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*Ownership and Employment
in Russian Industry: 1992-1995*

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Comments Welcome

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Ownership and Employment in Russian Industry: 1992-1995*

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Abstract

Using data collected from a panel of 6,205 civilian manufacturing firms located in the Central, Volga, North Caucasus, Northern and Western Siberian regions of Russia, this paper examines the hypotheses that in the first stage of the transition process (1) Russian industry exhibited a low labor elasticity, and (2) employment changes were highly correlated with ownership structure. The first section summarizes what we know about output and employment patterns in Russian industry between 1992 and 1995. In section two, characteristics of the panel are described. Section three describes the methodology employed to test the two hypotheses. Section four presents the empirical results. In particular, given the socialist production and employment patterns Russia inherited, the results from the panel data regressions indicate that manufacturing firms in Russia experienced an unsustainably low elasticity of labor in the first stage of the transition process. However, ownership structure tends not to be a major influence on employment change for these Russian firms. Section five offers concluding remarks.

JEL Classification: P42, J23, C23, L60, D21

Key Words: Russian enterprises, transition, ownership, employment

Ownership and Employment in Russian Industry: 1992-1995

Executive Summary

How responsive is employment to output changes in firms in transition economies? Does employment responsiveness vary by ownership structure? Numerous studies of firms in transition economies find a low elasticity of labor in the first stage of the transformation process. Explanations for firms' failure to adjust employment levels in correspondence to output reductions include both formal and informal institutional and infrastructure changes, or lack thereof. Studies which examine in more detail the relationship between ownership structure and changes in employment levels find that state-owned firms tend to have the lowest employment response. These two hypotheses are examined here using a panel of 6,205 civilian manufacturing firms located in the Central, Volga, North Caucasus, Northern, and Western Siberian regions of Russia. Based on data collected in 1992 and 1995, three results emerge. First, there are significant industry and regional variations in employment patterns, as well as differences that are linked to whether the firm was expanding or contracting output during this period. Second, regression results indicate that, overall, Russian firms were less responsive with regard to employment than firms in other transition economies at a similar stage of transformation. Firms that were expanding output are exceptions to this result. Third, ownership structure is not significant in explaining variations in employment response to output changes. Industry, workforce size and export experience in 1992 explain a significant portion of the variation; location in Moscow has a marginal effect.

Ownership and Employment in Russian Industry: 1992-1995

Despite rather dramatic declines in industrial output, numerous studies of firms in transition economies document a rather low elasticity of labor, at least in the initial stage of the transformation from plan to market (Anderson et al. 1997, Basu et al. 1997, Boeri and Keese, 1992, Earle 1997, Estrin et al. 1995, Jackman 1994, Lizal and Svejnar 1997). In particular, Basu et al. (1997) find that Czech and Slovak firms registered labor demand-sales elasticities of 0.0 to 0.1 in the initial stage of their transition process; Polish and Hungarian firms exhibited labor demand-sales elasticities of 0.3 and 0.6 in a similar stage. Within two years, the elasticities had risen to 0.33 in Slovakia, 0.6 in the Czech Republic, 0.4 in Poland, and 0.65 in Hungary, still low in comparison to expected firm response in developed market economies.¹ Explanations for firms' failure to adjust employment levels in correspondence to output reductions include both formal and informal institutional and infrastructure changes, or lack thereof (de Melo et al. 1996, de Melo and Gelb 1996, Heybey and Murrell 1997, Lavigne 1995). For example, changes in ownership structure, job rights, access to benefits, tax incentives, wage arrears, declining real wages, and the inaccurate measurement of employment, that is, unpaid leaves or hidden unemployment within factory gates, are cited as factors contributing to the marginal employment response (Commander et al. 1996, Daianu 1997, Rutkowski 1996, Dobrinsky 1996, Thornton and Mikheeva 1996, Thornton 1997). Several studies examine in more detail the relationship between ownership structure and changes in employment levels (Buck et al. 1994 1996, Earle et al. 1995, Earle and Estrin 1997, Frydman et al. 1996, Jones 1996). State-owned firms are found to have the lowest employment response.

Using data collected from a panel of 6,205 civilian manufacturing firms located in the Central, Volga, North Caucasus, Northern and Western Siberian regions of Russia, this paper examines the

¹ Profit-maximizing firms in a developed market economy producing a level of output where average product of labor exceeds marginal product of labor would have a short-run labor elasticity greater than one, and a long-run elasticity equal to one. A labor elasticity of less than one, because it reflects the firm's strategy of not responding to output changes by correspondingly or proportionately adjusting employment, is considered low.

hypotheses that in the first stage of the transition process (1) Russian industry exhibited a low labor elasticity, and (2) employment changes were highly correlated with ownership structure. The first section summarizes what we know about output and employment patterns in Russian industry between 1992 and 1995. In section two, characteristics of the panel are described. Section three describes the methodology employed to test the two hypotheses. Section four presents the empirical results. In particular, given the socialist production and employment patterns Russia inherited, the results from the panel data regressions indicate that manufacturing firms in Russia experienced an unsustainably low elasticity of labor in the first stage of the transition process. However, ownership structure tends not to be a major influence on employment change for these Russian firms. Section five offers concluding remarks.

