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# **Privatization Versus Competition: Changing Enterprise Behavior in Russia**

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# Working Paper

## Privatization Versus Competition: Changing Enterprise Behavior in Russia

*John S. Earle*  
*and*  
*Saul Estrin*

WP-96-049  
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## Foreword

The Economic Transition and Integration (ETI) Project at the International Institute for Applied Systems Analysis (IIASA) started a research activity on the behavior of Russian enterprises under liberalization, privatization and restructuring in 1995–1996. This activity originated upon the initiative of the Ministry of Economy of the Russian Federation. The major reason for focusing on this subject was the fact that the current state and further transformation of Russian medium and large sized enterprises became a challenge for the continuation and success of transition related reforms. Despite certain positive tendencies, numerous enterprises still adjust themselves to ongoing changes without considerable market adaptation and modernization. The emerging ownership structure and financial markets demonstrate limited positive influence on stockholders' incentives, decision-making process and strategies of restructuring.

In the course of these enterprise studies, a workshop on “Russian Enterprises on the Path of Market Adaptation and Restructuring” was organized at IIASA on 1–3 February 1996. Russian and Western experts, extensively working in the area of enterprise performance under transition, focused the discussions on recent empirical findings and analyses concerning the following issues: typical models of enterprise behavior; development of the financial situation at the enterprises and its determinants; impact of emerging markets and competition on enterprises; the consequences of privatization and patterns of restructuring; and enterprise social assets divestiture and conversion. The workshop arrived at both analytical conclusions and recommendations for policy measures stimulating “constructive” enterprise behavior. Possibilities for a joint research project on the motivations and behavior of enterprises in transition economies were also discussed.

The circulation of selected workshop papers as IIASA Working Papers is undertaken in order to provoke broad discussions of presented analytical results. Professors John S. Earle and Saul Estrin dedicate this paper to the thorough analysis of the comparative impact of privatization and competition on enterprise incentives and performance by the relation of behavioral indicators to the variables, measuring ownership and competition.



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# Privatization Versus Competition: Changing Enterprise Behavior in Russia<sup>\*</sup>

*John S. Earle*<sup>\*\*</sup>

*and*

*Saul Estrin*<sup>\*\*\*</sup>

*“There is no point in liberalizing prices before the monopolies have been dismantled.”* G. Yavlinsky (January 1994).

*“Privatization is useless with a monopolistic market structure.”*  
V. Klaus (1990).

*“More important in many cases than changing the ‘ownership’ is changing the market structure — subjecting these enterprises to competition.”*  
J. Stiglitz (1994, p. 136).

## 1 Introduction

The dramatic program of privatization and liberalization in Russia offers an exceptional opportunity to test the relative efficacy of corporate governance and product market competition as mechanisms for disciplining the behavior of firms. Previous research concerning the effects on firm behavior of ownership change and exposure to competitive markets has been somewhat inconclusive, for a number of reasons. To begin with, most studies have analyzed firms or industries in developed capitalist economies and undertaken static, cross-section comparisons of “performance” (usually defined as profitability) across observations with fixed ownership structures and market environments (e.g., Vining and Boardman (1992)). Given the difficulties of adequately controlling for heterogeneity and the possible endogeneity of ownership and market structure, however, it would perhaps be more persuasive to examine the effects of changes in these conditions on a

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given set of firms. Yet, in the stable economies of the West, there have been few opportunities to analyze firms which have undergone significant changes in their ownership and environment.

Furthermore, if one accepts the basic premise of most prior studies that the units of observation are in some kind of long-run equilibrium (or at least that disequilibrium can be adequately controlled for), then it is likely that the possible behavioral changes or potential efficiency gains which could be observed by the researcher are rather small. This is particularly so in light of the fact that most of the economies where such studies are undertaken are dominated by private ownership and “workably competitive” markets, so that the general environment may still exert a disciplining force even if the particular conditions facing the firm do not. State-owned monopolies in the West, after all, usually operate in competitive markets for managers, labor, and most other factors; they can avail themselves of the latest technologies, organizational innovations, and managerial techniques; their performance can be compared, according to a common set of standards, with neighboring privately owned, competitive firms; and instances of gross malfeasance can be publicly evaluated and remedied through a democratic process: all of these factors (at least in principle) would seem to go quite some distance towards mitigating inefficiencies associated with state ownership and monopoly power.

The situation in Russia (and other transition economies) stands in stark contrast. Concerning ownership change, the privatization program has transferred shares in more than 12,000 companies from state to private hands, resulting in a wide variety of new ownership structures, including the participation of insiders, outsiders, and in many cases still the state. Simultaneously, policies have been enacted to liberalize prices, foreign trade, and the entry of new businesses; yet many highly concentrated sectors remain. In a few short years, a large number of firms have been privatized and experienced a rise in competition, but the outcomes are quite heterogeneous.

Moreover, regardless of their current ownership or of the conditions in the product markets which they presently face, all Russian enterprises which are more than a few years old have assets — including plant and equipment, labor forces, managerial skills, organizational capital and modes of operating — which were built up for the most part during a period when there was nothing approaching a competitive market environment and essentially no private ownership. The consequence is the manifest need of Russian enterprises for large-scale restructuring along many dimensions and for a drastic re-orientation towards the market and away from the state. For the researcher, the situation holds out the possibility for observing substantial differences in behavior.

This paper employs evidence from a recent, in-depth survey of 394 Russian manufacturing firms to examine the association between ownership, market structure and firm behavior. We exploit the rich variation across firms in the extent of privatization, in the identity of the dominant new owners (managers, workers, or outsiders) and in the degree to which product markets have become competitive, as measured by several indicators including concentration ratios, import penetration ratios, location, the geographic scope

of markets, and the subjective reporting of the enterprise managers themselves. We use information on behavior of the firms “pre-reform” and more recently to measure several dimensions of restructuring and performance, including changes in product lines, lay-offs and labor productivity. We then relate these behavioral indicators to the variables measuring ownership and competition.

