

CENTRE FOR ECONOMIC PERFORMANCE

DISCUSSION PAPER NO. 316

**PRIVATIZATION VERSUS COMPETITION:  
CHANGING ENTERPRISE BEHAVIOR IN RUSSIA**

December 1996

J. EARLE AND S. ESTRIN

## **ABSTRACT**

We investigate whether competitive forces and privatization have yet begun to play an efficiency-enhancing role in Russia. We also explore the economic effects of harder budget constraints on enterprise behaviour. The empirical work is based on a large enterprise panel of Russian firms 1990-94, representing around 10% of Russian manufacturing output. We conclude that privatization is having an impact on enterprise efficiency and restructuring but domestic market structure and harder budget constraints for the most part are not. Intriguingly, Russian firms are found to be sensitive to the degree of import penetration.

# Programme on Economic Reform

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**DECEMBER 1996**

Produced by  
Centre for Economic Performance  
London School of Economics and Political Science  
Houghton Street  
London  
WC2A 2AE

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ISBN 07530 0959 5

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and Social Research Council.



## **ACKNOWLEDGEMENTS**

The research for this paper was conducted with the support of the Project on Russian Enterprise Restructuring of the World Bank, the Labor Research Program of the CEU Privatization Project, and the Industrial Restructuring and Political Economy Project of the Center for International Security and Arms Control. The authors would like to thank Branko Jovanovic, Ivan Komarov, and Zuzanna Sakova for research assistance and Qimiao Fan for making available the Russian enterprise data set. The paper has benefitted from comments by David Bernstein, Erik Berglof, Alexander Dyck, Paul Geroski, Paul Joskow, Mario Nuti, Russell Pittman, Mark Schaffer, David Stout and participants in seminars at the ASSA Meetings in San Francisco in 1996 as well as at Leuven University, London Business School IIASA, CISAC (Stanford University), Warwick University and a CEPR conference on competition policy in Florence. Any remaining errors are our own.

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# PRIVATIZATION VERSUS COMPETITION: CHANGING ENTERPRISE BEHAVIOR IN RUSSIA

J. EARLE and S. ESTRIN

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

*"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

Economists have long regarded competition and private ownership as the key disciplines on enterprise performance and efficiency. In this paper, we investigate whether competitive forces and privatization have yet begun to play an efficiency-enhancing role in the process of economic transition from plan to market in one of the most important experiments with economic reform; Russia between 1992 and 1994. We also explore the economic effects on enterprise behavior of another key element in reform, namely the hardening of budget constraints. We conclude that while privatization is having a positive impact, domestic market structure is not a significant determinant of company performance. However Russian firms are sensitive to the degree of import penetration. The effects of harder budget constraints on enterprise behaviour is found to be more modest.

There is a growing literature on economic transition (see eg Blanchard etal (1990), Portes (1993), World Bank Development Report (1996)). Issues which receive repeated stress are price (and trade) liberalisation, privatization and "depoliticisation" - reducing the economic links between enterprises and the state - including the hardening of budget constraints. Economic theory has predictions

about how these may be expected to affect enterprise behavior (see eg Estrin (1994) MacMillan (1996) and Aghion and Blanchard (1996)) and these have been tested to some extent for Central Europe.<sup>1</sup> Our aim in this paper is to test these hypotheses together, and for the important case of Russia. We also test the idea that privatization and competition may have complementary effects on enterprise performance, so that the effects of either factor is increased by a larger value of the other.

Russia is a particularly interesting testing ground because it has undergone enormous changes in these areas of reform in recent years. Thus, government budget subsidies to firms have been massively reduced since 1992, while liberalization has proceeded apace. According to the EBRD Transition Report, 1995, we find on a 1-4 scale for progress in liberalization, Russia is awarded a 3 on prices and on trade respectively; only slightly below the most advanced reform countries like Poland or Hungary. Moreover, Russia has carried out a major mass privatization programme, transferring shares in more than 12,000 companies from state to private hands.

There is already a significant Western literature on the relative importance of competition and ownership structures on enterprise behavior (see eg Bishop, Kay and Mayer(1994), Geroski and Jacquemin (1981), Nickell (1995)). One might expect stronger results for transitional economies. This is because Western economies are dominated by private ownership and "workably competitive" markets, so that the general environment may still exert a disciplining force. State-owned monopolies 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 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 (see Portes (1993), Estrin (1994), World Development Report (1996)).

