

## Competition and Enterprise Performance in Transition Economies Evidence from a Cross-country Survey<sup>1</sup>

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### Abstract

This paper uses a survey of 3,300 firms in 25 transition countries to shed light on the factors that influence restructuring by firms and their subsequent performance as measured by growth in sales and in sales per employee over a three-year period. We begin by surveying what a decade of transition has taught us about the factors that determine how firms respond to the new market environment. We go on to analyse the impact on performance of ownership, soft budget constraints, the general business environment and a range of measures of the intensity of competition as perceived by a firm. We find that competition has an important and non-monotonic effect on the growth of sales and of labour productivity: some degree of perceived market power is associated with higher sales growth, but competitive pressure is also important. Similar competition effects are found upon firms' decisions to develop and improve their products, but market power has an unambiguously negative impact on purely defensive (cost-reducing) restructuring activity. New firms have grown relatively fast, but among old firms ownership per se has no significant relationship to performance (though state-owned firms have engaged in significantly less development of new products). Soft budget constraints have a broadly negative and the business environment a broadly positive impact on restructuring and performance.

Keywords: competition, restructuring, privatization, soft budget constraints, business environment

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What determines the success with which firms in transition economies can respond to the demands of the new market environment? And where can the most important gains in productivity be expected to come from? In this paper we report the results of a large cross-country survey of firms from 25 countries that show the relative influence of competition, ownership and features of firms' external environment (including the presence of soft budget constraints) on their restructuring actions and subsequent sales and productivity performance. These results show convincingly that competition matters, but it matters in an intriguing and complex way.

When the process of transition began there was widespread agreement that liberalization - the power of firms to set prices, choose what to produce and invest as they thought fit - was a necessary condition for significant improvement in the productivity of the economy as a whole. But beyond that there was little consensus as to the nature of the industrial transformation to be expected.

Findings such as those of Hare & Hughes (1991) led some observers to expect that the main gains from reform would come from a re-direction of resources between sectors of the economy, from those where value-added was low (or even negative) to those where value added was high. Others thought the main gains would come from changes in corporate governance, specifically from the privatization of hitherto state-owned enterprises and from the elimination of state subsidies. Yet others thought that the essential ingredient was competition, which could not be ensured merely by privatization since many state-owned enterprises were effectively monopolists (e.g., Newbery & Kattuman, 1992). What else was required to ensure competition was also much disputed: many countries set up competition agencies to try to establish competitive conditions directly (e.g., Fingleton et al., 1996), while skeptics argued that the only important consideration was trade liberalization so as to import competition from abroad (e.g., Sachs & Berg, 1992; the discussion is reviewed in Neven & Seabright, 1998). Entry by new firms was viewed as an important component of the economic transformation but there was great uncertainty about its likely quantitative contribution to improved performance (e.g., Johnson, 1994).

More recently attention has been drawn to the importance of the overall environment for market transactions, which may affect all firms in an economy though not necessarily in a uniform way (e.g., Brunetti et al., 1997a, Hellman et al., 2000, Hellman & Schankerman, 2000). This environment comprises a range of factors associated with the functioning of the state that influence the profitability and predictability of economic activity – from tax systems to regulatory hurdles, to official corruption, to organized criminality and the uncertain enforcement of business contracts and property rights. Without a sound business environment, it is argued, new investment and improved productivity are unlikely to emerge from abandoning central planning, liberalizing prices and trade, changing ownership and cutting state support.

What have ten years of transition taught us about the relative importance of these different factors? This paper uses the results of a large survey of firms across transition countries to investigate this issue. We begin in section 1 by reviewing briefly a number of existing findings under the headings of sectoral reallocation, corporate governance, soft budget constraints, business environment and competition.

In the remainder of the paper, we use the results of a survey of 3,300 firms to pursue the question of the determinants of performance improvements in the business sector in transition. The survey was undertaken by the European Bank for Reconstruction and Development and the World Bank.<sup>2</sup> In section 2, the survey sample is outlined. This is followed by a preliminary description of the data according to the determinants of performance discussed in section 1. Section 3 outlines the econometric problems raised by the data available and the modelling strategy used in the paper. Section 4 presents the results for the analysis of both restructuring and performance improvements. Section 5 summarizes our findings and concludes.

## 1 Determinants of performance improvement in the business sector of transition economies

A striking and poorly anticipated feature of the transition has been the extent of deterioration of performance as measured by the decline in output. Using the broad measure of real GDP, the weighted average for the countries in Central and Eastern Europe and the Baltics showed a U-shaped pattern with a deterioration of about 20% compared with the 1990 level until 1992-3 followed by recovery (for example, Chart 3.1, EBRD, 1999). The level of GDP was still 5% below the 1990 level in 1999. For the CIS, the pattern is more L-shaped. The cumulative fall in GDP was more than 40% of the 1990 level. The level of output remained fairly flat from about 1995. This provides the macro context for the analysis of “performance improvement” at the level of the firm, which is the focus of this paper.

In this section, we assess factors identified in the literature as likely to contribute to the improvement of performance. We consider in turn the inter-sectoral reallocation of resources, ownership change, hardening of budget constraints, the improvement of the “business environment” and competition.

*First*, aggregate productivity gains have not primarily come from inter-sectoral shifts. As Appendix 1 shows, it is possible to decompose changes in aggregate labour productivity exactly into *within-sector* and *between-sector* components. The contribution of the between-sector component will obviously be greater the more narrowly the sectors are defined. In market economies the contribution of resource shifts between 2-digit SIC sectors to aggregate productivity change is typically small. Fig. 1(a) illustrates for the case of Austria,<sup>3</sup> where between-sector movements accounted for 6.5% of the total between 1991 and 1996 (1.1 percentage points out of a total increase of 17.4 percentage points). It was natural to expect that the contribution would be larger in transition economies, but in fact this was not so. Fig. 1(b) shows that for Poland,<sup>4</sup> a country that saw continuous and rapid increases in average labour

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<sup>2</sup> Preliminary findings from this survey were reported in the 1999 *Transition Report* of the EBRD.

<sup>3</sup> Austria is entirely typical. In France, for example, between-sector movements accounted for 8.9% of total productivity change between 1990 and 1996 (1.25 percentage points out of a total increase of 14 percentage points). In the United States between 1987 and 1996, the between-sector component was even slightly negative, indicating a slight shift of labour towards lower-productivity activities.

<sup>4</sup> Poland is in turn entirely typical of transition economies that saw increases in productivity. In the Czech Republic the contribution of between-sector components was 4.3% of the total (2.4 percentage points out of an increase of 55.4 percentage points). In Hungary it was less than a tenth of a percentage point out of a total increase of 52.3 percentage points. However, preliminary calculations suggest that circumstances were different in countries where aggregate labour productivity fell. In Russia, aggregate

productivity between 1992 and 1996, the contribution of between-sector components was a mere 4.2% of the total (1.9 percentage points out of a total increase of 45.2 percentage points).

[Fig. 1 here]

*Second*, a striking finding has been the absence of clear and unambiguous effect of changes in ownership or corporate governance on the performance of the affected firms. Apart from a general consensus that state ownership had failed, there was little initial agreement among either politicians or their expert advisers as to the appropriate nature or speed of privatization. Consequently the transition economies have seen a bewildering variety of types of scheme – from voucher privatization to initial public offerings, from insider to outsider schemes. The transformation from predominantly state-owned to predominantly privately-owned firms has varied from astonishingly fast to stubbornly slow. It would be natural to expect this variety of experiences to constitute a great natural experiment, yielding powerful evidence about what works and what does not. But so far, at least, that has not happened.<sup>5</sup> Evidence that privatization enhances performance has not leapt out of the data. It has had to be coaxed out by careful adjustments that allow for the fact that the choice of firms for privatization may have been far from random and that the effect of ownership change may be different for different performance measures.<sup>6</sup> Evidence that the form of privatization matters has been even more elusive.<sup>7</sup>

A recent attempt has been made to use the statistical technique of meta-analysis to synthesize the empirical results of over one hundred studies (Djankov and Murrell, 2000). Meta-analysis aims to provide an objective quantitative combination of all studies that have investigated a common question. The advantage as compared with the “narrative” or “historical” approach to the review of the literature is that individual studies may be inconclusive because they lack statistical power and reviews are prone to reporter bias in the selection of studies. Meta-analysis provides a pooled estimate based on the estimates in the individual studies. The key problems with using meta-analysis are the heterogeneity in the sample selection and in the models tested in the individual studies (privatization “treatments”, types of firms, dependent variable, study design and statistical analysis). Meta-analysis is least problematic in the case of randomized trials (e.g., in medical research).<sup>8</sup> The Djankov

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labour productivity was 3.4% lower in 1998 than in 1992, but without the between-sector component it would have been 23.4% lower. In Romania, productivity was 3.8% lower in 1996 than in 1991, and without the between-sector component it would have been 12.2% lower. In the case of these two countries the between-sector component appears to be reflecting differential rates of labour shedding rather than the movement of labour from one sector to another. However, unresolved questions remain about the comparability of the price indices used to calculate these results.

<sup>5</sup> See Carlin (2000).

<sup>6</sup> See Claessens and Djankov (1999a), Grosfeld and Nivet (1997), Smith et al. (1997) and Frydman et al. (1999).

<sup>7</sup> A study of firms in the Czech Republic, Hungary and Poland (Frydman et al. 1999) finds that both manager and employee-ownership is associated with performance no better than that of state-owned firms whereas studies of Russia (Earle and Estrin 1997), of Estonia (Jones and Mygind 1999) and of Slovenia (Smith et al. 1997) find results to the contrary for manager-owned, worker-owned or both. A study of six CIS countries finds that where managers have a stake of more than 30% or less than 10%, the effect is positive (Djankov 1999b).

<sup>8</sup> For a survey of the methodological problems associated with “narrative” and meta-analysis reviews, see Chalmers and Altman (1995).

and Murrell paper attempts to take such factors into account by scoring individual studies according to the nature and quality of the methodologies adopted. But they fail to address the problem that there may exist a bias that is consistent in its effect across studies. For example, if “on average” across countries and studies, better firms are selected for privatization, then averaging across studies averages the bias, and scoring as they do simply weights the bias differently but does not eliminate it.

With these important caveats in mind about the suitability of meta-analysis to analyze the determinants of performance in the transition, the findings of Djankov and Murrell are reported. Pooling 35 studies, they found that privatization improved performance significantly. For the CIS countries, however, there was no significant difference between the performance of state-owned and privatized firms. From 23 studies that looked at the effectiveness of different kinds of owners, it appears that correction for selection bias alters the ranking of performance improvements. Taking selection bias into account, investment funds, blockholders, foreigners and commercialized state-owned firms performed better than traditional state-owned enterprises (SOEs); manager-owned firms performed no differently from SOEs.

However, enterprise level studies may miss one of the main ways in which privatization matters. Such studies either compare the average performance of different countries (and so are complicated by all the many differences in initial conditions and in country experiences that are going on at the same time) or else compare the experience of different firms within the same country. There may be powerful influences across firms that confuse the comparison between them. There are two particular reasons for thinking this. The first is that commitment to a privatization process may have a dramatic effect on the incentives for managers of *all* firms in a country, not just those that have already been privatized but also those who see the prospect of privatization looming in the near future.<sup>9</sup> The second is that transition economies have been characterized by even stronger inter-dependencies between firms and their customers and suppliers than is true of market economies. Blanchard & Kremer (1997) make this the centerpiece of their explanation for the aggregate fall in output of many countries in the transition process. The consequence is that the performance of a privatized firm may be strongly influenced by that of its non-privatized customers and suppliers, and conversely for state-owned firms.