The enterprise data set on which we focus is particularly appropriate for this purpose. Organized by the World Bank, the survey was conducted by VTsIOM (the All-Russian Center for Public Opinion Analysis) on a sample drawn from a complete list of all Russian industrial firms in 1991 with employment greater than 15. The population was first stratified by size and region, and then an initial sample was randomly drawn. Sample replacement (of firms on the initial list which declined to participate) was implemented on the basis of industrial branch in addition to size and region.<sup>1</sup> Severe problems of missing data run throughout the survey data, and our usable set for the purpose of assessing ownership is reduced to 321 observations. Fan and Lee (1995) and the appendix to Commander, Fan, and Schaffer (forthcoming) contain detailed descriptions of the survey.

The rest of the paper is organized as follows. Section 2 contains a brief summary of ownership change in Russia, defining the variables which we use in our empirical analysis. Section 3 pulls together information about market structure in Russia, drawing on official statistical data and other researchers’ estimations, in addition to our calculations from the enterprise survey. We pay particular attention to variation across firms in the geographic scope of markets. Section 4 describes our approach to measuring restructuring and performance, we describe the several indicators we use in this paper. Section 5 contains the estimation results for equations relating the restructuring and performance variables to ownership, market structure and other covariates. Section 6 concludes.

## 2 Ownership Change in Russia

The pace and magnitude of ownership change in Russia in the early 1990s dwarf any contemporary or historical comparisons. From an initial condition of nearly 100 percent state ownership in the manufacturing sector in 1990, most enterprises had been mostly privatized by mid-1994. Excluding *de novo* firms, Table 1 shows the percentage of shares held by the state and by the private sector, as well as the percentage of firms more than 50 percent privatized as of July 1994, for broad industry groups and roughly 2-digit branches of industry for the sample of firms in the World Bank survey data.<sup>2</sup>

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<sup>1</sup>The survey also included 45 firms in the new private sector, drawn from separate regional lists. We have excluded these new start-ups from the current analysis, because we cannot observe them “before” and “after” the reform (since by definition, they did not exist prior to the reform, at least not legally). Moreover, they are fundamentally different from the “old” firms in that they do not face the same set of restructuring problems.

<sup>2</sup>These patterns and the privatization program which gave rise to them are analyzed in greater detail in our 1995b paper, together with the legal setup and functioning of corporate governance institutions at the level of enterprises.

Overall, 62 percent of formerly state-owned shares were privately owned, and 67 percent of former state enterprises were subject to the potential control of private owners (defined as greater than 50 percent ownership). The pattern differs quite significantly by branch, however: rates of privatization are highest in consumer goods sectors and lowest in energy and fuel.

As we have discussed elsewhere (1995a), the potential for new private owners to gain control, undertake restructuring and improve performance of privatized companies is likely to depend on the type of new owner who dominates. To summarize briefly, it may make a difference if the dominant owner-group consists of outsiders or of insiders (firm employees), but we have also argued that different types of insiders — managers versus non-managerial employees — may be likely to exhibit different objectives and face different constraints as dominant owners; and the same may be true for the various types of outsiders — banks, foreign companies, domestic partner companies, or citizens (for instance, as the result of a voucher program). To summarize briefly, insider-owners are less likely to be successful at restructuring and improving performance, compared with some types of outsiders.<sup>3</sup> Insiders, particularly workers, may have greater difficulties in raising capital (due to lenders' fears of expropriation, aggravated by a poorly functioning bankruptcy regime) and in making decisions which may have distributional implications, that is which create losers as well as winners among them.

Indeed, the Russian privatization program resulted in insider domination in the vast majority of cases, as shown in Table 2. Of the average 62.4 percent of private shareholdings for all the companies in the sample, more than three-quarters, or 48.2 percentage points are owned by insiders, of which more than two-thirds belong to workers. Once again, the patterns differ significantly by sector. For instance, although insiders dominate overall, there are nonetheless significant pockets of outside ownership in the Russian economy. Outsiders are especially prevalent in heavy industry. We exploit the large variations in ownership patterns in our estimation of the determinants of restructuring and performance below.<sup>4</sup>

### 3 Competition Measures and Policy

This section describes alternative measures of concentration and competitiveness in Russian markets, drawing on information from the survey of Russian firms and from secondary

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<sup>3</sup>That is, under the counterfactual that the program had been designed to facilitate greater outside ownership, particularly controlling stakes by large foreign or institutional investors. It is difficult to dispute Chubais' contention that Russian policymakers in 1992 faced a severely constrained set of politically feasible programs.

<sup>4</sup>Here we have reported information only on the overall pattern of shareholding, while in our earlier (1995b) paper we presented estimates of the incidence of nonvoting shares. Because most nonvoting shares are held by insiders and the state, counting only voting shares raises quite significantly the relative state of outsiders. The results reporting below concerning the relationship between behavior and ownership, however, are robust to this change of specification.

sources. Our purpose is not to evaluate the aggregate or average degree of concentration in the Russian economy, but merely to establish the fact of significant variation across product markets within Russia, variation which we hypothesize could account for some of the differences among firms in the extent of restructuring.<sup>5</sup> Means for the variables by industry groups are shown in Tables 3.1, 3.2, and 3.3.

Our first set of indicators draws upon two studies of concentration in Russia: Brown, Ickes, and Ryterman (1994, henceforth BIR) and Joskow, Schmalensee, and Tsukanova (1994, henceforth JST). BIR present 4-firm sales concentration ratios calculated by Plan-Econ for 2-digit branches in 1989; we have labeled this variable CR4B. JST present 4-firm sales concentration ratios at a more disaggregated level (approximately 4-digit industries) in 1991, but for a limited number of sectors: only 101 firms. Given the substantial arbitrariness in defining levels of disaggregation across heterogeneous classes of products, and assuming there was little change in market shares from 1989 to 1991 (since the major reforms started in 1992), we have also combined the two variables, using CR4J when it is available, and otherwise using CR4B; the new variable is called CR4BJ. The variables show quite a high variance in concentration: CR4BJ has a mean of .27 and a range from .03 to 1.