I. Output and Employment in Russian Industry

It is hard to exaggerate the decline in industrial output associated with Russia's transition process. Goskomstat reports that at the end of 1992, the first year of transition, industrial output was 74% of the 1990 level (Goskomstat 1996, p. 249). By the end of 1995, industrial output was less than half of the 1990 level. The impact of transition on output varies tremendously by industry: in light industry, for example, 1995 output was less than 20% of the 1990 level; in fuel, the 1995 level of output was more than two-thirds of the 1990 level (Jeffries 1996, Lavigne 1995).

Interestingly enough, the decline in industrial output occurred at a time when the number of firms in industry was increasing. Goskomstat reports that the number of firms in the fuel industry was 725 in 1992 and 823 in 1995; for chemicals the corresponding figures are 1479 and 5077; for machine building, 13,505 and 48,905; in construction materials, 5053 and 8359 (Goskomstat 1996, pp. 262-271). In the wood/forestry/paper, light, and food industries, the number of firms more than doubled: 8187 to 17152, 10150 to 23007, and 7073 to 14713, respectively. This pattern is no doubt driven by the privatization process which was initiated in June 1992. As firms were required to change their ownership structure, they had the option of dividing into multiple units. The standard interpretation that entry of new firms

indicates the existence of economic profits in the industry does not apply in Russia. In fact, the reverse is true: light industry experienced the highest percentage increase in number of firms, as well as the greatest percentage decrease in output. In terms of profitability,² light industry firms exhibited a rather dramatic decline in profitability, but the decline in profitability was not significantly different than firms in machine building, chemicals, or ferrous metallurgy.

Despite the impact of transition on industrial production, employment in industry remained remarkably stable between 1992 and 1995. Industrial workers accounted for 29% of the workforce in 1992 and more than one-quarter of the workforce in 1995, at a time when, overall, the size of the workforce fell by over 6%.³ The pattern may be driven in part by the fact that the number of part-time workers in industry was growing, reaching 12.6% in 1995 (Goskomstat 1996 p.38). It appears to be somewhat at odds, however, with Goskomstat figures on “new entrants” and “leavers” in industry, but this may be a consequence of the unit of measure -- new entrants and leavers are measured as a percent of average payroll, rather than number of workers, for reasons that are not explained.

On the basis of these official figures, one would conclude that Russian firms were not responding to output conditions by changing their employment behavior in the first stage of the transition process. There are a number of reasons why this result emerges, some are associated with the upward bias in the employment figures and some are associated with the downward bias in output figures. First, regarding the upward bias in employment, firms had an incentive to over-report their workforce size. The excess wage tax in effect between 1992 and 1996 penalized firms for paying wages that were more than six times the federal minimum wage. This practice could be hidden from tax authorities if firms kept employees on the books who were neither working at the firm, nor receiving wages. Second, firms had an incentive to put workers on unpaid leave rather than release them from the company. Released workers were to be

² Goskomstat (1996, pp. 262-271) reports the profitability of industrial firms in 1992 and 1995. For light industry, profitability fell from 41% to 20%. In contrast, in wood/forestry/paper, profitability only decreased by 10%.

³ This figure is based on calculation using workforce size figures reported by Goskomstat (1996, p. 35).

paid 3 months' wages at the time of termination (Standing 1996). Workers on unpaid leave retained their rights to the nonmonetary benefits that the company provided: medical clinic, child care facilities, housing, and the like. Thus they were unlikely to trade off the termination payment for the stream of benefits, especially when they could work elsewhere without reporting their income.

The downward bias in output figures stems from Russia's confiscatory tax policy. Firms are obliged to pay taxes on value of output, regardless of whether it ultimately is sold. In a world where tax rates on revenues (not profits) exceed 35% and tax payments are required before sales revenues are forthcoming (Linz 1997a), there is a strong incentive to under-report output volume and value.

While interesting, data provided in Goskomstat handbooks are not sufficient for analyzing firm-level responses to the transition process. Ultimately, the success of Russia's transition process will depend on how effectively firms are able to adjust to the new economic conditions. This paper focuses on their employment response, using a panel of firms which provided output and employment information in 1992 and 1995, the first stage of Russia's transition process.

II. Characteristics of Firms in the Panel

The panel was constructed by matching firm-specific registration numbers in 1992 and 1995 from a listing of civilian manufacturing firms published in business directory form by a privately-owned company in Moscow.⁴ The panel was restricted to those firms that did not divide into separate or multiple units between 1992 and 1995, as well as to those firms that remained in the same industry in both years.⁵

⁴The firm, Business Information Agency, obtained the data contained in their 18-volume directories from Goskomstat, the Russian Federation Statistical Agency. The data from the directories was coded and entered into a database by several research assistants, with funding provided by an All-University Research Initiation grant from Michigan State University, and a research grant from the William Davidson Institute of the University of Michigan. I thank Kathleen Beegle, Janet Blake, Stephen Glenister, Elizabeth Harkness, Sarah Linz and Natalia Smirnova for their yeoman service.