This paper employs evidence from a recent, in-depth survey of 394 Russian manufacturing firms. 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 industry and region, and then an initial sample was randomly drawn.<sup>2</sup> 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>3</sup>

In the following section, we outline hypotheses about the relationship between ownership form, market structure, international competition and budget constraints on the one side, and enterprise behavior on the other. We also specify the data proxies to be used for ownership and market structure respectively. The results are reported in the third section, and conclusions are drawn in the fourth.

## **2. HYPOTHESES AND DATA**

It is not our intention in this paper to offer major new theoretical insights, but rather to bring together a variety of strands of the structure--conduct-performance and corporate governance literatures, to be applied in the transition context. In the following sub-sections we outline the estimation framework and hypotheses, and in the subsequent subsections consider specification of performance, of ownership form and of market structure respectively. The basic hypotheses are that company performance will be superior<sup>4</sup> in more competitive markets, with private ownership and when budget constraints are hard. The approach to measuring performance in transition derives from Earle and Estrin (1996)) and the information on ownership, market structure and international competition comes from

official sources and the Russia survey itself.

## 2.1. Hypotheses

The underlying framework is captured in the equation:

$$P_i = P_i(\text{own}_i, \text{comp}_i, \text{imp}_i, \text{hbc}_i, O_i) \quad (1)$$

where  $i$  denotes firms;  $P_i$  denotes an indicator of enterprise performance;  $\text{own}_i$  specifies ownership form;  $\text{comp}_i$  indicates domestic market structure;  $\text{imp}_i$  denotes international competition;  $\text{hbc}_i$  indicates hardness of budget constraint; and  $O_i$  is a vector of other covariants of performance, for example regional variables.

The Western literature contains numerous examples of papers which estimate the relationship between company performance and domestic market structure (see eg Scherer and Ross (1990)). Company performance is often proxied by profitability or price-cost margins, and market structure by concentration indices or Herfindahls (see Sleuwaegen and Dehandschuffer (1986)), and of course more competition implies lower profits; the industrial organization literature predicts a positive relationship *ceteris paribus* between profitability or margins and the degree of concentration (see eg Tirole(1989)). Recent work on efficiency and technical change has gone on to suggest that, because incentives are dulled by monopoly power, competitive firms will also be more efficient in terms of factor productivities and innovativeness (see eg Nickell (1995)). In the transition context, one might also assume that competition will be the major force leading firms to raise productivity, reduce waste and improve performance (see eg Blanchard et al (1990), Stiglitz (1994) Dyker and Barrow (1995)).

In recent years, international competition has become one of the most significant factors determining market power in particular countries. This has been increasingly reflected in empirical work which has sought to relate profitability, or conversely technical efficiency, to measures of import penetration (see eg Geroski and Jacquemin (1981), Esposito and Esposito (1971)). While analyses of progress in transition stress the importance of free trade, increased exports to the West and

impact penetration (see eg EBRD Transition Report, (1994) and (1995), World Bank Development Report (1996)), there have been virtually no attempts to test the hypothesis of imports as a competitive pressure on firms in the transition context (but see Earle and Woergoetter (1993)).

The Western literature has also been very concerned with the relative performance of state owned and private firms. Because state owned firms may have different objectives, such as the social targets of the government, or because managerial performance is harder to evaluate and corporate governance more difficult to enforce under state ownership (see eg Estrin and Perotin (1991)), it is predicted that state owned firms will be less efficient than their privately owned counterparts. This has been tested in a variety of ways, usually in the context of production or cost functions with dummy variables controlling for different ownership. The British privatisations of the 1980s have also allowed for tests of productivity changes as a consequence of changes in ownership form from state to private (see eg Vickers and Yarrow (1988)), Bishop, Kay and Mayer (1994)). Vining and Boardman (1992) have also sought to distinguish between ownership and competition effects on enterprise behavior. There have been surprisingly few studies of ownership effects in the transitional context (but see Estrin (1996)) for a survey of findings).

