilian enterprises. It has six of the top 25 civilian firms and seven of the top 50 civilian firms.³⁵

3.3 Industry Concentration

Prior to presenting our evidence, we should say a few words about measuring, comparing, and thinking about industry concentration. Any comparison of concentration between the U.S. and Russia is tricky because the U.S. has both many more industries and many more firms than Russia. In manufacturing alone, the U.S. has 448 industries at the 4-digit S.I.C. level, while Russia has only 350 4-digit industries.³⁶ Even when using percentages of concentrated industries versus actual numbers, the comparison could be biased by the type of industries that Russia does not have. The U.S. also has almost 18 times as many firms. In terms of firms per industry, the U.S. has an average of 685.5 firms per industry in manufacturing, while Russia's average is only 49.1. In these simple terms, Russia's production is clearly more concentrated. This does not mean, however, that Russia's industrial markets are necessarily non-competitive.

We employ three measures of industry concentration. The most well known is the four-firm concentration ratio (CR4). This is a ratio of the sum of the measure for the largest four firms (according to the same measure) to the sum of the measure over all firms in the industry. More specifically, we usually calculate the sum of employment in the four firms with the most employment in the industry as a percent of the sum of employment in all the firms in the industry. We calculate CR8's in the same manner for the largest eight firms in an industry.³⁷

We also classify enterprises according to how many enterprises there are in that industry, that is, we identify monopolists, duopolists, oligopolists, and others which fall into larger categories. Finally, we use the Russian measure of a "dominant" firm; a dominant firm is one which accounts for a 35 percent or greater share of its industry's market in terms of employment or sales. In the tables

³⁵Kemerovskaya *oblast* is located on the east border of Western Siberia in the south.

³⁶This number for the U.S. does include military production and thus likely includes industries which are not counted in the Russian number.

³⁷Without information about costs we cannot calculate Lerner Indices. We calculate concentration ratios rather than Herfindahl-Hirschman Indices (HHI's). As Scherer and Ross explain, CR4's and HHI's are highly correlated (Scherer and Ross [1990: 74]), and the analysis we do is not precise enough to warrant the more complicated statistic.

looking at Russia alone; and unless otherwise specified, all measures are calculated at the four-digit industry level. That means we report the *highest* possible measure of industry concentration.

We therefore implicitly define the relevant market for competition as the four-digit industry level. This assumption is no more than a guess or a proxy. For some industries, the relevant markets are more distinct, for some more aggregated.³⁸ As we explain earlier in the paper, we intentionally measure industry concentration instead of product concentration. The four-digit level is then the most disaggregated market we can choose. In the case where the relevant markets are larger, we actually overstate concentration. We try to control for this problem in the U.S.-Russia comparisons by calculating the statistics at the same level in each country.

Myth 4: Russian industry is highly monopolized. These monopolies are very large enterprises.

Reality 4: When measured at the national level, there are very few monopolistic enterprises in Russia, and most of these firms are relatively small.

Table 11 shows that only 43 of the 21,391 civilian Russian enterprises are monopolies in their four-digit industries at the national level. While this represents 10.6 percent of all industries, it only represents 0.2 percent of civilian firms, 0.2 percent of civilian employment, and 0.2 percent of civilian output. This measure of industry concentration and, thus, potential competition is much lower than the statistics often quoted, for example the ones from Kroll [1991] above, which is that around 80 percent of Russian products are produced by monopolies. Table 11 also shows that, while the mean size of a monopoly is 726 workers, the median is only 285 workers. Even 726 workers is less than the means in all other competition classes, except the class with the most number of firms. Looking at table 12, we see that there are no extra-large firms that are monopolies, or duopolies for that matter. In fact, 32 of the 43 monopolies have less than 1,000 employees.

If we define oligopoly quite liberally to mean four or fewer firms in an industry, we see in table 11 that, while 26.4 percent of industries in this sample are oligopolies, they only account for 1.1 percent of all these firms and 1.9 percent of all this employment. At the same time, 70.3 percent of firms and 41.8 percent of employment falls in enterprises in industries which have more than 100

³⁸Scherer and Ross [1990: 73] offer a good discussion of defining markets according to SIC codes.

firms. The highest employment mean is in the industry category with five to ten firms, and table 12 shows that the plurality (and one-third of all) extra-large firms are in industries with 21 to 50 firms. Mammoth monopolies simply do not dominate the civilian industrial sector.

Myth 5: Russian industry is heavily concentrated.

Reality 5.1: Measured at the two-digit level, U.S. manufacturing is at least as concentrated as Russian manufacturing.

Table 13 lists CR4's and CR8's by employment for companies in two-digit manufacturing branches in the U.S. and Russia.³⁹ If one took the argument seriously that the industrial structure of Russia was arbitrary, then one would expect there to be no correlation between the concentration ratios in Russia and the United States. In fact, however, the Pearson correlations between the U.S. and Russia for the two sets are .72 and .82 respectively. These results suggest that, in terms of the larger firms in these branches, the U.S. and Russian industrial structures are actually quite similar -- a surprising result if one believes that the Russian industrial structure should appear artificial or unnatural as a consequence of central planning. Further, the mean CR4 and CR8 for the U.S. are both *greater* than those for Russia; the hypothesis that they are equal is rejected with 97 percent confidence or better. Table 14 presents similar information, but with the CR4's and CR8's calculated by sales rather than employment. Here again, the Pearson statistic shows positive correlation with values of .67 and .77. While the mean ratios for the U.S. are greater than those for Russia, in this case one cannot reject the null that they are equal. This is still a surprising result when one expects Russian manufacturing to be much more concentrated.

These tables present another interesting comparison -- that between the CR's calculated in terms of employment and those calculated in terms of sales within the two countries. In all four comparisons, U.S. and Russia for four-firm and eight-firm, the concentration ratios calculated in terms of sales are higher than those for employment. But, this difference is much greater for Russia than for the U.S. The null hypothesis that the U.S. four-firm concentration ratios for employment

³⁹Comparisons of the U.S. and Russia are potentially biased in favor of the result that the U.S. is less concentrated. The reason is that the U.S. Census Bureau does not publish concentration ratios when those numbers might reveal information about specific enterprises in an industry. These missing data then are concentration ratios that are quite high; six such observations are deleted from this analysis. This bias causes the analysis to understate concentration in the U.S.

and sales have equal means cannot be rejected, but the null for the other three sets can be rejected, and for the Russian numbers, the confidence level is greater than 99 percent. The mean concentration ratios calculated by sales in the Russian series are at least six percentage points higher than those calculated in terms of employment, while for the U.S. the difference is only 1.8 points. This finding implies that, relative to the U.S., the large firms in Russian *manufacturing* represent a larger percentage of output than they do of labor. This conclusion continues to hold if we look at industry as a whole. Extra-large enterprises in civilian manufacturing account for 25.6 percent of manufacturing output and only 15.3 percent of manufacturing labor; extra-large enterprises in all of civilian industry account for 22.9 percent of industrial output and just 17.3 percent of industrial labor. The small and medium-sized firms, on the other hand, account for a greater percentage of labor than of output.

Reality 5.2: Measured at the four-digit level, the industrial structures of the U.S. and Russian manufacturing sectors are quite different, and the Russian sector *appears* more concentrated.

Comparing CR4's across 331 observations of matching U.S. and Russian four-digit industries, we find that the Pearson Correlation is only .06. The mean CR4 for Russian manufacturing is 69 while the mean for the U.S. is 36, and, not surprisingly, the null that the means are equal is rejected with 100 percent probability. It is interesting that the structures of two economies seem to diverge so much when viewed at a lower level of aggregation. Upon examination of the data, we discover that, in striking contrast to the U.S. industrial structure, many industries in Russia, are in fact, very small. Thus, a more meaningful way to compute the Pearson correlations is to weight the comparisons of industrial concentration by industry size.

One simple way of weighting is to compare only the predominant industries in Russia with the same industries in the United States. Comparing the ratios for the top 25 percent of industries in Russia in terms of employment, we find that the means are not significantly different; both are about 40. As we take larger groupings of the major industries, the mean CR4 for Russia increases while that for the U.S. remains about the same. Even for the top 75 percent of industries though, the Russian mean is still under 60, that is, on average, concentration is not high enough to be considered a barrier.

Reality 5.3: At the four-digit industry level, many more Russian industries are concentrated than U.S. industries; however these industries account for a minority share of Russian industrial activity.

When one thinks about the above analysis, it may not seem significant that the concentration levels are roughly similar between the U.S. and Russia for only the top 25 percent of industries in Russia. Further analysis reveals, however, that the top 25 percent of industries accounts for almost 80 percent of employment in the 331-industry sample. The top 75 percent, whose mean CR4 is less than 60, accounts for over 99 percent of the employment.

Table 15 presents more statistics on industrial concentration in Russia using the full sample of Russian industries and grouping industries by concentration ratios instead of ordering by employment. From this table, we see that 55.2 percent of four-digit industries in all Russian industry have four-firm concentration ratios of employment of 61 percent or more; 62.1 percent have four-firm ratios of sales of 61 percent or more. This 55.2 percent of industries in the top half of the table represents only 17.5 percent of industrial employment and 17.4 percent of industrial sales. To provide a context for these statistics, we compare them to those for the U.S. Table 16 offers a comparison of U.S. and Russian four-digit industry concentration in manufacturing using categories of four-firm concentration ratios.⁴⁰ Here we see that, in the U.S., only 17.6 percent of industries have CR4's of 60 percent or greater, while in Russia, 64.8 percent do. There is little doubt that more Russian manufacturing industries are concentrated. However, the 17.6 percent of industries in the U.S. account for 19.8 percent of value added, while the 64.8 percent in Russia account for only 30.9 percent of sales and 25.0 percent of employment. In other words, the percentage of industries in the U.S. that are concentrated is much more indicative of shares of economic activity than in Russia. Thus, the statistics describing the *number* of concentrated industries are misleading when assessing the importance of concentration to the economy.

Reality 5.4: Concentrated industries in Russia have a different industrial structure than industry in general.

⁴⁰We use calculations from Scherer and Ross [1990: 83] which are based on 1982 establishment data and use establishment groups as the unit of measure.

Concentrated industries in Russia have proportionately more medium, large, and extra-large enterprises and fewer small ones than in industry in general. This demonstrates that the problem of very few small firms is even more important in concentrated industries. Concentrated industries (defined, for example, as industries with CR4's of over 40 percent) are thus different from other industries, not only in terms of the industries' top enterprises, but also in the overall distribution of enterprises within the industries. This is evident from the data in the bottom half of table 12. In addition, note from table 16 that concentrated industries account for a larger share of output than employment, while in other industries just the opposite is true. This seems to suggest that enterprises in highly concentrated industries have higher labor productivity than in industry in general. One must be careful about such inferences, however, since they are based on data generated under the system of regulated prices and planned outputs.

Reality 5.5: In the set of industries that are highly concentrated, concentration is mostly due to having few firms in the industry rather than to having principal firms in the industry.

When industries are arranged by CR4's, into deciles for example, one might expect that the share of total industries in a decile would be roughly similar to the share of total value added or national employment in that decile. This is in fact the case for the US. For Russia, on the other hand, while the top decile represents the lowest share of output and employment, it accounts for more four-digit industries than the other three combined. On the top four deciles of industries by concentration ratios (table 15). Table 16 shows a similar distribution – almost half of all industries fall in the top category of the CR4 ranges. If we arranged the data in table 16 from quintiles into deciles of concentration ratios, we would find that most of the 45 percent would indeed fall in the 90 to 100 category, but account for a small share of employment and sales. The very high CR4's suggest one of two things: either production in these industries is highly concentrated in the largest firms, or these industries have very few firms. Table 17 shows that the latter is true. One hundred seven of the 125 industries in the 91 to 100 percent decile have four or fewer firms, and none of these industries has more than 10 firms. There is, in fact, a triangle of zeros in the lower left portion of the table – concentrated industries have few firms. No industry with an employment CR4 greater than 60 percent has more than 50 firms.