⁵ A total of 21,582 firms were included in the 1992 data set, and 12,521 firms in the 1995 data set. Of these, in less than 1% of the cases did multiple firms in 1992 report the same registration number; in about 15% of the cases, the registration number for a single firm in 1992 was matched with multiple firms in 1995. In about 10% of the cases, the industry code changed between 1992 and 1995. For some firms, a logical explanation may underlie the industry change; firms switching from tractor components to wheelchair production (that is, the main product

Table 1: Regional Distribution of Firms in Panel

Region	Frequency	Percent
Western Siberia	396	6.3
<i>of which</i>		
Novosibirsk	230	
Tomsk	166	
North Caucasus	697	11.2
<i>of which</i>		
Rostov	433	
Stavropol	267	
Volga	1146	18.5
<i>of which</i>		
Astrakhan	123	
Samara	255	
Volgograd	318	
Penza	258	
Ulyanovsk	192	
Central	3565	57.4
<i>of which</i>		
Vladimir	180	
Ivanovo	222	
Kostroma	191	
Tver	379	
Yaroslavl'	191	
Bryansk	191	
Kaluga	193	
Orel	126	
Ryazan	229	
Smolensk	246	
Tula	276	
Moscow (city)	686	
Moscow region	455	
Northern	401	6.4
<i>of which</i>		
Arkhangelsk	140	
Vologda	198	
Murmansk	63	
Total	6205	100.0

Source: Calculations from firm level data provided in vols 1-18, *Business Map 93: Russian Industry* (Moscow: Business Information Agency 1993), *Biznes-Karta 95* select volumes (Moscow: Business Information Agency 1995).

Altogether, there are 6,205 firms in the panel that provided the requisite information for this analysis. More than half of the firms are located in the Central Region (see Table 1). Nearly 20% are located in the Volga Region, and just over 10% in the North Caucasus Region. Western Siberia and the Northern Region each account for about 6% of the firms.

The distribution of firms by industry is summarized in Table 2. Nearly one-third are in the food industry; firms in light industry, wood/forestry/paper, and machine building each account for about 15% of the panel. Construction materials and printing account for about 6%, respectively.

Ownership structure of the firms in the panel is reported in Table 3. Between 1992 and 1995, as a consequence of the pace of Russia's mass privatization program (Aslund 1995a 1995b, Boycko et al 1995, Frydman et al 1993, Jeffries 1996, Nelson and Kuzes 1994), the share of state-owned firms in the panel fell from 87% to 33%. Where joint stock companies accounted for only 2% of the panel in 1992, they accounted for more than 50% in 1995. The number of firms listed as privately-owned (sole proprietorship, partnership, "other") increased from less than 1% to nearly 10% during this same time. Joint ventures remained a relatively small fraction of the total number of firms in the panel. The share of leased and cooperatively-owned firms fell substantially as a consequence of the new ownership and tax laws; the number of collectives increased from 2% to 6%.

Table 4 illustrates the magnitude of employment change for firms reporting workforce size in both 1992 and 1995.⁶ Columns 2 and 3 report mean workforce size by industry; column 4 reports the

assortment changes in such a way as to require industry reclassification). In other instances, it may simply be a change or inconsistency in the coding: in Rostov alone, 18 firms coded in the power industry in 1992 were listed in the fuel industry in 1995. In Volgograd, 3 firms in the power industry in 1992 were listed in the machine building industry in 1995. In some instances, the change in industry affiliation appear to be a mistake: in Moscow, one firm was listed in the power industry in 1992 and the food industry in 1995. Thus, to simplify the analysis and clarify the results, only those firms appearing in both listings in the same industry are included in this study.

⁶ Employment is measured by the number of employees reported to local authorities by each firm. Firms report "full-time equivalents." That is, if the firm employs two part-time workers, where each is working one-half the normal work week, the firm reports a single worker. A similar calculation is made when job-share includes more than two workers. In effect, this standardizes for the normal 40-hour work week, and the increasing use of part-time workers in 1995 as compared to 1992 (Linz 1997) does not bias the results. The reported figures give no clear indication of the number of employees actually working, and/or being paid, however. Standing (1996) estimates at least one-in-five employees in industry are on unpaid leave; Lehmann et al (1997) put this figure at

Table 2: Distribution of Firms by Industry

Industry	Frequency	Percent
Power	133	2.14
Fuel	132	2.13
Ferrous/Nonferrous Metallurgy	45	0.73
Machine Building	1023	16.49
Chemicals	158	2.55
Wood/Forestry/Paper	896	14.44
Construction Materials	408	6.58
Light	925	14.91
Food	2033	32.76
Printing	395	6.37
Miscellaneous	57	0.92
Total	6205	100.00

Source: Calculations from firm level data provided in vols 1-18, *Business Map 93: Russian Industry* (Moscow: Business Information Agency 1993), *Biznes-Karta 95* select volumes (Moscow: Business Information Agency 1995).