*Third*, there is abundant evidence (Schaffer, 1998) that poor performance by firms leads them to be bailed out by the state. In Djankov and Murrell’s meta-analysis, they pool the results of 10 studies and report a link between soft budget constraints and weaker firm performance. This is insignificant for CIS countries alone. State owned firms and larger firms are characterized by softer budget constraints. One of the studies is Frydman et al. (2000) in which it is argued that it was the inability of state firms to generate revenue growth that necessitated budgetary softness if the enterprises were not to fail. In other words, in their view, privatization is a necessary condition if hard budget constraints are to improve the revenue performance of firms that are currently state-owned. A major problem that all studies of this type face is how to identify the chain of causality between performance and budgetary softness. By definition, firms with soft budget constraints are rescued

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<sup>9</sup> Pinto et.al. (1993) was one of the earliest studies to draw attention to the fact that hardening of budget constraints might have a stronger effect on behaviour than privatization itself, even if the former was only possible in an environment characterized by a commitment to eventual privatization.

because they are performing poorly; but does the existence of soft budget constraints ex ante cause firms to perform poorly in the first place? It is difficult to solve this endogeneity problem through the use of instrumental variables estimation because of a lack of suitable instruments. The use of meta-analysis cannot help here; this is a case where the direction of the bias is very likely to be consistent across studies. We return to this issue below.

*Fourth*, there is a growing body of evidence that the business environment, as shaped by how the state functions, has a significant impact on aggregate economic performance. Analyses of the world-wide business environment implemented by the World Bank in 1996, for example, reveal significant relationships between the quality of the business environment and both aggregate growth and investment. Brunetti et al. (1997) find in cross-country regressions a significant and positive relationship between businesses' perceptions of the credibility of government policy and both growth in GDP per capita and the share of fixed investment in GDP, after controlling for other factors. Fries and Gelfer (2000) show that "reward-to-volatility" ratios for stock market returns (1996-99) of the countries covered in the 1996 World Bank survey are significantly and positively related to key dimensions of the soundness of the business environment, including the predictability of government policies, corruption and access to finance. These results are consistent with the hypothesis that the quality of the business environment is significantly related to the risks and expected returns to investment. The analysis in this paper is a first attempt to identify the impact of the business environment in transition economies on individual enterprises, both in terms of their growth and restructuring decisions.

Finally, studies are beginning to accumulate that examine the role of competition in the transition.<sup>10</sup> Nickell motivates his 1996 paper by noting the paucity of evidence for market economies of a causal link from competition to improved performance. He observes that the most convincing evidence comes from a "broad brush" comparison between the lack of dynamism of centrally planned as compared with market economies (Nickell, 1996).

Identifying the role of competition is not easy. The degree of competition faced by a firm is not particularly easy to measure since competition might affect performance through a variety of quite different means and changes in performance would be expected in turn to affect market structure. For instance, even if the degree of competition it faces has no direct causal influence on the behaviour of any individual firm, it may be that more competitive market environments see a faster

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<sup>10</sup> In a study of Bulgaria, Jones et al. (1998) found a positive effect of larger market share on performance. Using a measure of competition at industry level, Konings (1998) found in a study of Bulgaria and Estonia that more competitive pressure in the industry enhanced firm performance in Bulgaria but not in Estonia. For Russia, Earle and Estrin (1998) found that greater competition in the market complemented the effect of privatization in enhancing performance. Brown and Earle (2000) reported strong positive effects of domestic and import competition in the product market on total factor productivity. A study of Georgian firms (Djankov and Kreacic 1998) found that competition from foreign producers tended to be associated with employment cuts and changes in suppliers (but tended to reduce the likelihood of the disposal of assets, renovations and computerization). By contrast, firms with a larger market share were more likely to engage in computerization, renovations, the establishment of a new marketing department and the disposal of assets. Djankov and Murrell (2000) pool 17 studies and report a positive impact of competition on performance. Whereas for the non-CIS, both domestic and foreign competition are effective, for the CIS countries, only domestic competition is significant.

replacement of relatively inefficient by relatively efficient firms. In this case, a correlation emerges over time between a measure of competition at industry level and the average efficiency of those firms that survive.

In fact it is quite likely that competition has a direct influence on behaviour, but economic models show that the effect may be ambiguous. One example of ambiguity comes from Willig's (1987) model, in which he demonstrates two offsetting effects of increased competition on the incentives for managers to exert effort. Whilst increased competition makes profits more sensitive to managerial effort, it also depresses demand for the firm's output, which dampens profits and hence blunts the incentive.

In the innovation literature, there are models that suggest that more competition is good for innovation and others that highlight a hump-shaped relationship, in which a moderate degree of competition is better than either monopoly or intense competition. For reasons first suggested by Schumpeter and recently analyzed more formally by others (see Aghion & Howitt, 1998, for example), some degree of prior market power may be important in providing firms with sufficient retained earnings to finance investment. Moreover, the prospect of some future profits may be essential to ensure that current retained earnings are indeed invested instead of wasted. Other variants stress a monotonic relationship with greater competition inducing productivity growth. For example, the emergence of new competitors threatens the temporary monopoly profits from innovation and increases the incentive of the incumbents to shorten the innovation cycle (Aghion, Dewatripont and Rey 1997).

Empirical support for the role of competition as a spur to innovation comes from recent econometric research using the number of innovations as the measure of performance (e.g., Blundell et al. 1995). This is consistent with the results of a quite different methodology (bench-marking using case studies) in which Baily and Gersbach (1995) found that "head-to-head" competition in the same market resulted in faster innovation in several manufacturing industries. Nickell (1996) controls for industry level concentration and import concentration and tests whether a firm-level measure of competition is correlated with performance. He finds that indicators of competitive pressure at firm level are significantly related to the level and growth of total factor productivity. In an empirical study of entry thresholds, Bresnahan and Reiss (1991) found that most of the competitive impact from entry comes from the first two entrants to challenge a monopolist, with the effect levelling out once market participants number around five.

Although competition is not straightforward to measure there are reasons for thinking that the economic environment in transition economies provides a more fruitful setting in which to test hypotheses about the effects of competition than equivalent environments in market economies. This is because of the well-known problem that market structure changes over time in response to competitive pressures, and therefore that the causality may run from performance to structure as much as the other way around. Transition economies differ from market economies in that much of their market structure as inherited from central planning had not been shaped at all by market forces, so the variety of observed market structure may provide a more genuine natural experiment than we normally see.

## 2 The nature of the survey and preliminary data description

The EBRD and the World Bank conducted a large survey of enterprises in twenty transition countries in the early summer of 1999 and its provisional findings were published in the EBRD *Transition Report 1999*. Surveys of five more transition countries were completed later in 1999. The aim of the survey was to investigate how enterprise restructuring behaviour and performance were related to competitive pressure, the quality of the business environment, and the relationship between enterprises and the state. The survey was a cross-section and, as will be clear in section 3, cannot therefore answer some of the questions more appropriate to panel data. However, its size and broad scope are unusually valuable, as is the fact that it poses detailed questions about the firms' business and competitive environment, and about the different restructuring actions taken by them in the recent past.

The full sample size was 3,954 firms. The survey included approximately 125 firms from each of the 25 countries, with larger samples in Poland and Ukraine (over 200 firms) and in Russia (over 500 firms). Sampling was random from the population of firms in each country, except that minimum quotas were imposed for state-owned firms and large firms. Initial analysis of the data suggested that developments in the agricultural sector were quite different from those in the non-agricultural business sector. We therefore omit from the analysis 453 firms in agriculture as well as firms missing any of the most basic indicators (industry, size classification, ownership classification, sales growth and employment growth) leaving us with a sample of 3,305 firms. The figures reported in the tables below sometimes rely on a smaller sample because of missing values in an indicator of interest; the econometric analysis in the next section removes all firms with missing values in any variable in use, reducing the sample to 2,245 firms.

Just over half the firms in the sample were newly-established private firms, 8% were privatized to insiders (managers and/or employees), 22% were privatized to outsiders, and 16% remained state-owned. Table 1 provides some basic information on the distribution by size, sector and region of the sample of firms. The sample is dominated by small and medium-sized enterprises; just over half the sampled firms employed fewer than 50 persons, and less than 8% employed more than 500. The firms are divided fairly evenly between industry (46%) and services (54%); just over one-third of firms are from the manufacturing sector. About one-third of the sample is from the Central and Eastern European region (including the Baltics) and 12% of firms are Russian. Most firms were located in either large cities or national capitals (41%) or in medium-sized cities (34%), with the remaining one-quarter in towns and rural areas.<sup>11</sup>

[Table 1 here]

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<sup>11</sup> For the allocation of countries to regions, see Table 7.



## *Performance, Restructuring and Management Turnover*

Table 2 presents data on the average performance by firms using the performance measures that we concentrate on in this paper: the growth of real sales and of real sales per worker. These measures were calculated from self-reported figures for the real growth of sales and of employment over the previous three years.

In the sample as a whole, 30% of firms reported a contraction in sales (in real terms) over the previous three years; just under one-quarter reported flat sales and just over 46% reported growing sales. The Central and Eastern European region including the Baltic States (CEB) and the South East European region (SEE) were the only regions in which more than one half of firms reported growing sales. In line with the macroeconomic performance across different regions, the proportion of firms with shrinking sales in a region ranged from just over one-fifth in CEB to one-third in Russia and 40% in the Western and Southern CIS.

For state-owned and privatized firms, average growth of sales was negative; it was positive for new firms. The opposite was true of productivity growth: average growth of sales per worker was negative in new firms and positive in old ones. For both privatized and new private firms, average growth increased with the size of the firm. This was not the case for state firms. In old firms, where between 55 and 60% of firms had declining sales, the more rapid shedding of labour than reduction of output lies behind the positive productivity growth recorded. In new firms, average productivity growth was negative but there is a clear size effect: as we move to higher size classes, productivity growth becomes less negative. In the largest size class, positive productivity growth was recorded for new firms. A possible explanation for this size effect is the endogeneity of size. Larger firms may be larger at the time of survey because they grew faster (or shrank less rapidly); we return to this issue in the next section when we discuss our econometric estimations.

[Table 2 here]

The survey instrument was designed to explore in some detail the extent to which firms had engaged in restructuring actions. These activities include “defensive restructuring” that can take the form labour shedding and plant closures and “strategic restructuring” or innovation, which in the context of transition economies refers to the introduction of new products to the market or the upgrading of existing ones. Managers were also questioned about the firm’s relationships with suppliers, customers and banks and about changes in the firm’s organizational structure.

These questions about restructuring are important since they enable us to explore more closely how performance improvements come about. Images of “good” hard-working firms pitted against “bad” unchanging dinosaurs may be quite inaccurate as an account of the forces shaping economic change. As will be seen, successful firms differ from unsuccessful ones much less in whether they attempt to restructure than in the kinds of restructuring they undertake.

Table 3 indicates the various types of action that firms have been taking. Early studies of transition frequently found that amongst old firms, there was little difference in the defensive restructuring actions taken by privatized and state-owned

firms. In the wake of the marketization shock, it was expected that both privatized and state-owned firms would be forced to cut costs by reducing employment and closing unviable plants. Private ownership was thought to be more relevant for strategic restructuring with the implication that privatized and new private firms would tend to dominate the expansion of employment and the introduction of new products.

We begin with defensive restructuring. As we would expect, old firms were much more likely to cut employment than new entrants and the difference between state and privatized firms were small. Plant closures show a very similar pattern.

New entrants, by contrast, were much more likely to create jobs. As expected, privatized firms created more employment than state owned firms and were more likely to open a new plant. Interestingly, one-fifth of new firms had opened a new plant in the previous three years. The table also provides information on specific forms of strategic restructuring. There is some support in the table for the idea that private firms (both privatized and new ones) have engaged in more new product development than state firms. There is little difference between state and privatized firms in their record on upgrading of existing products. Amongst old firms, those privatized are somewhat more likely than state ones to have changed suppliers and customer base in the previous three years, and to have initiated significant changes in their organizational structure. Although new firms appear about as likely to have changed their suppliers as privatized firms, they were much less likely to have engaged in organizational change.