It may seem obvious that this latter explanation is true. But, limited evidence on the U.S. suggests that the opposite is true, that is, that high CR4's in the U.S. indicate a high concentration of

production in the larger firms, but do not necessarily indicate a very small number of firms. Table 18 presents comparisons of sales CR4's and CR8's for selected four-digit industries in the U.S. and Russia.⁴¹ In this selected sample alone, there are two four-digit industries in the top decile with far more than ten firms -- one has 352 firms. Of the 16 industries with CR4's of 60 percent or greater, there are nine with more than 50 firms. Thus, based on this sample evidence alone, we know that a table 17 for the U.S. would not have zeros in the lower left triangle. In all of the 350 industries, of the 53 U.S. industries with CR4's of 60 or greater, there are 19 industries with more than 50 firms, and of the 10 in the top decile (including those with undisclosed ratios), six of them have more than 10 firms--the average is 121 firms.

The Russian evidence points to three explanations. The first is that the industries in our data set with few firms have parallel four-digit industries in the defense sector. We know that many civilian goods were produced by enterprises in the military-industrial complex and, thus, are not represented in our data.⁴² Where this is the case then, the industries actually have many more firms and are likely less concentrated than our data show. If we had these firms in our data, then, not only would we find fewer concentrated industries, but we would also see that the match up between industries and shares of both employment and output is more even. In other words, it is not that these industries have such a small share of employment and output relative to the others in our data, but rather we just do not see how much they actually account for. Looking at table 18, we guess that the exclusion of firms in the military-industrial complex probably explains the high concentration and low firm numbers for household television receivers, semiconductors, and even possibly screw machine products. However, it probably does not explain the concentration in the women's and misses' dresses industry.

⁴¹As it is not feasible to include a table with all 350 manufacturing industries, we present a selected sample in 18. To create a "random" sample for comparing the U.S. and Russia, we adopt the selected industries which Scherer and Ross [1990: 77], with no intention of comparing to Russia, present in their text. The U.S. numbers in our table are updated to 1987, however, and we change a few of the industries up or down a category in order to exactly match as many industries as possible. We also reordered the listing so that the 1987 CR4's for the U.S. industries are in descending order.

⁴²Another reason why some firms may be missing is that some of these products are consumed by the enterprises that produce them. Therefore, these products never reach the market. This explanation is especially important for critical inputs whose delivery was very uncertain under central planning. To eliminate the uncertainty, enterprises often developed the internal capacity to produce their inputs ("universalism").

The second explanation is that some industries there were some industries which, Soviet planners intentionally kept small. These industries were probably low priority sectors -- light industry and consumer goods. This explains both the low number of firms and the low share of output and employment. For these industries, then, the conventional wisdom about Russian industrial concentration does hold, although the high concentration is probably just a consequence of low priority, and thus low output and few firms, rather than the explicit intent of the planners.

The final explanation is that some industries are small because they are relatively new industries. As of 1989, the planners had not had the chance to build many enterprises in these industries, plus, with new technologies, they may have been reluctant to invest large amounts initially. For example, plastic pipe and plastic foam products are two industries that have very few firms and thus are very concentrated in Russia, but have many firms and low concentration ratios in the U.S. The closely related four-digit industry, plastic bottles, did not even exist in Russia in 1989. Here, high concentration is a consequence of youth and, thus, low output and few firms, rather than the explicit intent of the planners.

Understanding these three explanations is very important. When we can identify the reasons why an industry has a small number of firms, we can then predict which industries might indeed suffer from oligopolistic behavior after price liberalization. The new industries likely have good incentives for entry and should not present a problem, but the others, especially those that produce intermediate goods, likely represent bottlenecks in the new economy. For these, the impact of their concentration will be greater than their share of economic activity in general.

In sum, there is, in fact, a group of industries which resemble the conventional wisdom about concentration in the Russian economy. They represent, however, a small share of the economy. There is another group which appears highly concentrated in our data, but in fact these industries are augmented by production of civilian goods in the military-industrial complex. Apart from these industries, and even including those augmented by production in the military-industrial complex, Russian industry is not highly concentrated when measured at the national level. The vast majority of industries have enough firms that, with a national market, competition should exist. Although this seems to contradict the historical evidence, one feature of the command economy does indeed suggest this result. As we explain later, ministers preferred to keep entire chains of production within their ministry to minimize reliance on firms outside of their direct control. Thus, for many intermediate goods, each ministry wanted its own enterprise. For these industries, we should find at least as many enterprises as there were ministries that used the products.

Reality 5.6: The difference between Russian and U.S. concentration arises not in the largest firms in each industry, but, rather, in the secondary firms in each industry.

Here we use table 18 to look at specific comparisons between four-digit industries. For many industries, the U.S. and Russia have very similar concentration ratios, but Russia has only a fraction of the firms that the U.S. does. For example, the CR4 and CR8 for the Russian storage-batteries industry are only slightly different while Russia has one tenth as many firms – 13 where the U.S. has 125. For farm machinery and equipment, Russia also has similar concentration ratios, but only has 147 enterprises where the U.S. has 1,576. The U.S. and Russian ratios are about similar for the metal-cutting machine tools industry, but there are 381 such firms in the U.S. and only 51 in Russia. Thus, while Russia does have fewer firms in each industry in general, that does not mean that industries are controlled by oligopolies any more so than in a market economy like the U.S. Rather, for industries with similar concentration of large firms, the big differences appear in the secondary firms. In the last example, each secondary (ninth largest or smaller) firm in the U.S. accounts for an average of .16 percent of sales, while each in Russia accounts for 1.26 percent.

These findings are the logical conclusion of the results of the analysis on enterprise size. Russia is characterized by medium and large firms, while the U.S. is characterized by very small and extra-large firms. So, we find that, while the large firms in Russia may represent the same share of their industry that the extra-large firms in the U.S. represent of theirs, the remainder of the industry's production in Russia is filled by a small number of medium-sized firms while that in the U.S. is filled by a myriad of very small firms. In terms of price competition, these medium-sized firms are probably more likely to compete with the primary firms given a national market in Russia than the small ones do with the mammoth ones in the U.S. This is good news for short-term monopoly concerns in Russia. The small firms in the U.S., however, offer dynamic advantages to the whole industrial structure as we discuss above.

Myth 6: The Russian economy is controlled by a large number of *dominant* enterprises.

Reality 6: Dominant enterprises do not, in fact, dominate the national economy.

In table 19, we present the results of analysis using the Russian definition of *dominant* enterprise. This definition was created in the context of anti-monopoly policy. An enterprise is dominant if it commands a 35 percent or greater share of its market. For the purposes of policy, markets are defined differently for different industries. Here, we start by looking at the national market. We find that less than 1 percent of all enterprises and less than 4 percent of all employment are accounted for by firms with 35 percent or greater market shares at the national level. The results are similar when measured using sales except that dominant firm sales as a percentage of total is 7.6 percent. Some of these industries have more than one dominant firm. While such industries would be considered concentrated in the analysis above, these individual firms have less market power than if only one were dominant. The table shows that, if we ignore industries with two dominant firms, the share of industries with dominant firms is somewhat diminished. Table 20 shows dominant firms and dominated industries across branches of production. Four manufacturing branches seem to cover much of the dominance: electronics, fabricated metal, instruments, and paper. Mining also exhibits a high proportion of dominant firms and dominated industries.

4. Barriers to Competition

In the preceding section we have presented evidence that supports our view that, at the national level, industrial concentration — the presence of too few firms or of powerful firms — is not responsible for problems of imperfect competition in Russia. This still leaves open the question of whether there are structural impediments to competition in Russia. In this section, we argue that important barriers to competition do exist in Russia. These barriers, however, are not the result of industrial concentration, but rather are primarily the result of markets that are highly segmented.⁴³

Under the prior regime, enterprises were highly isolated, divided along both ministerial and, often, geographic lines.⁴⁴ In part, this segmentation can be viewed as a legacy of central planning. Unfortunately, certain features of the transition environment strengthen these divisions, undermining

⁴³As Ofer [1992: 91] points out "...inertia in distribution links and in supply and marketing routes, and the remaining main core of production according to ministerial fiat may preserve monopolistic power and produce monopolistic prices." Kahn and Peck [1991: 66-67] also emphasizes that problems in distribution may create local monopolies.

⁴⁴This point was noted in the IMF-World Bank-OECD-EBRD joint study: "Even where more than one enterprise exists, the national aggregates hide a high degree of regional monopoly power that is protected by generally poor communications and transportation and by administered marketing channels which, in turn, are insulated from one another by ministerial lines of responsibility" [1991: 16].

the efficient distribution of goods. In this section, we discuss the nature of these segmentations, both ministerial and geographic, in more detail.

4.1 Ministerial Segmentation

The success of central planning relied on the ability of planners and industrial ministers to retain control over the important decisions of enterprises. The roles of *Gosplan* (the State Planning Committee) and the industrial ministries in guiding production and investment decision making are well known.⁴⁵ Under central planning, the distribution of goods was also coordinated centrally, by *Gossnab* (the State Committee for Material Technical Supply). *Gossnab* was responsible for creating and managing the wholesale trade system, including identifying appropriate trading partners, setting the contractual terms of delivery, and arranging for the transportation of goods.

This system was designed to allow planners at *Gossnab* to control the system of distribution. Preventing enterprises from developing their own trading links was an important element in limiting enterprise autonomy and forcing adherence to the plan. Given the sheer size of the task of supply control, *Gossnab* planners relied heavily on historic linkages between enterprises when designing their distribution plans. In many cases, this inertia meant that enterprises were forced to remain in relationships that, over time, become obsolete due to the creation of alternative and potentially more appropriate partners.

Moreover, many enterprises were assigned trading partners that were unable to fulfill their contractual obligations on a timely basis. This uncertainty undermined the ability of enterprise directors to meet their production targets and, consequently, to receive adequate financial rewards. Unfortunately, the economic and legal structure provided little recourse for the director, pressing him or her to find alternative sources for important inputs.⁴⁶ In some cases, the director independently developed the internal capacity to produce the needed inputs. In other cases, the industrial minister took the initiative and established the capacity to produce important inputs, particularly when so doing

⁴⁵For more information, see Gregory and Stuart [1986].

⁴⁶One important direction this effort took is the development of informal distribution lines between enterprises. Most enterprises employed a *tolkach* (expediter) whose job it was to procure inputs through informal channels. Although these efforts were widespread, they were formally illegal, and inhibited the development of economy-wide supply information. For more on informal aspects of plan fulfillment, see Powell [1979].

reduced his or her reliance on enterprises outside the ministry.⁴⁷ This latter feature of central planning alone suggests that, for important commodities, there must be at least as many firms as there are industrial ministries.

The dominant feature of this system of distribution was the absence of institutions to provide enterprises with the information they would require to establish links with other firms on a decentralized basis. In effect, *Gossnab* and the industrial ministries created a barrier to insulate enterprises from their trading partners. As a consequence, enterprises tended to become highly isolated, without knowledge of national and, in some cases, local market structure.

Vertical dependence among enterprises is, to a great extent, the consequence of the arbitrary demarcation between processes in Soviet industry. Enterprises within an industrial ministry can usefully be thought of as processes along an assembly line. While there are logical ways of dividing of an assembly line into its constituent parts, ministers made divisions for reasons of *control*, rather than economic rationality. This is of little consequence when the enterprises are subordinate to a ministry that fits them together. With the collapse of the industrial ministries enterprises are now free to seek out new customers and new suppliers, but this ability is checked by the arbitrary ways in which the assembly line is divided. Enterprise directors suppose that they are tied to a vertical chain that it is very difficult to escape from.