Finally, Kornai (1980) argued that poor enterprise performance in socialist economies was associated with soft-budget constraints, that is to say the knowledge of managers that their firm would be subsidized by the authorities whatever their own performance. Clearly the eradication of soft budget constraints, especially when associated with the disappearance of company specific rents because of the more competitive market environment, should also lead to an improvement in company performance, notably in the areas of reducing cost and raising efficiency. There is considerable case study and survey evidence that this factor has been important in improved company performance in Central Europe (see eg Pinto et al (1993), Estrin et al (1995), Carlin et al (1996)). In the transition context, there has been considerable

speculation (e.g., Friedman and Johnson (1995)) that certain types of reform may be highly complementary. For instance, privatization may yield higher benefits when prices, imports, and the entry of new businesses are liberalized, and vice versa. It could be that competition in the product market only acts as a discipline on private owners, or that monopolists behave no differently whether they are owned privately or by the state. Yet there have as yet been no empirical studies which attempt to test whether such mutually reinforcing effects of private ownership and competitive markets have actually been present.

We therefore set out to test in the transition context a positive relationship between company performance in the sense of efficiency or productivity on the one hand, and private ownership, increased competition at home and abroad and harder budget constraints on the other. The remainder of this section considers appropriate ways to measure the five variables in question.

## **2.2. Indicators of Company Performance in Transition**

Firms in the former socialist economies were structured quite differently from competitive capitalist firms; products were produced for planners, not markets; plan targets were taut with rewards for attainment; and financial controls were non-existent (see eg Ellman (1989) for a full discussion). This led to emphasis on physical production for the state with little or no reference to product saleability or quality, and little concern for cost, particularly with respect to labor, capital and energy. Quality problems as well as weaknesses in innovation were exacerbated by price distortions, for example in favour of necessities and intermediates but against final products, and especially in energy inputs. Measuring the process of adjustment from such a starting point to that implied by a competitive market system is a multi-faceted phenomenon, though improvements in productivity clearly play a pivotal role (see Tirole (1988) on restructuring in capitalist firms, and McMillan (1996) for a survey of



restructuring in transitional economies). Earle and Estrin (1996) argue that one can focus on three key aspects of restructuring in the context of transition, namely: -

- i) Long run restructuring, notably investment in new capital to improve production techniques, quality and product range and changed R&D incentives. Also relevant is enterprise unbundling, because socialist firms were highly vertically integrated to avoid the problems caused by plan uncertainties. An important element of restructuring, as well as a way of financing developments in the core business, involves divestment of non-core productive and social assets.
- ii) Short term restructuring to raise efficiency, notably reducing the labor, energy and material intensity of production, without offsetting increases in capital intensity.
- iii) “depoliticisation” or breaking the economic, social and political links between the firm and the state. In addition to state subsidy, which is a determining variable on enterprise behavior, key indicators here are the scale of output to, or the purchase of inputs from, the state.<sup>5</sup>

These three aspects of restructuring form the basis of the empirical work which follows.

### **2.3. Performance and Ownership Changes in Transition**

The Western literature argues that private firms will perform better than state owned ones, for reasons of sharper incentives and a more profit-oriented motivation. However, the comparison is typically made between large publicly quoted Western companies, where the stock market can play a significant role in disciplining company performance, and public enterprises, where they cannot. Several authors (eg Aghion, and Blanchard (1996)) have stressed that the

benefits of privatization depend on whether the owners are outsiders to the firm. But as Earle and Estrin (1996) show, privatization in the transitional economies has not taken the standard form of selling to highest bidder, associated with the simultaneous emergence of a capital market and external ownership. Instead, most countries have followed a strategy of “mass privatisation” (see Estrin (1994)) with the result that insider ownership predominates. It is not clear that privatization will necessarily lead to improved governance, and therefore improved economic performance, in this case.

Hypotheses about the impact of ownership form on competition in transitional economies may need to be specified quite carefully, to take account of the form of ownership which has emerged. In our empirical work we therefore first segment the data into state owned firms and privatized firms by including as an independent variable the proportion of shares in private hands (PSH). We then go on to control for the relative stake of insiders and outsiders in privatized firms, by including separately the shareholding of outsiders (OSH), workers (WSH) and managers (MSH).

In general, we would predict private ownership to improve performance. However, such developments may be less marked, or even perverse, in firms with large insider shareholdings. Indeed there may be a plethora of effects from different ownership structures, depending on the particular performance indicator used. Outsiders are the best suited ownership group for long term restructuring, (see Aghion and Blanchard (1996)) because they would take the most dispassionate view of existing production organizational structures. They also suffer least in principle from agency problems that might restrict the ability of insiders to raise finance from capital markets (see eg Hansmann (1990)). When comparing the two insider groups, managers are probably preferable to employees as owners in terms of their likely access to external capital.

