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of Manufacturing Firms in
Seven European Transition Economies*

by Stijn Claessens, Simeon Djankov and Gerhard Pohl

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Determinants of Performance of Manufacturing Firms in Seven European Transition Economies

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Stijn Claessens

Simeon Djankov

Gerhard Pohl*

Abstract

We document the operational performance of (former and current) state enterprises over the 1992-1995 period for seven countries in Central and Eastern Europe (Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovakia, and Slovenia) using large samples of firm level data and a consistent methodology. We find that firms in the Czech Republic, Hungary, Poland, and Slovakia have the highest factor productivity growth and firms in Bulgaria and Romania the lowest, with firms in Slovenia in between. We find three factors which help explain the variation in firm performance: initial conditions (firm size, sector, and level of productivity), status of privatization, and quality of bank lending. Firms in tobacco, furniture, and paper improve faster than firms in other sectors, while firms in the textile, lumber, petroleum refining, rubber and nonelectrical machinery sectors improve slower than other firms. Firms with a lower initial level of factor productivity display higher productivity growth than other firms, suggesting convergence of productivity. Productivity growth is most often negatively correlated with firm size. Productivity growth is positively related to privatization in all countries, with firms privatized for two years displaying the most change. Finally, bank financing appears to have been increasingly allocated to more productive firms in all countries except Bulgaria and Romania.

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Determinants of Performance of Manufacturing Firms in Seven European Transition Economies

I. Introduction

Countries in Central and Eastern Europe (CEE) have been at the forefront of transition economies in reforming their state enterprises. Since 1990, Hungary, Poland, the Czech Republic, the Slovak Republic, and Slovenia have been undertaking reforms aimed at improving state enterprises performance. Some other CEE-countries, such as Bulgaria and Romania, have lagged, but have also made progress in enterprise reform. Reforms have included similar aspects in all countries: increased managerial autonomy, increased competition, privatization, increased supervision, better incentives for managers, and increased financial discipline, including bankruptcy and liquidation. The intensity of particular aspects of enterprise reform has varied greatly across countries, however. For example, while 81 percent of Czech manufacturing production was privatized by early 1996, Bulgaria saw only 5 percent of enterprises privatized during the same period.¹

As five years have passed since the beginning of these reforms, differences in performance across enterprises and countries resulting from different reform strategies should have become apparent by now. Due to the paucity of data, however, only an incomplete picture is available. To our knowledge, only two papers to date look at enterprise restructuring in a cross-section of countries, Estrin et al. (1995) and Pohl et al. (1996). The first relies on limited case study evidence and the second focuses on the largest 300 to 500 enterprises in each country. Neither paper addresses the question what policies may explain enterprise performance differentials.

This paper has two objectives: to document the performance for manufacturing firms during 1992-1995 for seven CEE countries (Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovakia, and Slovenia) using firm level data and a consistent methodology; and to study which basic characteristics and reform policies can help explain performance. We do not attempt to assess the impact of all specific reforms on enterprise behavior. The debate on "what policy matters most" has ultimately to be decided empirically. Unfortunately, many policy variables cannot be easily incorporated in an empirical analysis and, others, for example the marginal effect of a specific policy are difficult to disentangle. Our purpose, hence, is to estimate which country's package of reforms provided the best environment for productivity growth in the (former and current) state enterprise sector. We do, however, identify some specific reforms—privatization and hard bank lending constraints—and investigate the effects of these on enterprise restructuring, realizing that while these specific reforms are probably most essential, others matter too.

The paper begins with a development of the basic hypotheses to be tested. Section III next describes the data, while Section IV develops three restructuring indicators. The patterns of enterprise restructuring within countries are documented in section V and Section VI presents a

¹ This measure is based on the *value* of production taken from the Statistical Yearbooks of both countries.

statistical analysis of the determinants of firm restructuring across all countries. Conclusions are in section VII.

II. Determinants of Restructuring: Hypotheses

The transition from plan to market involves liberalizing the economic system, allocating property rights to individual owners and investors (privatization), and a fundamental restructuring of economic institutions (see World Development Report 1996). At the micro-level this implies enterprise restructuring. Enterprise restructuring is probably best understood as the initial transition process from a highly distorted economy with many large loss-making firms to a "normal" market economy in which the overwhelming majority of all firms are profitable. This involves reducing losses through a variety of measures to improve productivity (most importantly, reducing labor forces and concentrating on those activities in which the firm has a competitive advantage). How to bring about enterprise restructuring is more controversial, however.

Policy makers and their advisers have stressed various aspect of enterprise reform: managerial autonomy, competition, privatization, concentrated ownership, hard bank lending, and financial discipline, including bankruptcy and liquidation. The relative importance of each these factors in enhancing enterprise restructuring is unknown. This is for a number of reasons. To begin with, the variation in performance among firms in any one transition economy is much greater than that in market economies (see Pohl et al. (1996)), making it more difficult to explain individual enterprise restructuring. This is likely because adjustment and restructuring are influenced by not just one, but a large number of factors, each of which contributes an essential, but often a statistically marginal aspect to enterprise reform. Previous studies find that most variables explain little of relative enterprise performance within a country (once one controls for just a few, basic variables). Comparisons across countries are even more difficult since many of the specific polices and reforms are not easily captured in quantitative way, e.g., changes in the institutional framework. While the contribution of particular reforms to enterprise restructuring is hard to identify, it is clear from the experience to date that a comprehensive policy reform package is needed. The degree of enterprise restructuring can be taken as an indicator of the overall strength of a reform package.