Thus, an important legacy of central planning is an industrial structure that is highly segmented based on historic trading relationships. We call this type of segmentation *ministerial* because it arose out of the ministerial system that included both *Gossnab* and the industrial ministries. Unfortunately, the information problem that arose out of the ministerial system continues to persist today. Currently, much of distribution is organized by wholesale organizations, many of which are vestiges of the system of central planning. They continue to distribute for the supply organizations and industrial ministries to which they previously corresponded even when the latter have been privatized or decentralized. Thus, they act to maintain and reinforce the ministerial distinctions that arose prior to the introduction of markets. Until new wholesale firms are created to compete with these firms, old patterns of production and distribution are likely to persist.

⁴⁷An extreme example of this "ministerial autarky" occurs with respect to timber. As described in Hewett [1988: 173]: "Minergo (Energy and Electrification), for example, ships sawn timber produced by construction firms at the Bratsk and Krasnoiarsk hydroelectric stations in Siberia 3,000-5,000 kilometers away to its enterprises in the European USSR. Simultaneously Minlesbumprom (timber, pulp, paper, and wood) ships sawn timber to Siberia from its enterprises in the European USSR."

Ministerial segmentation has important implications for industrial concentration in the Russian economy. It has produced well-defined and persistent vertical linkages between enterprises, linkages which, in some sense, can be considered a form of vertical integration. As enterprises re-create the vertical chains of the assembly line, they represent both fewer and larger producers in the economy. However, the vertical integration that we observe in the Russian Federation is quite distinct from vertical integration in western countries. In the Russian Federation, the integration does not take a legal form nor is it motivated by conventional economic interests.⁴⁸ Rather, it is created by a lack of knowledge of alternative trading partners. In the extreme, one could view the Russian economy as segmented along historically determined chains of production, in which each firm in the chain may be acting as both a monopsonist and a monopolist.⁴⁹⁻⁵⁰ Once firms become better informed about their trading alternatives, we can expect some of the more inefficient chains of production to break down.⁵¹

4.2 Geographic Segmentation

Many markets in the Russian Federation, which one would naturally expect to be national, are, in fact, regional or local. In part, this geographic segmentation is a vestige of the system of central planning. In the prior regime, the production of many commodities of lesser importance, such as clothing or footwear, was planned by regional, not national, authorities, and thus these enterprises are only experienced in selling within local markets. Moreover, currently the distribution of these

⁴⁸In the Williamsonian tradition the primary explanation of vertical integration is the reduction in transactions costs that occur when *asset specificity* is present. In the case of Russia, however, it is not asset specificity, but the lack of knowledge of alternative suppliers and customers that creates the potential for integration.

⁴⁹Rughvir Khemani suggests that this type of market segmentation offers another reason for heterogeneity of firm size within industries, that is, a firm in a given industry was established or maintained at the size necessary for its vertical, or ministerial, market regardless of the sizes of other firms in the same industry.

⁵⁰Ed Hewett [1988: 170-174] discusses the reasons for strong vertical linkages as well as physical vertical integration. He concludes, "As a consequence, the successful enterprise is the vertically integrated enterprise, and the successful ministry, the vertically integrated ministry."

⁵¹To date most of the evidence supporting the presence of ministerial segmentation is anecdotal, but non-contradicting. In fall 1992, we interviewed 75 firms across western Russia. The survey was conducted by the authors in collaboration with Alan Gelb and I.J. Singh from the World Bank and Valeriy Makarov and other economists from the Central Economics and Mathematics Institute in Moscow. These interviews revealed that enterprise directors were often not aware of alternative trading partners, even when they were known (by the interviewers) to exist.

and other goods is arranged by the wholesale trade organizations that we discuss above. In certain areas, many of these wholesale trade organizations have only single outlets that act as regional monopolies. As a consequence, the markets for certain goods are highly localized.⁵²

Naturally, one expects that after liberalization, the size of the markets for these types of goods will expand quickly. However, certain features of the transition environment suggest that some barriers to this expansion do exist. Specifically, some regional or *oblast* governments have implemented restrictions on the free flow of inter-*oblast* trade. Such restrictions have historic precedents in both legal and illegal activity. Under the prior regime, the transportation of goods between cities required special permits. Any official could stop a truck and inspect its load to determine whether the delivery was authorized or not. And, if the delivery was, in fact, unauthorized, the truck driver may have offered the official a bribe to ignore the transgression.

The use of licenses and other regulations to restrict the free flow of trade between *oblasts* appears to persist during the transition, although in ways that are presently unmeasurable. Much of the evidence is anecdotal. Many *oblast* governments have introduced explicit controls restricting the export of important goods from their region. Typically, these governments still control the local prices of important consumer commodities and therefore require export restrictions in order to prevent the flow of these commodities into neighboring, high-price regions. Private entrepreneurs often complain that, in addition to these export restrictions, they encounter the extra cost of formal and informal tariffs when transporting good across *oblast* borders. However, the extent to which these added costs are the consequence of explicit policy is unknown. The failure of the federal government to invalidate old laws and the activation of new, often conflicting, laws provide local officials with wide discretion in the enforcement of policy. To some extent, local officials appear to be using this lack of clarity to collect bribes from firms engaged in the transportation of goods, although, again, the pervasiveness of this phenomenon is not known.

Barriers to inter-*oblast* commerce also are created by problems in the system of transportation. Unfortunately, the present transportation system in the Russian Federation was designed to support the unique institutions of central planning. Certain types of transportation infrastructure, such as roadways, are presently underdeveloped because they threatened the ability of government authorities to maintain central control over economic behavior.⁵³ For example, nearly all

⁵²Kahn and Peck [1991: 66] emphasize the importance of regional, as opposed to national, markets as a barrier to competition.

⁵³Gregory and Stuart [1986].

transport in terms of ton-kilometers is served by trains and not by trucks. Trains are easier to administer and control centrally, while trucks require roads. Roads complicate enforcement of restrictions on internal travel. Moreover, the present system of incentives prevents the efficient use of available transportation. For example, central control over rail transportation (and the absence of freight-forwarding institutions) has led to conditions where freight must be scheduled at least six months in advance.

How important are these barriers in creating local monopolies and oligopolies?

Unfortunately, we do not have direct evidence that enables us to identify which markets have become localized. Nor do we precisely know the level of localization – the economic region, the *oblast*, or the city or town. However, we have prepared some tables to indicate the potential impact of local markets on the presence of imperfect competition in Russia based on the assumption that geographic segmentation in Russia is present.

To begin, refer to table 21. Table 21 introduces the reader to the twelve economic regions and describes each of them in terms of their dependence on particular branches of the civilian economy. Table 19 shows that, if markets are segmented based on the twelve economic regions, a larger share of industries have dominant firms. They account for about 10 percent of firms and about one-third of employment and sales. In table 22, we calculate the number of monopolies and oligopolies that would be present, again based on the assumption that markets are largely contained within economic regions. We find that in three major economic regions – Chernozem, Northwest, and Volgo-Vyatka – regional monopolies and oligopolies may employ nearly half of all civilian workers or more. It is, of course, not surprising that as we disaggregate on a geographical level that concentration should increase because, in the Soviet period, industrial location decisions generally were made on ministerial, not regional lines.⁴

Much of the anecdotal evidence suggests that markets may even be segmented to a finer geographic level, to the *oblast* level or, in some cases, to the level of the city or town. Clearly, the smaller the geographic market, the greater the potential for imperfect competition. Unfortunately, high levels of industrial concentration in localized markets not only lead to higher prices and lower output, they also exacerbate the existing problems of highly localized labor markets. During the Soviet period, the government severely restricted internal migration. Citizens were issued domestic passports and not permitted free travel outside of their city of residence. Thus labor markets were

⁴The exception, of course, was the *sovmarkhoz* – regional planning ministries – that were implemented by Khrushchev. This experiment ended in 1964.

limited to cities or towns except in the cases where the government wanted workers to move, for example when it enticed workers to the Far East with higher wages. Currently, although the migration laws have changed, the shortage of housing at current prices and other factors continue to restrict labor mobility. As a consequence, firms that may be monopolists or oligopolists in their local goods markets may also be monopsonists or oligopsonists in their local labor markets.

Table 23 presents statistics that describe the average number of civilian firms and industries in both *oblasts* and in cities or towns. This table suggests that, while *oblasts* contain many firms, they also contain many industries. Thus, although *oblasts* may be industrially diverse, the presence of barriers to free trade suggests that many of these industries may be local monopolies or oligopolies. This feature has mixed implications for reform. With industrial diversity, *oblasts* are relatively insulated from economic shocks that affect particular industries, such as shocks to certain types of heavy industry. On the other hand, the presence of local concentration raises political pressure for price controls, regulations, and other forms anti-monopoly policy that may impede the progress of economic reform.

A potentially more important problem is the number of towns in Russia with very few industries or enterprises. More than 90 percent of all cities and towns in Russia have nine or fewer civilian firms or industries. Further, as shown in table 24, almost one-half of all cities have only one firm and more than three-quarters have four firms or fewer. In an environment with labor mobility and little market segmentation, the particular spatial distribution of firms would not pose a serious threat to reform. Under such conditions, even if the only employer in the town shuts down, workers can find employment elsewhere. However, when labor is highly immobile,⁵⁵ entire cities and towns are open to potentially large unemployment shocks, if the dominant local industry experiences a downturn. Under these conditions, workers in these firms are likely to pressure their local governments to intervene and try to find them subsidies, undermining the process of micro-adjustment. Although there are many cities with four firms or fewer, these cities account for only 12.2 percent of all civilian employment in industry. Typically, these cities are small towns that predominantly host small firms. In table 25, we observe that the largest firms are not in cities with four firms or less. They tend to be in cities with a moderate number of other firms, suggesting that

⁵⁵The issue, of course, is whether observed low mobility of labor in Russia is due to a lack of inter-regional employment that resulted from the absence of enterprise failure under the old regime, or whether this is due to *impediments* to labor mobility, such as lack of housing. The latter effect seems to be very important in Russia.

either larger firms require complementary goods to be produced or the local work force requires a sufficiently diversified local economy.⁵⁶

We emphasize that local monopolies and oligopolies in these cities and towns exist only as a consequence of segmented markets, not as a consequence of having too few firms in their particular industries. In table 26, we present statistics on the potential competitiveness of industries in cities of different sizes. We find that very few firms in cities with four firms or fewer are in industries that are highly concentrated when measured at the national level. In fact, most of the firms in cities and towns with few firms are in industries with many firms. This fact suggests either that these firms are in industries that naturally serve only local markets (such as bakeries), or that these firms are in industries that, with improvements in the system of distribution, are potentially very competitive.

5. Implications for Economic Reform

The fact that barriers to competition in Russia arise, not from industrial concentration at the national level, but from ministerial and geographic segmentation of markets, has important implications for economic reform. We now turn to the implications of our findings for competition policy and economic reform.

With respect to competition policy, a whole set of issues arises surrounding the relative importance and appropriate timing of anti-trust policies. Contestable markets theory argues that the facilitation of free entry and exit alone should induce competitive behavior in firms through the threat of entry. Even when monopoly power is exercised, many would contend that, in the Russian case, the conventionally measured welfare losses are less than the benefits from faster privatization due to the attractiveness of owning monopolies and oligopolies. Moreover, if the threat of entry does not inhibit monopoly profits, these profits will attract new entry into the market. Thus, the government should keep its hands off enterprises.