There are also noticeable size effects. Large firms were more likely to have decreased employment than were smaller ones; they were also more likely to have closed or opened plants. The introduction of new products and the upgrading of existing ones is also positively related to the size of the firm.

[Table 3 here]

Managers are the agents of restructuring and the survey allows us to identify the extent to which there were changes in management. Table 4 shows details of management change. Old firms changed management more often than new entrants (which is understandable given the small size of many new entrants and the likelihood that a high proportion of them were owner-managed). Interestingly, managerial turnover was higher in state than in privatized firms, and state-owned firms were just as likely as those privatized to outsiders (and much more likely than insider-privatized firms) to have made use of the managerial labour market to bring in new blood from outside.

[Table 4 here]

Overall, the differences between privatized and state firms are perhaps less marked than the fact that both types of firm have clearly been very active in recent years. As we have seen, many of the indicators of restructuring are positively related to size: it is not just small and medium enterprises that have demonstrated flexibility and readiness to change. Even if state firms have shown somewhat less willingness to restructure than private firms, they are far from being unchanging dinosaurs.

But to the extent that state, privatized and new private firms do behave differently, why does this happen? Is it because of intrinsic differences in incentives due to ownership, or to the fact that ownership is correlated with other things, such as a difference in the intensity of competition or a different relationship to the state? To pursue this question further, it is necessary to examine the external environment and constraints on firms.

### *External Environment and Constraints*

The survey collected information on the external environment as perceived by the firm. In particular, we have indicators of the firm's

- relationship with the state as measured by tax arrears, arrears to utilities and receipt of direct subsidies;
- perception of the quality of the general business environment in the country;
- perception of the nature of competition it faces in the market.

We consider two ways to measure the country-level factors that determine the overall environment for business activity, and which may be important determinants of performance. The first is an indicator of the presence of soft budget constraints. In principle, a soft budget constraint is a feature of the environment faced by a particular firm, namely the likelihood that it would receive a subsidy or could run up arrears on its debts if it wished. In practice, however, all we can observe are a firm's estimates of its problems with tax arrears to central and local government and arrears to utilities. These measures are frequently used in studies as indicators of the presence of a soft budget in a country (Schaffer 1998), but they do not allow us to identify soft budget constraints on a firm-by-firm basis, still less to test for their association with performance. Are firms without arrears or subsidies firms that are performing well and so do not need the arrears or subsidies to which they in principle have access? Or are they firms that have come to terms with hard budget constraints and so perform better than they would otherwise do? We discuss in the next section how we deal with this problem in our econometric work. Here we report the variation across countries and across ownership type and size class in reported budget softness.

We construct our soft budget constraint index using the method of principal components, using the same set of 2,245 firms used for the econometric analysis. The raw measures of soft budgets are the ratings by firms of arrears to central government, local government, and utilities, all on a scale of 1 ("substantial") to 4 (none owed). Our soft budget constraint index is the first principal component extracted from unstandardized responses; it is a weighted average of the raw measures, where the weights are the eigenvectors of the first component. The results of the principal components analysis are presented in Table 5. The first principal component explains 82% of the variance in the three raw measures; the weights given to the three raw measures in the construction of the index are fairly close, with the heaviest weight given to arrears to central government. We normalize the constructed index to lie in the interval [0,1], where 1 indicates a high degree of budget softness and would be the score of a firm that had rated all three categories of arrears as "substantial".

The second measure is one that represents the overall business environment. The survey asked managers to rank the extent to which aspects of the macroeconomy, taxation, policy stability, business regulation, the operation of the judiciary, law and

order, infrastructure and finance imposed obstacles on the operation and growth of their business. These are evidently subjective reports and as such are subject to well-known biases (notably that a tendency to complain may be either a luxury of a relatively favourable situation, or an excuse to use when the firm is doing badly). Nevertheless, in the hope that they may cast a little light on a notoriously murky area, we have employed a similar procedure to the soft budget constraint variable and constructed a measure of the overall business environment in each country based on principal components analysis; the results are presented in Table 6. The first of the 11 components explains 34% of the total variance, much more than the remaining 10 – the second component explains only 13%. The heaviest weights in the index are given to crime, corruption, the exchange rate, policy instability, and inflation. We again normalize the index to lie in the interval [0,1], where 1 indicates a “good” business environment and would be the score of a firm that had rated all 11 measures as presenting “no obstacle” to the operation of its business.

[Tables 5 & 6 here]

Table 7 shows the ranking of countries according to the measures of the softness of budget constraints and the quality of the business environment constructed from the survey data. Countries are ranked from “best” to “worst” on each measure so that those with the hardest budget constraints and the highest quality business environments are ranked first. Countries from Central and Eastern Europe including the Baltics (CEB) have three of the five hardest budget constraints: Lithuania, Hungary and Estonia. The southern CIS and South-Eastern Europe (SEE) countries appear to have the softest budget constraints – although it is noteworthy that two CEB countries (Slovenia and the Czech Republic) are ranked 19<sup>th</sup> and 20<sup>th</sup> out of 25 countries. Russia is ranked with a harder budget constraint above these two countries at 15<sup>th</sup>.

Estonia, Slovenia and Hungary have the highest scores for the quality of the business environment. Russia is ranked 19<sup>th</sup> out of 25 and Albania, Kyrgyzstan and Moldova are ranked worst. Uzbekistan emerges as the best performer from Central Asia both on the budget hardness indicator (6<sup>th</sup>) and on the business environment indicator (7<sup>th</sup>). The mean regional scores for each measure are shown in Table 8.

[Table 7 here]

Table 8 also reports variations in the soft budget constraint and business environment measures for different ownership and size categories. Budget constraints were softer for old than for new firms. Softness increased with the size of the firm. New and privatized firms appear to have had a more pessimistic assessment of the business environment than do state-owned firms. Larger firms appear to have viewed the business environment more favourably than did smaller ones.

[Table 8 here]

Table 9 reveals a striking difference between the competitive environment reported by state and private firms. One-quarter of state firms reported that they faced no competition in the domestic market for their main product. For privatized firms, this was true of less than one in ten firms and for new firms, of one in 20. Private

firms reported a much greater sensitivity of their sales to a 10% increase in their price relative to their competitors than did state firms. Whereas just over one-quarter of state firms believed that a 10% price rise would lead many customers to switch to alternative suppliers, this was closer to 40% for private firms. The reported markup of prices over operating costs was highest for new firms and lowest for state firms. This may reflect the sharing of rents with workers in state firms that have monopoly power. Table 7 also indicates that a smaller proportion of state firms as compared with other firms reported pressure from domestic competitors as playing a significant role in their decision to enter new markets or introduce new products. Amongst private firms, one in five reported pressures from foreign competitors as significant in stimulating the introduction of new products. New entrants reported less pressure from foreign competition, which may reflect their small average size. As the lower part of the table suggests, indicators of market power were generally related directly to size. The exception is the mark-up, where smaller firms reported higher mark-ups.

[Table 9 here]

If we consider the average sales growth according to the number of competitors a firm reports itself as facing, the result is very interesting. Firms facing between one and three competitors had average sales growth of over 11%, while monopolists had more or less zero growth and firms facing more than three competitors had growth of only 2%. Whether this bivariate correlation stands up to more rigorous econometric estimation will be investigated in section 3.

As we noted earlier, firms facing an intermediate level of competition may be those that are innovating. The prospect of super-normal profits from the temporary dominance of a market niche provides the incentive for the introduction of a new product or the entry into a new market. The presence of some rents finances the investment needed to implement the necessary restructuring. From this perspective, it is useful to examine how firms financed their investment. Table 10 reports the proportion of fixed investment over the previous year financed from a range of sources and shows that retained earnings were of major importance for the firms in our survey. Retained earnings accounted for 60% of all investment. They were more important for privatized than for state firms and in turn more important for insider than for outsider owned privatized firms. It is interesting to note that state finance for investment was not a significant source for privatized firms but accounted for one-fifth of finance for investment by state-owned firms. Privatization has allowed firms significant access to equity finance only in Central and Eastern Europe, and even here privatized firms raised only 11% of funds from new equity compared to 6% for state firms. Local commercial banks provided a greater share of investment finance than equity markets except in the Southern CIS and Central Asia (where the banking sector is particularly weak), and even this was above 10% of fixed investment only in the CEB countries.

[Table 10]

The potential significance of retained earnings is underlined by the fact that when firms were asked the greatest obstacle to financing of their business, 46% replied high interest rates on borrowing, a far greater proportion than for any other obstacle. State firms reported lower levels of concern with financial constraints than

did private firms (Table 11). This presumably reflects the easier access of state firms to state investment finance along with other factors such as size.

[Table 11]

### **3. Econometric estimation and modelling strategy**

Our objective is to make use of this large cross-sectional data set to examine the determinants of restructuring and performance. There are serious shortcomings with the data that limit the analysis that can be undertaken. In particular, there is no true time-series dimension. We have only self-reported information on the change in real sales as well as on the kinds of restructuring activities carried out by the firms over the preceding three years. This feature of the data limits the confidence we can place in the analysis of ownership effects because we cannot implement a test for the selection effects of privatization. To the extent that it was the “better” state-owned firms that were privatized, the lack of a correction for selection effects would bias the results toward finding a positive relationship between privatized firms (compared with those still in state ownership) and both restructuring and performance. We need to keep this problem in mind when analyzing the results.

However, other features of the data balance the lack of a true time series dimension. First, the extent of country variation in the sample is very valuable. With 25 countries, it is possible to address the problem of the endogeneity of soft budget constraints and the perceived business environment. We, like previous researchers, have at our disposal firm-level indicators of budget softness or the business environment. However, as argued in the previous section, in a study covering just one or a few countries, these raw data are of limited use in an econometric testing framework. It is difficult or impossible, for example, to disentangle the possible impact on performance of an environment of soft budget constraints from the effect of the firm’s performance on its own experience of budgetary softness. With 25 countries covered by our sample, we are able to address this issue by exploiting the cross-country dimension to increase the number of instruments available for instrumental variables estimation.

Second, as noted in the introduction, the measurement of competitive pressure in the economy is very difficult. In many studies, only industry level proxies for competition in the form of indicators of market structure are available (e.g., concentration ratios). The problem is that the “industry” may be quite distant from the concept of the “market” that is relevant to a firm’s products. Moreover, concentration measures may not accurately reflect the competitive threat in an industry, especially in so-called endogenous sunk-cost industries. The firm-level measures of perceived competition described in the previous section might provide a measure closer to the economic concept in which we are interested.

It was argued earlier that transition countries provide a valuable opportunity for attempting to measure the impact of competition on performance because endogeneity is less of a problem than in established market economies. There, the market structure may have been shaped by the successful performance of some firms, leading to a positive correlation between the degree of monopoly and performance

with the causality from performance to structure. In transition countries, it is more plausible to think that the extent of competition in the market is exogenous to the firm. We must recognize, however, that our firm-level measures of “perceived competition” may indeed reflect actions taken by the firm to introduce new products or enter new markets where it will face less competition. Innovation may be motivated by the prospect of market power and successful innovation may be rewarded by market power, albeit temporary. Hence, we cannot escape entirely from the problems of the endogeneity of market structure.