Empirical studies on firm behavior in transition economies agree on the three broad determinants of the speed and depth of restructuring: a firm's initial conditions ("inheritance"), enterprise-specific factors (corporate governance, managerial ability), and the external environment (the overall market environment including macroeconomic stability, import competition, financial discipline, the bargaining power of labor unions, etc.). Initial conditions include sector of activity (Estrin et al., 1995), the pre-transition level of productivity (Estrin and Takla, 1995), firm size (Pinto et. al., 1993), and the inherited debt burden. Firm-specific factors include the structure of property rights,² especially the extent of progress towards full privatization (Estrin, 1994), the presence of and type of outside owners (Claessens et al., 1996), the ability (and willingness) of managers to attract foreign partners, and more generally to ensure

² For a theoretical discussion of the effects of different privatization methods on firm restructuring, see Aghion and Blanchard (1996), Blanchard (1996), and Shleifer and Vishny (1994).

access to better technology, intermediate inputs and capital goods. The role of the external environment has been extensively studied in cross-country comparisons of transition economies' growth performance (Sachs, 1996). Fast liberalization, for example, has been shown to lead to productivity growth (World Development Report 1996 and Gelb et al, 1996). Financial discipline imposed by external parties is an essential part of this external environment: when no one financing losses, firms have no choice but to eliminate losses by increasing productivity.³ We discuss these set of determinants now in more detail.

a. Initial Conditions

Sector origin is important. Under central planning (and within the CMEA arrangements) many countries specialized in particular products or sectors. Bulgaria, for example, specialized in electronics and Slovakia had large armaments industry. This concentration and specialization may have affected the speed of enterprise restructuring. Since all countries liberalized their trade with Western markets (and lost their CMEA markets) simultaneously, sector-specific demand shocks are likely to have affected enterprises in all countries similarly.⁴ Or, put differently, there is no *a priori* reason to suspect that the steel sector in one country was affected differently by external shocks than any other country's steel sector—as both faced (or at least could face) the same markets and same set of input and output prices. Pre-transition concentration in particular sectors may, however, have affected enterprise performance differently due to existing economics of scale or externalities. In the case of Bulgaria, its large electronics sector may have had some benefits over the electronics sectors in other countries as it led to a large pool of specialized labor.⁵ These economic and political factors could have had a large effect on the subsequent productivity growth pattern. We control for the commonality among these effects using standard 2-digit SIC sector dummies, thus assuring consistency across countries.

Several earlier studies have attempted to estimate the impact of *firm size* on the subsequent speed and depth of restructuring. Again, economic as well as political factors have motivated the inclusion of the size variable. Larger firms may, on the one hand, have more difficulty to restructure themselves than smaller firms, but they may have, on the other hand, preferential access to financing, which may enhance their capacity to restructure. Empirically, the issue is still unresolved. Some studies (Pinto et al., 1993; Djankov and Pohl, 1997) find a positive

³ It should be noted that important relationships exist between micro factors (initial conditions and internal factors) and the external environment. The influence of external discipline, for example, depends on managerial expectations regarding how binding (credible) these are. Thus a belief that governments will bail out loss-making firms importantly affects enterprise restructuring. A number of studies have studied these relationships, e.g., Pinto et al., (1993) and Claessens and Peters, (1997).

⁴ Early conclusion of Association Agreements with the European Union provided all seven countries with a similar, fairly open trade regime. Some differences exist, however, and are due to the political economy of protection in each country.

⁵ Preferential political treatment of certain sectors was, however, often common to all CEE-countries. The heavy machinery sector, for example, was singled out as the most protected by government policies in all seven countries due to its high political profile.

correlation between firm size and restructuring, while others (Estrin and Takla, 1995) come to the opposite conclusion. In this paper, we therefore study the effect of size on enterprise restructuring on a country-by-country basis and for the region as a whole.

The *initial level of productivity* has traditionally been used in studies of enterprise restructuring in market economies and transition economies to explain subsequent changes in factor productivity. Here, again, the empirical evidence is inconclusive. A recent study for a cross-section of industrialized countries (Bernard and Jones, 1996) finds that low initial levels of productivity have positive effects on subsequent productivity growth (catch-up effect). This can be interpreted as evidence that the closer a firm is to the production possibility frontier (of the respective industry), the less the need and ability to restructure. This suggests a convergence within sectors. This is the finding of Djankov and Hoekman, 1997 for the case of Bulgaria. Two other studies for transition economies (Waring, 1996; Estrin and Takla, 1995) find a positive correlation between the initial level of productivity and productivity growth. They interpret their findings as supportive of the view of that industry leaders maintain (and expand) their dominance through the accumulation of better business practices. Put differently, better firms are more likely to continue improving, maybe as they learn while doing, or as they have better access to capital and external know-how.

b. Firm-specific factors

Firm-specific factors include the quality of the labor force, the presence (lack) of modern machinery, the ability (and willingness) of managers to attract foreign partners, better technology, intermediate inputs and capital goods, the extent of progress towards full privatization, the presence and type of outside owners. Some of these are captured indirectly by the initial conditions variables we use. Many transition economies went through sector-wide efforts to upgrade machinery.⁶ A sector dummy may then capture this as an initial condition, but it could also be interpreted as an additional factor. Similarly, exposure to international markets—a likely determinant of enterprise restructuring—may be related to the type of industry. But, in most cases it will be difficult to capture firm-specific factors.

We focus on two firm-specific factors: privatization and hard bank lending constraints. The hypotheses for the privatization variables are two-fold: first, privatized state enterprises display greater restructuring, and second, the longer the firm is privatized, the greater the positive impact. The hypothesis for the hard bank lending constraint is that if enterprises are subject to tougher financial constraints they restructure more. There is, however, a second relationship between enterprise restructuring and financing, which can work in the opposite direction: enterprises which restructure are more likely to attract external financing for their expansion plans. This effect would imply a positive relationship between enterprise restructuring and financing, i.e., enterprise which restructure more receive more financing. This relationship likely manifest itself only in the later stages of transition as the financial systems has improved and resources are being allocated more efficiently. Since this relationship likely only dominates when the financial system is sufficiently market-based, one can expect that the relationship between

⁶ In all seven countries, textile machinery is relatively close to world-standards (Ernst and Young, 1995).

financing and enterprise restructuring becomes positive over time for countries which have made progress in banking reform.

c. External environment

The speed with which the institutional framework for a market-economy was established has affected enterprise restructuring in each country.⁷ We therefore include time, differently indexed for each country, to correct for aggregate demand and other institutional effects. We do not attempt to decompose different policies. This would require longer time-series data than available at present. Furthermore, since reforms are likely to move in tandem, identification problems arise.

[Table 1 here]

Several recent studies have attempted to evaluate the development of the external environment and institutional reform in transition economies. Table 1 reports the results for the seven CEE-countries. All are based on subjective indicators and show little variation across the countries, as they have generally liberalized and reformed their economies to similar degrees. The only exceptions are Bulgaria and Romania which score lower on all four indexes. This low variation across countries makes it difficult to assess the success of a given country's aggregate policies in enhancing firm productivity growth. We thus do not attempt to directly measure the effect of the market environment.