The second set of indicators uses the information in the survey to estimate Herfindahl-Hirschman indices for 2-digit sectors. To minimize the number of missing values, we use employment as the base variable. To calculate appropriate weights, we use data from 1993, when aggregate employment figures by sector are available. HIRAW is simply the sample index for each sector:

$$HIRAW = \sum_{j=1}^m S_j^2,$$

where  $S_j$  = share of firm  $j$  in sectoral employment in the sample of  $m$  firms in the sector. Our sample was stratified by size (as well as region), and if we maintain the assumption that the size distribution is also representative for each sector, then it is possible to estimate the index for the population quite simply as follows:

$$HIADJ = (m/n) * HIRAW,$$

where  $m/n$  is the ratio of the number of firms in the sample to the number in the population for each sector.<sup>6</sup> HIRAW also displays quite significant variation with a range from .09 to .87, but HIADJ achieves a maximum of only .05.

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<sup>5</sup>Ickes, Ryterman, and Tenev (1995) argue that “very intense” competition may have a negative effect on enterprise adjustment (because of short-run adjustment costs), and examine qualitative indicators of adjustment.

<sup>6</sup>To demonstrate this, define  $HI$  = population Herfindahl-Hirschman index

$$= \sum_{i=1}^n P_i^2$$

Although the potential for foreign competition to exert some disciplinary effect in Russia is frequently discounted (for instance, in JST, p. 303), we have gathered data on imports and computed import penetration ratios to allow an explicit test of the hypothesis.<sup>7</sup> IP0 (derived from Roskomstat data) is import penetration from the “far abroad”, which excludes the former Soviet Union; while IP1 (from the World Bank) includes all imports. Both variables take *output+imports−exports* for each sector as the denominator, and the two variables are highly correlated. Both vary significantly across sectors.<sup>8</sup>

The next group of indicators in Table 3.1 adjusts the concentration ratios above for import penetration. We multiply each concentration ratio by (1-IP1) which represents the share of domestic sales accounted for by domestic producers; where import penetration is greater, the sales concentration ratio is correspondingly reduced.<sup>9</sup> In fact, this adjustment has a significant impact on measured concentration, reducing both its mean and its variance. But there is still significant variation across sectors, for instance from .03 to .77 in CR4BJIP1.

The final indicator in Table 3.1 comes from the survey: PRICONT is a dummy equal 1 if the firm reports that the prices for its major products are subject to state control. The 1991 Law “On Competition and Limitation of Monopolistic Activity in Goods Markets” defined dominant market position as 35 percent or more (to be set annually by the State Committee on Anti-Monopoly Policy), and the 35 percent definition was used in the “anti-monopoly lists” which the government ordered local anti-monopoly committees to compile in early 1992. According to JST (p. 339), “[I]n August 1992, the Gaidar government ordered federal and regional price committees to regulate the prices of most

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where  $P_i$  = proportion of employment of firm  $i$  in the population of the given sector. Say the sample contains  $m$  firms (as above) drawn from the  $n$  firms in the population in a size-wise representative fashion, in which case  $S_i = (n/m)P_i$  for any firm  $i$  in the sample. Further suppose that the population can be decomposed into  $K$  groups of equally size firms, where groups are indexed by  $k$ , the  $k$ th group containing  $l_k$  firms. Then HI can be written

$$\sum_{k=1}^K l_k P_k,$$

since each element of group  $k$  has an equal share  $P_k$ . The sample can be similarly decomposed into  $K$  groups, each of size  $(mn/n)l_k$ , and the sample

$$HIRAW = \sum_{k=1}^K \left(\frac{m}{n}l_k\right)\left(\frac{n}{m}P_k\right)^2$$

substituting  $S_i = (n/m)P_i$  from above. Simplifying the equation yields the formula for HIADJ (the approximation to HI).

<sup>7</sup>The “import discipline hypothesis” originated in Esposito and Esposito (1971), was continued with Geroski and Jaquemin (1981), and has been tested on a data set of Czech industries by Earle and Wörgötter (1994).

<sup>8</sup>It might be useful to try to construct variables measuring the extent of effective protection, which were found to have high explanatory power in Carlsson (1972) and Saunders (1980), although it should be noted that those studies were conducted at the industry rather than the firm level.

<sup>9</sup>This adjustment is suggested in Scherer and Ross (1990), p. 79.

goods produced by firms on the monopoly registers”. Although this authority was supposed to expire at the end of 1993, it seems that much of the regulation continued. Thus, the existence of price controls may reflect market power, at least as perceived by local anti-monopoly committees (although one cannot preclude a variety of other motivations).

Table 3.2 contains a group of subjective indicators of the extent of market power based on responses to questions on the survey of firms. Managers were asked to report whether they had “major competitors for [their] major products” and, if so, how many. “Major competitors” is not precisely defined in the survey question, and no doubt it would have been difficult to do so in economically meaningful terms. On the other hand, given the difficulties in choosing the appropriate size of the market for any given firm and of measuring the strength of actual and potential competitors in it, the managers’ subjective evaluation may be an indicator worth investigating. We define MAJCOMPD as a dummy variable equal to 1 if the manager reports that the firm faces a major competitor, and 75 percent (the mean of MAJCOMPD) of firm managers report that they do. Taken literally, this would imply that one quarter of the sample firms are monopolists or dominant firms in their industry. MAJCOMP# is the number of major competitors, equal to zero if MAJCOMPD is, and the average is 21 with a range from 0 to 1100.

The managers were also asked to report the geographic breakdown of the competition they face; under the presumption that foreign competition may be a particularly powerful disciplinary device, we have computed the variables MAJFORD and MAJFOR#, measuring whether the firm reports any foreign competitor (= 1 if so; = 0 otherwise) and the number of foreign competitors, respectively. In fact, a surprising number of Russian firms — 51 observations, or 20 percent of the valid sample — report that they face foreign competition. The average number of foreign competitors is 9 (including zeroes), with a maximum of 1000.