Although entry and the threat of entry are important mechanisms for eliminating the concentration problems imposed by highly segmented markets, there are nonetheless good reasons for considering the role of an active competition policy in Russia. Three features of the current environment suggest that enterprise directors will not perceive a threat for entry or will not care. Thus, the persistence of non-competitive behavior may warrant competition policy. First, the

⁵⁶ It should be noted that in some of these small cities there may be military enterprises that are not included in our data set. Such additional firms as do exist would mitigate the vulnerability of those towns to potentially volatile local markets.

environment is very uncertain. This uncertainty tends to shrink the time horizon for decisionmakers. In this case, enterprise directors will substantially discount the future fall in profits which could be the result of attracting entry or regulation in the current period. Second, directors realize that the legal and administrative complexity of starting a new firm acts as an effective barrier against many potential entrants into their markets. Third, the high cost of capital (to agents not in the state sector) and the difficulties in acquiring facilities make it very difficult to start up new businesses.⁵⁷

In certain cases then, an active competition policy may be warranted. It then becomes important to design the policy appropriately. This clearly depends on the causes of imperfect competition. We argue that traditional anti-trust policies are inappropriate when the sources of imperfect competition are ministerial and geographic segmentation.

Anti-trust policy in Russia includes two types of distinct actions. First, the Russian government has established anti-monopoly committees at regional and local levels. These committees use product categories and current relevant market sizes to identify "monopolies" – those firms with a 35 percent or more market share – to be regulated. Anti-monopoly price regulations are based on the belief that this market power comes from industrial structure. However, as we have emphasized, the dominant cause of market power is market segmentation. Not only do price regulations fail to address the real problem then, they probably exacerbate it by eliminating gains from inter-regional trade and therefore reinforcing the segmentation. This type of regulation is also vulnerable to a degree of mismanagement and corruption which could pose a real threat to the process of enterprise reform in Russia. Any flexibility that local officials have in defining markets provides them with wide discretion in identifying firms and thus, provides them with a tool to potentially punish any firm that pursues its own, rather than the government's, objectives.

Second, anti-trust activity often involves breaking up larger firms into smaller ones. In the case of Russia, this type of action is often discussed in the context of privatization. The idea that monopolistic or oligopolistic firms should be broken apart into smaller enterprises is partly based on the conventional belief that these firms are inefficiently large. However, as we show above, the evidence does not support this belief. Thus, we question the ability of the government to determine, *ex ante*, the appropriate size for firms in an industry. We also question whether the government has sufficient information to be able to determine, *ex ante*, whether a particular organizational structure is suited for market competition.

⁵⁷This factor is clearly more important in sectors where the minimum efficient scale of the firm is large. Hence new entry in the retail sector has been quite dramatic.

Moreover, when the real problem is market segmentation, it is not at all clear that breaking up enterprises will add to the *effective* number of potential competitors in the market. The breakup of a large enterprise will not produce several identical small enterprises. In most cases, it will involve the breakup of an integrated enterprise into its parts. If the market is segmented, this policy will merely reproduce vertical dependence, as the former constituents of the enterprise will have still rely heavily on each other. The optimal policy under such conditions must involve measures that reduce the segmentation of markets (we discuss these types of measures below).

Moreover, both types of anti-trust policies often target specific sectors, in which the effects of high prices create important economic or political consequences. For example, these policies may target firms in one part of a chain of production only, such as in light industry. If this is the case, then anti-trust policy runs the risk of creating worse market structures than those that are currently in place. For example, in most cases, firms are engaged in trade relationships which can be characterized as bilateral monopolies. They purchase inputs from a limited number of firms that, in turn, sell to only a limited number of customers. Thus, there is a mutual dependency between the supplier and the customer. If, say, the limited number of customers are divided into many direct competitors, then a power asymmetry is created, in which many downstream firms compete for a limited number of upstream supplies. In this case, the relative bargaining power of the upstream producer is increased and the costs of imperfect competition may be increased. Ignoring the role of market segmentation in creating imperfect competition can thus lead to anti-trust policies that exacerbate the situation.

The effectiveness of import competition as a remedy for market power depends on two features of the economy. First, the economy must be open. Second, the economy must have a good distribution system. Imported goods cannot easily flow into countries lacking seaports, airports, train stations, and other centers of trade. The absence of such a system in Russia is at the center of our discussion of imperfect competition. In our view, ministerial and geographic segmentation forces trading relationships to be backward looking, promoting the maintenance of relationships developed under central planning, rather than new ones. To promote enterprise adjustment, a distribution system must exist that is forward looking. This requires no unnecessary restrictions on the flow of domestic trade; a good network of wholesale and retail enterprises to link producers with customers; a good information system to allow firms to identify potential suppliers and customers; and a good transportation system to move goods from the place of production to the place of consumption; a good storage system to hold goods, to separate the time of production from the time of consumption; a good communication system to allow firms to negotiate and modify contracts as needs change; a

rapid payments and settlements system to facilitate financial compensation for products or services provided; and, a system of enforceable contract law to enable firms with no history of relations to contract with one another. Unfortunately, the Russian economy is faced with *oblast*-level restrictions on commerce; wholesale- and retail-trade monopolies (and barriers to entry in wholesale and retail trade); poor infrastructure and poor *incentives* in infrastructure (information, transportation, communication, storage); long delays in the payment and settlements system; and the absence of an enforceable system of contract law.

Improvements in the system of distribution would require a combination of investment in public infrastructure, improvements in the legal system, some privatization, and, most importantly, elimination of all barriers to free internal trade and free entry.⁵⁸ Moreover, by improving distribution, the creation of small trading firms will facilitate the entry of new industrial firms.⁵⁹ We would expect that these new firms will become an important source of innovation in the economy.⁶⁰ As more small new firms enter, we also anticipate that the size distribution of industrial firms will change to reflect a more-market-oriented industrial structure.

6. Conclusion

In this paper, we have presented evidence that calls into question the conventional wisdom that Russia suffers from excessive industrial concentration. Concentration, measured at the national level, is not significantly (in an economic sense) greater in Russia than in the United States. While this indicates that Russia does not suffer from the problem of *gigantomania* – that is, production concentrated in a few very large enterprises – national comparisons may obscure important issues when distribution is costly and information is poor. Indeed, we have argued that the major barriers to competition that do exist in Russia, arise from market and geographic segmentation.

⁵⁸ Free entry, to the extent that it leads to the expansion of previously repressed sectors of the economy – such as services and communications – may also play an important role in mitigating the consequences of reductions in employment in industry that are associated with restructuring.

⁵⁹One potential source of new entrants that could play an important role is the MIC. The decline in orders for MIC output provides incentives for entry into civilian industry. Moreover, the natural industries to enter are those where profits are high. This suggests that the MIC will be a dynamic source of competition in Russia.

⁶⁰Dearden, Ickes, and Samuelson [1990] show that the cost of inducing innovation is increasing in the amount of hierarchy, and use this to explain the slow rate of innovation adoption in Soviet industry.

Analysis of market structure in Russia is important for understanding economic reform.

Market segmentation has created a situation where enterprise directors believe that they are dependent on a small number of customers and suppliers. This makes the transition environment much more uncertain, and thus inhibits adjustment to the market.

It is often argued, that privatization of state-owned enterprises will lead to improved economic performance solely because ownership will provide the proper incentives. It seems unlikely, however, that without competitive pressures, ownership alone will be sufficient to change behavior.

Enterprises bent on survival will minimize changes that entail significant risks. Consequently, it will be critical to remove the barriers to competition that exist in Russia. This means that it is crucial to know the sources of these barriers. Our analysis strongly suggests that *market infrastructure* – communication, distribution, and information – is the most important element of a competition policy in Russia.

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Table
1989 Census of Manufacturers

Number of Industrial Firms	21,391
Total Employment in Industrial Firms	13,751,839
Number of Cities	4374
Number of Oblasts	78

Characteristics of Firm Employment	
Mean	643
Median	211
Minimum	1
Maximum	100,605
Range	100,604
Variance	4,578,015
Coef of Var	332.82

Number of Industries at each SIC Level	
2 Digit	39
3 Digit	180
4 Digit	406
5 Digit	489

1-Digit SIC	Firm Size				Total
	Small	Medium	Large	Ex-large	
Agriculture	1411	122	15	3	1551
Mining & Construction	307	259	140	25	731
Manufacturing: food, textiles, wood, print, chemicals	6518	4049	1082	14	11663
Manufacturing: rubber, leather glass, metals, M&E	1410	2750	1304	69	5533
Transport and Util.'s	238	572	84	1	895
Trade	1	0	0	0	1
Fire, Insurance, Real Estate	0	0	0	0	0
Services: business, repair	430	515	65	1	1011
Services: health, education	2	1	0	0	3
Public Administration	2	1	0	0	3
Total	10319	8269	2690	113	21391

Table prepared by A. Brown, B. Ickes, and R. Ryterman.

Table 2. Estimates of Mean Employment by Firms in the Military-Industrial Complex in Russia for 1989

Sector	Employment	Number of Enterprises	Mean Employment Per Firm
Civilian Industry	13,751,839	21,391	643
of which Heavy Civilian Industry	4,250,750	2,429	1,750
MIC	7,979,161	5,309	1,503
Estimated MIC	9,289,726	5,309	1,750
All Industry	21,731,000	26,700	814

Sources: Goskomstat Economic Yearbook for 1990 and PlanEcon data.

Table 3. Aggregate Industrial Concentration Patterns in 1985

Nation	Average Size of Leading Firms (Number of Employees)		Leading Company Employment as a Percent of Total Industrial Employment (in %)	
	Top 10	Top 20	Top 10	Top 20
United States	310,554	219,748	13.1	18.6
Japan	107,106	72,240	7.3	9.9
West Germany	177,173	114,542	20.1	26.0
United Kingdom	141,156	108,010	23.1	35.3
France	116,049	81,381	23.2	32.5
South Korea	54,416	n.a.	14.9	n.a.
Canada	36,990	26,414	15.3	21.9
Switzerland	60,039	36,602	49.4	60.2
Holland	84,884	47,783	84.5	95.1
Sweden	48,538	32,893	49.4	66.9
Russia (1989)	62,649	48,133	4.6	7.0

U.S. statistics based on company data.

Sources: Scherer and Ross [1990, p. 63] and PlanEcon data.

Table prepared by A. Brown, B. Ickes, and R. Ryterman

Table 4. Comparison of the Size Distributions of Russian and U.S. Manufacturing Firms

		Size class by employment				
Country	Statistic	Small 1-249	Medium 250-999	Large 1000-9999	Ex-large 10000 or more	Total
Russia	Number of firms <i>with estimated MIC**</i>	9,065	5,662	2,386	83	17,196
		10,374	7,651	4,292	188	22,505
	As a percent of total number of firms in manufacturing <i>with estimated MIC</i>	52.7	32.9	13.9	0.5	100.0
		46.1	34.0	19.1	0.8	100.0
U.S.	Number of firms	299,666	5,530	1,657	267	307,120
	As a percent of total number of firms in manufacturing	97.6	1.8	0.5	0.1	100.0
Russia	Number of workers <i>with estimated MIC</i>	974,721	2,874,640	5,911,370	1,758,320	11,519,051
		1,151,649	3,959,560	11,440,500	4,257,068	20,808,777
	As a percent of total number of workers in manufacturing <i>with estimated MIC</i>	8.5	25.0	51.3	15.3	100.0
		5.5	19.0	55.0	20.5	100.0
U.S.	Number of workers	5,777,592	2,519,572	4,518,667	8,632,159	21,447,990
	As a percent of total number of workers in manufacturing	26.9	11.7	21.1	40.2	100.0
Russia	Avg. # of workers	108	508	2,478	21,185	670
U.S.	Avg. # of workers	19	456	2,727	32,330	70

*U.S. data are from U.S. Census 1987 Enterprise Statistics and are company data.