Third, the data are very rich in their restructuring variables. This helps us to narrow down the ways in which competition, soft budget constraints and the quality of the business environment affect restructuring and performance. The survey reports information about the constraints faced by firms, the actions taken by them in response to those constraints, and the outcome of these actions in terms of performance. It would be tempting, but misleading, to think that the causality runs from a firm’s external constraints through the restructuring decisions it takes to the performance outcome. Although this may often be true, sometimes the causality runs the other way. It may be the firm’s poor performance that provokes its owners or managers to take certain restructuring decisions. If these are good decisions they may improve performance relative to what it would otherwise have been, even if they are associated with a deterioration of performance relative to what it was in the past. Likewise, it may be the firm’s good performance, or the observed willingness of its managers to take difficult restructuring decisions that makes the firm an attractive prospect for privatization. These difficulties in disentangling the direction of causality have been even greater for many previous studies that have tried to link the firm’s external constraints directly to performance; the presence of restructuring information provides important clues about the likely ways in which the causality may operate.<sup>12</sup>

Our strategy is to estimate equations for performance, with the dependent variable measured in two ways: first, by the real growth of sales over the preceding three years, and second by the growth of real labour productivity over the same period.<sup>13</sup> We take performance to depend on five types of variable, some of which are evidently endogenous: ownership, competition, the extent of restructuring activity, the state of the business environment and the presence of soft budget constraints. The common equation structure is:

$$y = \beta_0 + \beta_1 comp + \beta_2 r + \beta_3 state + \beta_4 new + \mathbf{X}\beta_5 + \beta_6 sbc + \beta_7 be + u_1 \quad (1)$$

where  $y$  is the performance variable (growth of sales or labour productivity),  $comp$  and  $r$  are variables for the extent of competition and restructuring, respectively,  $state$  is a dummy variable for state-owned firms,  $new$  is a dummy variable for *ab initio* private firms (those without a state-owned predecessor),  $\mathbf{X}$  is a set of controls (size of

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<sup>12</sup> See Djankov (1999a,b), Earle and Estrin (1997), Bilsen and Konings (1997).

<sup>13</sup> As a robustness test, we re-estimated our performance regressions using winsorized measures of sales and productivity growth. Winsorizing truncates the distribution of a variable at some arbitrary point – in our case, at the 2.5% and 97.5% percentiles – but then rather than, say, discarding the outlier observations, accumulates them at the truncation points. We winsorized by country, and hence to construct winsorized log sales and productivity growth, the 5% of firms with the highest and lowest growth in a country have had their reported growth truncated in this way. The results did not change significantly.

firm as measured by the log of employment, location as measured by a dummy for whether the firm is located in a large city, and sector as measured by a dummy for the service sector), *sbc* and *be* are variables for soft budget constraint and business environment, respectively, and *u* is an error term.

As noted earlier, there may be a spurious correlation between performance as measured over the preceding three years and size as measured at the time of survey, because *ceteris paribus* firms that grew during the period will tend to be larger at the end of the period. We therefore use average employment during the period as our size measure in the sales growth equation, calculated from observed end-period employment<sup>14</sup> and employment growth during the period (both in logs).<sup>15</sup> This measure of size is problematic for the productivity equation because employment growth is used in the construction of both the size and the productivity variables, and measurement error in employment growth will generate a spurious positive correlation between them. On these *a priori* grounds, and on the *ex post* grounds of the absence of size effects in the sales growth equation (see below), we omit size from the productivity equation.

The variables *r*, *sbc* and *be* are constructed using principal components from responses to various relevant questions. In addition, we used the same methodology to construct a variable *d* capturing “defensive” or cost-reducing restructuring.<sup>16</sup> The soft budget constraint and business environment indexes were described above. For our basic restructuring measure *r* we used responses to four questions on whether, in the preceding three years, firms had developed a new product line or upgraded an existing one, opened a new plant, or obtained ISO9000 accreditation. Our “defensive restructuring” measure *d* was constructed using responses to three questions on whether firms had reduced employment by more than 10%, discontinued at least one product line, or closed at least one plant. Tables 12 and 13 summarize the principal components results for these restructuring measures. In the case of our restructuring measure *r*, the first of the four components explains 44% of the total variation, more than double that of the second component; introduction of a new product or upgrading an existing one are given the largest weights in the construction of the index. The first principal component of the defensive restructuring measure *d* explains 55% of the total variation, almost double that of the second component; the index gives the largest weighting to labour shedding. In both cases, the indexes are normalized so that the minimum value is zero and the maximum value is the number of possible restructuring measures. This is done to facilitate interpretation of the regression results – a unit increase in the index corresponds, roughly speaking, to the introduction of another restructuring measure.

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<sup>14</sup> Firms report employment by choosing 1 of 6 size categories; our end-period “log employment” is the log of the midpoint of the reported category.

<sup>15</sup> We note that when the sales growth equation is reestimated using end-period size, it is positive and highly significant. In the results reported below using average-period size, it is statistically insignificant.

<sup>16</sup> The use of these summary measures is more conservative than the alternative of including all the individual components as explanatory variables in the various regressions. With so many regressors, a likely outcome of this alternative procedure is a finding that some regressors are significant and with the expected sign, some are insignificant, and some are significant but with the opposite of the expected sign, making it difficult to reach an overall interpretation of the results.



The restructuring estimating equation is

$$r = \gamma_0 + \gamma_1 comp + \gamma_2 pressure + \gamma_3 state + \gamma_4 new + \mathbf{X}\gamma_5 + \gamma_6 sbc + \gamma_7 be + u_2 \quad (2)$$

where *pressure* is the firm's response to three questions on the influence of domestic competition, foreign competition, and customers on developing new products and entering new markets (in each case rated on a scale of 1=not important to 4=very important), and the other variables are as defined above. The defensive restructuring equation is the same except for the omission of *pressure*:

$$d = \delta_0 + \delta_1 comp + \delta_2 state + \delta_3 new + \mathbf{X}\delta_4 + \delta_5 sbc + \delta_6 be + u_3 \quad (3)$$

Although we report estimates using *d* as a dependent variable we did not use it as an explanatory variable in our performance equations because of endogeneity problems. Our measures of defensive restructuring (e.g., labour shedding) are likely to depend on firm performance, and we lack adequate instruments to deal with this problem.

We are, however, able to address the endogeneity of *sbc*, *be* and *r*, by taking advantage of the fact that our dataset has a panel-like structure. We adopt a one-way error component framework, in which the term  $u_{ij}$  in each estimating equation corresponding to firm *i* in country *j* is assumed to have a country-specific effect  $\mu_j$  and an idiosyncratic component  $\gamma_{ij}$ . When  $\mu_j$  is assumed to be a fixed parameter, estimation is done using the method of instrumental variables (2-stage least squares) applied to a fixed effects model. When  $\mu_j$  is treated as stochastic, we use the instrumental variables analogue of the random effects model, Baltagi's (1981) error-components 2-stage least squares (EC2SLS) estimator.<sup>17</sup> We report both fixed effects 2SLS and EC2SLS estimations. Analogously to Hausman and Taylor's (1981) and Amemiya and MaCurdy's (1986) estimators for endogenous random effects, we use as instruments our measures of competition (market structure and 10% price test) interacted with the 25 country dummies. That is, where  $C_j$  is the country dummy (column vector) for country *j*,  $Z$  is a measure of competition (also a column vector), and  $*$  denotes entry-wise matrix multiplication (Hadamard or Schur product), we have, for each of our competition measures, a 24-column instrument matrix  $\tilde{\mathbf{Z}} = [Z * C_2 \dots Z * C_{25}]$ . The first interaction term is dropped because of collinearity with the uninteracted  $Z$  present in the equations (1)-(3). As Baltagi (1995, pp. 118-19) puts it in his discussion of the Hausman-Taylor and Amemiya-MaCurdy estimators, we are taking advantage of the panel-like nature of our dataset by using instruments from *within* the model. Each competition measure is used 25 times, once as an exogenous variable in equations (1)-(3) and 24 times as an instrument.

Another way of describing our strategy is in terms of identification and exclusion restrictions and the underlying structural model. The parameters in our performance and restructuring equations (1)-(3) are assumed to hold for all countries, i.e., we are pooling across countries. The soft budget constraint and business environment faced by firms is, however, assumed to vary across countries – e.g., poor

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<sup>17</sup> The intuition behind the EC2SLS estimator is that, where the standard random effects estimator is a weighted average of the between and within estimators, the EC2SLS estimator is a weighted average of 2SLS estimation of a between estimator and 2SLS estimation of a within estimator. See Baltagi (1995), chapter 7.

performance by a firm in one country may be less likely to generate tax and utility arrears than if it operated in another country. It may also be the case that the way in which features of the business environment affect firm performance differ across countries. Using competition measures (which enter directly into equation (1) and which through equation (2) indirectly affect performance via restructuring) interacted with country dummies as instruments is, in effect, modelling this differential behaviour across countries. By pooling across countries in our performance and restructuring equations but allowing the soft budget constraint and business environment parameters to vary across countries, we are in effect treating entrepreneurs as similar across countries but governments as different. The validity of the interaction effects as instruments can be tested using a test of overidentifying restrictions, and we do so.

The full set of instruments available are thus the country-competition interaction effects and the *pressure* variables that appear as determinants of restructuring in equation (2). Equation (1) is identified through the exclusion of the country-competition interaction effects and the *pressure* variables; equation (2) is identified by the exclusion of the interaction effects and the performance variables. However, because our prior is that defensive restructuring is spurred by poor performance but we do not have the instruments available to estimate equation (3) with  $y$  as an explanatory variable, the defensive restructuring structural equation is unidentified. Estimation of the defensive restructuring equation without performance as an explanatory variable means equation (3) is in effect partially a reduced form equation, and the estimated coefficients need to be interpreted in this light.<sup>18</sup> Similarly, the *a priori* exclusion of  $y$  as an explanatory variable in the restructuring equation (2) means it is identified, but this exclusion may be questioned. An additional issue involving equation (2) concerns the *pressure* variables: one may question whether a response to a question on whether the firm “faces pressure” is exogenous.<sup>19</sup> We will also see that the results for equation (2) itself suggest caution in the treatment of  $r$  in equation (1). A separate problem is that ideally restructuring activity should be measured *prior* to the period in which performance is measured, but all we have is restructuring and performance measured contemporaneously. Because of these concerns, we therefore estimate equation (1) in two forms, with and without  $r$  as an explanatory variable. When  $r$  is included as an explanatory variable, the instrument set consists of the country-competition interaction terms and the *pressure* variables; when  $r$  is excluded from the estimation of equation (1), only the country-competition interaction terms are used as instruments.

Our estimations are presented along with several diagnostic tests. The benchmark estimation is 2SLS fixed effects. For this estimation we report the Davidson-MacKinnon (1993) test of overidentifying restrictions, a test of the joint hypothesis that the instruments are valid (i.e., uncorrelated with  $\epsilon_{ij}$ ) and that none of the instruments should have been included in the set of regressors and were not. We report the results of a standard fixed effects ordinary least squares (OLS) regression, accompanied by a specification test of OLS versus 2SLS, a Durbin-Wu-Hausman

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<sup>18</sup> That is, the reported coefficients include both direct and indirect impacts, the latter operating via firm performance.

<sup>19</sup> Some evidence that this is a legitimate concern come from 2SLS estimation of equation (1), omitting *sbc* and *be*, and instrumenting  $r$  with the *pressure* variables only. This equation fails the Davidson-MacKinnon test of overidentifying restrictions at a p-value of 1%.

(DWH)  $\chi^2$  test with degrees of freedom equal to the number of endogenous variables. Failure of this test indicates inconsistency of OLS.

A DWH specification test is also used to test the EC2SLS results versus 2SLS, i.e., a test of fixed vs. random effects. A DWH  $\chi^2$  test statistic may sometimes be negative, a finite-sample problem that is outside the model structure; a suggested interpretation is to treat the result as zero and not reject the null (Greene 2000, p. 386). Lastly, both the 2SLS and EC2SLS results are accompanied by an F-test of the significance of the instruments in the first-stage regressions (Bound et al., 1997). High values of the F-statistic would indicate that our instruments are well correlated with the endogenous variables that appear on the right hand side. We shall see that the correlations are weaker in the 2SLS fixed effects specifications, which can explain why *sbc* and *be* have low levels of significance in the second-stage regression. The stronger first-stage correlations in the random effects specification are driven by the fact that the instrument set used in the EC2SLS estimator in effect includes, in addition to the country-interacted competition variables, the country dummies themselves,<sup>20</sup> and there is considerable cross-country variation in both *sbc* and *be*.