Transportation and infrastructural deficiencies probably act as a barrier not only to foreign competition, but to domestic producers located in other regions as well. To provide some assessment of the geographic dimension in which firms operate, Table 3.3 gives a summary of the firms’ reports on the extent to which revenue is generated locally (RAYON), regionally (OBLAST), nationally (NATIONAL), and from 3 different categories of countries importing Russian goods (former Soviet Union (FSU), former CMEA (CMEA), and non-FSU, non-CMEA markets (WEST)). While on average 50 percent of revenue is derived from markets which the firms describe as national, there is considerable heterogeneity. The hypothesis for these variables is that the wider the geographic scope of the market, the more competition faced by the firm; thus, concentration ratios should be adjusted accordingly.

It is an issue of ongoing (and perhaps ultimately unresolvable) controversy as to which measure of concentration is most appropriate, or, indeed, whether the choice makes any

difference.<sup>10</sup> The appropriate specification of foreign competition and, more generally, of geographic scope is also unresolved. The basic problem is that the relevant concept — how near the market approaches perfect competition — is simply not measurable (short of a Lerner index). For instance, in principle it is possible for a market with one seller to be perfectly competitive nonetheless, if it is also perfectly contestable; all observable indicators would imply a monopoly situation, but behavior would be otherwise. It is not our purpose to try to resolve these controversies here, but merely to put forward a set of variables which may be proxies for potential determinants of enterprise behavior. We allow the variables to enter and interact in a variety of alternative specifications in our estimations below.

## 4 Indicators of Restructuring and Performance

The transition underway in Russia and other East European countries provides a particularly interesting quasi-experimental setting within which to investigate (among a number of topics) the effects of changes in corporate governance and in the economic environment upon the behavior of firms. As is well-recognized in both earlier work on soviet-type economies and in the new literature in transition economics, the behavior and organization of state-owned enterprises within socialist economic systems are fundamentally different compared to conventional firms in market economies. The speed and magnitude of change in the objectives and constraints of firms in the transition would thus imply that one may observe large changes in their behavior as they adjust from one system to another.<sup>11</sup>

The different context has implications not only for the magnitude of change which may be observed, but also for the types of behavior which are interesting to measure. Analyses of the effects of privatization or of concentration in developed capitalist economies are frequently conducted under the implicit assumption that the firms are observed in a steady-state equilibrium, so that it is appropriate to focus directly on measures of performance, particularly profitability. In the transition situation, by contrast, what is perhaps more interesting is the ability of firms (under the influence of new owners and a new economic environment) to change their behavior in desirable directions. Profitability may be a particularly poor measure of behavioral change, certainly so in the short run, because many types of restructuring may impose higher short-run costs and only increase profits in the longer run (even leaving aside the accounting problems which are multiplied in a

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<sup>10</sup>See Kwoka (1981) for a summary of the issues and the argument that high correlation among alternative measures does not imply that the choice is immaterial. Also see Sleuwaegen and Dehandschutter (1986), who argue in favor of the Herfindahl-Hirschman index.

<sup>11</sup>Indeed, the changes over 1991 to 1994 are at an order of magnitude seldom if ever seen in most “normal” situations: for instance, the mean change in real output for the firms in our sample is –52.2 percent, the mean change in nominal output is 16585.7 percent (the difference due to the near-hyperinflation in Russia over this period), and the mean change in employment is –25.2 percent.



situation where the accounting system is itself undergoing a transition and few firms are subject to rigorous outside audit).

For these reasons, we find it use to examine behavioral variables which may capture some of the major dimensions of the restructuring process: product market, employment, compensation, unbundling (changing boundaries), and investment. Elsewhere (1995c), we have provided some defense of each of these categories as well as put forth the argument that restructuring is a process of overall change which cannot be captured by any one variable and instead requires the construction of an aggregate index or set of indices; these we shall not repeat here. This paper instead describes a few individual indicators of change in the conduct of firms over the 1990 to 1994 period: product lines, layoffs and labor productivity.

Summary statistics for the restructuring indicators are shown in Table 4. CORPROD is the simple correlation coefficient between the structure of a firm's production in 1994 with that in 1990 (each firm provided the percentage of the value of its output obtained from each of 3 major products in 1994 and from the same 3 in 1990). Some firms changed the composition of their outputs dramatically, but on average there was only moderate adjustment: the mean correlation is .56. LAYOFF is the firm's layoff rate from the beginning of 1992 until the time of the survey in July 1994 (defined as the ratio of number of workers laid off to the mean of employment in 1991 and employment in 1994).

We also investigate labor productivity as an indicator of the performance of different firms. Here we are interested in the effects of privatization and increased competition on the level rather than the change in the dependent variable. But to control for the fact that labor productivity may vary systematically for a variety of reasons (for instance, different capital/labor ratios) across firms, we include the lagged (pre-reform) level on the right-hand side. These equations may also be interpreted as restructuring equations, where the firm has managed to reduce employment while keeping output up, or to raise output while keeping employment down. Two versions of labor productivity, defined as nominal sales per employee ( $S/EMP$ ), and real output per employee ( $RX/EMP$ ), are shown in Table 4, both for 1994 (subscript 4) and the lagged value in 1990 (subscript 0).

## 5 Estimation Results

Our estimating equations take the following general form:

$$RI_i = f(OWN_i, COMP_i, X_i),$$

where  $RI$  = an indicator of restructuring (described above),  $OWN$  is a vector of ownership variables which varies across specifications,  $COMP$  is a vector of variables measuring the extent of competition in the firm's product market which also varies across specifications, and  $X$  is a vector of other covariates, usually including regional dummy variables. The productivity equations are similarly specified, but  $X$  includes the (4-year) lagged dependent variable.