**See Table 2 and the text for explanation.

Table prepared by A. Brown, B. Ickes, and R. Rytterman

Table 5. Comparison of the Size Distribution of Russian and U.S. Small Manufacturing Firms

Country	Statistic	Size class by employment						Total
		1-4	5-9	10-19	20-49	50-99	100-249	
Russia	Number of firms	27	205	512	1,386	2,476	4,459	9,065
	<i>with estimated MIC**</i>	27	207	521	1,517	2,762	5,340	10,374
	As a percent of total number of small firms in manufacturing	0.3	2.3	5.6	15.3	27.3	49.2	100.0
	<i>with estimated MIC</i>	0.3	2.0	5.0	14.6	26.6	51.5	100.0
U.S.	Number of firms	112,926	58,598	32,158	65,834	18,661	11,489	299,666
	As a percent of total number of small firms in manufacturing	37.7	19.6	10.7	22.0	6.2	3.8	100.0
Russia	Number of workers	76	1,513	7,435	48,645	180,815	736,237	974,721
	<i>with estimated MIC</i>	76	1,533	7,576	53,336	202,165	886,963	1,151,649
	As a percent of total number of workers in manufacturing small firms	0.0	0.2	0.8	5.0	18.6	75.5	100.0
	<i>with estimated MIC</i>	0.0	0.1	0.7	4.6	17.6	77.0	100.0
U.S.	Number of workers	215,443	394,067	378,180	1,750,874	1,289,853	1,749,175	5,777,592
	As a percent of total number of workers in manufacturing small firms	3.7	6.8	6.5	30.3	22.3	30.3	100.0
Russia	Avg. # of workers	3	7	15	35	73	165	108
U.S.	Avg. # of workers	2	7	12	27	69	152	19

U.S. data are from the U.S. Census 1987 Enterprise Statistics and are company data.

**See Table 2 and the text for explanation.

Table prepared by A. Brown, B. Ickles, and R. Rytarman

Table 6. Comparison of the Size Distribution of Russian and U.S. Manufacturing Firms

Country	Statistic	Size class by employment						Total
		1-49	50-99	100-249	250-999	1000-9999	10000 or more	
Russia	Number of firms	2,130	2,476	4,459	5,662	2,386	83	17,196
	<i>with estimated MIC**</i>	2,272	2,762	5,340	7,651	4,292	188	22,505
	As a percent of total number of firms in manufacturing	12.4	14.4	25.9	32.9	13.9	0.5	100.0
	<i>with estimated MIC</i>	10.1	12.3	23.7	34.0	19.1	0.8	100.0
U.S.	Number of firms	269,516	18,661	11,489	5,530	1,657	267	307,120
	As a percent of total number of firms in manufacturing	87.8	8.1	3.7	1.8	0.5	0.1	100.0
Russia	Number of workers	57,669	180,815	736,237	2,874,640	5,911,370	1,758,320	11,519,051
	<i>with estimated MIC</i>	62,521	202,165	886,963	3,959,560	11,440,500	4,257,068	20,808,777
	As a percent of total number of workers in manufacturing firms	0.5	1.8	6.4	25.0	51.3	15.3	100.0
	<i>with estimated MIC</i>	0.3	1.0	4.3	19.0	55.0	20.5	100.0
U.S.	Number of workers	2,738,564	1,289,853	1,749,175	2,519,572	4,518,667	8,632,159	21,447,990
	As a percent of total number of workers in manufacturing firms	12.8	8.0	8.2	11.7	21.1	40.2	100.0
Russia	Avg. # of workers	27	73	165	508	2478	21185	670
U.S.	Avg. # of workers	10	69	152	456	2727	32330	70

*U.S. data are from U.S. Census 1987 Enterprise Statistics and are company data.

**See Table 2 and the text for explanation.

Table prepared by A. Brown, B. Ickes, and R. Rytman

Table 7. Size Characteristics of Firms by Industrial Branches in Russia in 1989

Branch	Number of Firms by Employment Size*				Share of		Share of Branch Employment by Size*				Share of
	Small	Medium	Large	Ex-Large	# Firms	Total Firms	Small	Medium	Large	Ex-Large	Total Em
Agriculture*	1411	122	15	3	1551	7.3	39.7	19.9	25.4	15.0	1.6
Apparel	225	445	144	0	814	3.8	5.0	38.2	58.9	0.0	3.8
Chemicals	103	188	158	5	454	2.1	1.9	14.2	75.0	8.9	4.9
Construction*	40	25	3	0	68	0.3	21.6	55.3	23.2	0.0	0.1
Electronics	37	100	118	3	258	1.2	1.1	11.1	78.8	9.0	3.2
Fabricated Metal	173	305	72	3	553	2.6	5.9	36.7	44.0	13.4	2.8
Food	4128	1587	140	3	5858	27.4	28.7	48.6	19.4	3.3	9.6
Furniture	110	218	62	0	390	1.8	5.7	42.5	51.8	0.0	1.7
Ind M&E	190	474	389	26	1089	5.1	1.3	12.9	57.7	28.1	13.6
Instruments	117	95	69	1	282	1.3	3.4	17.9	74.6	4.0	2.0
Leather	64	123	73	0	260	1.2	3.4	24.6	72.0	0.0	1.7
Lumber	581	1105	198	0	1884	8.7	8.9	57.8	35.3	0.0	6.8
Mining*	287	234	137	25	683	3.1	2.3	9.4	37.8	50.5	8.0
Miscellaneous	96	217	43	0	356	1.7	8.8	54.2	39.0	0.0	1.3
Paper	38	62	57	0	157	0.7	2.4	14.7	82.9	0.0	1.4
Petroleum	20	35	25	2	82	0.4	2.0	13.6	62.1	22.3	1.0
Primary Metal	35	54	116	20	225	1.1	0.5	3.3	47.5	48.7	5.1
Printing	1256	146	22	0	1424	6.7	29.2	42.8	28.0	0.0	1.0
Rubber	24	89	50	3	176	0.8	1.2	16.9	68.7	13.2	2.0
Services*	430	515	65	1	1011	4.7	11.3	56.2	29.6	3.0	2.8
Stone C&G	642	1120	226	0	1988	9.3	7.4	49.9	42.7	0.0	7.6
Textile	64	241	272	4	601	2.8	1.2	15.6	78.0	6.3	6.2
Tobacco	3	22	3	0	28	0.1	1.2	72.8	26.0	0.0	0.1
Transport Equip	32	173	128	13	346	1.6	0.4	8.8	38.7	51.1	7.2
Transportation*	238	572	84	1	895	4.2	5.0	54.4	37.5	3.1	3.6
Others*	5	2	0	0	7	0	31.6	68.4	0.0	0.0	0.0
Total	10319	8269	2690	113	21391	100	6.6	27.5	48.7	17.3	100.0

*Small: Employ < 200, Medium: 200 < = Employ < 1000, Large: 1000 < = Employ < 10,000, Large: 10,000 < = Employ.

*Non-manufacturing branches.

Table prepared by A. Brown, B. Ickes, and R. Ryterman.

Table 8. Characteristics of the Largest Firms by Employment in Russia in 1989

Characteristic	Statistic	Top 10	Top 25	Top 50	Top 100	All Ex-large*
Separate Oblasts	Number	7	14	26	37	39
Separate Branches	Number	4	4	8	15	15
Separate 4-digit Industries	Number	4	9	22	40	46
Employment	% of Total	4.6	8.0	11.6	16.3	17.3
	Mean	62,649	43,966	31,958	22,421	21,027
<i>Employment with estimated MIC**</i>	% of Total	4.0	7.1	10.2	14.3	20.8
	Mean	92,698	65,561	46,899	33,001	22,073
Employment Share of Total Sample	Mean	15.8	17.3	17.5	15.5	15.8
Employment Share of Regional Sample	Mean	50.0	53.2	54.1	53.7	55.0
Output	% of Total	4.2	9.8	14.4	21.6	22.9
	Mean	1860.7	1734.9	1273.3	952.9	895.2
Output Share of Total Sample	Mean	16.9	19.0	18.8	16.0	16.7
Output Share of Regional Sample	Mean	51.3	52.6	55.1	54.5	55.9

*Ex-large refers to enterprises with greater than 10,000 employees, of which there are 113 in the PlanEcon sample and 217 in the sample with the estimated MIC.

**See Table 2 and the text for explanation.

†The share statistics are the means over enterprises of each enterprise's market share within its 4-digit industry as measured by the given variable for the given market.

Notes:

46 of the top 50 enterprises represent only four branches. The other four enterprises are each from separate branches making the total branches represented eight.

In the top 50 there are only six enterprises which are dominant nationally, that is only six with greater than or equal to 35% employment share of the sample. There are only eight which are dominant in terms of sales.

In the top 50, 35 enterprises are dominant in terms of employment in their regional market, and 33 are dominant in terms of sales in their regional market.

The biggest drop in employment size is between the third and fourth enterprises going from 88969 to 58379.

Only one-third of the extra-large enterprises have employment between 20,000 and 100,605, while the other two-thirds have employment between 10,000 and 20,000.

Kemerovskaya Oblast has the largest share of very big enterprises; it contains six of the top 25 and seven of the top 50.

Table prepared by A. Brown, B. Ickes, and R. Ryterman.

Table 9. Aggregate Concentration Shares in the U.S. and Russia

Nation	Size Measure	Share of 100 Largest Manufacturing Corporations (in %)	Share of 200 Largest Manufacturing Corporations (in%)
United States (1982)	Domestic value added	32.8	43.2
	Domestic plant sales	31.8	44.0
	Employment in the U.S.	23.8	32.7
Russia (1989)	Employment in manufacturing	16.7	23.4

U.S. data are establishment data.

Sources: Scherer and Ross [1990, p. 59] and PlanEcon data.

Table prepared by A. Brown, B. Ickes, and R. Ryterman.

Table 10. Aggregate Concentration in Russian and U.S. Manufacturing

Nation	Number of Companies	Percent of manufacturing sales accounted for by--			
		4 largest companies	8 largest companies	20 largest companies	50 largest companies
Russia (1989)	17,196	6	9	15	24
United States (1987)	310,341	9	12	18	27

U.S. data is company data.

Sources: U.S. Census Bureau 1987 Concentration Ratios in Manufacturing and PlanEcon data.

Table prepared by A. Brown, B. Ickes, and R. Ryterman.

Table 11. Measures of Industrial Concentration of Firms in Russia in 1989

Measure of Concentration		Statistic	Value of Statistic for Industries* with the Following Number of Firms								
			1	2	3	4	5 to 10	11 to 20	21 to 50	51 to 100	more than 100
Number of Industries			43	24	19	21	80	75	63	34	47
Percent of all Industries	Frequency		10.8	5.9	4.7	5.2	19.7	18.5	15.5	8.4	11.6
	Cumulative		10.8	16.5	21.2	26.4	46.1	64.6	80.0	88.5	100.0
Number of Firms			43	48	57	84	598	1134	2014	2382	15031
Percent of all Firms	Frequency		0.2	0.2	0.3	0.4	2.8	5.3	9.4	11.1	70.3
	Cumulative		0.2	0.4	0.7	1.1	3.9	9.2	18.6	29.7	100.0
Labor Force (number of workers)	Percent of Labor Employed by Industries:										
		Frequency	0.23	0.38	0.49	0.83	10.52	13.27	18.53	13.94	41.82
		Cumulative	0.23	0.60	1.09	1.92	12.44	25.71	44.24	58.18	100.00
		Characteristics of Employment in Firms in Industries:									
		Mean	728	1091	1181	1356	2420	1609	1265	805	383
		Median	295	481	271	422	694	505	432	301	181
		Minimum	22	10	7	21	8	1	6	4	1
		Maximum	7180	9421	10278	17784	100605	48905	45904	20845	54550
		Range	7158	9411	10271	17763	100597	48904	45898	20841	54549

* Industries are measured at the 4-digit SIC level.