## 4. Results

### *Performance*

Tables 14 and 15 report results for performance measured by the growth of sales and of productivity, respectively. When interpreting the results, it is important to recall that the average growth of sales and of productivity of firms was close to zero and only just over 40% of firms reported positive sales growth over the preceding three years. The findings are striking.

[Tables 14 and 15 here]

The nature of competition in the product market has important effects on the performance of firms. There are strong indications of a non-monotonic relationship with performance. Sales and productivity growth were higher in firms facing between one and three competitors in the market for their main product than in firms that either faced no competition at all or that faced more than three competitors. The positive effect of an intermediate degree of product market competition is economically as well as statistically significant. Firms facing between one and three competitors reported growth between 10% and 13% higher than other firms. Firms reporting more than three competitors have higher sales growth than monopolists, though not significantly so.

The second indication that competition effects are important comes from the positive sign on the variable for firms reporting that sales would fall only slightly or not at all in response to a 10% price rise: these firms saw sales growth between 10% and 15% higher than others. In relation to productivity growth, we find a clear inverse-U shaped pattern with firms reporting that sales would fall slightly in response to a 10% price rise having significantly higher productivity growth (between 6% and

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<sup>20</sup> These are unavailable as instruments in the fixed effects 2SLS estimator because they appear as explanatory variables.

8%) than either firms reporting a high sensitivity of demand or those reporting complete insensitivity of demand.

New product restructuring is an important determinant of sales growth and as we shall see below, the pressure from foreign competitors and from customers to introduce new products are both significant determinants of restructuring. This highlights a third channel through which competition effects are playing a role in the performance regressions.

Controlling for other factors, there is no significant relationship between privatization and performance. That is, state-owned firms show no significant difference in their sales or productivity growth performance as compared with privatized firms that were formerly state-owned. New private firms have significantly higher sales growth and lower productivity growth. It is, of course, impossible to tell how much of the positive relationship between new entry and sales growth is due to “survivor bias”, namely the fact that the only new firms observed are the successful ones. The weaker productivity growth of new entrants is likely to indicate that such firms have been attracting labour faster than their sales have been growing. Unfortunately, the data is not available to examine the relative productivity *level* of new entrants as compared with incumbent firms.

The prevalence of soft budget constraints has a negative impact on the sales growth of firms, but this is significant only in the OLS fixed effects estimation. The business environment has a positive impact, though this is significant only in the OLS fixed effects (at the 5% level) and in the random effects EC2SLS specification (at the 5% level in the productivity equations, and nearly so in the sales equations). There is no systematic relationship between sector or urbanization and performance. As explained earlier, size of firm is included only in the sales regression and is insignificant.

The diagnostic tests reported in Tables 14 and 15 are broadly reassuring about the validity of the estimation procedures implemented.<sup>21</sup> The F-test of fixed effects confirms the joint significance of country effects. The more conservative procedure is to estimate via fixed rather than random effects and we begin by comparing fixed effects estimation using the OLS estimator with the 2SLS estimator. Our concern to deal with the endogeneity of the soft budget constraint, business environment and restructuring variables motivated the 2SLS estimation. As noted in section 3, two issues arise. The first question is whether the instruments are correlated with the endogenous variables. The F-tests of the significance of the instruments in the first stage regressions suggest that there might be cause for concern about the instruments, particularly in the case of the business environment variable. The second concern is to ascertain whether the instruments are valid in the sense that they are uncorrelated with the idiosyncratic error and that none of the instruments should have been included in the set of regressors. This test of overidentification is passed by a considerable

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<sup>21</sup> An additional test not reported in the tables was to see whether the results are sensitive to how *r*, *sbc* and *be* are constructed using principal components. We reestimated the performance equations using, in place of these constructed variables, the single variable given the greatest weight by the principal components procedure, namely whether or not the firm had upgraded a product line, whether it had a problem with tax arrears to central government, and whether organized crime was a problem. The results of the estimations were similar to those reported in the tables.

margin. The DWH tests of the OLS versus the instrumental variables (i.e., 2SLS) specifications suggest there is no significant difference between the two – but this may simply reflect the relative weakness of the instruments.

Since a random effects estimation is more efficient, we tested whether it was possible to accept a random effects (EC2SLS) versus a fixed effects (2SLS) model. The test passed by a large margin in one of the four cases, failed by a large margin in a second case, and generated negative  $\chi^2$  statistics in the other two cases. Although as noted in section 3 the negative  $\chi^2$  statistics can be interpreted as allowing us to accept the hypothesis that the EC2SLS estimation is consistent, the results for this DWH test generally appear to be sensitive to the regression specification and should be interpreted with caution. The F-tests of the instruments in the first-stage regressions are passed much more convincingly in the random effects model. This is true of both the soft budget constraint and the business environment variables and is not surprising since we hypothesized an important country effect in each case; it also helps explain why the latter is significant in the random effects specifications but not in the fixed effects specifications.

We can summarize the implications of the testing procedure for performance as follows. The competition effects in the sales growth and productivity equations are very robust. Our a priori hypothesis about the likely endogeneity of the soft budget constraint and business environment variables in the sales growth equation is also confirmed – in both cases the effects become less significant once a 2SLS procedure is implemented.

### *Restructuring*

Table 16 reports the results of the equation for new product restructuring. As reported in Table 3, nearly 30% of firms reported that they had introduced a major new product line. The regression results confirm that larger firms are much more likely and those in the service sector much less likely to have engaged in new product restructuring.

[Table 16 here]

In addition, the following features emerge from the results. State-owned firms are less likely to engage in new product restructuring.<sup>22</sup> There is no systematic difference between privatized and new firms in this respect.

Although the number of competitors is not a significant determinant of the decision to innovate, we can nevertheless observe important competition effects. Market power as measured by the 10% test is an important positive determinant of new product development, but so is pressure from both foreign competitors and from customers (though pressure from domestic competitors is insignificant).<sup>23</sup> Domestic

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<sup>22</sup> We cannot exclude the possibility that firms with more potential to restructure in this way were more likely to have been privatized.

<sup>23</sup> For new entrants in particular, there is a possible endogeneity associated with market power as measured by the 10% test. Compared with an average reported mark-up of 17 percentage points, a previous decision to develop a new product or market was associated for new entrants with an increased mark-up of 2.7 percentage points, and a decision to upgrade an existing product with an

and foreign competition appear to be only imperfect substitutes. Soft budget constraints are a significant disincentive to new product restructuring in most specifications. The quality of the business environment is not significantly related to innovation.

The diagnostic tests suggest that the restructuring equation be interpreted with caution. In particular, even the conservative fixed effects 2SLS estimation is not completely satisfactory. There is evidence that the instruments are relatively weak in the first stage regressions, and the failure of the Davidson-MacKinnon test indicates either that they are invalid or that they should have been included as regressors in the equation.<sup>24</sup> Whilst we can accept the random versus fixed effects specification, we would still counsel caution. It is for this reason that we presented the performance regressions both with and without the restructuring variable.

Finally, table 17 reports the results for defensive restructuring. These are very interesting, because the impact of ownership and competition are the opposite of those for new product restructuring. State-owned firms are very significantly *more* likely to have engaged in defensive restructuring. We cannot exclude the possibility that this may reflect the fact that privatized firms undertook defensive restructuring earlier in the reform process – i.e., before the sample period. Although the number of competitors is insignificant, firms with market power as measured by the 10% test are significantly *less* likely to have engaged in defensive restructuring. The effects of size and service sector presence are similar to those for new product restructuring.

[Table 17 here]

Controlling for these other factors, soft budget constraints are associated in most specifications with *more* defensive restructuring. This suggests we may be having some difficulty identifying precisely how soft budget constraints work: they may be a way in which poorly-performing firms continue to survive, but defensive restructuring may be part of the price the state extracts for its continued support. The business environment variable is negative in the OLS estimation – i.e., a better business environment is associated with less defensive restructuring but is positive in the 2SLS estimation (fixed effects). This may suggest that firms doing more defensive restructuring are particularly critical of the business environment they face, but when endogeneity is accounted for, a better business environment promotes more defensive restructuring. However, the diagnostic statistics suggest that the defensive restructuring equation is problematic. The Davidson-McKinnon test is failed and, moreover, it is not possible to accept the random versus the fixed effects specification.

We can summarize our findings for the determinants of restructuring. We have less confidence that problems of endogeneity have been dealt with satisfactorily in the restructuring equations as compared with the performance equations. This makes us

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increased mark-up of 2.1 percentage points (the former statistically significant at 5% and the latter at 10%).

<sup>24</sup> The fact that the same instrument set passed the Davidson-MacKinnon test in the sales and productivity growth equations suggests that the problem here is the omission of these variables from the restructuring equation rather than their lack of validity as instruments. This in turn can be interpreted as suggesting that the impact of competition on restructuring varies by country, either directly or indirectly because we have excluded performance as an explanatory variable. We do not, however, explore this further here.

less sure about the way in which soft budget constraints and the business environment affect restructuring. Nevertheless, the competition and ownership effects seem to be robust to the estimation method. New product restructuring increases with market power and firms subjected to pressure from foreign competitors and suppliers do more new product restructuring. By contrast, firms that do not face much competition do less defensive restructuring. State-owned firms do less new product but more defensive restructuring. However, this could be a cohort effect rather than an ownership effect.

## 5. Concluding remarks

An important finding of this study is the power of competition in influencing performance.<sup>25</sup> It appears much more important than the effect of ownership *per se*. We did not expect to find it so clearly, and we did not expect to find evidence of a non-monotonic effect. In the growth of sales and productivity, as well as in new product restructuring, the presence of some market power together with competitive pressure, especially from foreign suppliers, strongly and robustly enhances performance. New product restructuring is in turn an important contributor to firm performance, so this non-monotonic character of competition (“some market power but not too much”) appears to have both direct and indirect effects. These findings are consistent with the presence of a Schumpeterian-type competitive process at work in the transition economies, albeit one accompanied by considerable disruption and turbulence (see Carlin, Haskel and Seabright, 2001). Consistent with the findings of Bresnahan and Reiss (1991), this evidence suggests that it is the presence of two or three seriously competing firms that generates competitive conduct. Moreover, transition is an investment-intensive process and the descriptive evidence from the survey indicates the presence of financing constraints. This supports the interpretation that retained profits – in the presence of competitive pressure – are important for financing the restructuring that helps firms to succeed.

The presence of soft budget constraints appears to have a broadly negative impact, and a favourable business environment a broadly positive impact, on firm performance. These effects are not so econometrically robust as the competition effect, though this is unsurprising since they are country-level effects and significantly endogenous.

Turning to policy implications, our findings strongly reinforce the message that unchallenged monopoly is a drain on performance. It is certainly more important to ensure that monopolists face at least some challenge than to try refereeing the necessarily confused process of rivalry among the few. It is true that at the same time as the importance of competition is becoming more apparent, so are the difficulties in the way of bringing about such a process effectively (see Fingleton et al., 1996). But our results help to illuminate the many ingredients needed for the competitive process to work. Not only must there be a market structure in which firms face rivalry rather than secure monopoly but also: an end to soft budget constraints, removal of the obstacles facing new entrants, and financial systems that can support major investments in restructuring.

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<sup>25</sup> Strictly speaking this is perceived competition, and interesting questions arise about the robustness of the link between perceived competition and the objective character of the market environment, questions we cannot pretend to have given adequate consideration here.