The differences in our approach from the conventional one in much of the literatures on ownership and market structure deserves some emphasis. In the previous section, we tried to justify our use of left-hand side measures which also differ from the conventional focus on profitability: what fascinates in the transition is how firms adjust to the rapid changes in and around them more than their short-run performance. In our productivity equations, we also evaluate performance, but these equations also differ from those in the small literature on the “x-inefficiency” of monopolies and state ownership. In those literatures, the typical unit of observation is a firm (or industry) with unchanging ownership and facing unchanging product market conditions; variation exists only in the cross-section and therefore includes any unmeasurable idiosyncratic components.<sup>12</sup> By contrast, many of our firms were privatized and most of them faced some change in the degree of competition which they faced. Using information from before and after the reforms, we hope to be able to control for the idiosyncratic component of variation.

We have investigated a wide variety of specifications of the general model described above, and we report only representative results here. Here we report results for the four indicators discussed in the previous section: two version of labor productivity (S/EMP and RX/EMP), extent of changes in the product mix (CORPROD), and the layoff rate (LAYOFF).

In the estimation results below, we allow for 2 alternative specifications of ownership and 3 alternative specifications of competition. OWN1 is simply PSH, the percentage of shares in the firm which are privately held. OWN2 includes WSH, MSH, and OSH, a disaggregation of PSH among workers, managers, and outsiders, respectively.

The competition specifications are as follows:<sup>13</sup>

COMP1: CR4BJ, CR4BJ\*IP  
COMP2: INVMC# (1/(MAJCOMP+1)), MAJFORD  
COMP3: PRICONT

Combined, the 2 OWN specifications and 3 COMP specifications make 6 total for each dependent variable. In addition, to control for the hardness of budget constraints, GOVSUP, a dummy variable equal to 1 if the firm reports receiving any kind of state support in 1992–94, is included in all specifications. The lagged dependent variable is included in productivity equations, for reasons discussed in the previous section. Among a number of other specifications, we also estimated equations which included regional dummies and the measures of the geographic scope of the firm’s markets (from Table

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<sup>12</sup>See Vining and Boardman (1992) for a summary of literature and the results of such an analysis using data on a sample of Canadian firms. Information on firms which have experienced a change in ownership (state to private) or in product market conditions seems to be largely anecdotal; see, for instance, the discussion in Scherer and Ross (1990), Chapter 18, and the studies cited therein.

<sup>13</sup>We tried a number of other specifications, including the Herfindahl-Hirschman indices calculated from our sample, and various interactions of a number of competition variables, but they were either insignificant, or (to say much the same thing), they did not substantially affect the conclusions we present here.

3.3), entered separately, as well as interactively with CR4BJ, with CR4BJ\*IP, and with IP. None of these additions materially affected the results from the simpler specifications, shown in Tables 5.1 to 5.4.

The results in Table 5.1 demonstrate a clear positive effect of privatization on productivity, measured as  $S/EMP$  in 1994. The magnitude of the coefficient is large, suggesting between 3 and 5 percent increase in productivity for each additional percentage of shares which are privately owned. The result holds across all specifications which include PSH, although when ownership is disaggregated among workers (WSH), managers (MSH), and outsiders (OSH), the results are significant only for MSH and OSH together with COMP2. Competition variables show up as significant only in COMP1, where sales per employee is increased by concentration (CR4BJ), but the effect is lowered by import penetration (CR4BJ\*IP). Because sales are defined in nominal terms, it is difficult to know if these results, taken alone, imply that monopoly raises productivity and that import competition reduces it, or (more likely) that monopoly raises prices and import competition reduces monopoly power, since revenue can be increased by increasing price as well as quantity. The specifications with other definitions of market power (COMP2 and COMP3) return no significant affects of the market environment on firm productivity.

The estimations with real output per employee ( $RX/EMP$ ), shown in Table 5.2 strongly confirm the positive effect of privatization, and most particularly of managerial share ownership, on productivity. The complete lack of significance for any of the competition variables in these specificants (and all others which we tried, also including our measures of the geographic scope of markets and regional dummies) suggest market power may have enabled firms in Russia to raise prices, but increased competition is not associated with increased efficiency.

The results of estimating equations with CORPROD as the dependent variable appear in Table 5.3. The coefficient on PSH is positive, but nowhere precisely estimated. Because a positive coefficient would imply less product market restructuring on the part of privatized firms, it is especially worth investigating. Elsewhere (1995a), we have hypothesized that firms with predominant worker ownership would be less likely to engage in much internal re-organization insofar as such restructuring creates losers as well as winners inside the firm. In specifications 2 and 6, where OWN2 is used so that the effects of different types of new share-owners can be disentangled, WSH is positive and significant. Only MSH is always negative, and only in conjunction with COMP2 (specification 4). Interestingly, outsiders also seem less eager to engage in this type of restructuring. The only competition variable to show up significantly in this equation is the interaction of the concentration ratio with the import penetration ratio. This result, which also holds when IP is entered separately, and not only interactively, suggests that imports may stimulate adjustment.

Determinants of layoff behavior are shown in Table 5.4. PSH is positive and significant in most specifications, and when disaggregated, the ownership effects turn out, for reasons

similar to those for CORPROD, to come predominantly from managerial ownership. No competition variables are significant in these equations.<sup>14</sup>

## 6 Conclusion

In this paper, we have made an initial attempt to measure whether the recent change of regime in Russia has had consequences for enterprise behavior. That some aspects of behavior have changed substantially is not in doubt, as a glance at our summary statistics or a few visits to Russian enterprises can attest. But whether those changes can be linked in a systematic way to policies in such areas as privatization, liberalization and anti-trust, or to the hardening of budget constraints is trickier.

Some might argue that it is still too early to look for systematic relationships. The privatization program only finished its first, “mass” phase in mid-1994 (the time of the survey from which we draw most of our information in this paper), and sales of the remaining shares and companies are still ongoing as of late 1995. Competition is also only gradually evolving, as new companies grow large enough to compete with the formerly state-owned behemoths and as foreigners gingerly test the water, and Russian companies are only moderate in their response. In a situation of great chaos and uncertainty, random experimentation may seem to be the order of the day, making it hard to make any predictions about the direction to be taken by “restructuring” enterprises. Moreover, together with all the other changes, the ways of measuring those changes (accounting systems and statistical reporting) are themselves changing, making it difficult to monitor and calibrate, a problem still further exacerbated by the years of near-hyperinflation. Perhaps it would indeed be better to “let the dust settle” a bit before trying to determine the new lay of the land.