Table 3: Distribution of Firms by Ownership Structure: 1992, 1995

	1992		1995	
	<i>Frequency</i>	<i>%</i>	<i>Frequency</i>	<i>%</i>
State-owned	5366	86.8	1997	32.6
Lease	284	4.6	55	0.9
Cooperative	245	4.0	1	--
Collective	114	1.8	360	5.9
Joint stock	134	2.2	3127	51.0
Joint venture	28	0.4	20	0.3
Private/other	7	0.1	565	9.2
Total ^a	6178		6125	

^a Includes all firms in panel that reported ownership information; that is, not limited to only those firms reporting ownership in both years.

Source: Calculations from firm level data provided in vols 1-18, *Business Map 93: Russian Industry* (Moscow: Business Information Agency 1993), *Biznes-Karta 95* select volumes (Moscow: Business Information Agency 1995).

percentage change in employment. The 1995 figures are likely to be biased upward as a consequence of employment practices that leave workers “on the books” even if they no longer show up for work or receive wage payments. Despite this, in all but the power industry, mean workforce size fell. The percentage reduction in mean workforce size exceeded 20% in machine building and printing, and was 10% or more in the chemical, wood/forestry/paper, and light industries. This same pattern does not hold when calculating percentage change in workforce size, however. For the firms in this panel, employment expanded in machine building by 34%, in fuel by 30%, in wood/forestry/paper by 27%, and in power by 20%. Employment reductions were less than 10% in metallurgy, chemicals, construction materials, and printing. Only in the food industry did workforce size fall in excess of 10%.

Regional variation in employment change was pronounced. Employment in the Moscow firms in this panel rose by 68%.⁷ Double-digit employment increases also occurred in Stavropol (27%), Ryazan (34%), Smolensk (10%), and Vologda (34%). Of the twenty-five regions included in this panel (see Table 1), employment reductions were most severe in Arkhangelsk (-28%), Murmansk (-24%), and Astrakhan (-13%).

How does employment change correspond to the change in output for firms in this panel? Output change is somewhat difficult to decipher because of problems arising with the output measure. First, relatively few firms reported output figures for both years. As seen in Table 5 (column 1), less than one third of the firms in the panel (1,905 of 6,205 firms) reported output figures for both years. Second, firms reported their volume of output in current rubles.⁸

10%. Both agree that more than half of the employees in industry routinely experienced wage delays.

⁷ This figure refers to the city of Moscow only. In Moscow region, employment fell by 8%.

⁸ The business directories do not provide explicit information about the time frame covered by the output figure, or any other figure (employment, depreciation, value of capital stock, for example). The 1992 directory appears to refer to year-end results. The 1995 directory refers to mid-year data, and is taken to mean the results associated with mid-1994 to mid-1995. Thus, in both cases, it is assumed the information refers to annual figures.

Table 4: Distribution of Firms by Industry, Mean Workforce Size, and Percent Change in Workforce Size: 1992-1995

Industry	(1) Number of Firms^a	(2) Mean Workforce Size 1992	(3) Mean Workforce Size 1995	(4) % Change Number Employees 1992-1995
Power	112	870	966	19.6
Fuel	130	1542	1443	30.1
Ferrous/Nonferrous Metallurgy	42	870	818	-7.4
Machine Building	898	1436	1143	34.1
Chemicals	149	1519	1371	-2.8
Wood/Forestry/Paper	872	392	336	26.8
Construction Materials	393	409	385	-2.8
Light	886	814	692	-11.4
Food	1955	240	230	11.3
Printing	387	127	94	-3.2
Miscellaneous	51	468	339	-28.3
Total	5,875			11.5

^a Includes only those firms reporting workforce size in both 1992 and 1995.

Source: Calculations from firm level data provided in vols 1-18, *Business Map 93: Russian Industry* (Moscow: Business Information Agency 1993), *Biznes-Karta 95* select volumes (Moscow: Business Information Agency 1995).

Table 5: Mean Value of Output: 1992-1995
(billion rubles)

Industry	(1) Number of Firms^a	(2) Mean Value of Output 1992	(3) Mean Value of Output 1995	(4) Number of Firms Expanding Output	(5) Expanding Firms as Percent of Total
Power	40	27.98	45.28	27	67
Fuel	14	23.18	36.64	7	50
Ferrous/Nonferrous Metallurgy	20	15.39	10.10	5	25
Machine Building	289	24.00	80.68	71	25
Chemicals	92	53.05	33.40	24	26
Wood/Forestry/Paper	182	8.36	12.40	54	30
Construction Materials	140	4.92	6.67	27	19
Light	343	41.26	6.95	19	6
Food	749	9.76	7.16	108	14
Printing	22	5.32	4.45	6	27
Miscellaneous	14	18.51	4.21	2	14
Total	1905	19.75	21.00	350	18

^a Includes only those firms reporting output figures for both years.

Source: Calculations from firm level data provided in vols 1-18, *Business Map 93: Russian Industry* (Moscow: Business Information Agency 1993), *Biznes-Karta 95* select volumes (Moscow: Business Information Agency 1995).