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## Appendix 1:

### Decomposing labour productivity:

Consider an economy with two sectors, A and B. Let  $P_A$  be labour productivity in sector A, and  $P$  be the aggregate productivity in the economy. Then

$$P \equiv \frac{(\text{production}(A) + \text{production}(B))}{(\text{employment}(A) + \text{employment}(B))}$$

which can also be written as

$$P \equiv P_A * \frac{\text{employment}(A)}{\text{employment}(A) + \text{employment}(B)} + P_B * \frac{\text{employment}(B)}{\text{employment}(A) + \text{employment}(B)}$$
$$\equiv P_A * S_A + P_B * S_B$$

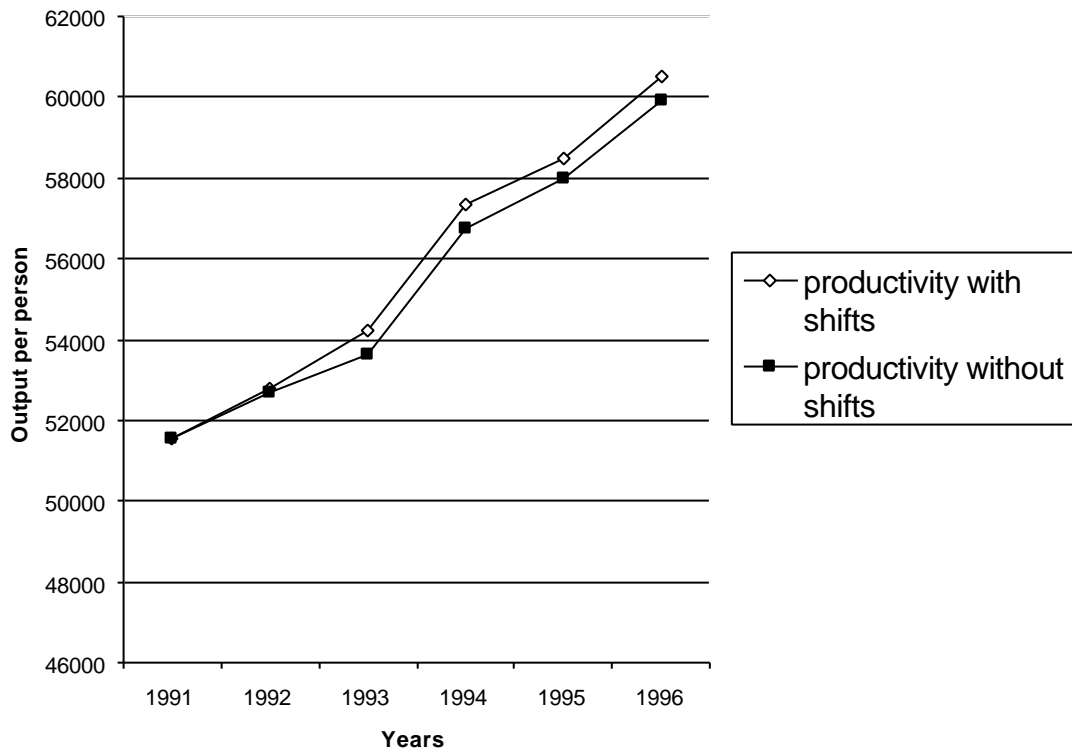
Denote the change in productivity between period  $t-1$  and period  $t$  as  $\Delta(P) \equiv P^t - P^{t-1}$ .

Then it follows straightforwardly that

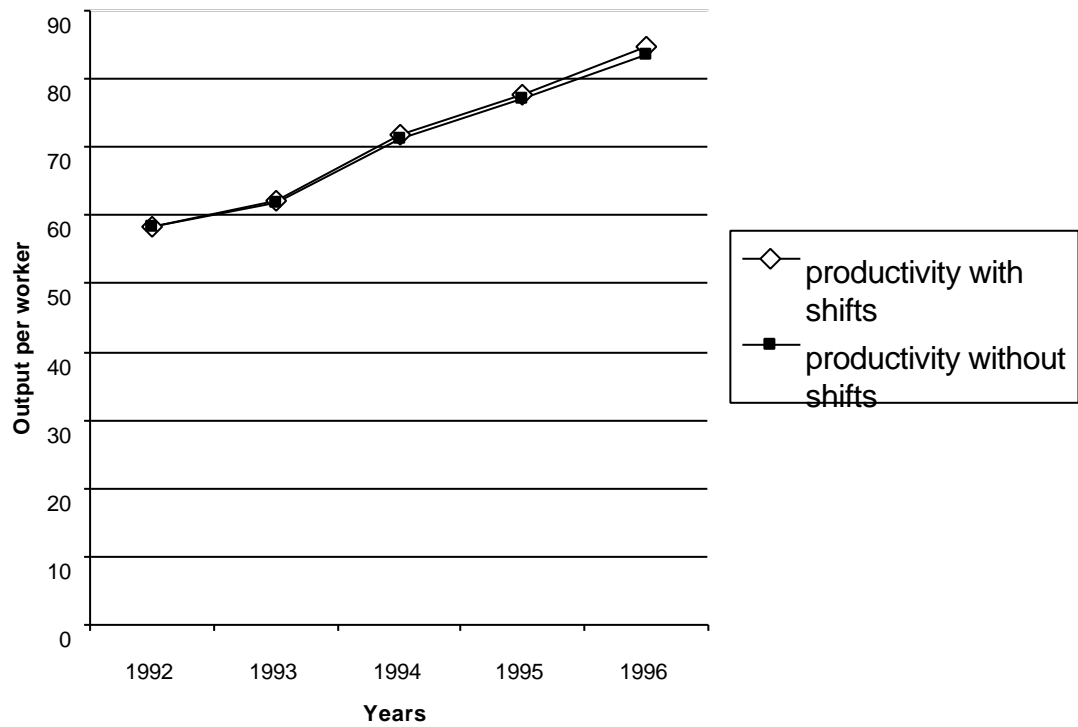
$$\Delta(P) \equiv S_A \Delta P_A + S_B \Delta P_B + P_A^{t-1} \Delta S_A + P_B^{t-1} \Delta S_B$$

where the first two terms constitute the within-sector component and the last two constitute the between-sector component.

**Figure 1a: Labour Productivity (Austria)**



**Figure 1b: Labour productivity (Poland)**



**Table 1. Number of firms by size, sector and region.**

(In proportion of firm type, %)

		<b>Manu- facturing</b>	<b>Other industry</b>	<b>Retail &amp; wholesale trade</b>	<b>Other services</b>	<b>Total</b>
Full sample	All firms	1129 (34.2)	377 (11.4)	1049 (31.7)	750 (22.7)	3305 (100)
	Micro	176	71	504	221	972 (29.4)
	Small	210	94	292	168	764 (23.1)
	Medium	374	144	186	214	918 (27.8)
	Large	369	68	67	147	651 (19.7)
CEB		317 (28.5)	90 (8.1)	361 (32.6)	340 (30.7)	1108 (100)
SEE		334 (44.6)	69 (9.2)	209 (27.9)	137 (18.3)	749 (100)
Russia		131 (32.3)	65 (16.0)	155 (38.1)	55 (13.6)	406 (100)
Western CIS		116 (37.3)	47 (15.1)	104 (33.4)	44 (14.2)	311 (100)
Southern CIS		125 (28.6)	55 (12.6)	164 (37.5)	93 (21.3)	437 (100)
Central Asia		106 (36.1)	51 (17.4)	56 (19.1)	81 (27.6)	294 (100)

Note. Micro firms (employment < 10); small firms (employment 10-49); medium firms (50-199), large (>200). "Other industry" comprises mining, construction and electricity; "other services" comprises transport, financial, personal, business and miscellaneous services. The allocation of countries to regions is shown in Table 5.

**Table 2. Real sales and productivity growth by ownership of firm**

Full sample (non-agricultural businesses), mean log 3-year sales and productivity growth

		<b>Old firms</b>		<b>New firms</b>	<b>All firms</b>
		<b>SOE</b>	<b>Privatized</b>		
Number of firms (in proportion of firm type, %)		529 (16.0)	976 (29.5)	1800 (54.5)	3305 (100)
Sales growth		-0.010	-0.020	0.062	0.026
Number of firms, in proportion of firm type (%)	Increase in sales	39.7	44.8	48.9	46.2
	Zero growth	30.0	20.1	24.1	23.9
	Decline in sales	30.6	35.1	26.8	29.9
		100	100	100	100
Productivity growth		0.089	0.082	-0.030	0.022

Note: The question asked was, "By what percentage have your sales changed in real terms over the last three years?". "Productivity" growth is calculated from the change in sales and in employment reported over the last three years.

**Table 3. Enterprise Restructuring Activities by Ownership Type and Size of Firm**

(In proportion of firm type, %)

	Old firms		New firms	All firms
	SOE	Privatized		
Employment decreases	47.4	44.2	17.9	30.4
Closure of plant	11.2	10.9	5.6	8.0
Employment increase	15.1	22.3	37.7	29.6
Opening of new plant	15.7	22.7	19.1	19.6
New product line	27.4	33.6	28.4	29.8
Upgrade	42.3	43.1	37.6	40.0
Change supplier	16.6	21.1	21.3	20.5
Change customer	17.6	27.3	24.1	24.0
Change main bank	15.3	18.3	14.3	15.6
Change organizational structure	7.6	12.6	8.4	9.5
	Micro	Small	Medium	Large
Employment decreases	17.3	24.9	38.0	45.8
Closure of plant	3.7	5.9	10.7	13.2
Employment increase	27.8	39.7	27.3	23.5
Opening of new plant	11.2	18.5	23.7	27.8
New product line	22.1	28.9	31.4	39.9
Upgrade	31.1	38.5	42.7	51.2
Change supplier	21.4	20.0	20.8	19.4
Change customer	24.7	24.3	22.5	24.4
Change main bank	8.4	18.2	18.6	19.2
Change organizational structure	5.5	11.2	10.9	11.3

Notes: All restructuring indicators refer to changes in the previous three years. Employment decrease/increase refers to a decrease/increase of employment of more than 10%. "New product line" refers to the successful development of a major new product line. "Upgrade" refers to the upgrading of an existing product line. "Change supplier"; "Change customer" is change of identity of main supplier/main customers (>20% of sales). "Change organizational structure" means firm has had a completely new organizational structure. Size of firms as defined in Table 1.

**Table 4. Managerial Turnover by Ownership Type**

(In proportion of firm type, %)

	Old firms			New firms	All firms
	SOE	Privatized			
		Insider-owned	Outsider-owned		
Changed general manager in past 3 years	37.6	21.0	30.3	10.9	20.2
Of which, new general manager from outside the firm	13.8	7.3	13.8	3.0	7.4

Note: Insider owned firms are defined as those that are neither state-owned nor new private firms and answered "Its managers" or "Its workers" to the question, "Which of the following best describes the type of owner which now has the largest stake in your firm?" Outsider owned firms are defined by those privatized firms that are not insider owned.