As against this epistemological pessimism, we would argue that much can be learned in Russia, even in the short run, and that the situation is too exciting (and perhaps dangerous) to wait for historians to sort out in the next generation. Moreover, if one is ever in the future to be able to chart the path of transition, including thorough understanding of the starting point, then the time for gathering data and trying to make sense of events is already slipping away.

But most importantly, we believe that even the exploratory results offered in this paper are instructive. Privatization seems to have a clear and substantial effect on productivity, one which is robust across a wide variety of specifications. Its effect on the restructuring of product lines and employment (layoffs) is much less clear: privatization *per se* is not consistently significant. But we demonstrate that the specific type of new owner can make a big difference, a proposition for which we have argued on theoretical grounds (1995a).

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<sup>14</sup>To test the intriguing notion that privatization and competition may have a complementary relationship (for instance, so that competition would only have an effect on privatized companies), we also tried specifications including interaction terms for OWN and COMP, but the estimated coefficients on these variables were not significant.

Most importantly, worker-ownership is associated with less changes in the product mix and with fewer layoffs, while managerial ownership is associated with more of both, and outsider ownership with more product changes but no difference in layoffs.

Our results for competition are more ambiguous. In some cases, we have managed to unearth statistically significant relationships among variables, but despite our attempts to measure competition in a multitude of ways (as shown in Tables 3.1, 3.2, and 3.3), it is hard to identify a consistent pattern. Where we have measured productivity in terms of nominal sales per employee, it is possible that our results indicate the ability of monopolists to raise prices and the degree to which import competition may limit that power. This inference is strengthened by the lack of significant effect of concentration on productivity when the latter is defined in terms of real output, implying no effect of market structure on real productivity.

One of the biggest surprises to us was that our variables measuring the location of firms and the geographic scope of their markets bore no fruit. Either entered separately or as interactions with concentration or import penetration ratios, neither group appeared to be significant in almost any equation. Most commentators on concentration and competition policy in Russia (for instance, JST) maintain that market power is exercised primarily on the regional level, and we were prepared to believe the same. But, on the contrary, import penetration shows up as perhaps the strongest competition variable (although still somewhat inconsistent), and its effect does not vary significantly across regions.

Our analysis of these data thus seems to indicate that privatization is having some positive impact, even if the large-scale giveaways to insiders diminish the benefits. Perhaps this provides some empirical support for the often heard recommendations (including our own) for policies designed to facilitate secondary trading of shares and the entry of outsiders. The effect of competition, on the other hand, is much less clear. Taken at face value, the results suggest that regional market power is less important than many commentators have assumed, while imports are already beginning to have some impact nationwide. The data generally seem to reject competition variables as determinants of restructuring. The other possibility is, as we have noted, that competition and market power are extraordinarily difficult to measure, and that our variables are too highly aggregated or imprecise to define the relevant markets properly. Together with trying to gather better indicators, it would be valuable to estimate similar relationships to those we have examined in this paper using additional measures of firm behavior and restructuring. We have begun to assemble a more systematic collection of such measures (1995c), and we plan to report on their relationship with such variables representing important classes of “motivators”, such as ownership, competition, and budget constraints, at a later date.

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## **APPENDIX: Tables**



Table 1: Privatization by Sector of Russian Industry

Sector of Industry	State Share	Private Share	PO%	N
<b>Energy and Fuel</b>	52.4	47.6	42	19
Energy	72.0	28.0	29	7
Fuel	41.0	59.0	50	12
<b>“Heavy Industry”</b>	38.7	60.8	70	133
Ferrous metallurgy	16.6	83.4	90	10
Nonferrous metallurgy	21.1	78.3	88	8
Chemicals	17.0	83.0	85	13
Heavy machine building	30.9	69.1	75	20
Electrotechnical machinery	27.3	70.2	82	11
Machine tools and computers	60.9	39.1	43	14
Automobile industry	23.3	76.2	89	9
Agricultural machinery	41.9	58.1	69	13
Light machine building	60.5	39.5	50	4
Defense industry	53.4	46.6	73	11
Ship building	38.2	61.8	75	8
Radio industry	77.8	20.2	25	12
<b>“Light Industry”</b>	40.2	58.4	61	80
Communications and Electronics	43.1	54.9	60	15
Metal constructions	28.6	69.4	79	14
Machine repairing	35.8	61.0	53	15
Wood harvesting	73.9	26.1	22	9
Wood working industry	36.3	63.7	71	14
Construction materials	35.5	64.5	69	13
<b>“Consumer Goods”</b>	28.1	71.1	74	89
Textiles	17.1	81.6	82	22
Clothing industry	10.8	88.7	90	21
Food processing	41.6	56.8	67	18
Meat and milk	11.0	89.0	82	11
Other industrial production	60.0	39.2	47	17
<b>Total Industry</b>	<b>37.0</b>	<b>62.4</b>	<b>67</b>	<b>321</b>

Notes: PO% = percentage of firms in sector more than 50 percent privatized; N - number of firms in sample. The total of State Shares and Private Shares does not always strictly equal 100, both because of rounding errors and because of the occasional existence of “other” owners whose property status was not specified. However, the magnitude of these unclassified “other” shares was never large enough to affect the categorization of the firm as predominantly state or privately owned.