III. The Data

We have firm-level data (balance sheet and profit and loss statements) for 1992-95 obtained from private firms or statistical offices. Typically, the data cover the majority of manufacturing firms registered as SOEs in 1991.⁸ The data are annual observations at the plant level and cover the majority of plants in manufacturing industries. If some plants are owned by the same parent company, this relationship is accounted for in the data. Table 2 lists for each country the number of firms in the dataset, aggregate employment in 1992, aggregate employment as a share of total manufacturing employment, and the sectoral distribution of employment. The table shows that the data, although not always a complete manufacturing census, are representative of the manufacturing sector in each country. The data include detailed information on the value of output, firm expenditures, employment, and average hours worked.⁹ Descriptive statistics on employment (mean and median number of employees, and standard deviation) are provided in Figure 1. Expenditures on energy are provided separately from other material inputs' expenditures. Data on firm-specific fixed assets are also provided but not used in the analysis.

⁷ Note that supply shocks are already taken into account through the sector dummies

⁸ The data include enterprises that have been privatized to domestic or foreign strategic investors and enterprises that went through the mass privatization programs in the Czech Republic, Poland, Slovakia, and Slovenia.

⁹ The database also includes information on stock prices of all listed firms. For a detailed description of the individual datasets, see Djankov, 1997.

Sales and inventory changes are reported separately in all cases. This allows us to adjust the revenue numbers to account for sold (rather than produced) output during the period when countries still used old accounting conventions. Firm-specific output prices are not available. Instead, we use producer price indices at the 2-digit SIC level, as reported by the respective statistical offices. This limits the comparisons between firms within the same sector and country, but does not introduce a significant bias in comparisons across sectors or countries. All nominal values are deflated using these producer price indices.

We exclude all firms which have missing observations¹⁰ and form balanced panels, i.e. all firms show up throughout the 1992-95 period. The information concerning firm entry and exit is thus not utilized here. Entry could lead to a downward bias as new firms are likely to be more productive. Exit could lead to an upward bias as less productive firms will more likely exit. On balance, the bias is thus not obvious. Since most entry has occurred in service industries and since the number of liquidated firms was negligible prior to 1996,¹¹ this omission is unlikely to result in a significant bias.¹² Although the database is not ideal, it is very comprehensive and allows for comparisons across countries.

IV. Indicators of Restructuring

To measure the extent of enterprise restructuring and evaluate the impact of reform strategies, we focus on labor productivity, average operating profitability and total factor productivity growth (TFP). All three measures are important indicators of enterprise restructuring, but to different degrees depending on the stages of reform. Taken together, they present a fairly complete picture of the restructuring process. Also all three measures rely on basic data (revenues, expenses, etc.) and should thus not greatly be affected by the still-evolving accounting practices in these countries (note that we have corrected for the effects of the most important changes in accounting practices over time).

Labor productivity (defined as value added per employee in constant prices) is a useful measure of restructuring, particularly in the early stages of enterprise adjustment. After a sharp fall following price liberalization and demand collapse, labor productivity has increased in most transition economies and surpassed pre-transition levels for many firms. This has happened through layoffs and real wage reductions, but also greater wage differentiation by region, by

¹⁰ This procedure mostly affects the Bulgarian dataset. Although we have the complete manufacturing census, only half of all firms report consistently in all years.

¹¹ Previous studies have argued that liquidation of firms in Hungary during 1992-93 lead to significant exit. This is not the case. Although many firms applied for liquidation, the majority of them were still in operation at the end of 1995 (Gray et al., 1996).

¹² We have the complete manufacturing census (including entry and exit) for four countries (Bulgaria, Romania, Slovakia, Slovenia) and will study the importance of entry and exit in a companion paper.

industry, and by form of enterprise ownership.¹³ Labor productivity is also regarded as a *leading* indicator of restructuring (Wolff, 1996) since wage and labor adjustment measures can be taken more rapidly than modernizing the capital stock, entering new markets, etc. We define labor productivity as value added (revenues minus material and energy expenses, deflated to 1992 values) per worker.

We next measure the extent of restructuring by examining firms' **average operating profitability** over time. Changes in operating profitability (defined here as [total revenues - wages - material inputs] \ total revenues) reflect a large number of restructuring measures: labor and wage rationalization, adjustment of input use to reflect new relative prices, better output quality and higher sales revenues, and the movement of resources toward higher-productivity firms and sectors. In measuring these changes, we use operating profitability (as was done in Pohl et al, 1996, Claessens and Peters, 1997) rather than net profitability. The difference between operating and net profitability is in (not) accounting for interest and other financial charges; and depreciation. Interest and other financial charges involve a redistribution of income depending on the debt and equity claims on the enterprise. Given the often arbitrary allocation of liabilities under central-planning, the inclusion of interest could introduce unnecessary noise in measuring enterprise restructuring. Depreciation is an imputed charge—again, often based on somewhat arbitrary accounting conventions (and often different across the seven CEE countries), not an obligation to pay someone else. As the average ratios of depreciation charges to fixed assets varied significantly across countries in our dataset, we excluded such charges from the analysis.

Using operating profitability as an indicator of firm restructuring can be misleading, however, since relative prices of inputs have changed dramatically over the 1989-96 period. In particular, some inputs may still be affected by price controls and costs would consequently be a poor measure of their performance. These caveats have become less important in the later part of the sample (1992-96), however, as the initial price shocks had already occurred and price controls had become less important.

Finally, we calculate **total factor productivity (TFP)** growth, which measures changes in a firm's efficiency in using inputs (factors of production): labor, material inputs, and capital. TFP growth is the standard measure of productivity and has been widely used in empirical studies of industrialized (Jorgenson, Gollop, and Fraumeni, 1987) and semi-industrialized (see the papers in Roberts and Tybout, 1996) countries. It has not been used extensively in transition economies. The aversion to using TFP may be based on the belief that book values of fixed assets are grossly inaccurate and introduce significant noise in any estimation. The exclusion of capital as a factor of production, on the other hand, may lead to biased estimates of productivity - tantamount to assuming that the intensity of capital usage has remained the same over the transition period.¹⁴

¹³ In several countries, wage differentials reflecting differences in skills or in productivity have been constrained by nationwide wage scales and wage controls, such as the *popiwiek* in Poland and the excise wage tax in Bulgaria.