**Table 5. Construction of soft budget constraint measure**

Component	Eigenvalue	Difference	Proportion	Cumulative Proportion
1	1.999		0.815	0.815
2	0.338	1.662	0.138	0.953
3	0.116	0.221	0.048	1.000
Survey question: How significant are your firm's overdue payables (original scale: 1-4)				Eigenvector of 1 <sup>st</sup> component (weighting)
to central government?				0.640
to local government?				0.575
to utilities?				0.510

**Table 6. Construction of business environment measure**

Component	Eigenvalue	Difference	Proportion	Cumulative Proportion
1	4.357		0.341	0.341
2	1.660	2.696	0.130	0.472
3	1.398	0.263	0.109	0.580
4	1.058	0.340	0.083	0.662
5	0.892	0.166	0.070	0.732
6	0.811	0.081	0.063	0.795
7	0.749	0.062	0.059	0.854
8	0.629	0.120	0.049	0.903
9	0.476	0.153	0.037	0.940
10	0.399	0.077	0.031	0.972
11	0.365	0.034	0.029	1.000
Survey question: How problematic are these factors for the operation and growth of your business? (original scale: 1-4)				Eigenvector of 1 <sup>st</sup> component (weighting)
Organized crime/mafia				0.444
Corruption				0.399
Street crime/theft/disorder				0.395
Exchange rate				0.330
Inflation				0.309
Policy instability/uncertainty				0.308
Financing				0.222
Tax regulations				0.218
Infrastructure (e.g. telephone, electricity, water, roads, land)				0.177
High rate of taxation				0.175
Business licensing				0.172

**Table 7. Country rankings for soft budget constraint and business environment variables**

Soft budget constraint (“hardest” first)		Rank	Business environment (“best” first)		Rank
Estonia	CEB	1	Estonia	CEB	1
FYR Macedonia	SEE	2	Slovenia	CEB	2
Belarus	W-CIS	3	Hungary	CEB	3
Hungary	CEB	3	Armenia	S-CIS	4
Lithuania	CEB	5	Rep. Srpska	SEE	5
Bulgaria	SEE	6	Poland	CEB	6
Uzbekistan	C-ASIA	6	Uzbekistan	C-ASIA	7
Kazakhstan	C-ASIA	8	Slovakia	CEB	8
Poland	CEB	9	Latvia	CEB	9
Latvia	CEB	10	Czech Republic	CEB	10
Albania	SEE	11	Azerbaijan	S-CIS	11
Kyrgyzstan	C-ASIA	11	FYR Macedonia	SEE	11
Bosnia	SEE	13	Bosnia	SEE	13
Romania	SEE	13	Croatia	SEE	13
Moldova	S-CIS	15	Bulgaria	SEE	15
Russia	RUSSIA	15	Belarus	W-CIS	16
Slovakia	CEB	15	Lithuania	CEB	16
Ukraine	W-CIS	15	Kazakhstan	C-ASIA	18
Slovenia	CEB	19	Romania	SEE	18
Czech Republic	CEB	20	Russia	RUSSIA	18
Armenia	S-CIS	21	Ukraine	W-CIS	18
Rep. Srpska (Bosnia-Herzegovina)	SEE	22	Georgia	S-CIS	22
Croatia	SEE	23	Albania	SEE	23
Azerbaijan	S-CIS	24	Kyrgyzstan	C-ASIA	24
Georgia	S-CIS	25	Moldova	S-CIS	25

Note: For explanation of the construction of the soft budget constraint and business environment variables on which these rankings are based, see text.



**Table 8. Soft budget constraint and business environment variables by ownership, size and region.**

Soft budget constraint, higher score is “softer”. Business environment, higher score is “better”. Both measures lie in the range [0, 1].

	<b>Soft budget constraint</b>	<b>Business environment</b>
<b>All firms</b>	0.18	0.48
<b>Old firms:</b>		
SOEs	0.24	0.53
Insider-privatized	0.21	0.46
Outsider-privatized	0.23	0.48
<b>New firms</b>	0.13	0.46
<b>Micro</b>	0.14	0.45
<b>Small</b>	0.15	0.47
<b>Medium</b>	0.20	0.47
<b>Large</b>	0.23	0.52
<b>CEB</b>	0.14	0.58
<b>SEE</b>	0.18	0.45
<b>Russia</b>	0.18	0.38
<b>Western CIS</b>	0.15	0.40
<b>Southern CIS</b>	0.31	0.43
<b>Central Asia</b>	0.13	0.43

**Table 9. Competition in the Product Market**

	Old firms		New firms	All firms
	SOE	Privatized		
<b>Panel A. Strength of competition</b> (in proportion of firm type, %)				
Zero competitors	25.6	8.8	5.2	9.5
One to three competitors	18.9	13.2	11.9	13.4
More than three	55.0	77.9	82.9	77.1
<b>Panel B. 10% price test</b> (in proportion of firm type, %)				
Many customers would switch to other suppliers	25.9	36.3	39.3	36.3
Customers would stay but sales would fall a lot	23.3	26.9	24.8	25.2
Customers would stay but sales would fall slightly	26.3	25.7	24.9	25.3
No change in sales	24.5	11.1	11.0	13.2
<b>Panel C. Mark up of price over operating costs</b> (% , median for each type of firm)				
Markup	10	10	15	12
<b>Panel D. Pressure from domestic and foreign competitors in decisions to develop new products and markets</b> (in proportion of firm type, %)				
Domestic competition	18.4	22.5	27.5	24.6
Foreign competition	17.5	21.1	15.4	17.4
	<b>Micro</b>	<b>Small</b>	<b>Medium</b>	<b>Large</b>
<b>Panel A. Strength of competition</b> (in proportion of firm type, %)				
Zero competitors	4.8	7.2	12.4	15.1
One to three competitors	8.9	10.9	16.1	19.4
More than three	86.3	81.9	71.5	65.5
<b>Panel B. 10% price test</b> (in proportion of firm type, %)				
Many customers would switch to other suppliers	43.9	38.1	30.3	31.1
Customers would stay but sales would fall a lot	25.1	24.6	25.8	25.3
Customers would stay but sales would fall slightly	21.1	24.4	28.9	27.8
No change in sales	9.9	12.9	15.0	15.7
<b>Panel C. Mark up of price over operating costs</b> (% , median for each type of firm)				
Markup	15	15	10	10
<b>Panel D. Pressure from domestic and foreign competitors in decisions to develop new products and markets</b> (in proportion of firm type, %)				
Domestic competition	31.6	23.6	22.0	18.9
Foreign competition	15.4	14.1	16.9	24.6

Note. The question asked in Panel A was “Thinking of your firm’s major product line in the domestic market, how many competitors do you face?”; in Panel B: “If you were to raise prices of your main product line 10% above their current level (after allowing for any inflation and assuming that your competitors maintained their current prices), which of the following would best describe the result?”; in Panel C: “Considering your main product line, by what margin does your sales price exceed your operating costs (i.e. the cost of material inputs plus wage costs)?”; in Panel D, the proportion of each type of firm reporting that pressure from domestic or foreign competitors is “very important” is shown. Size of firms as defined in Table 1.

**Table 10. Sources of Finance for Investment**

(In proportion of firm type, %)

	Old firms			New firms	All firms
	SOE	Privatized			
		Insider-owned	Outsider-owned		
Internal funds (retained earnings)	51.6	67.8	58.7	62.1	60.2
The state	22.6	3.2	1.4	0.5	4.4
Bank loans	6.8	9.7	9.9	6.8	7.7
Sale of new equity	3.2	5.3	5.9	6.8	5.9
Family	0.4	0.3	3.4	10.9	6.8

Note: The question asked was, “What proportion of your firm’s fixed investment has been financed from each of the above sources over the past year?” The residual “other” category is not reported.

**Table 11. Financial Constraints**

Mean score by type of firm. Scale is 4 for “major obstacle” to 1 for “no obstacle” (ranked by seriousness of obstacle by “All firms”).

	Old firms			New firms	All firms
	SOE	Privatized			
		Insider-owned	Outsider-owned		
High interest rates	3.14	3.39	3.31	3.26	3.26
Access to long-term bank loans	2.67	2.90	2.67	2.80	2.76
Paperwork/bureaucracy	2.31	2.39	2.40	2.52	2.45
Collateral	2.33	2.40	2.36	2.45	2.41
Poor credit information on customers	2.18	2.25	2.23	2.26	2.24
Access to lease finance	2.21	2.44	2.12	2.20	2.20
Access to equity/investors/partners	2.17	2.24	2.12	2.17	2.16
Banks lack money to lend	2.21	2.22	2.12	2.20	2.18
Access to connections with banks/financial institutions	1.97	2.04	2.04	2.26	2.15
Access to export credit	2.19	2.29	2.17	2.06	2.13
Access to foreign banks	2.07	2.01	2.02	2.19	2.12
Corruption of bank officials	1.62	1.67	1.63	1.91	1.79

Note: the question asked was “How problematic are these different financing issues for the operation and growth of your business?”

**Table 12. Construction of new products restructuring measure  $r$** 

Component	Eigenvalue	Difference	Proportion	Cumulative Proportion
1	0.336		0.439	0.439
2	0.167	0.169	0.218	0.657
3	0.145	0.022	0.189	0.846
4	0.118	0.027	0.154	1.000
Survey question: Has your company undertaken any of the following initiatives in the last three years?				Eigenvector of 1 <sup>st</sup> component (weighting)
Upgrading of existing product line				0.693
Successful development of major new product line				0.622
Opening of new plant				0.298
Quality accreditation (ISO 9000)				0.212

**Table 13. Construction of defensive restructuring measure  $d$** 

Component	Eigenvalue	Difference	Proportion	Cumulative Proportion
1	0.235		0.551	0.551
2	0.126	0.109	0.296	0.846
3	0.066	0.061	0.154	1.000
Survey question: Has your company undertaken any of the following initiatives in the last three years?				Eigenvector of 1 <sup>st</sup> component (weighting)
A reduction in the company workforce of greater than 10%				0.901
Discontinuation of at least one product line				0.368
closure of at least one existing plant				0.231

**Table 14. Performance regressions: sales growth**

Dependent variable: real sales growth over the past 3 years					No. obs=2245
Estimation method:	Fixed effects, OLS	Fixed effects, 2SLS	Fixed effects, 2SLS	Random effects, EC2SLS	Random effects, EC2SLS
* = significant at 5% level ** = significant at 1% level	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)
Number of competitors, omitted is “zero”					
1-3 competitors	0.104* (0.043)	0.098* (0.044)	0.114** (0.045)	0.103* (0.044)	0.125** (0.045)
>3 competitors	0.039 (0.037)	0.044 (0.039)	0.035 (0.040)	0.051 (0.039)	0.046 (0.039)
Market power (10% test), omitted is “many customers would change suppliers”					
Sales would fall a lot	0.034 (0.026)	0.030 (0.027)	0.041 (0.027)	0.032 (0.027)	0.043 (0.027)
Sales would fall slightly	0.113** (0.026)	0.100** (0.028)	0.131** (0.027)	0.099** (0.028)	0.131** (0.027)
No change in sales	0.132** (0.034)	0.118** (0.037)	0.152** (0.037)	0.118** (0.036)	0.150** (0.036)
New product restructuring	0.086** (0.009)	0.146** (0.032)	omitted	0.150** (0.029)	omitted
Ownership, omitted is “privatized”					
State ownership	-0.034 (0.033)	-0.019 (0.034)	-0.056 (0.034)	-0.018 (0.034)	-0.058 (0.034)
New entrant	0.106** (0.026)	0.104** (0.029)	0.111** (0.029)	0.105** (0.028)	0.110** (0.028)
Soft budget constraint	-0.135** (0.039)	-0.069 (0.157)	-0.209 (0.158)	-0.052 (0.143)	-0.246 (0.139)
Business environment	0.157** (0.051)	0.162 (0.176)	0.196 (0.158)	0.248* (0.144)	0.338* (0.164)
Test of joint significance of SBC and business environment	F(2,2207) =11.6** p=0.000	$\chi^2(2)=1.23$ p=0.542	$\chi^2(2)=2.67$ p=0.264	$\chi^2(2)=3.40$ p=0.183	$\chi^2(2)=7.92$ p=0.019*
Log employment	0.005 (0.008)	-0.003 (0.009)	0.016 (0.008)	-0.003 (0.009)	0.017* (0.008)
Services	0.039 (0.022)	0.070** (0.028)	-0.006 (0.023)	0.072** (0.027)	-0.007 (0.023)
Big city	0.041* (0.021)	0.034 (0.024)	0.052* (0.024)	0.033 (0.023)	0.048* (0.023)
constant	-0.326** (0.064)	-0.400** (0.125)	-0.247* (0.127)	-0.473** (0.116)	-0.325** (0.110)
R-square (overall)	0.105	0.104	0.067	0.105	0.065
F-test of fixed effects	F(24,2207) =5.82 p=0.000	F(24,2207) =5.24 p=0.000	F(24,2208) =5.71 p=0.000	n.a.	n.a.
DWH statistic	$\chi^2(3)=4.36$ p=0.225	n.a.	n.a.	$\chi^2(13)=54.2$ p=0.000	$\chi^2(12) < 0$
F-test of significance of IVs in 1 <sup>st</sup> stage regressions	n.a.	F(122,2087) = stat (p)	F(120,2090) = stat (p)	F(147,2087) = stat (p)	F(144,2090) = stat (p)
Soft budget constraint		=1.18 (0.088)	=1.19 (0.088)	=1.31 (0.010)	=1.35 (0.005)
Business environment		=1.90 (0.000)	=1.14 (0.145)	=3.03 (0.000)	=2.52 (0.000)
New product restructuring		=1.50 (0.000)		=1.54 (0.000)	
Davidson-MacKinnon test of overidentifying restrictions	n.a.	$\chi^2(120)=122$ p=0.434	$\chi^2(118)=123$ p=0.348	n.a.	n.a.