Turning to short run restructuring, once again outsiders are likely to be the most clearly oriented to maximize profit and minimize cost, and to have the least qualms about the necessary changes. However,

there is some descriptive evidence from the transitional economies that outsiders have problems establishing effective corporate governance and control over firms (see Frydman, Gray and Rapaczynski (1996)). Moreover as Pinto et al (1993) and Estrin et al (1995) suggest, if product markets are competitive and budget constraints hard, insiders may be forced to restructure production anyway. In comparing workers against managers as owners, both have equivalent incentives to cut all waste and inefficiency except that associated with overmanning. Because workers as owners however might be expected to use their control rights to secure their own jobs, employment changes, especially via involuntary redundancies, are likely to be less when worker ownership is significant.

#### **2.4. 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. 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>6</sup>

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 by branch, however: rates of privatization are highest in consumer goods sectors and lowest in energy and fuel.

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.<sup>7</sup>

## **2.5. Domestic and International Competition**

In this sub-section we provide five alternative measures of concentration and import penetrating in Russian markets, each picking up slightly the different notions of market competition. Means for the variables by industry groups are shown in Tables 3, 4, and 5.

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 (1993, henceforth JST). BIR present 4-firm sales concentration ratios calculated by PlanEcon for 2-digit branches in 1989; we have labelled 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. This is perhaps a surprisingly low mean given the traditional view of large scale of socialist firms, and reflects the large size of the Russian market in comparison with the typical socialist firm in, for example, Bulgaria or East Germany.

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>8</sup> *HIRAW* also displays quite significant variation with a range from .09 to .87, but *HIADJ* achieves a maximum of only .05.

The potential for foreign competition to exert some disciplinary effect in Russia is frequently discounted (for instance, in *JST*, p. 303). However, the import share is actually rather high, which suggests that we should undertake an explicit test of the hypothesis. *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.

The next group of indicators in Table 3 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 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 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.

Table 4 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 0, and the average is 21.

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).

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, we provide, in Table 5, 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.

### **3. SPECIFICATION AND RESULTS**

#### **3.1. Specification**

In estimating equation (1) to test the hypotheses derived in the previous section, we need first to specify our proxies for company performance, capturing elements of both short term and long term restructuring. As an indication of long run restructuring in the product market,<sup>10</sup> we use CORPROD; the simple correlation coefficient between the structure of a firm's production post-reform in 1994, with that pre-reform in 1990<sup>11</sup>. As can be seen in Table 6, some firms changed the composition of their outputs dramatically, but on average

there was only moderate adjustment: the mean correlation is 0.56.

We also use labor productivity as an indicator of performance.<sup>12</sup> 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 of the equation. Two versions of labor productivity, defined as nominal sales per employee (S/EMP), and real output per employee (RX/EMP), are shown in Table 6, both for 1994 (subscript 4) and the lagged value in 1990 (subscript 0). To go more deeply into the labour restructuring issue, we also consider the layoff rate because to bring employment levels into line with production, after the large decline in output, requires involuntary reductions in employment. LAYOFF is defined as the firm's layoff rate<sup>13</sup> from the beginning of 1992 until the time of the survey in July 1994.

We have investigated a wide variety of specifications of the model (1). We report the same six specifications in all the regressions because we feel they cover the most important conceptual alternatives. The pattern of findings are similar in all the other specifications, many of which are reported in the textual endnotes. We allow for 2 alternative specifications of ownership and 3 alternative specifications of competition. The first ownership specification, PSH, the percentage of shares in the firm which are privately held. The second comprised WSH, MSH, and OSH, a disaggregation of PSH among workers, managers, and outsiders respectively.