¹⁴ The average factor shares are similar across countries (see below), consequently there is no significant bias introduced in the estimations through differences in factor-intensities. Further, the imposition of identical factor intensities for each country may result in biased estimates since the efficiency of factor *usage* is a

We avoid both problems by using energy consumption as a proxy for capital utilization.¹⁵ This correction has many desirable properties (Burnside, Eichenbaum, and Rebelo, 1995a,b). Most importantly, in the transition context, it is a flow measure and does not depend on any measure of fixed assets. It is also shown to be a good measure of capital services and is less volatile over time when compared to the standard measures.

The TFP-specification we use has two additional important characteristics. First, in calculating factor weights, we use shares in total cost rather than in total revenues. This allows for non-zero profits (and thus imperfect competition and factor market distortions). Second, we do not impose constant returns to scale, as the sum of factor shares are not constrained to add up to one. The relaxation of these two standard assumptions is particularly important in transition economies and has been repeatedly stressed in previous studies.

TFP growth is calculated using a two-step procedure.¹⁶ First, we estimate a standard production function of the form

$$\Delta Y_{it} = \alpha_i^0 + \alpha_{it}^1 [\alpha_i \Delta M_{it} + \beta_i \Delta L_{it} + \gamma_i \Delta E_{it} + \varphi_i \Delta K_{it}] + \varepsilon_{it} \quad (1)$$

where ΔY_{it} ($\ln Y_{it} - \ln Y_{i,t-1}$) is the log-difference in total revenues, ΔM_{it} is the log-difference in material inputs, ΔL_{it} is the log-difference in number of hours worked, and ΔE_{it} is the log-difference in energy usage. The weights of production factors are α_i , β_i , γ_i and φ_i as respectively the share of material input expenditures, the share of the total wage bill, the capital bill, and the energy bill in total expenditures averaged for each firm over the sample period. Next we use the proxy of energy consumption for capital utilization to get

$$\Delta Y_{it} = \alpha_i^0 + \alpha_{it}^1 [\alpha_i \Delta M_{it} + \beta_i \Delta L_{it} + (\gamma_i + \varphi_i) \Delta E_{it}] + \varepsilon_{it} \quad (2)$$

function of the overall reform program. We therefore use separate production functions or allow for country- and time-specific intercepts or dummies.

Share in Total Costs (%)

Country	Bulgaria	Czech Rep.	Hungary	Poland	Romania	Slovakia	Slovenia
Capital+Energy	19.1	24.4	20.8	20.2	18.7	24.1	20.2
Labor	25.1	20.9	23.9	25.1	25.6	24.4	24.5
Materials	55.8	54.7	55.2	44.7	55.7	51.5	55.3

¹⁵ An alternative approach is pursued in Tybout (1992). The paper attempts to correct for missing capital stock numbers and makes inflation adjustments. It does not address the fundamental question whether capital stock is the most appropriate proxy for capital utilization.

¹⁶ We closely follow the methodology developed in Basu and Fernald, 1995.

Having estimated equation (2), we can calculate TFP growth in year t for firm i as the sum of the firm's fixed effect (α^0) and the regression residual ($\varepsilon_{i,t}$).¹⁷ In other words, TFP growth is defined as

$$\Delta \hat{t}_{i,t} = \hat{\alpha}_i^0 + \hat{\varepsilon}_{i,t} \quad (3)$$

The choice of factor inputs may be affected by the changes in productivity. Using factor input log-differences as right-hand side variables in the OLS estimation may result in a biased and inconsistent coefficient α^1 . As a test for robustness, we employ a two-step least squares (2SLS) estimation. We use sector and time dummies as instruments, since they are correlated with the demand for factors but not with the productivity shocks. The results (Figure 6) do not differ qualitatively from the OLS estimates. The only noticeable differences are the relative improvement of Polish firms' performance and the relative deterioration (compared to Figure 5) of firms' performance in Slovenia.

The 2SLS estimations correct for possible endogeneity but do not allow us to measure the relative importance of initial conditions in explaining TFP growth. We therefore choose the White-corrected OLS estimates as the base for any further analysis.

V. Indicators of Restructuring: Results

We first document the median statistics for each of three restructuring measures for all countries and each year (Figures 3-6).¹⁸ The most striking fact emerging from the data is that enterprises in most countries have restructured successfully, albeit at a lower rate in the later period (1994 -1995). Figures 2 and 3 show that labor productivity has risen over the 1992-95 period in all countries, except Bulgaria and Romania. The estimated increases in labor productivity for the 1992-95 period shown in Figure 3 vary from a high of 6.8 % for Czech firms to a low of -1.6 % for Bulgaria. The data suggest that firms in the Czech Republic, Slovakia, and Poland have restructured their labor forces (and other operational aspects) the most, and firms in Bulgaria and Romania the least. After an initial increase, labor productivity in Bulgaria has actually declined in 1994 and only recovered in 1995 to a level still below 1992. And in Romania, the recovery in 1995 also failed to compensate for the fall in 1993 and 1994. What is surprising in comparing labor productivity (Figure 3) with labor shedding (Figure 2) is that there is much less

¹⁷ TFP growth can be calculated between two consecutive years, as well as over longer periods. Year-to-year differences provide of course the evolution of productivity growth, while beginning-to-end-period differences provides a picture of average firm performance and smooths some of the year-to-year variations. We use both procedures for robustness purposes.

¹⁸ We report median rather than mean values to reduce the problem of large outliers. We prefer medians to eliminating outliers in an ad-hoc manner since elimination of outliers (for example, by cutting 5% of the estimates on both tails of the distribution) is only appropriate when there exists an ex-ante reason to suspect possible biases. One such reason may be data entry errors. For robustness purposes only, we eliminate the top and bottom 5% firms in terms of average TFP growth over the whole period and rerun all regressions. The results (not reported) are not qualitatively different from the original estimates.

difference in labor shedding than there is in labor productivity. While firms in all seven countries have thus reduced their labor force significantly, not all have been able to increase value-added per remaining worker.

The average operating profitability varied widely among the seven countries (Figure 4). It was the highest in the Czech Republic and the Slovak Republic (14.1% in the Czech Republic in 1995), with Slovenia as a close third. Hungary and Poland have lower operating profitability ratios. The ratios actually improved in all these countries, the most in Slovakia (by 2.9 percentage points) and the least in Slovenia (by 0.7 percentage points). In Bulgaria and Romania, the operating profitability ratios are more variable over time and much lower than in the other countries, with a low of -0.9% for Romania in 1992. In 1995 profitability ratios in Bulgaria and Romania were only 0.6% and 0.8% respectively.