**Table 15. Performance regressions: productivity growth**

Dependent variable: constructed from real 3-year sales and employment growth					No. obs=2245
Estimation method:	Fixed effects, OLS	Fixed effects, 2SLS	Fixed effects, 2SLS	Random effects, EC2SLS	Random effects, EC2SLS
* = significant at 5% level ** = significant at 1% level	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)
Number of competitors, omitted is “zero”					
1-3 competitors	0.110** (0.039)	0.116** (0.041)	0.125** (0.041)	0.118** (0.040)	0.129** (0.040)
>3 competitors	0.035 (0.034)	0.052 (0.036)	0.045 (0.036)	0.054 (0.035)	0.047 (0.036)
Market power (10% test), omitted is “many customers would change suppliers”					
Sales would fall a lot	0.026 (0.024)	0.021 (0.024)	0.028 (0.024)	0.023 (0.024)	0.029 (0.024)
Sales would fall slightly	0.077** (0.024)	0.062* (0.026)	0.079** (0.025)	0.063** (0.025)	0.080** (0.024)
No change in sales	0.049 (0.031)	0.027 (0.034)	0.045 (0.033)	0.030 (0.033)	0.047 (0.032)
New product restructuring	0.031** (0.008)	0.073** (0.028)	omitted	0.074** (0.026)	omitted
Ownership, omitted is “privatized”					
State ownership	-0.023 (0.030)	-0.018 (0.030)	-0.030 (0.030)	-0.020 (0.030)	-0.033 (0.030)
New entrant	-0.096** (0.022)	-0.091** (0.025)	-0.102** (0.025)	-0.095** (0.025)	-0.108** (0.024)
Soft budget constraint	0.007 (0.036)	0.008 (0.144)	-0.071 (0.143)	-0.009 (0.130)	-0.111 (0.126)
Business environment	0.047 (0.047)	0.246 (0.156)	0.266 (0.190)	0.250 (0.130)	0.283 (0.148)
Test of joint significance of SBC and business environment	F(2,2208) =0.51 p=0.603	$\chi^2(2)=2.52$ p=0.283	$\chi^2(2)=2.22$ p=0.330	$\chi^2(2)=3.83$ p=0.148	$\chi^2(2)=4.69$ p=0.096
Services	-0.023 (0.020)	0.002 (0.027)	-0.043* (0.021)	0.001 (0.026)	-0.046* (0.020)
Big city	0.001 (0.019)	-0.010 (0.022)	0.001 (0.021)	-0.012 (0.021)	-0.004 (0.021)
constant	-0.038 (0.049)	-0.206 (0.123)	-0.082 (0.115)	-0.209 (0.110)	-0.086 (0.099)
R-square (overall)	0.049	0.042	0.034	0.043	0.032
F-test of fixed effects	F(24, 2208) = 4.70 p=0.000	F(24, 2208) = 4.11 p=0.000	F(24, 2209) = 4.39 p=0.000	n.a.	n.a.
DWH statistic	$\chi^2(3)=3.45$ p=0.328	n.a.	n.a.	$\chi^2(12)=3.21$ p=0.994	$\chi^2(11) < 0$
F-test of significance of IVs in 1 <sup>st</sup> stage regressions	n.a.	F(123,2088) = stat (p)	F(120,2091) = stat (p)	F(148,2088) = stat (p)	F(144,2091) = stat (p)
Soft budget constraint		=1.17 (0.103)	=1.17 (0.105)	=1.68 (0.000)	=1.43 (0.001)
Business environment		=1.91 (0.000)	=1.15 (0.132)	=3.87 (0.000)	=2.72 (0.000)
New product restructuring		=1.53 (0.000)		=1.86 (0.000)	
Davidson-MacKinnon test of overidentifying restrictions	n.a.	$\chi^2(120)=106$ p=0.822	$\chi^2(118)=108$ p=0.725	n.a.	n.a.

**Table 16. Determinants of new product restructuring**

<b>Dependent variable: constructed by principle components as discussed in the text</b>			
<b>No. obs=2245</b>			
Estimation method:	Fixed effects, OLS	Fixed effects, 2SLS	Random effects, EC2SLS
* = significant at 5% level	coeff.	coeff.	coeff.
** = significant at 1% level	(s.e.)	(s.e.)	(s.e.)
Number of competitors, omitted is “zero”			
1-3 competitors	0.037 (0.109)	0.024 (0.112)	0.043 (0.114)
>3 competitors	-0.148 (0.097)	-0.170 (0.101)	-0.163 (0.102)
Market power (10% test), omitted is “many customers would change suppliers”			
Sales would fall a lot	0.097 (0.065)	0.077 (0.067)	0.077 (0.068)
Sales would fall slightly	0.249** (0.065)	0.223** (0.068)	0.221** (0.068)
No change in sales	0.330** (0.085)	0.314** (0.089)	0.299** (0.089)
Firm faces important pressure to develop new products and markets from domestic competitors, omitted is “not at all important”			
Slightly important	0.112 (0.080)	0.130 (0.083)	0.151 (0.083)
Fairly important	0.088 (0.080)	0.104 (0.085)	0.126 (0.085)
Very important	0.092 (0.088)	0.096 (0.094)	0.111 (0.093)
Firm faces important pressure ... from foreign competitors, omitted is “not at all important”			
Slightly important	0.256** (0.073)	0.272** (0.076)	0.278** (0.076)
Fairly important	0.169* (0.072)	0.165* (0.075)	0.162 (0.074)
Very important	0.265** (0.079)	0.276** (0.084)	0.279** (0.082)
Firm faces important pressure ... from customers, omitted is “not at all important”			
Slightly important	0.043 (0.084)	0.045 (0.086)	0.052 (0.087)
Fairly important	0.166* (0.082)	0.161 (0.087)	0.177* (0.083)
Very important	0.203* (0.090)	0.204* (0.098)	0.227* (0.095)
Ownership, omitted is “privatized”			
State ownership	-0.219** (0.082)	-0.216** (0.084)	-0.266** (0.085)
New entrant	0.095 (0.066)	0.042 (0.071)	0.018 (0.071)
Soft budget constraint	-0.213* (0.097)	-1.01** (0.392)	-1.40** (0.336)
Business environment	-0.055 (0.130)	-0.220 (0.530)	0.031 (0.372)
Test of joint significance of SBC and business environment	F(2,2199) =2.42 p=0.089	$\chi^2(2)=6.80$ p=0.033	$\chi^2(2)=17.6$ p=0.000
Log employment	0.109** (0.020)	0.121** (0.021)	0.132** (0.021)

Estimation method:	Fixed effects, OLS	Fixed effects, 2SLS	Random effects, EC2SLS
Services	-0.471** (0.054)	-0.501** (0.057)	-0.506** (0.057)
Big city	0.145** (0.053)	0.100 (0.060)	0.073 (0.057)
constant	0.783** (0.173)	1.04** (0.349)	0.974** (0.281)
R-square (overall)	0.120	0.111	0.100
F-test of fixed effects	F(24, 2199) = 7.95 p=0.000	F(24, 2199) = 5.86 p=0.000	n.a.
DWH statistic	$\chi^2(2)=4.66$ p=0.098	n.a.	$\chi^2(21)<0$
F-test of significance of IVs in 1 <sup>st</sup> stage regressions Soft budget constraint Business environment	n.a.	F(120,2081) = stat (p) =1.17 (0.103) =1.14 (0.149)	F(144,2081) = stat (p) =1.43 (0.001) =3.29 (0.000)
Davidson-MacKinnon test of overidentifying restrictions	n.a.	$\chi^2(118)=141$ p=0.072	n.a.



**Table 17. Determinants of defensive restructuring**

**Dependent variable: constructed by principle components as discussed in the text** No. obs=2245

Estimation method:	Fixed effects, OLS	Fixed effects, 2SLS	Random effects, EC2SLS
* = significant at 5% level ** = significant at 1% level	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)
Number of competitors, omitted is “zero” 1-3 competitors	0.003 (0.050)	0.019 (0.052)	0.034 (0.051)
>3 competitors	0.004 (0.043)	0.022 (0.046)	0.028 (0.045)
Market power (10% test), omitted is “many customers would change suppliers” Sales would fall a lot	-0.069* (0.030)	-0.066* (0.031)	-0.070* (0.031)
Sales would fall slightly	-0.010** (0.030)	-0.101** (0.031)	-0.103** (0.031)
No change in sales	-0.195** (0.040)	-0.205** (0.042)	-0.217** (0.041)
Ownership, omitted is “privatized” State ownership	0.113** (0.038)	0.109** (0.039)	0.094* (0.039)
New entrant	-0.154** (0.031)	-0.145** (0.033)	-0.169** (0.032)
Soft budget constraint	0.341** (0.045)	0.451** (0.181)	0.196 (0.149)
Business environment	-0.180** (0.060)	0.101** (0.241)	0.214 (0.167)
Test of joint significance of SBC and business environment	F(2,2199) =34.7 p=0.000	$\chi^2(2)=6.46$ p=0.042	$\chi^2(2)=3.08$ p=0.214
Log employment	0.071** (0.009)	0.068** (0.010)	0.072** (0.009)
Services	-0.065** (0.025)	-0.061* (0.026)	-0.064** (0.026)
Big city	0.010 (0.025)	0.011 (0.027)	-0.007 (0.026)
constant	0.367** (0.074)	0.201 (0.145)	0.185 (0.117)
R-square (overall)	0.163	0.156	0.152
F-test of fixed effects	F(24, 2208) = 6.38 p=0.000	F(24, 2208) = 5.38 p=0.000	n.a.
DWH statistic	$\chi^2(2)=1.83$ p=0.400	n.a.	$\chi^2(12)=33.1$ p=0.001
F-test of significance of IVs in 1 <sup>st</sup> stage regressions Soft budget constraint Business environment	n.a.	F(120,2090) = stat (p) =1.19 (0.09) =1.14 (0.145)	F(144,2090) = stat (p) =1.58 (0.000) =3.47 (0.000)
Davidson-MacKinnon test of overidentifying restrictions	n.a.	$\chi^2(118)=146$ p=0.040	n.a.

## APPENDIX TABLES

**Table A1. Summary statistics of continuous variables used in regressions**

Variable	Mean	Standard deviation	Minimum	Maximum
Log sales growth (3 years)	0.0463	0.505	-2.30	2.30
Log productivity growth (3 years)	0.0339	0.444	-2.56	2.30
New product restructuring index	1.30	1.27	0	4
Defensive restructuring index	0.445	0.606	0	3
Soft budget constraint index	0.177	0.273	0	1
Business environment index	0.476	0.221	0	1
Log employment (average period)	3.75	1.72	0.714	7.42

**Table A2. Summary statistics of categorical variables used in regressions**

Number of competitors	Zero 8.7%	1-3 14.2%	> 3 77.1%	
Market power (10% test)	Many customers would switch 36.1%	Sales would fall a lot 24.8%	Sales would fall slightly 26.4%	No change in sales 12.7%
Ownership	Privatized 30.6%	State-owned 14.9%	New private firm 54.5%	
Industrial sector	Industry 45.6%		Services 54.4%	
Location	Town 58.4%		Large city 41.6%	
Pressure from domestic competitors	Not impt. 19.8	Slightly 25.1	Fairly 31.5	Very impt. 23.6
Pressure from foreign competitors	Not impt. 43.9	Slightly 17.9	Fairly 20.9	Very impt. 17.3
Pressure from customers	Not impt. 16.4	Slightly 23.1	Fairly 36.3	Very impt. 24.2