Table 2: Disaggregated Shareholdings in Russian Industry

Share Owners	Means by Industry Groups				Total Industry		
	Fuel & Energy	“Heavy Industry”	“Light Industry”	“Consumer Goods”	Mean	Standard Devia- tion	Valid N
<b>State</b>	52.4	38.7	40.2	28.1	37.0	40.4	320
<b>Private</b>	47.6	60.8	58.4	71.7	62.4	40.1	319
Insiders	33.9	44.8	44.5	59.8	48.2	36.3	320
Managers	12.4	12.4	11.9	20.1	14.4	22.1	318
Workers	22.8	32.5	32.8	39.8	34.0	30.9	320
Outsiders	12.4	15.9	13.8	11.0	13.8	20.0	320
Banks	0.29	0.87	0.84	0.65	0.77	4.11	309
Investment							
Funds	4.8	3.7	3.2	2.0	3.2	8.1	309
Other							
Firms	0.59	4.7	3.9	4.8	4.3	11.4	309
Foreign	0.00	0.44	0.38	0.00	0.28	2.4	309
Individuals	4.7	4.8	5.1	3.1	4.4	11.4	309
Others	0.00	0.46	1.3	1.1	0.8	4.4	319
<b>N</b>	19	133	80	89			321

Notes: Industry groups are defined as in Table 1.

Table 3.1: Measures of Market Power in Russia

Variables	Means by Industry Groups				Total Industry		
	Fuel & Energy	“Heavy Industry”	“Light Industry”	“Consumer Goods”	Mean	Standard Devia- tion	Valid N
CR4B	41.0	28.4	9.2	10.4	19.5	14.7	273
CR4J	NA	46.5	44.3	25.7	44.3	22.0	103
CR4BJ	41.0	35.4	23.8	12.4	26.1	21.3	274
HIRAW	26.8	22.9	17.3	21.9	21.5	12.3	321
HIADJ	0.37	0.10	0.05	0.08	0.1	0.11	321
IP0	0.00	30.7	22.3	31.7	26.8	13.8	310
IP	0.00	28.8	20.9	21.0	23.1	12.6	304
CR4BIP	41.0	20.1	6.87	8.3	14.9	10.9	256
CR4JIP	NA	33.7	36.0	31.6	34.0	15.0	100
CR4BJIP	41.0	25.5	18.7	10.3	20.4	16.1	257
PRICONT	70.6	42.1	38.7	34.1	40.5	49.2	304
N	19	133	80	89			321

Table 3.2: Subjective Measures of Market Power in Russia

Variables	Means by Industry Groups				Total Industry		
	Fuel & Energy	“Heavy Industry”	“Light Industry”	“Con- sumer Goods”	Mean	Standard Devia- tion	Valid N
MAJCOMPD	0.63	0.72	0.79	0.79	0.75	0.43	309
MAJCOMP#	14.8	19.7	19.0	27.0	21.0	101.8	267
MAJFORD	0.06	0.25	0.08	0.25	0.20	0.40	259
MAJFOR#	0.06	10.76	0.63	17.1	9.0	87.8	259
N	19	133	80	89			321

Table 3.3: Geographic Scope of Markets in Russia

Variables	Means by Industry Groups				Total Industry		
	Fuel & Energy	“Heavy Industry”	“Light Industry”	“Consumer Goods”	Mean	Standard Devia- tion	Valid N
RAYON	16.5	3.1	15.4	19.3	11.8	25.8	243
OBLAST	12.2	18.1	41.7	31.4	27.4	34.8	245
NATIONAL	60.1	65.4	35.6	40.0	50.1	39.0	248
FSU	7.8	8.3	5.0	1.7	5.7	10.0	289
CMEA	0.72	1.9	0.73	0.27	1.1	5.6	287
WEST	6.9	5.7	1.7	3.5	4.2	12.7	286
N	19	133	80	89			321

Table 4: Measures of Restructuring in Russia

Variables	Means by Industry Groups				Total Industry		
	Fuel & Energy	“Heavy Industry”	“Light Industry”	“Consumer Goods”	Mean	Standard Devia- tion	Valid N
S/EMP4	21.6	6.7	4.7	9.6	8.0	10.2	234
S/EMP0	0.03	0.05	0.03	0.03	0.04	0.08	171
RX/EMP4	0.03	0.07	0.15	0.25	0.15	0.22	116
RX/EMP0	0.11	0.12	0.25	0.36	0.22	0.32	284
CORPROD	0.61	0.50	0.64	0.61	0.56	0.65	153
LAYOFF	0.03	0.07	0.06	0.08	0.07	0.11	235
N	19	133	80	89			321

Table 5.1: Regression Results for Labor Productivity [Log(S/EMP4)]  
(Standard errors in parentheses)

Variable	Specification					
	1	2	3	4	5	6
PSH	0.44 <sup>b</sup> (0.21)		0.51 <sup>b</sup> (0.23)		0.32 <sup>a</sup> (0.19)	
WSH		0.42 <sup>a</sup> (0.25)		0.24 (0.31)		0.21 (0.25)
MSH		0.46 (0.38)		0.94 <sup>a</sup> (0.58)		0.63 <sup>a</sup> (0.38)
OSH		0.47 (0.36)		0.83 <sup>a</sup> (0.44)		0.32 (0.37)
CR4BJ	0.02 <sup>b</sup> (0.01)	0.02 <sup>b</sup> (0.01)				
CR4BJIP	-0.09 <sup>b</sup> (0.02)	-0.09 <sup>b</sup> (0.02)				
1/(1+MAJCOM#)			-0.10 (0.36)	-0.15 (0.37)		
MAJFORD			-0.15 (0.20)	-0.09 (0.21)		
PRICONT					-0.03 (0.15)	-0.03 (0.15)
GOVSUP	-0.07 (0.15)	-0.07 (0.16)	-0.06 (0.19)	-0.06 (0.19)	-0.16 (0.15)	-0.15 (0.15)
Log(S/EMP0)	0.40 <sup>b</sup> (0.07)	0.40 <sup>b</sup> (0.08)	0.38 <sup>b</sup> (0.09)	0.37 <sup>b</sup> (0.09)	0.47 <sup>b</sup> (0.07)	0.46 <sup>b</sup> (0.07)
Constant	2.77 <sup>b</sup> (0.35)	2.77 <sup>b</sup> (0.35)	2.72 <sup>b</sup> (0.40)	2.68 <sup>b</sup> (0.40)	3.19 <sup>b</sup> (0.35)	3.16 <sup>b</sup> (0.35)
Adj $R^2$	0.36	0.35	0.18	0.18	0.22	0.21
N	125	125	99	99	156	156

Notes: <sup>a</sup> significant at 0.1 level; <sup>b</sup> significant at 0.05 level.