Table prepared by A. Brown, B. Ickes, and R. Ryterman.

Table 12. Frequency of Firms by Size in Industrial Concentration Classes

<i>Size by Employment</i>	<i>Frequency of Firms in Industries with the Following Number of Firms</i>									
	1	2	3	4	5 to 10	11 to 20	21 to 50	51 to 100	> 100	Total
Small (E < 200)	16	11	24	27	101	263	514	904	8460	10319
Medium (200 < -E < 1000)	17	25	18	30	258	489	948	1022	5466	8269
Large (1000 < -E < 10,000)	11	12	16	26	219	354	519	446	1087	2690
Extra Large (E > -10,000)	0	0	1	1	20	28	35	10	18	113
Total	43	48	57	84	598	1134	2014	2382	15031	21391

<i>Size by Employment</i>	<i>Frequency of Firms in Industries with the Following Four-Firm Concentration Ratios</i>										
	91-100%	81-90%	71-80%	61-70%	51-60%	41-50%	31-40%	21-30%	11-20%	0-10%	Total
Small (E < 200)	97	58	98	133	127	184	284	912	1729	6699	10319
Medium (200 < -E < 1000)	138	87	167	220	277	336	484	1032	1946	3582	8269
Large (1000 < -E < 10,000)	92	58	151	118	254	187	314	531	513	472	2690
Extra Large (E > -10,000)	6	9	8	14	25	6	32	8	5	0	113
Total	333	212	422	485	883	713	1114	2483	4193	10753	21391

The four-firm concentration ratio is the employment of the four largest firms as a percent of total employment in the industry.
Table prepared by A. Brown, B. Ickes, and R. Ryterman.

Table 13. U.S. and Russian Concentration Ratios Based on SALES

Industry	Two-digit Industry Code	Four-firm		Eight-firm	
		U.S. (1987)	Russia (1989)	U.S. (1987)	Russia (1989)
FOOD AND KINDRED PRODUCTS	20	10	11	19	15
TOBACCO PRODUCTS	21	92	42	97	61
TEXTILE MILL PRODUCTS	22	17	8	29	13
APPAREL AND OTHER TEXTILE PRODUCTS	23	10	6	13	11
LUMBER AND WOOD PRODUCTS	24	10	4	14	7
FURNITURE AND FIXTURES	25	20	11	25	18
PAPER AND ALLIED PRODUCTS	26	25	34	39	53
PUBLISHING AND PRINTING	27	8	16	14	23
CHEMICALS AND ALLIED PRODUCTS	28	19	13	26	22
PETROLEUM AND COAL PRODUCTS	29	29	41	61	62
RUBBER AND MISCELLANEOUS PLASTICS PROD.	30	16	25	22	36
LEATHER AND LEATHER PRODUCTS	31	11	21	16	31
STONE, CLAY, AND GLASS PRODUCTS	32	17	3	26	6
PRIMARY METAL INDUSTRIES	33	25	30	36	46
FABRICATED METAL PRODUCTS	34	9	24	13	32
INDUSTRIAL MACHINERY AND EQUIPMENT	35	22	12	28	18
ELECTRICAL AND OTHER ELECTRONIC EQUIP.	36	19	11	29	19
TRANSPORTATION EQUIPMENT	37	46	46	60	55
INSTRUMENTS AND RELATED PRODUCTS	38	29	24	44	34
MISCELLANEOUS MANUFACTURING INDUSTRIES	39	7	10	10	17

Sources: U.S. Bureau of the Census Company Summary (1987) and PlanEcon data

Table prepared by A. Brown, B. Ickes, and R. Ryterman

Table 14. U.S. and Russian Concentration Ratios Based on EMPLOYMENT

Industry	Two-digit Industry Code	Four-firm		Eight-firm	
		U.S. (1987)	Russia (1989)	U.S. (1987)	Russia (1989)
FOOD AND KINDRED PRODUCTS	20	9	4	18	6
TOBACCO PRODUCTS	21	92	33	97	53
TEXTILE MILL PRODUCTS	22	19	5	29	9
APPAREL AND OTHER TEXTILE PRODUCTS	23	10	6	13	10
LUMBER AND WOOD PRODUCTS	24	7	2	10	4
FURNITURE AND FIXTURES	25	18	9	24	15
PAPER AND ALLIED PRODUCTS	26	20	18	31	29
PUBLISHING AND PRINTING	27	7	9	12	15
CHEMICALS AND ALLIED PRODUCTS	28	19	7	27	13
PETROLEUM AND COAL PRODUCTS	29	38	34	66	53
RUBBER AND MISCELLANEOUS PLASTICS PROD.	30	13	17	19	28
LEATHER AND LEATHER PRODUCTS	31	12	13	18	20
STONE, CLAY, AND GLASS PRODUCTS	32	19	2	27	4
PRIMARY METAL INDUSTRIES	33	20	18	30	30
FABRICATED METAL PRODUCTS	34	6	16	10	23
INDUSTRIAL MACHINERY AND EQUIPMENT	35	18	9	24	14
ELECTRICAL AND OTHER ELECTRONIC EQUIP.	36	19	11	27	19
TRANSPORTATION EQUIPMENT	37	38	35	52	43
INSTRUMENTS AND RELATED PRODUCTS	38	23	14	40	25
MISCELLANEOUS MANUFACTURING INDUSTRIES	39	4	7	7	12

Sources: U.S. Census Bureau Company Summary (1987) and PlanEcon data.

Table prepared by A. Brown, B. Ickes, and R. Ryterman.

Table 15. Measures of Industrial Concentration of Firms in Russia for 1989

		<i>Value of Statistic for Industries* in the Following Deciles of Four-Firm Concentration Ratios of EMPLOYMENT</i>										
<i>Measure of Concentration</i>	<i>Statistic</i>	0 to 10%	11 to 20%	21 to 30%	31 to 40%	41 to 50%	51 to 60%	61 to 70%	71 to 80%	81 to 90%	91 to 100%	Total
Number of Industries		20	31	37	27	31	36	33	38	28	125	406
Percent of all Industries	Frequency	4.9	7.6	9.1	6.7	7.6	8.9	8.1	9.4	6.9	30.8	
	Cumulative	4.9	12.6	21.7	28.3	36.0	44.8	53.0	62.3	69.2	100.0	
Number of Firms		10753	4193	2483	1114	713	683	485	422	212	333	21319
Percent of all Firms	Frequency	50.3	19.6	11.6	5.2	3.3	3.2	2.3	2.0	1.0	1.6	
	Cumulative	50.3	69.9	81.5	86.7	90.0	93.2	95.5	97.5	98.4	100.0	
Number of Employees		2944198	2232027	2033250	1868026	741955	1530577	628866	662479	666221	444240	13751839
Percent of all Employees	Frequency	21.4	16.2	14.8	13.6	5.4	11.1	4.6	4.8	4.8	3.2	
	Cumulative	21.4	37.6	52.4	66.0	71.4	82.5	87.1	91.9	96.8	100.0	
Percent of all Sales	Frequency	11.2	19.6	7.7	27.9	6.0	10.2	4.0	6.1	4.2	2.9	441320.4
	Cumulative	11.2	30.8	38.5	66.4	72.4	82.6	86.6	92.7	96.9	100.0	

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		<i>Value of Statistic for Industries* in the Following Deciles of Four-Firm Concentration Ratios of SALES</i>										
<i>Measure of Concentration</i>	<i>Statistic</i>	0 to 10%	11 to 20%	21 to 30%	31 to 40%	41 to 50%	51 to 60%	61 to 70%	71 to 80%	81 to 90%	91 to 100%	Total
Number of Industries		14	19	34	29	30	28	31	41	43	137	406
Percent of all Industries	Frequency	3.4	4.7	8.4	7.1	7.4	6.9	7.6	10.1	10.6	33.7	
	Cumulative	3.4	8.1	16.5	23.6	31.0	37.9	45.6	55.7	66.3	100.0	
Number of Firms		8576	4515	2691	1484	1419	603	516	726	442	419	21319
Percent of all Firms	Frequency	40.1	21.1	12.6	6.9	6.6	2.8	2.4	3.4	2.1	2.0	
	Cumulative	40.1	61.2	73.8	80.7	87.3	90.2	92.6	96.0	98.3	100.0	
Number of Employees		2664951	1476631	1902195	1270026	2126020	852481	1051921	901732	1005634	500268	13751839
Percent of all Employees	Frequency	19.4	10.7	13.8	9.2	15.5	6.2	7.6	6.6	7.3	3.6	
	Cumulative	19.4	30.1	43.9	53.1	68.6	74.8	82.5	89.1	96.4	100.0	
Percent of all Sales	Frequency	21.3	5.0	6.4	21.0	16.4	5.3	7.1	5.4	8.9	3.1	441320.4
	Cumulative	21.3	26.3	32.7	53.7	70.1	75.4	82.5	87.9	96.8	100.0	

*Industries are measured at the 4-digit SIC level.

Four-firm concentration ratios are the sum of the statistic for the four largest firms as a percent of the total of the statistic for the industry.

Table prepared by A. Brown, B. Ickes, and R. Rytterman.

Table 16. Distribution of U.S. and Russian Manufacturing Industries by Four-Firm Ratios

All Ratios by Sales

Four-Firm Concentration Ratio Range	Number of Industries		Percentage of all Industries		Percentage of Total value added	Percentage of Output	Percentage of Employment
	U.S.	Russia	U.S.	Russia	U.S.	Russia	Russia
	0-19	86	25	19.2	7.1	21.7	18.7
20-39	163	52	36.4	14.9	38.8	17.2	24.0
40-59	120	46	26.8	13.1	19.7	33.3	22.2
60-79	56	68	12.5	19.4	14.9	16.3	13.2
80-100	23	159	5.1	45.4	4.9	14.6	11.8
Total	448	350	100	100	100	100	100

Russian Ratios by Employment

Four-Firm Concentration Ratio Range	Number of Industries		Percentage of all Industries		Percentage of Total value added	Percentage of Output	Percentage of Employment
	U.S.	Russia	U.S.	Russia	U.S.	Russia	Russia
	0-19	86	39	19.2	11.1	21.7	24.1
20-39	163	56	36.4	16.0	38.8	35.7	30.5
40-59	120	56	26.8	16.0	19.7	18.0	13.4
60-79	56	63	12.5	18.0	14.9	11.3	9.8
80-100	23	136	5.1	38.9	4.9	10.9	9.2
Total	448	350	100	100	100	100	100

U.S. data are for 1982 and are establishment data.

Sources: Scherer and Ross [1990, p.83] and PlanEcon data

Table prepared by A. Brown, B. Ickes, and R. Ryterman

Table 17. Frequency of Firms by Firm-Industry and Concentration Ratio

Number of Firms in Industry	Incidence of Firms in Industries* with the Following Four-Firm Concentration Ratios of Employment										Total
	91 to 100%	81 to 90%	71 to 80%	61 to 70%	51 to 60%	41 to 50%	31 to 40%	21 to 30%	11 to 20%	0 to 10%	
1	43	0	0	0	0	0	0	0	0	0	43
2	48	0	0	0	0	0	0	0	0	0	48
3	57	0	0	0	0	0	0	0	0	0	57
4	84	0	0	0	0	0	0	0	0	0	84
5 to 10	101	175	181	72	69	0	0	0	0	0	598
11 to 20	0	37	212	294	239	292	60	0	0	0	1134
21 to 50	0	0	29	119	286	421	571	498	90	0	2014
51 to 100	0	0	0	0	89	0	336	1335	526	96	2382
> 100	0	0	0	0	0	0	147	650	3577	10657	15031
Total	333	212	422	485	683	713	1114	2483	4193	10753	21391

*Industries are measured at the 4-digit SIC level.