Changes in TFP vary from a high of 6.2 % for Czech firms in 1993-94 to a low of -6.1 % for Bulgarian firms in the same period (Figure 5). Several countries saw rapid TFP increases in the later part of the period with somewhat slower growth earlier. The Slovak Republic, Hungary and Poland display comparable TFP growth over the whole 1992-95 period (Figure 2), somewhat lower than that of the Czech Republic, while Slovenia has lower TFP growth than these four countries, and Bulgaria and Romania negative TFP growth. The TFP growth measures thus indicate that firms in the Czech Republic, Hungary, Poland, and the Slovak Republic have become consistently more efficient in the use of factors of production, with efficiency improvements of 4.5% p.a. on average. Firms in Slovenia have lagged and firms in Bulgaria and Romania show a decline in total factor productivity.

The results in Figures 2-7 serves as descriptive statistics only. To show (statistically significant) differences in performance across countries, we employ analysis-of-variance technique using a pair-wise t-test.¹⁹ Table 3 shows that the restructuring of Czech firms is statistically superior to that of firms in other countries. Firms in Hungary, Poland, and Slovakia statistically perform equally well, and firms in Slovenia perform better than firms in Romania but not better than firms in Bulgaria. Finally, the difference between Bulgarian and Romanian firms' TFP growth is statistically insignificant.

There is also sign of convergence of firm performance within countries as the standard deviation of TFP-estimates have fallen for all countries over time (Figure 7). The distributions of firm productivity (not shown) have generally become less wide with less fat tails, and closer to the

¹⁹ We test the null-hypothesis that on average firms in country *I* have the same TFP growth as firms in country *J* ($H_0: \Delta TFP_I = \Delta TFP_J$) The t-test has the following form:

$$t = \frac{\hat{\mu}_i - \hat{\mu}_j}{\sqrt{\frac{n_i \hat{\sigma}_i^2 + n_j \hat{\sigma}_j^2}{n_i + n_j - 2} \left(\frac{1}{n_i} + \frac{1}{n_j} \right)}}$$

where μ is the mean value of TFP growth, σ is the standard deviation, and n is the number of observations for each country.

normal-shape type one typically observes for market-economies. Many firms have restructured or exited. The number of firms which cannot cover variable costs has declined in all seven countries. The incidence of highly profitable firms has also disappeared as intensified competition has cut profit margins. Reforms and competition have thus eliminated the extreme observations on both ends of the distribution.

There also are some common patterns over time between the three measures: labor productivity improves first, followed by improvements in total factor productivity, with the average cost measure changing the least and with a lag. We formalize this by calculating simple correlations for all firms in the seven countries. Labor productivity is indeed the measure which is a leading indicator of enterprise restructuring as the correlation between the two-period lagged labor productivity and profitability is the highest (0.76). Changes in TFP are in between as the correlation with one-period lagged labor productivity is 0.64 and with future profitability 0.72.

VI. Determinants of enterprise restructuring

We next use our performance indicators to test the hypotheses put forth in Section III. As noted, what matters most to enterprise restructuring is difficult to identify precisely. The approach we use is panel regressions where we investigate which type of characteristics help explain the differences in the three restructuring measures we use. The explanatory variables allow for a rich interpretation of the importance of historical factors, aggregate or sector specific demand and supply shocks, and changes in incentives, including changes in privatization and hard bank lending constraints. A similar approach using aggregate industry level data was used for industrialized countries in Wolff (1996). We focus our discussion here on the year-to-year TFP-measure, but analysis of the year-to-year changes in the other two of measures provides broadly the same qualitative results (as does the analysis of the change between the first and last period in the three measures). We have also allowed for the endogeneity of some of the relationships—such as between financing and loss-making—by using instrumental variables. The results, not reported, strongly support the results of the panel-regressions reported here.

We proceed in three steps. First, we include only proxies for initial conditions as explanatory variables. All firms report their sector origin at the 2-digit SIC. We use this classification to account for the effect of individual sectors, with dummy (0/1) variables. To adequately measure the importance of size, we rank all firms (in a given country) by 1992 employment and divide the sample into five groups with equal number of firms, each represented by a dummy variable. Last, we calculate the initial level of TFP (1992) for each firm and rank all firms in a given sector by their TFP levels. Once ranked, we divide the firms in each sector into quartiles and construct dummy variables for each quartile. Note that this method allows us to compare the most productive firms in *each* sector with the least productive firms in the *same* sector in a given country.

The results are reported in Table 4. Since all explanatory variables are dummies, we can interpret the coefficients as elasticities and thus compare them. Several results are worth mentioning. The size dummies suggest that larger firms perform worse. The largest firm dummy (5th Quintile) is statistically positive significant only for Poland and the Slovak Republic. The

largest Romanian and Slovenian firms perform actually significantly worse than their smaller counterparts, as do the 3rd quintile Slovak firms and the 4th quintile Slovene firms. Since the sector dummies are also included in the regression, this ambiguity cannot be explained by different sectoral composition across the countries.

Only a few sector dummy variables are significant. In the Czech Republic only one sector dummy is significant. In Hungary, Romania and the Slovak Republic, five to six dummies are significant. In Bulgaria, none of the sector dummies is significant at conventional levels. Only in Slovenia are 11 out of 18 dummies significant. The fact that sector dummies do not account for much of the explanatory power in most countries suggests that historical factors and sector-specific supply and demand are less important in explaining enterprise restructuring than previously argued. One reason may be the failure of previous studies to control for other variables (size, initial level of factor productivity) thus attributing to sector classification effects that may be driven by other factors.

The coefficients on the initial level of total factor productivity show convergence for countries as there is a significantly positive sign for the firms in the lower quintiles of initial productivity for all countries and only one significantly positive sign for the 3rd quintile (there is also a significantly negative sign for the 3rd quintile in the Czech Republic). This result is consistent with previous studies on industrialized countries (Bernard and Jones, 1996) and is confirmed in the convergence of TFP-measures shown in Figure 7. The convergence for all other countries suggests that reform programs has led both worst and better firms to produce closer to their production possibility frontier.

The 1995 time-dummy is significantly negative for the Czech Republic and Hungary and positive for Bulgaria, Poland and Romania. For the 1994, the time dummy is significantly negative for Bulgaria and Hungary, and positive for Poland. The signs and the magnitudes thus suggest that Bulgaria, Poland, and Romania had an upward time pattern in productivity growth, while productivity growth in Czech Republic and Hungary has slowed down in 1995.