For comparability, 1992 output figures were adjusted for inflation,⁹ and the mean value of output for the firms in this panel is reported by industry for 1992 and 1995 (Table 5, columns 2 and 3). Overall, there is very little difference in the mean value of output: 19.75 billion rubles in 1992 in comparison to 21.00 billion rubles in 1995. Industry variations are pronounced, however. The mean value of output was higher in 1995 than 1992 for firms in the power, fuel, wood/forestry/paper, and construction materials industries. Given the construction boom in Russia, it is not surprising to find an expansion in wood/forestry/paper¹⁰ and construction materials. Nor is it surprising that a disproportionately higher percentage of firms in the power and fuel industries experienced an increase in output value between 1992 and 1995 (column 5). In stark contrast, however, only 14% of the firms in the food industry experienced an increase in output between 1992 and 1995.

The increase in the mean value of output between 1992 and 1995 for firms in the machine building industry is rather astounding. It should be noted, however, that the increase is driven by only 25% of the machine building firms in the panel. Equally astounding is the magnitude of difference in the mean value of output in 1992 and 1995 in the light industry firms in this panel. In this case, the decrease is driven by more than 90% of the light industry firms in the panel. Overall, of those firms reporting output in both years, more than 80% experienced a decrease in output value; only 18%, overall, experienced an increase

⁹ A price index of 171.66 for "all industry", calculated from data provided in *Russia in Figures* (Moscow: Goskomstat, 1996), was used to adjust 1992 output figures to comparable 1995 prices. This index does not include the percentage increase in prices in 1992 in comparison to 1991, because it is believed that the 1992 output volume figures reported by the firms in this panel already adjusted for the 1992 price level. For comparative purposes, a second source of price changes was examined. Figures published in *Tsenyi v Rossii* (Moscow: Goskomstat, 1996), pp. 152-152, allowed for calculation of percentage change in price between 1992 and 1995 by industry: power, 163%; fuel, 138%; ferrous metallurgy (black), 159%; chemicals 151%; machine building, 152%; forestry/wood products, 153%; construction materials, 155%; light industry, 141%; food industry, 148%; and "all industry", 151%. No explanation is offered in either publication (e.g., coverage, inclusive dates) that would justify the difference in the "all industry" price index.

¹⁰ Wood and forestry products have traditionally been an important export in the Soviet/Russian economy. In this panel, however, of the 896 firms in this industry, only 37 exported in 1992 and 22 in 1995. For exporters of wood and forestry products in 1992, of the 12 reporting output value, the mean was significantly higher (20.76) than the industry as a whole; in 1995, the opposite result emerges. That is, of the 7 exporting firms in this industry in 1995 that reported output values, the mean was significantly lower (11.43) than the industry as a whole.

in output value (350 of 1,905 firms).¹¹

To more accurately assess the relationship between changes in employment and output, the panel was partitioned into two groups: firms experiencing output reductions between 1992 and 1995 (losers), and firms experiencing output expansions (winners). Table 6 describes the mean percentage change in output value by industry for all firms in the panel (column 1), as well as for both winners and losers (columns 3 and 5). While one might view these magnitudes rather skeptically, and thus question official price data, the relative proportion of winners and losers seems to conform to what is generally reported in studies of Russian firms based on survey data (Boycko et al. 1996, Blasi et al 1997, Linz 1997b).

Not shown in Table 6 is the regional distribution of the winners and losers. That is, more than one-quarter of the winners (column 3) are located in Vologda and Murmansk (the majority of these firms are in the food and wood/forestry/paper industries). These two regions account for less than 3% of the losers. Moscow alone accounts for 12% of the winners. In machine building and chemicals, two industries where more than three-quarters of the firms were losers between 1992 and 1995, winning seems to be highly correlated to location in the capitol city. That is, more than one-third of the machine building firms, and at least one-quarter of the firms in the chemicals industry that experienced output increases are located in Moscow and the surrounding region.

How responsive was employment to output change? One measure compares the percentage change in employment with the percentage change in output for firms in this panel. Table 7 summarizes the information for firms reporting both output and employment data in both years (n=1,887). Perhaps most interesting is the pattern emerging for the losers, those firms experiencing declining output value between 1992 and 1995. In all industries but construction materials, the average percentage decline in output value exceeded 50%, yet workforce downsizing, with the exception of machine building, did not exceed 10%. This result is most obvious in light industry where the average decline in output value

¹¹ Had the industry price indices been employed, 5-10% more firms would be included in this category of firms experiencing an increase in output because the 1992 output values would be lower; output increases based on the industry price indices would have been 15% to 25% higher.

**Table 6: Mean Percentage Change in Output:
1992-1995**

Industry	All Firms		Expanding Firms		Contracting Firms	
	(1) Mean % Change/Q,	(2) Number of Firms	(3) Mean % Change/Q,	(4) Number of Firms	(5) Mean % Change/Q,	(6) Number of Firms
Power	457.69	40	703.67	27	-53.17	13
Fuel	151.74	14	369.78	7	-66.31	7
Ferrous/Nonferrous Metallurgy	12.26	20	201.89	5	-50.95	15
Machine Building	1845.20	289	7704.16	71	-62.99	218
Chemicals	188.54	92	888.76	24	-58.60	68
Wood/Forestry/Paper	557.10	182	2000.62	54	-51.88	128
Construction Materials	37.43	140	367.67	27	-41.47	113
Light	30.40	343	1856.27	19	-76.67	324
Food	194.22	749	1697.97	108	-59.14	641
Printing	1179.00	22	4491.47	6	-63.17	16
Miscellaneous	-53.57	14	20.98	2	-66.00	12
Total	450.92	1905	2727.21	350	-61.42	1555

Source: Calculations from firm level data provided in vols 1-18, *Business Map 93: Russian Industry* (Moscow: Business Information Agency 1993), *Biznes-Karta 95* select volumes (Moscow: Business Information Agency 1995).