The four-firm concentration ratio is the employment in the four largest firms as a percent of total employment in the industry.

Table prepared by A. Brown, B. Ickes, and R. Ryterman.

**Table 18. Sales Concentration Ratios for Representative Industries
for the United States (1987) and Russia (1989)**

S.I.C. Code	Industry Description	4-Firm Ratio		8-Firm Ratio		Number of Firms	
		U.S.	Russia	U.S.	Russia	U.S.	Russia
2067	Chewing gum	96		100		8	
33310	Primary copper*	92	54	100	85	7	12
2111	Cigarettes	92	38	(D)	59	9	24
3641	Electric lamps	91	77	94	94	93	12
3711	Passenger cars	90	84	95	98	352	10
2043	Cereal breakfast foods	87		99		33	
2082	Beer and malt beverages	87	13	98	22	101	237
3632	Household refrigerators and freezers	85		98		40	
3211	Flat glass	82	63	(D)	74	65	29
3511	Turbines and turbine generators	80	81	95	99	68	10
3221	Glass containers	78	33	89	53	35	36
3334	Primary aluminum	74	66	95	92	34	11
3721	Aircraft	72		92		137	
3011	Tires and inner tubes	69	68	87	92	114	10
2841	Soap and detergents	65	76	76	95	683	11
3691	Storage batteries	64	57	78	81	125	13
3562	Ball and roller bearings	58	53	68	84	113	19
3411	Metal cans	54	100	70	100	161	2
2822	Synthetic rubber	50	65	76	92	58	10
3144	Women's footwear, except athletic	50		61		123	
(3140)	Footwear		25		37		111
3523	Farm machinery and equipment	45	42	52	58	1576	147
3312	Blast furnaces and steel mills	44	46	63	71	271	36
2041	Flour and other grain mills	44	14	63	23	237	235
2211	Cotton weaving mills	42	18	59	28	246	122
3674	Semiconductors	40	100	58	100	755	2
3651	Household audio and video equip.	39	100	59	100	360	1
3621	Motors and generators	36	30	49	49	349	48
2051	Bread, cake, and related products	34	8	47	11	1948	1467
3965	Fasteners, buttons, etc.	33	80	43	92	247	16
2873	Nitrogenous fertilizers	33	49	55	79	117	13
2911	Petroleum refining	32	42	52	65	200	31
3541	Metal-cutting machine tools	31	28	41	46	381	51
2086	Bottled and canned soft drinks	30	33	40	45	846	76
3241	Portland cement	28	24	47	40	123	42
2851	Paints and allied products	27	74	40	84	1121	61
2653	Corrugated and solid fiber boxes	26	100	41	100	952	4
2711	Newspapers	25	54	39	65	7473	32
2834	Pharmaceutical preparations	22	33	36	52	640	63
2026	Fluid milk	21	10	32	15	652	472
3552	Textile machinery	20	57	30	81	475	17
3452	Screw machine products	16	99	24	100	834	5
2421	Sawmills and planing mills	15	20	21	32	5252	199
3273	Ready-mixed concrete	8	28	11	45	3749	48
2335	Women's and misses' dresses	6	100	10	100	5398	3

U.S. data are establishment data.

(D) Withheld to avoid disclosing data for individual companies.

*U.S. statistics are for 1982 from Scherer and Ross.

Sources: Scherer and Ross (1990, p. 77), U.S. Bureau of Census 1987 Concentration Ratios in Manufacturing, and PlanEcon data.

Table prepared by A. Brown, B. Ickes, and R. Ryterman 59

Table 19. Frequency of Dominant Firms within Industries in Russia in 1989

<i>Measured in employment</i>	# of firms	# as % of nat'l total	sum as % of nat'l sum
National			
Firms with > -35% of market in their industry*	173	0.81	3.8
Of those, firms in industries where only one firm has more than 35%	135	0.63	3.5
Regional			
Firms with > -35% of market in their industry ..	2122	9.92	34.9
Of those, firms in industries where only one firm has more than 35%	1634	7.64	27.8
<i>Measured in sales</i>			
National			
Firms with > -35% of market in their industry	203	0.95	7.6
Of those, firms in industries where only one firm has more than 35%	163	0.76	6.7
Regional			
Firms with > -35% of market in their industry	2189	10.23	37.9
Of those, firms in industries where only one firm has more than 35%	1751	8.19	30.8

*Industry is measured at the four-digit SIC level.

Table prepared by A. Brown, B. Ickes, and R. Ryterman.

Table 20. Concentration Characteristics of Firms by Industrial Branches in Russia in 1989

Branch	FIRMS with > = 35% Employment Share in their 4-digit Industry					INDUSTRIES with Firms with > = 35% Employment Shares				
	# Firms	As Share of Branch Firms	As Share of Branch Em	# In Ind w/ only 1	# of 4-digit Industries	# of Ind	As Share of Branch Ind	# Firms in these Ind	As Share of Branch Firms	As Share of Branch Em
Agriculture*	5	0.3	0.4	3	8	4	50.0	18	1.2	0.5
Apparel	10	1.2	3.3	8	19	8	42.1	26	3.1	4.6
Chemicals	5	1.1	5.0	5	27	5	18.5	35	7.7	11.3
Construction*	0	0.0	0.0	0	1	0	0.0	0	0.0	0.0
Electronics	11	4.3	8.4	9	20	10	50.0	53	20.6	19.4
Fabricated Metal	19	3.4	10.9	13	27	15	59.3	53	11.4	16.4
Food	7	0.1	0.5	5	35	6	17.1	10	0.2	0.6
Furniture	4	1.0	0.4	4	9	4	44.4	6	1.5	0.5
Ind M&E	16	1.5	6.2	14	44	15	34.1	93	8.5	11.2
Instruments	9	3.2	8.9	6	14	7	60.0	44	16.6	15.9
Leather	3	1.2	0.9	3	7	3	42.9	13	5.0	1.7
Lumber	4	0.2	0.3	2	14	3	21.4	4	0.2	0.3
Mining*	12	1.8	10.8	12	27	12	44.4	94	14.2	22.9
Miscellaneous	8	2.2	5.1	8	16	8	50.0	31	8.7	8.7
Paper	10	6.4	8.8	8	12	9	76.0	37	23.6	16.7
Petroleum	2	2.4	1.2	2	5	2	40.0	11	13.4	2.5
Primary Metal	10	4.4	3.3	8	19	9	47.4	25	11.1	5.3
Printing	9	0.6	4.5	7	13	8	61.5	30	2.1	8.8
Rubber	4	2.3	1.1	2	10	3	30.0	6	3.4	1.2
Services*	0	0.0	0.0	0	11	0	0.0	0	0.0	0.0
Stone C&G	6	0.3	1.5	4	26	5	19.2	40	2.0	3.5
Textile	10	1.7	2.5	8	21	8	39.1	27	4.5	4.3
Tobacco	2	7.1	3.4	2	3	2	66.7	4	14.3	4.5
Transport Equip	3	0.9	1.7	3	9	3	33.3	10	2.9	3.2
Transportation*	1	0.1	0.1	1	6	1	16.7	1	0.1	0.1
Others*	3	42.8	77.9	3	3	3	100.0	7	100.0	100.0

*Non-manufacturing branches.

Table prepared by A. Brown, B. Ickes, and R. Ryterman.

Table 21. Concentration of Employment in Branches Across Regions for Enterprises in Russia in 1989

Branch	Row %		Region													Share of Total E
	Central	Column %	Chernozem	E Siberia	Far East	Kaliningrad	N Caucasus	North	Northwest	Urals	Volga	Vyatka	W Siberia			
Agriculture*	10.9	0.8	3.3	6.9	18.8	8.7	4.5	17.0	2.6	10.2	5.7	5.8	5.3	0.9	1.6	
Apparel	29.5	4.7	4.2	3.9	3.6	0.5	13.7	2.4	6.8	10.7	10.3	7.6	6.8	2.7	3.8	
Chemicals	21.6	4.5	5.9	5.5	0.9	0.0	7.7	1.4	4.6	13.0	19.5	9.4	10.5	5.5	4.9	
Construction*	16.8	0.1	4.2	3.8	4.1	0.6	3.0	14.3	6.0	8.2	4.1	3.5	31.3	0.4	0.1	
Electronics	24.1	3.3	9.5	4.1	1.2	1.0	6.5	0.1	8.8	13.3	9.3	11.6	10.6	3.7	3.2	
Fabricated Metal	21.6	2.6	7.2	3.9	3.2	0.0	10.1	0.9	12.4	15.4	9.2	9.4	6.8	2.0	2.8	
Food	17.3	7.1	8.8	4.7	8.7	0.8	14.5	3.8	4.6	10.5	11.3	5.3	9.6	9.8	9.6	
Furniture	25.1	1.8	3.6	5.1	3.7	0.8	17.8	3.3	8.1	8.4	9.0	8.8	8.8	1.6	1.7	
Ind M&E	27.3	15.8	6.7	2.8	1.6	0.4	10.5	2.1	5.9	15.5	13.4	5.4	8.4	12.2	13.6	
Instruments	43.0	3.7	1.8	1.7	0.5	0.6	8.8	0.1	8.5	8.9	14.3	6.2	5.7	1.2	2.0	
Leather	25.8	1.8	5.8	2.8	2.3	0.4	13.3	1.0	9.3	13.8	11.6	8.4	6.0	1.1	1.7	
Lumber	11.7	3.4	0.9	16.7	6.1	0.3	2.6	19.2	4.5	14.6	4.4	7.7	9.1	6.6	6.8	
Mining*	6.8	2.3	3.4	9.5	7.6	0.2	11.4	10.6	2.2	18.3	3.7	0.8	25.6	22.1	8.0	
Miscellaneous	37.1	2.1	2.2	2.1	1.0	0.0	10.3	4.1	10.0	11.4	4.5	14.2	3.1	0.4	1.3	

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Table 21 Cont.

Branch	Share of																Total E
	Central	Chernozem	E Siberia	Far East	Kaliningrad	N Caucasus	North	Northwest	Urals	Volga	Vyatka	W Siberia					
Paper	14.1	0.9	0.7	11.4	6.9	2.3	4.6	1.8	25.0	12.5	3.4	11.8	4.4	6.2	0.6	0.1	1.4
Petroleum	14.2	0.6	-0.0	14.5	1.8	0.4	0.0	8.3	0.8	3.2	0.6	28.4	14.8	5.1	0.8	0.9	1.0
Primary Metal	15.0	3.9	8.3	4.3	1.5	2.1	0.0	3.1	5.8	1.5	1.7	43.3	5.1	4.3	9.4	6.2	6.1
Printing	41.3	1.8	3.3	3.1	3.2	0.8	0.5	6.7	2.7	9.8	0.6	10.9	8.6	3.5	6.3	0.7	1.0
Rubber	29.0	2.5	8.1	2.8	0.5	0.2	0.0	5.9	0.2	8.8	3.4	8.2	20.0	5.9	10.9	2.3	2.0
Services*	25.8	3.1	4.3	6.8	5.0	3.3	0.4	10.5	2.1	5.3	2.9	15.9	10.1	4.6	9.4	2.8	2.8
Stone C&G	25.5	8.1	5.7	6.0	4.8	8.3	0.3	9.1	3.3	5.7	8.1	14.5	11.6	4.6	8.9	7.2	7.5
Textile	55.2	14.8	3.2	4.0	0.7	1.1	0.3	7.3	1.3	5.3	6.3	6.5	7.8	4.1	4.2	2.8	6.2
Tobacco	23.7	0.1	10.5	2.2	0.0	0.0	0.0	18.2	0.0	13.5	0.3	8.1	7.8	0.2	7.7	0.1	0.1
Transport Equip	25.5	7.9	1.9	3.6	3.7	6.1	0.9	4.8	2.2	1.7	2.4	10.4	27.1	15.7	2.6	2.0	7.2
Transportation*	15.2	2.3	4.3	11.9	9.1	7.5	0.4	6.7	7.4	3.5	2.4	14.6	10.2	5.1	11.7	4.5	3.6
Others*	38.1	0.0	0.0	0.8	0.0	0.0	0.0	30.2	0.0	0.0	0.0	8.8	13.8	0.0	8.5	0.0	0.0
Share of total E	23.4	5.0	5.9	4.3	0.8	8.7	5.0	5.2	14.9	11.2	6.5	9.3					100.0

*Non-manufacturing branches.