Table 5.2: Regression Results for Labor Productivity [Log(RX/EMP4)]  
(Standard errors in parentheses)

Variable	Specification					
	1	2	3	4	5	6
PSH	0.44 (0.30)		-0.14 (0.32)		0.21 (0.26)	
WSH		0.41 (0.37)		-0.25 (0.45)		0.18 (0.32)
MSH		0.92 <sup>a</sup> (0.55)		0.47 (0.76)		0.78 (0.49)
OSH		0.09 (0.54)		-0.42 (0.58)		-0.19 (0.49)
CR4BJ	1E-03 (0.01)	1.9E-03 (0.01)				
CR4BJIP	-0.03 (0.02)	-0.03 (0.02)				
1/(1+MAJCOMP#)			-0.55 (0.52)	-0.60 (0.53)		
MAJFORD			0.26 (0.28)	0.24 (0.29)		
PRICONT					-0.25 (0.21)	-0.24 (0.21)
GOVSUP	0.23 (0.23)	0.23 (0.23)	0.12 (0.27)	0.13 (0.27)	0.06 (0.20)	0.08 (0.20)
Log(RX/EMP0)	.99 <sup>b</sup> (0.08)	0.97 <sup>b</sup> (0.08)	1.00 <sup>b</sup> (0.09)	0.98 <sup>b</sup> (0.09)	0.99 <sup>b</sup> (0.07)	0.99 <sup>b</sup> (0.07)
Constant	-1.17 <sup>b</sup> (0.33)	-1.22 <sup>b</sup> (0.34)	-0.74 <sup>b</sup> (0.38)	-0.76 <sup>b</sup> (0.38)	-0.82 <sup>b</sup> (0.29)	-0.86 <sup>b</sup> (0.29)
Adj $R^2$	0.66	0.66	0.67	0.67	0.69	0.69
N	88	88	64	64	110	110

Notes: <sup>a</sup> significant at 0.1 level; <sup>b</sup> significant at 0.05 level.



Table 5.3: Regression Results for Changes in Product Lines (CORPROD)  
(Standard errors in parentheses)

Variable	Specification					
	1	2	3	4	5	6
PSH	0.22 (0.15)		0.19 (0.17)		0.20 (0.14)	
WSH		0.45 <sup>b</sup> (0.19)		0.29 (0.22)		0.36 <sup>b</sup> (0.18)
MSH		-0.09 (0.24)		-0.55 (0.31)		-0.13 (0.24)
OSH		0.03 (0.28)		0.73 <sup>b</sup> (0.33)		0.19 (0.28)
CR4BJ	0.01 (0.01)	0.01 (0.004)				
CR4BJ*IP	-0.03 <sup>b</sup> (0.01)	-0.03 <sup>b</sup> (0.01)				
1/(1+MAJCOM#)			0.06 (0.25)	0.13 (0.24)		
MAJFORD			0.02 (0.17)	-0.03 (0.17)		
PRICONT					0.03 (0.10)	0.04 (0.11)
GOVSUP	0.09 (0.12)	0.08 (0.12)	0.01 (0.14)	-0.08 (0.14)	0.05 (0.11)	0.04 (0.11)
Constant	0.41 <sup>b</sup> (0.15)	0.42 <sup>b</sup> (0.15)	0.46 <sup>b</sup> (0.17)	0.48 <sup>b</sup> (0.16)	0.40 <sup>b</sup> (0.17)	0.40 <sup>b</sup> (0.14)
Adj $R^2$	0.02	0.04	-0.03	0.05	-0.01	0.002
N	124	124	88	88	148	148

Notes: <sup>a</sup> significant at 0.1 level; <sup>b</sup> significant at 0.05 level.

Table 5.4: Regression Results for Layoffs  
(Standard errors in parentheses)

Variable	Specification					
	1	2	3	4	5	6
PSH	0.04 <sup>a</sup> (0.02)		0.03 (0.02)		0.03 <sup>a</sup> (0.02)	
WSH		0.03 (0.03)		0.02 (0.03)		0.02 (0.02)
MSH		0.07 <sup>a</sup> (0.04)		0.09 <sup>b</sup> (0.05)		0.07 <sup>b</sup> (0.03)
OSH		0.03 (0.04)		-5.9E-04 (0.04)		0.01 (0.04)
CR4BJ	-4.6E-04 (6.8E-04)	-4.2E-04 (6.9E-04)				
CR4BJIP	9.2E-04 (2.0E-03)	9.1E-04 (2.0E-03)				
1/(1+MAJCOM#)			5.6E-03 (0.03)	2.6E-03 (0.03)		
MAJFORD			6.2E-03 (0.02)	0.01 (0.02)		
PRICONT					-0.02 (0.01)	-0.02 (0.01)
GOVSUP	-0.02 (0.02)	-0.02 (0.02)	-0.03 <sup>a</sup> (0.02)	-0.03 <sup>a</sup> (0.02)	-0.02 (0.01)	-0.02 (0.01)
Constant	0.06 <sup>b</sup> (0.02)	0.06 <sup>b</sup> (0.02)	0.05 <sup>b</sup> (0.02)	0.05 <sup>b</sup> (0.02)	0.06 <sup>b</sup> (0.02)	0.06 <sup>b</sup> (0.02)
Adj $R^2$	0.01	0.003	0.02	0.02	0.02	0.02
N	182	182	136	136	230	230

Notes: <sup>a</sup> significant at 0.1 level; <sup>b</sup> significant at 0.05 level.