Table 7: Employment Response

Industry	All Firms				Expanding Firms				Contracting Firms			
	(1) Mean % ΔQ	(2) Mean % ΔL	(3) % ΔL % ΔQ	(4) N	(5) Mean % ΔQ	(6) Mean % ΔL	(7) % ΔL % ΔQ	(8) N	(9) Mean % ΔQ	(10) Mean % ΔL	(11) % ΔL % ΔQ	(12) N
Power	458	18	.11	40	703	27	.17	27	-53	-1	-.03	13
Fuel	152	<1	-.11	14	370	-4	-.12	7	-66	4	-.10	7
Ferrous/Nonferrous Metallurgy	12	-2	.78	20	202	4	.04	5	-51	-4	1.02	15
Machine Building	1872	-11	.37	285	7704	10	-.27	71	-62	-19	.58	214
Chemicals	191	-3	.17	91	889	18	.11	24	-58	-11	.19	67
Wood/Forestry/Paper	554	-12	-.54	180	2008	-18	-2.68	53	-52	-10	.35	127
Construction Materials	39	2	-.02	138	368	2	.29	27	-41	2	-.10	111
Light	17	-10	-.001	339	1799	-16	-2.71	17	-77	-9	.14	322
Food	195	11	-.32	745	1712	38	1.78	107	-59	6	-.68	638
Printing	1179	-16	.06	22	4491	-23	-.65	6	-63	-14	.32	16
Miscellaneous	-56	-23	.41	13	21	7	-.75	2	-70	-29	.62	11
Total				1887				346				1541

Source: Calculations from firm level data provided in vols 1-18, *Business Map 93: Russian Industry* (Moscow: Business Information Agency 1993), *Biznes-Karta 95* select volumes (Moscow: Business Information Agency 1995).

reached almost 80%, but employment adjustment remained below 10%. In the food industry, for firms where output value was declining, employment expansion occurred.

Calculating correlation coefficients represents a second measure of the relationship between changes in output and employment in Russian firms. As seen in Table 8, the correlation between the percentage change in employment and a percentage change in output is nearly infinitesimal for firms in this panel, although it does vary by industry. Employment in firms in the metallurgy and chemicals industries tends to be more responsive to output changes than firms in other industries. Winners are more likely to generate a negative correlation coefficient, that is, reduce employment even if output value is increasing. With the exception of firms in the wood/forestry/paper industry, the magnitude of the coefficients tend to be higher among losers.¹²

On the surface, these data tell the tale of rather significant employment security in Russia in the first stage of the transition process. As such, they support findings based on firm-level surveys reported by Blasi et al. (1997), Lehmann et al. (1997), and Linz (1998). Because these data were collected when the excess wage tax was in effect, providing managers with an incentive to “over report” the size of their workforce, they must be interpreted with caution, however. Interestingly enough, the largest average percentage reductions in workforce size occurred in firms where output value rose (Table 7, column 6). Winners also were likely to release workers even though output was increasing (Table 8, column 3).

III. Methodology

This paper’s objective is twofold: first, to determine whether Russian manufacturing firms exhibited a low labor elasticity in the first stage of the transition process, and second, to evaluate the extent to which employment change was influenced by ownership structure.

Regarding the responsiveness of employment to output changes between 1992 and 1995, I assume

¹² This assessment is restricted to those industries where enough firms are in both the winners and losers categories to warrant a significant result.

Table 8: Correlation Coefficients: Change in Employment and Output

Industry	All Firms		Expanding Firms		Contracting Firms	
	(1) Correlation Coefficient	(2) N	(3) Correlation Coefficient	(4) N	(5) Correlation Coefficient	(6) N
Power	.0404	40	.0102	27	-.2993	13
Fuel	.0407	14	.5263	7	.2164	4
Ferrous/Nonferrous Metallurgy	.2146	20	.8690	5	.2017	15
Machine Building	-.0062	285	-.0364	71	.1966	214
Chemicals	.1871	91	.1023	24	.3127	67
Wood/Forestry/Paper	.1964	180	.3523	53	.1117	127
Construction Materials	-.0073	138	-.0599	27	.0624	111
Light	-.0516	339	-.4185	117	.0488	322
Food	.0190	745	-.0081	107	.1278	638
Printing	-.0499	22	.0449	6	.0684	16
Miscellaneous	.2106	13	1.0000	2	-.7446	11
Total	.0004	1887	-.0154	346	.1096	1541

Source: Calculations from firm level data provided in vols 1-18, *Business Map 93: Russian Industry* (Moscow: Business Information Agency 1993), *Biznes-Karta 95* select volumes (Moscow: Business Information Agency 1995).

that output changes were exogenously driven by changing demand conditions associated with the transition process. Consequently, the difference between the natural log of employment in 1992 and 1995 can be regressed on the difference between the natural log of (inflation-adjusted) output values in 1992 and 1995 to get the elasticity of labor with respect to output.

$$\ln L_{92} - \ln L_{95} = b_0 + b_1 (\ln Q_{adj92} - \ln Q_{95}) + e$$

The OLS regression was run for the full panel, and then separately for winners and losers, to see if there was any significant difference in the coefficients.