The competition specifications are as follows:

COMP1: CR4BJ, CR4BJ\*IP

COMP2: (1/(MAJCOMP+1)), MAJFORD

COMP3: PRICONT

Combining, the two ownership and three competition formulations yields six specifications for each of the four dependent variables. To control for the hardness of budget constraints, GOVSUP, a dummy variable equal to 1 if the firm reports having received any kind of state



support between 1992 and 1994, is included in all specifications. The lagged dependent variable is included in productivity equations. We also estimated equations which included regional dummies and the measures of the geographic scope of the firm's markets (from Table 5), entered separately, as well as interactively with CR4BJ, with CR4BJ\*IP, and with IP. Finally we added interactions of the OWN and COMP variables to some specifications in order to test for possible complementarity between ownership and market structure factors. None of these additions materially affected the results from the six specifications shown in Tables 7 to 10.<sup>14</sup>

### **3.2. Econometric Results**

Commencing with long run adjustment, the results of estimating equations with CORPROD as the dependent variable appear in Table 7. A positive coefficient implies less product market restructuring (a higher correlation in product range pre and post-reform) on the part of privatized firms. At first sight, there appear to be no ownership effects; the coefficient on PSH is positive, but nowhere precisely estimated. But as we argued above the form of private ownership may be as important as the fact of privatisation. We hypothesised that firms with predominant worker ownership would be less likely to engage in internal re-organization insofar as such restructuring creates losers as well as winners inside the firm. In specifications where the effects of different types of new share-owners can be disentangled, WSH is indeed positive and significant. Worker owned firms undertake this type of restructuring significantly less even than state owned firms, the omitted category. Only MSH is always negative, and only weakly significant in conjunction with COMP2 (specification 4). Managerial ownership does appear to spur long term restructuring, at least weakly. Interestingly, outsiders in Russian firms also seem less eager to engage in long term restructuring; in specification 4 the coefficient is also positive and significant.

The competition variable which shows up significantly in this

equation is the interaction of the concentration ratio with the import penetration ratio. This result, (which holds when IP is entered separately), suggests that imports stimulate long term adjustment. Neither the firm's subjective evaluation of the market structure, nor that of the local anti-monopoles committees, is significantly related to enterprise behaviour. There is no direct effect from harder budget constraints on this indicator of long term restructuring.

The equations for the two measures of labour productivity (nominal and real) are contained in Tables 8 and 9. The results in Table 8 demonstrate a clear positive effect of privatization on productivity, measured as by sales per worker in 1994. The magnitude of the coefficient is large, suggesting between 0.3 and 0.5 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. Thus we confirm that what matters for productivity changes is not only privatisation, but the form of privatisation and the character of the new private ownership. Managerial and outsider ownership raises the nominal value of sales per worker from the pre to post-reform period, relative to state ownership; however worker ownership does not.

Once again, the only significant competition variables are in COMP1. Sales per employee are increased by concentration (CR4BJ), but lowered by import penetration (CR4BJ\*IP). Because sales are defined in nominal terms, it is difficult to know if these results imply that monopoly raises productivity and that import competition reduces it, or (more likely) that monopoly raises prices and import competition reduces monopoly power. As before, the specifications with other definitions of market power (COMP2 and COMP3) return no significant affects of the market environment on firm productivity. The existence of government subsidies are never significantly related to sales per worker. In summary, the nominal value of sales per worker appear to be affected in ways predicted by theory for market structure

and ownership, but not softness of budget constraints.

The estimations with real output per employee<sup>15</sup> (RX/EMP) are shown in Table 9. The equations confirm the positive effect of privatization, and most particularly of managerial share ownership, on productivity. For the Comp 1 specification, we once again find a positive significant coefficient on PSH and MSH. The lack of significance of any of the competition variables including the market structure and import pressure variables, which proved successful in the previous equations, strengthens the suggestion that market power may have enabled firms in Russia to raise prices, but not efficiency. Hard budget constraints again do not appear to be associated with increased labour efficiency.

Finally we consider explicitly the issue of restructuring via layoffs Table 10. Private ownership is found to be positively associated with layoffs and it is interesting to note that these ownership effects come particularly from managerial ownership. Workers as owners therefore lay off their colleagues at the same rate as state owned firms. We also find that government subsidy acts to reduce the layoff rate; hence budget softness is correlated with attempts to maintain employment levels. Competition does not affect the rate of layoff in these equations, presumably because so far most employment changes have been voluntary. To test the 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. These were undertaken for specifications 1, 3 and 5 of the reported equations. However, the estimated coefficients on these variables were not significant. Here we cannot accept the view that privatization and competition are complementary in the reform process.

In summary, competition and ownership form affect prices and long term restructuring, but probably not underlying productivity. Managerial ownership does however stimulate deeper restructuring than worker or outsider ownership. Soft budget constraints appear primarily to affect the maintenance of employment levels and the layoff

rate.