The total explanatory power is good, between 0.081 and 0.154 of the total cross-time and cross-firm variation in the TFP change can be explained (the explanatory power for the change in labor productivity regressions is slightly higher). As initial conditions can explain at most 15% of productivity growth in any one country, there is a significant component of unexplained variation in enterprise restructuring, presumably as management qualities and incentives have varied across enterprises independent of the initial classifications. We turn to privatization to help explain the variation in firm performance.

We use dummies for each cohort of privatized firms to shed light on the time path of privatization effects. Privatization turns out to be very important in explaining the variation in TFP growth (Table 5). Altogether, the five privatization cohorts explain a further 1.3 percentage points (Bulgaria) to 9.3 percentage points (Slovakia) of the variation in TFP growth. Of the 35 privatization dummies in total for the seven countries, 21 are significantly positive, 3 significantly negative and 11 insignificant. The large number of statistically significant positive coefficients on private ownership suggest that changes in ownership have had a large positive effect on efficiency

and enterprise restructuring. Managers of privatized firms appear thus more responsive to desires for cost cutting and restructure more.²⁰ There is also a time pattern among the significant privatization dummies: all of the 2-year dummies are significantly positive and have generally the largest of the coefficients for a given country. This suggest that privatization is most effective in leading to changes in the second year. By the fifth year, the effect of privatization seems to be slowing down, but this may also reflect the small number of firms which have been privatized that long ago. For most countries, the general acceleration of enterprise restructuring is confirmed as country-specific time dummies again become less negative or more positive. The exceptions are again the Czech and Slovak Republics were the time dummies turn negative.

Next, we test the importance of financial discipline in explaining firm performance (Table 6). Since data on subsidies and inter-enterprise arrears are not easily comparable across countries or not available, we use the changes in bank loans (net of actual interest payments to derive a net transfer figure from banks to enterprises) as an (imperfect) proxy for (lack of) financial discipline. The hypotheses in Section III suggest a particular time-pattern in the regression coefficients—they should become more positive if relatively more loans are allocated to better (faster improving) firms. This is indeed the case for four of the countries (the Czech Republic, Poland, Slovakia, Slovenia), where the coefficients become (more) positive for 1995. The improvement is particularly noteworthy in Poland where the initial (1993) allocation of financing appears significantly distorted as lower productivity firms are associated with more financing. Interestingly, Hungary shows a good allocation of financing even early on in the period. This may be because Hungarian banks had started their institutional development earlier than other CEE-countries, possibly spurred by the early entry of foreign banks in the Hungarian lending market.²¹ Bulgaria and Romania, on the other hand, show a deteriorating pattern as the coefficients become (more) negative: it appears that the allocation of financing in the 1994-95 period increasingly favored worse performers, rather than good performers. In other words, Bulgaria and Romania still appear to be on the downward sloping side of the U-curve relationship between performance and lending, while the other countries appeared to have crossed the bottom of the U.

The inclusion of bank lending variable does not diminish the importance of privatization. The privatization coefficients significantly positive in about the same number of cases (20 in Table 6 versus 21 in Table 5). This suggests that privatization and the imposition of financial discipline are complements rather than substitutes.

Lastly, we create a panel where we included firms of all countries in one regression. This allows us to investigate whether we can explain enterprise restructuring using the three groups of factors alone, or whether there are other significant effects. In addition to the variables we already have included in the country-regressions, we now include a country-specific, time-variable dummy. This variable will account for any omitted government policies which vary across countries and which may help explain firm performance. The coefficients on the cross country-

²⁰ While not presented in this paper, for some countries we also have data on newly established private firms. The growth in output and employment is even stronger in these newly established private firms compared with both state-owned and privatized firms.

²¹ We owe this point to Mihaly Kopanyi.

time dummies for the Czech Republic and Slovakia are positive and significant over the whole period (Table 7). Hungary shows no improvement or deterioration over time. The other countries either see an improvement over time as coefficients start either from negative (and significant in Bulgaria and Romania) and become positive or as the coefficients become positive and significant (Poland).²² Note that Slovenia is the base country. The coefficients on most of the other variables remain similar. In particular, initial TFP is positively associated with productivity growth and the privatization dummies are all significantly positive except for the fifth year, with the second privatization dummy the largest. Only the bank financing variable has now a significantly negative sign in 1993 and 1994, suggesting that for the whole sample, financing was still poorly allocated during these years. This is likely driven by the particularly poor allocation of financing in these years in Bulgaria and Romania, as all other countries had improving or stable relationships for those years (Table 6).

VII. Conclusions

Restructuring of (former) state enterprises is perhaps the most important objective of the transition of Central and Eastern European countries to a market economy. Levels of income and economic development in these countries will only approach those of Western countries when these enterprises become more modern and efficient. The success of alternative transition strategies can be measured by the extent of enterprises restructuring.

Using firm-level data on financial and operational performance for the 1992-1995 period, we find that firms in the Czech Republic, Hungary, Poland, and Slovakia have the highest factor productivity growth and firms in Bulgaria and Romania the lowest, with firms in Slovenia in between. Restructuring appears to have been influenced by a variety of factors, some initial conditions, some external factors, and many others, often more idiosyncratic to the enterprise in question. We find that enterprises in the tobacco, furniture, and paper improve faster than firms in other sectors, while firms in the textile, lumber, petroleum refining, rubber and nonelectrical machinery sectors improve slower than other firms. Firms with lower initial level productivity display higher productivity growth than other firms, suggesting convergence of factor productivity. Productivity growth is most often negatively correlated with firm size. The clear conclusions across all countries is that ownership is important: privatized state enterprises clearly outperform the still state-owned state enterprises, especially in their second year of privatization. Bank financing appears to have been associated with higher productivity growth firms in all countries except Bulgaria and Romania, suggesting that financial systems have become more effective in allocating resources.

²² F-tests for the superpanel regression (all countries together) show that the size and sector dummies are jointly statistically insignificant in explaining changes in TFP -- F values of 0.13 and 0.47 respectively. Privatization and bank financing dummies are jointly statistically significant - F values of 4.351 and 3.122 respectively. The cut-off value is 1.01 at the 95% level.