To what extent was employment change influenced by ownership structure? The dependent variable is the difference between the log values of employment in 1992 and 1995. The independent variables include (1) dummy variables for each industry (see Table 2), with machine building used as the comparison case;¹³ (2) dummy variables for each ownership structure (see Table 3), with state-owned used as the comparison case; (3) dummy variable for location in Moscow;¹⁴ (4) dummy variable for export experience in 1992;¹⁵ (5) dummy variables for workforce size categories that correspond to privatization and tax definitions,¹⁶ with the comparison size being 200-1000 employees; and (5) a measure of the change in output volume.¹⁷ The OLS regression was run for the full panel, and then separately for winners and losers to see if there was any significant difference in the coefficients.

IV. Empirical Results

The lack of responsiveness of employment to changes in output is evident in Table 9. For the full

¹³ For discussion of industry differences, see Clark (1996).

¹⁴ For discussion of capitol city effect, see Linz and Krueger (1996), Linz (1997a), Nuti and Portes (1993).

¹⁵ For discussion of an export experience effect, see Linz (1997a, 1997c).

¹⁶ The five categories include: firms that employ fewer than 200 workers, firms that employ between 200 and 1000 workers, firms that employ 1001-5000 workers, firms that employ 5001-10,000 workers, and firms that employ more than 10,000 workers.

¹⁷ The natural log value of 1995 output is subtracted from the natural log value of the 1992 output.

Table 9: Employment Response: Regression Results

dependent variable = ChangeL

All Firms	coefficient	std. error	t-statistic
ChangeQ	.045	.007	6.72
Constant	.049	.010	5.00
n = 1887			
Adj R ² = .0229			
Expanding Firms			
ChangeQ	.026	.020	1.32
Constant	.060	.032	1.84
n = 346			
Adj R ² = .0022			
Contracting Firms			
ChangeQ	.079	.010	7.57
Constant	.002	.015	0.12
n = 1541			
Adj R ² = .0359			

Source: Calculations from firm level data provided in vols 1-18, *Business Map 93: Russian Industry* (Moscow: Business Information Agency 1993), *Biznes-Karta 95* select volumes (Moscow: Business Information Agency 1995).

panel, the coefficient on output indicates that 1% change in output value would result in less than a .05% change in workforce size. This is substantially smaller than for firms in other transition economies at a similar stage in the transformation process. For Russian manufacturing firms that expanded output between 1992 and 1995, winners, the coefficient is even smaller. For firms contracting output, losers, the coefficient is significantly larger than for winners, .08 in comparison to .03,¹⁸ but still too small to have any economic significance. These data underscore the premise that employment patterns in Russian industry in the first stage of the transition process had virtually nothing to do with output changes.

To what extent does ownership structure explain the change in workforce size for the civilian manufacturing firms in this panel? In the OLS regression, where a total of 1,726 firms provided sufficient information to be included in the analysis, ownership is not significant in explaining the variation in the change in workforce size between 1992 and 1995 (see Table 10, column 1).¹⁹ However, industry variation in the change in workforce size is significant. In comparison to machine building, firms in the power, chemicals, wood/forestry/paper, construction materials, light, and food industries experienced smaller changes in employment. Moreover, firms that exported in 1992 exhibited significantly smaller changes in workforce size than those without export experience. Location in Moscow has only a marginal effect; that is, firms located in the capitol city experienced a somewhat greater employment changes between 1992 and 1995 than firms located elsewhere. Not surprisingly, output change had a significant, albeit very small, impact on the change in workforce size for firms in this panel. Employment change is positively correlated to the firm's workforce size in 1992 for firms employing over 1000 workers, and negatively correlated to workforce size for firms employing fewer than 200 workers. Overall, however, this specification leaves a rather large portion of the variation in the change in workforce size unexplained. Replicating this regression for the 248 firms experiencing an increase in output value between 1992 and

¹⁸ A single equation with a dummy variable for winners and an interactive variable enabled me to employ an F-test on the output coefficients, which resulted in the failure to accept the hypothesis that the difference in the output coefficients was zero.

¹⁹ In a specification which includes ownership structure in 1992 as well as 1995, the negative coefficient on joint venture is significant, and relatively large, in comparison to the other coefficients: -.65.