#### 4. 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 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. 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. Our results however suggest that some patterns are beginning to emerge.

Privatization seems to have a clear and substantial effect on restructuring, one which is robust across a wide variety of specifications. We also demonstrate that the specific type of new owner can make a big difference; 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.

Competition is also beginning to play a significant role, especially competition from abroad. Our results indicate the ability of monopolists to raise prices and the degree to which import competition may limit that power. However, it is perhaps surprising that the variables measuring the location of firms and the geographic scope of

their markets bore no fruit. This is in contrast to most commentators, who maintain that market power in Russia is exercised primarily on the regional level. Our findings also suggest that soft budget constraints can slow the pace of restructuring, at least in terms of labour layoffs, even in privatised firms.

## ENDNOTES

1. For example, Pinto (1993) and Estrin et al (1995) find significant restructuring in state owned firms because of harder budget constraints. Estrin (1996) surveys the evidence on the impact of privatization on enterprise behavior in transitional economies. There is however as yet no empirical work on the effects of increased competition on enterprises in reform economies.
2. There are problems of missing data run which reduce the usable set for the purpose of assessing ownership to 321 observations. Fan and Lee (1995) and the appendix to Commander, Fan, and Schaffer 1996 contain detailed descriptions of the survey.
3. 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 and they do not face the same restructuring problems.
4. "Superior" performance in this literature means that costs and prices will be lower, as perhaps will be profits and price-cost margins. However, total factor productivity and perhaps innovativeness will be higher.
5. Frydman and Rapaczynski (1994) have convincingly argued that the incentives to seeking profit rather than rents (and therefore enterprise exposure to market forces) depends crucially on the relative advantages to be obtained in the two situations, with improved company performance depending on a decisive break from non-profit-maximizing behavior. We will not examine this aspect of restructuring in this paper (but see Earle, Estrin and Leschenko (1995)).
6. These patterns and the privatization program which gave rise to them are analyzed in greater detail in Earle, Estrin and Leschenko (1995).
7. Outsiders comprise primarily investment funds, other firms and individuals; banks and especially foreign investors have not yet taken major stakes.
8. To demonstrate this,

define HI = population Herfindahl-Hirschman index = 
$$\sum_{i=1}^n P_i^2$$

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 sized firms, where groups are indexed by  $k$ , the  $k$ th group containing  $l_k$  firms. Then HI can be written  $\sum_{k=1}^K l_k P_k^2$ , since each element of group  $k$  has an equal share  $P_k$ . The sample can be similarly decomposed into  $K$  groups, each of size  $(m/n)l_k$ , and the sample index can then be expressed as

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

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

$$HIADJ = \frac{m}{n} HIRAW.$$

9. This adjustment is suggested in Scherer and Ross (1990), p. 79.
10. Profitability may be a poor measure of behavioral change, certainly so in the short run, because many types of restructuring in transition 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 situation of hyperinflation, where the accounting system is itself undergoing a transition and few firms are subject to rigorous outside audit).
11. 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.
12. We are unable to estimate technical efficiency on our sample because we do not have data on the capital stock.
13. The ratio of number of workers laid off to the mean of employment in 1991 and employment in 1994.
14. We tried a number of other specifications as well, including the Herfindahl-Hirshman indices calculated from our sample, and various interactions of a number of competition variables, but they were usually insignificant.

15. The sample is smaller for real output than nominal sales because there are a larger number of missing values. Moreover, “real output” is a variable provided by the firms themselves, rather than calculated by deflating a nominal output series.



**TABLE 1**  
**Privatization By Sector of Russian Industry**

Sector of Industry	State Share	Private Share	PO %	N
Energy & Fuel	52.4	47.6	42	19
Energy	72.0	28.0	29	7
Fuel	41.0	59.0	50	12
“Heavy Industry”	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	27.3	70.2	82	11
Machine tools & 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
“Light Industry”	40.2	58.4	61	80
Communications & 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	65.5	69	13
“Consumer Goods”	28.1	71.7	74	89
Textiles	17.1	81.6	82	22
Clothing industry	10.8	88.6	90	21
Food processing	41.6	56.8	67	18
Meat and milk	11.0	89.0	82	11
Other industrial production	60.0	40.0	44	17
Total Industry	37.0	62.4	67	321

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.