The lessons from the experiences of the successful CEE-countries for other transition economies is that rapid privatization and financial discipline force firms to shed excess labor, restructure and return to profitability. This model is in contrast to Bulgaria and Romania which not only have been slow to privatize, but also have continued to finance the losses of firms. Because of the importance of privatization and financial discipline on aggregate enterprise restructuring, countries which have privatized firms more rapidly and improved their bank intermediation faster have seen more progress in firm restructuring. Large scale privatization has so far only been implemented in the Czech and Slovak Republics through mass privatization programs: this may consequently explain their good performance. Firms in these countries display, however, an additional, independent higher degree of firm restructuring beyond that due to privatization and financial discipline. This can be due to other, complementary policies or to an externality. The externality could be that there are additional advantages of a restructuring strategy which emphasizes systemic and fast privatization: it may lead to a shift in paradigm where the whole economy—private owners and financial institutions—rather than the government carries out restructuring. The latter would make the case for rapid privatization and the imposition of financial discipline even stronger.

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Table 1: Indices of Economic Liberalization
(end-1995)

	EBRD	World Bank	EIU	IEF
Bulgaria	2.30	6.40	2.20	3.50
Czech Rep.	3.30	9.50	3.30	2.10
Hungary	3.30	9.10	3.30	2.80
Poland	3.10	8.80	3.30	3.25
Romania	2.20	7.30	2.20	3.55
Slovakia	3.00	8.60	2.70	2.75
Slovenia	2.90	8.50	3.40	3.30

European Bank for Reconstruction and Development: The index is an unweighted average of four separate indices (enterprise reform; markets and trade; financial institutions; and legal reform). Each of the four indices is in turn a composite of several sub-indices. The index is based on a 1 (worst) to 5 (best) scale. For details, see EBRD (1996), pp.11-12.

World Bank: The index is a weighted average of estimates of liberalization of domestic transactions (price liberalization and abolition of state monopolies), external transactions (low import duties, current account convertibility), and enterprise restructuring (privatization and private sector development). The weights are 0.3, 0.3, 0.4 respectively. The index is based on a 1 (worst) to 10 (best) scale. For details, see De Melo, Denizer, and Gelb (1995).

Economist Intelligence Unit: Similar to the EBRD-index. See further EIU (1996).

Index of Economic Freedom: The index is an unweighted average of ten indicators: taxation, government consumption, monetary policy, foreign investment, banking, wages, property rights, regulations, black market. The index is based on a 1 (best) to 5 (worst) scale. For details, see Holmes, Johnson and Kirkpatrick (1997).

Table 2: Statistics on Sample of Firms

	Bulgaria	Czech Rep	Hungary	Poland	Romania	Slovakia	Slovenia
A. Data Structure							
No of firms	828	706	1,044	940	1,064	883	763
Number of Employees 1992	418,382	829,312	428,645	1,229,416	2,678,436	578,737	272,249
% of total*	48	64	41	40	93	93	92
B. Average Share of Sector Employment in Total Employment							
Food	12.0	5.4	11.2	8.7	8.4	13.7	10.4
Tobacco	0.8	1.5	2.6	1.1	1.6	0.8	1.9
Textiles	9.0	5.5	13.0	8.5	6.9	4.2	12.9
Apparel	5.1	2.3	3.7	1.9	1.1	3.4	5.8
Lumber	8.4	3.6	3.5	2.3	8.8	4.3	3.0
Furniture	2.8	1.2	2.8	2.0	5.5	1.6	3.2
Paper	3.1	1.5	1.6	1.4	1.5	1.9	1.7
Printing	0.7	3.3	0.9	0.4	5.1	2.9	1.1
Chemicals	6.7	2.3	8.0	7.9	8.8	7.6	8.0
Petroleum refining	3.8	2.6	4.4	3.2	6.7	1.0	1.0
Rubber	1.9	1.4	4.3	4.5	1.6	2.7	2.2
Leather	3.5	1.5	2.5	2.6	3.3	3.0	3.5
Stone, clay, glass	2.7	14.6	5.4	7.6	3.7	4.6	1.5
Primary metals	6.2	7.0	9.1	10.6	1.8	4.8	13.5
Fabricated metals	2.9	9.8	3.9	4.6	10.3	14.6	4.0
Nonelectrical machinery	17.5	16.2	5.6	15.2	9.2	10.0	4.1
Electrical machinery	4.3	3.0	10.9	3.2	3.6	5.0	14.1
Transport equipment	0.8	12.6	3.7	11.6	9.0	8.8	2.4
Instruments	7.6	3.8	2.3	2.2	2.2	4.1	5.3
Miscellaneous	0.2	0.9	0.6	0.5	0.9	1.0	0.4

* Share of 1992 manufacturing employment as reported in the Statistical Yearbooks of the respective countries.

Table 3: Testing Relative Country Performance
(t-tests on TFP average growth, 1992-95)

Country	Bulgaria	Czech Rep	Hungary	Poland	Romania	Slovakia	Slovenia
A. Estimates from OLS, White-correction regressions							
Bulgaria	0.000						
Czech Rep.	-6.008*	0.000					
Hungary	-3.446*	+3.465*	0.000				
Poland	-3.642*	+3.215*	-0.785	0.000			
Romania	+0.841	+8.714*	+5.182*	+4.987*	0.000		
Slovakia	-3.987*	+3.115*	-1.245	-1.421	-6.208*	0.000	
Slovenia	-1.065	+5.993*	+2.274*	+2.543*	-2.028*	+3.502*	0.000
B. Estimates from 2SLS, White-correction regressions							
Bulgaria	0.000						
Czech Rep.	-5.674*	0.000					
Hungary	-3.158*	+3.375*	0.000				
Poland	-5.152*	+0.478	-2.713*	0.000			
Romania	+0.996	+8.285*	+5.092*	+7.382*	0.000		
Slovakia	-3.825*	+2.834*	-0.798	+1.883	-6.003*	0.000	
Slovenia	-0.382	+6.543*	+3.162*	+5.423*	-1.623	+4.113*	0.000

* Significant at the 95% level. The cut-off value is 1.96.