Table 10: Variation in Employment Response: Regression Results

dependent variable = ChangeL

	coefficient	All Firms std. error	t-statistic	coefficient	Expanding Firms std. error	t-statistic	coefficient	Contracting Firms std. error	t-statistic
Ownership:									
Jstsk 95	.023	.022	1.00	-.084	.091	-0.93	.040	.022	1.84
Collect 95	-.014	.042	-0.34	-.042	.152	-0.28	.003	.043	0.09
Lease 95	-.064	.080	-0.79	-.142	.364	-0.39	-.050	.077	-0.64
Other 95	.008	.035	0.24	.079	.163	-0.48	.020	.033	0.61
Industry:									
Power	-.219	.060	-3.68	-.184	.120	-1.53	-.200	.088	-2.25
Fuel	-.145	.094	-1.54	-.173	.206	-0.84	-.190	.118	-1.60
Ferrous	-.109	.080	-1.35	-.090	.234	-0.38	-.116	.085	-1.36
Chemical	-.110	.042	-2.64	-.197	.122	-1.61	-.083	.043	-1.91
Wood	-.115	.039	-2.97	-.004	.178	-0.02	-.122	.038	-3.22
Construct	-.067	.038	-1.79	-.059	.127	-0.46	-.048	.038	-1.24
Light	-.103	.029	-3.54	.139	.136	1.02	-.132	.028	-4.64
Food	-.159	.028	-5.66	-.172	.094	-1.83	-.161	.029	-5.60
Printing	.024	.080	0.30	.314	.238	1.32	-.068	.082	-0.82
Miscellaneous	.123	.101	1.22	.040	.501	0.08	.123	.095	1.28
Location:									
Moscow	.039	.023	1.64	.058	.091	0.64	.032	.023	1.37
Export 92	-.086	.031	-2.69	-.089	.122	-0.73	-0.77	.031	-2.48
Workforce Size:									
< 200 employees	-.119	.023	-5.06	-.315	.086	-3.66	-.091	.023	-3.90
> 1000 employees	.094	.022	4.31	.098	.086	1.14	.088	.021	4.07
> 5000 employees	.171	.059	2.87	.197	.160	1.23	.154	.064	2.39
> 10,000 employees	.171	.079	2.16	.248	.222	1.12	.151	.085	1.78
ChangeQ	.049	.007	6.91	.002	.023	0.09	.073	.011	6.58
Constant	.113	.030	3.64	.147	.115	1.28	.075	.034	2.22
	n = 1726 Adj R ² = .1383			n = 248 Adj R ² = .0943			n = 1478 Adj R ² = .1321		

Source: Calculations from firm level data provided in vols 1-18, *Business Map 93: Russian Industry* (Moscow: Business Information Agency 1993), *Biznes-Karta 95* select volumes (Moscow: Business Information Agency 1995).

1995, the only statistically significant result is that the change in employment was lower for small firms than for firms employing 200-1000 workers (see Table 10, column 4). For the losers (see column 7), significant industry variation is evident, as is the effect of export experience and workforce size.

V. Conclusions

The regression results presented here suggest that Russian firms, at least on paper, did not change their employment behavior during the first stage of transition, despite dramatic changes in output and ownership. These results mask the extent to which firms kept workers on the books who were no longer employed by the firm. Even taking this into account, however, assuming that this proportion is 25-30% of a firm's workforce, the magnitude of the employment response to output changes would remain relatively small.

Is there a problem with such a low elasticity of labor? Prolonging socialist employment patterns delays the transition process and imposes greater costs on the population as a whole. So, yes, there is a problem with a low labor elasticity if Russia's employment pattern is not appropriate to what can be sustained in a market economy. Using the number of firms or employees engaged in the production of goods traded in non-CMEA markets is one measure of the extent to which employment patterns must change to facilitate a successful transition from plan to market. The greater the percentage of Russia's exports to OECD countries, for example, the more integrated the economy in global markets. In 1994, the share of OECD exports (including oil and gas) in Russian GDP was 7.4%; for Hungary, Poland and the Czech Republic, the figures were 19.9%, 14.5%, and 30.7%, respectively. Frydman et al. (1998) calculate a measure of export reorientation for twenty transition economies in Central and Eastern Europe and the former Soviet Union. Hungary, Poland, and the former Czechoslovakia score 22, 21, and 18, respectively. Russia scores 48 on a measure where lower is "better." Neither measure suggests that Russia in 1995 had made significant progress with regard to integrating in global markets.

Does it matter that privatized firms behave no differently than state-owned firms with regard to

employment changes? We know that enterprise overstaffing in state-owned firms in the Soviet economy was significant. Moreover, we know that a significant number of Soviet firms were “value-subtracting” when inputs and outputs were measured using world market prices. If privatized firms do not release workers in proportion to the declining demand conditions which they face, the possibilities for effectively restructuring the Russian economy are constrained, and the transformation from plan to market is delayed, which in turn raises the cost to the population. At the same time, however, if privatized firms do release workers in proportion to declining demand conditions, the unemployment rate will sky-rocket, and the regional consequences will be devastating.

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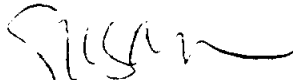
30 March 1998

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Dear Martha:

Enclosed please find copy of paper for the WDI working paper series. Thanks.

Sincerely,



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