Table prepared by A. Brown, B. Ickes, and R. Ryterman.

Table 22. Measures of Industrial Concentration Across Regions in Russia for 1989

Region	Statistic	Firm-Industries*		Region	Statistic	Firm-Industries*	
		1	< -4			1	< -4
Central	% of Industries	19.0	48.4	North	% of Industries	38.2	68.4
	% of Firms	1.4	7.6		% of Firms	4.7	14.2
	% of Employment	1.7	16.9		% of Employment	19.6	36.9
Chernozem	% of Industries	38.8	71.3	Northwest	% of Industries	37.9	77.2
	% of Firms	5.9	19.1		% of Firms	8.5	30.9
	% of Employment	15.5	49.0		% of Employment	17.4	52.0
E. Siberia	% of Industries	40.1	73.1	Urals	% of Industries	27.1	61.0
	% of Firms	4.8	15.1		% of Firms	3.0	13.2
	% of Employment	10.7	36.7		% of Employment	8.2	29.5
Far East	% of Industries	42.1	70.1	Volga	% of Industries	27.8	63.8
	% of Firms	5.5	15.0		% of Firms	3.0	14.1
	% of Employment	12.4	24.3		% of Employment	7.3	41.1
Kaliningrad	% of Industries	62.1	84.8	V-Vyatka	% of Industries	38.6	71.1
	% of Firms	27.0	62.6		% of Firms	5.3	18.6
	% of Employment	26.3	70.5		% of Employment	15.1	52.5
N. Caucasus	% of Industries	33.1	65.7	W. Siberia	% of Industries	32.2	65.2
	% of Firms	3.9	14.1		% of Firms	3.7	13.9
	% of Employment	8.9	25.3		% of Employment	8.5	29.5

Column lists the value of the statistic for industries with the given number of firms in that industry in that region. Industries are measured at the 4-digit SIC level.

Table prepared by A. Brown, B. Ickes, and R. Ryterman.

Table 23. Geographic Distribution of Firms and Industries in Russia for 1989

Unit	Statistic	Value of Statistic for OBLASTS in Each of the Following Deciles*										Total
		1	2	3	4	5	6	7	8	9	10	
Firms	Mean	67.6	129.3	177.0	203.5	232.3	263.7	304.6	379.9	439.4	655.3	
	Minimum	27	98	157	188	221	247	288	340	404	517	27
	Maximum	97	155	187	217	244	277	328	402	507	898	898
	Range	70	57	30	29	23	30	40	62	103	381	871
Industries	Mean	33.5	55.5	63.1	69.8	81.6	88.7	95.0	114.5	128.6	179.8	
	Minimum	18	44	60	67	77	86	91	106	125	135	18
	Maximum	41	60	68	74	85	91	103	123	132	234	234
	Range	23	16	6	7	8	5	12	17	7	99	216

Unit	Statistic	Value of Statistic for CITIES in Each of the Following Deciles*										Total
		1	2	3	4	5	6	7	8	9	10	
Firms	Mean	1.0	1.0	1.0	1.0	1.3	2.0	3.0	4.5	7.2	105.0	
	Minimum	1	1	1	1	1	2	2	4	5	9	1
	Maximum	1	1	1	1	2	2	4	5	9	768	768
	Range	0	0	0	0	1	0	2	1	4	759	767
Industries	Mean	1	1	1	1	1.2	2	2.9	4.4	6.9	54.1	
	Minimum	1	1	1	1	1	2	2	4	5	9	1
	Maximum	1	1	1	1	2	2	4	5	9	234	234
	Range	0	0	0	0	1	0	2	1	4	225	233

Industries are measured at the 4-digit SIC level.

* Each decile contains 10 percent of Russian cities or oblasts ranging from smallest to largest based on the unit of observation being analyzed.

For example, when analyzing the geographic distribution of firms in cities, cities are ranked based on their total number of firms.

Table prepared by A. Brown, B. Ickes, and R. Ryterman.

Table 24. Characteristics of Firms in Russian Cities by Firm and Industry Concentration for 1989

		<i>Value of Statistic for Cities with the Following Number of FIRMS</i>									
Attribute	Statistic	1	2	3	4	6 to 10	11 to 20	21 to 50	51 to 100	101 to 200	> 200
Number of Total Cities	Number	2097	578	356	282	693	228	92	33	15	2
Percent of Total Cities	Frequency	47.9	13.2	8.1	8.4	15.8	5.2	2.1	0.8	0.3	0
	Cumulative	47.9	61.1	69.3	75.7	91.5	96.8	98.9	99.6	100	100
Number of Total Firms	Number	2097	1162	1088	1128	4660	3246	2760	2334	1832	1114
Percent of Total Firms	Frequency	9.8	5.4	5.0	5.3	21.8	15.2	12.9	10.9	8.6	5.2
	Cumulative	9.8	15.2	20.2	25.5	47.2	62.4	75.3	86.2	94.8	100
Employment by Firms (number)	Mean	335.8	319.2	286.7	274.3	361.2	659.3	1030.8	940.0	1108.8	1051.2
	Median	179	80	64	62	76	122	146	128	213	645
	Minimum	1	1	3	1	1	1	2	4	5	8
	Maximum	7167	8511	17784	40960	25525	30092	99960	33235	100605	58379
	Range	7166	8510	17781	40959	25524	30081	99959	33231	100600	58371
	Variance	209208	424810	958388	1818212	1014338	2890801	13738589	4495489	12880964	5450188
	Coef Var	138.2	204.2	341.5	491.8	278.9	257.9	359.8	225.6	320.9	222.1
Percent of Total Employment	Frequency	5.1	2.7	2.2	2.2	12.2	15.6	20.7	10.0	14.9	8.5
	Cumulative	5.1	7.8	10.0	12.2	24.4	40.0	60.7	78.7	91.5	100.0

		<i>Value of Statistic for Cities with the Following Number of INDUSTRIES</i>									
Attribute	Statistic	1	2	3	4	6 to 10	11 to 20	21 to 50	51 to 100	101 to 200	> 200
Number of Total Cities	Number	2125	573	358	281	690	228	81	38	1	1
Percent of Total Cities	Frequency	48.8	13	8.2	8.4	15.8	5.2	1.9	0.8	0	0
	Cumulative	48.8	61.7	69.9	78.3	92.1	97.3	99.1	100	100	100
Number of Total Firms	Number	2155	1189	1106	1151	4791	3489	2947	3470	346	768
Percent of Total Firms	Frequency	10.1	5.5	5.2	5.4	22.4	16.3	13.8	16.2	1.8	3.6
	Cumulative	10.1	15.5	20.7	26.1	48.5	64.8	78.6	94.8	95.4	100
Employment by Firms (number)	Mean	336.7	338.4	283.7	278.0	370.0	693.6	1017.9	1055.6	1115.9	1022.1
	Median	182	85	82	61	78	123	123	178	1047	242
	Minimum	1	1	3	1	1	1	2	4	10	8
	Maximum	7167	16930	17784	40960	25525	32348	99960	100605	13354	58379
	Range	7166	16929	17781	40959	25524	32347	99959	100601	13344	58371
	Variance	205945	701343	638042	1805930	1013581	3288913	12741143	9147680	2822892	8726289
	Coef Var	134.8	247.5	302.9	488.8	272.9	281.9	350.7	288.5	145.1	253.7
Percent of Total Employment	Frequency	5.3	2.9	2.1	2.3	12.9	17.8	21.8	26.6	2.8	5.7
	Cumulative	5.3	8.2	10.3	12.6	25.5	43.1	64.9	91.5	94.3	100.0

Table prepared by A. Brown, B. Ickes, and R. Ryterman.

Table 25. Employment Size of Firms in Cities by Firm Concentration in Russia for 1989

		<i>Value of the Statistic for Cities with the following Number of Firms</i>										
		1	2	3	4	5 to 11	11 to 20	21 to 50	51 to 100	101 to 200	> 200	Total
Number of Cities		2097	576	356	282	693	228	92	33	15	2	4374
Number of Firms	Size by Employment											
	Small (E < 200)	1105	737	802	882	3105	1465	866	726	447	204	10319
	Medium (200 < = E < 1000)	866	340	215	217	1215	1335	1392	1129	968	592	8269
	Large (1000 < = E < 10000)	126	75	49	48	330	421	469	460	400	312	2690
	Extra Large (E < = 10000)	0	0	2	1	10	25	33	19	17	6	113
Total		2097	1152	1068	1128	4660	3246	2760	2334	1832	1114	21391

Table prepared by A. Brown, B. Ickes, and R. Ryterman.

Table 26. Frequency of Firms by Industrial Concentration Classes in Cities by Firm Concentration Classes

<i>Number of Firms in Industry</i>	<i>Firm Frequency in Cities with the Following Number of Firms</i>										
	1	2	3	4	5 to 10	11 to 20	21 to 50	51 to 100	101 to 200	> 200	Total
1	3	2	1	0	6	8	5	6	4	10	43
2	4	1	0	2	1	11	6	3	7	13	48
3	2	1	0	0	6	7	13	4	9	15	57
4	7	0	3	2	16	13	14	8	6	14	84
5 to 10	43	14	15	9	67	83	89	85	78	115	598
11 to 20	93	43	24	24	146	166	182	149	173	134	1134
21 to 50	147	59	43	47	270	288	306	349	311	194	2014
51 to 100	231	99	78	88	381	310	364	376	282	173	2362
> 100	1687	933	904	956	3767	2362	1781	1353	962	446	15031
Total	2097	1152	1068	1128	4660	3246	2760	2334	1832	1114	21391

<i>4-Firm Concen- tration Ratio</i>	<i>Firm Frequency in Cities with the Following Number of Firms</i>										
	1	2	3	4	5 to 10	11 to 20	21 to 50	51 to 100	101 to 200	> 200	Total
91 to 100%	23	8	5	5	33	51	46	37	42	85	333
81 to 90%	17	12	6	6	26	24	32	30	28	31	212
71 to 80%	28	11	7	6	68	55	68	51	55	72	422
61 to 70%	43	13	17	13	63	78	62	71	67	58	485
51 to 60%	50	24	18	19	78	108	117	110	87	73	683
41 to 50%	65	34	15	12	90	87	112	105	125	68	713
31 to 40%	109	34	25	42	173	171	182	167	161	70	1114
21 to 30%	176	58	61	45	309	323	422	469	383	237	2463
11 to 20%	384	184	126	147	732	745	684	596	411	194	4193
0 to 10%	1191	796	788	833	3087	1608	1055	698	473	226	10753
Total	2097	1152	1068	1128	4660	3246	2760	2334	1832	1114	21391

The four-firm concentration ratio is the employment in the four largest firms as a percent of total employment in the industry.

Table prepared by A. Brown, B. Ickes, and R. Ryterman.

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