Table 4: Estimation Results on Initial Conditions
(TFP-growth, country-panels, random effects model)

Country	Bulgaria	Czech Rep.	Hungary	Poland	Romania	Slovakia	Slovenia
Constant	-0.002 (0.034)	0.107* (2.176)	0.095* (1.964)	-0.120 (1.598)	-0.170* (2.476)	0.034 (0.897)	0.090 (1.614)
2nd Quintile Size	-0.020 (0.459)	0.013 (0.459)	-0.004 (0.156)	0.015 (0.593)	0.035 (0.904)	-0.027 (1.213)	-0.036 (1.042)
3rd Quintile Size	-0.037 (0.835)	0.003 (0.113)	0.006 (0.224)	-0.003 (0.114)	0.036 (0.927)	-0.039** (1.715)	-0.036 (1.024)
4th Quintile Size	-0.043 (0.967)	0.003 (0.092)	-0.011 (0.435)	0.004 (0.143)	0.022 (0.556)	-0.031 (1.365)	-0.055** (1.642)
5th Quintile Size	-0.009 (0.208)	0.002 (0.075)	-0.028 (1.065)	0.024** (1.662)	-0.041* (2.354)	0.030* (1.974)	-0.079* (2.157)
Food	0.088 (1.413)	0.048 (1.012)	0.004 (0.067)	0.030 (0.423)	-0.183* (2.715)	0.104* (2.635)	0.080 (1.467)
Tobacco	0.147 (1.175)	0.018 (0.298)	0.105 (1.534)	0.035 (0.302)	0.235* (2.834)	-0.011 (-0.198)	0.144** (1.634)
Textiles	-0.082 (1.253)	-0.044 (0.778)	-0.167* (-3.063)	-0.094 (1.213)	-0.203* (2.865)	-0.055 (1.123)	-0.181* (3.085)
Apparel	0.105 (1.315)	0.018 (0.324)	0.068 (1.136)	0.050 (0.427)	0.005 (0.004)	0.035 (0.815)	0.094 (1.504)
Lumber	0.055 (0.857)	-0.034 (-0.673)	-0.131* (2.187)	0.042 (0.523)	-0.089 (1.302)	0.051 (1.096)	-0.205* (2.854)
Furniture	0.046 (0.587)	0.267* (3.877)	-0.080 (1.324)	-0.085 (0.957)	0.331* (3.015)	0.030 (0.587)	-0.135* (1.926)
Paper	0.073 (0.715)	0.027 (0.398)	0.254* (3.086)	0.105 (1.117)	0.029 (0.306)	0.135* (2.798)	0.216* (2.296)
Printing	0.056 (0.398)	-0.094 (1.187)	0.058 (0.778)	-0.020 (0.209)	0.215* (2.305)	0.027 (0.665)	-0.147 (1.526)
Chemicals	0.117 (1.246)	0.020 (0.396)	-0.057 (1.023)	-0.038 (0.487)	0.001 (0.016)	0.097* (2.167)	-0.126* (2.023)
Petroleum refining	-0.006 (0.056)	-0.012 (0.116)	-0.048 (0.786)	-0.167* (1.975)	0.014 (0.145)	0.002 (0.013)	-0.275* (3.796)
Rubber	0.054 (0.345)	-0.021 (0.248)	-0.135* (2.067)	-0.010 (0.128)	-0.125 (1.231)	0.063 (1.329)	-0.295* (3.024)
Leather	0.032 (0.412)	0.105 (0.917)	0.021 (0.335)	0.146 (1.532)	0.131 (1.545)	0.007 (0.143)	0.090 (1.387)
Stone, clay, glass	0.121 (0.925)	-0.020 (0.426)	-0.045 (0.784)	0.001 (0.003)	0.152* (1.975)	-0.085** (1.816)	-0.114 (1.502)
Primary metals	-0.047 (0.413)	0.032 (0.406)	-0.057 (1.025)	0.004 (0.054)	-0.093 (0.765)	0.040 (0.876)	-0.074 (1.234)
Fabricated metals	-0.191 (1.413)	0.022 (0.415)	-0.168* (2.741)	0.014 (0.187)	-0.099 (1.413)	0.025 (0.598)	-0.184* (2.403)
Nonelectrical machinery	0.032 (0.524)	-0.018 (0.389)	-0.070 (1.264)	0.009 (0.117)	-0.108 (1.497)	0.026 (0.678)	-0.089 (1.403)
Electrical machinery	-0.068 (0.815)	-0.038 (0.634)	-0.174* (3.302)	0.004 (0.054)	-0.032 (0.356)	-0.097* (2.156)	-0.246* (4.376)
Transport equipment	0.050 (0.376)	0.018 (0.357)	0.024 (0.413)	0.024 (0.305)	0.057 (0.678)	0.026 (0.558)	0.115** (1.786)
1st Quartile Initial TFP Level	0.024* (1.923)	0.048* (2.056)	0.145* (6.524)	0.182* (7.895)	0.260* (7.598)	0.041* (2.067)	0.178* (6.065)
2nd Quartile Initial TFP Level	0.017 (0.986)	0.047 (0.897)	0.063* (2.824)	0.124* (5.456)	0.165* (4.856)	0.019 (0.954)	0.106* (3.576)
3rd Quartile Initial TFP Level	0.009 (0.221)	-0.044** (1.754)	0.035 (1.563)	0.080* (3.496)	0.085* (2.498)	-0.016 (0.798)	0.080* (2.805)
Dummy 1994	-0.065* (2.403)	0.003 (0.197)	-0.030* (2.054)	0.054** (3.667)	0.029 (1.287)	0.019 (1.543)	0.016 (0.905)
Dummy 1995	0.046** (1.709)	-0.031** (1.814)	-0.037* (2.511)	0.092* (6.205)	0.123* (5.376)	-0.005 (0.413)	0.010 (0.578)
Sample Size	2484	2118	3132	2820	3192	2649	2289
R ²	0.080	0.099	0.127	0.146	0.154	0.149	0.142

The estimates are heteroskedasticity consistent. t-Statistics shown in parentheses. * Significant at the 95% level. ** Significant at the 90% level.

Table 5: Estimation Results on Initial Conditions and Privatization
(TFP-growth, country-panels, random effects model)

Country	Bulgaria	Czech Rep.	Hungary	Poland	Romania	Slovakia	Slovenia
Constant	-0.019 (0.257)	0.027 (0.548)	0.069 (1.312)	-0.145* (1.915)	-0.163* (2.382)	-0.103* (2.651)	0.008 (0.175)
Size Dummies Included	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector Dummies Included	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1st Quartile Initial TFP Level	0.019 (0.489)	0.031* (1.231)	0.143* (6.296)	0.174* (7.589)	0.261* (7.633)	0.061* (3.075)	0.143* (4.805)
2nd Quartile Initial TFP Level	0.005 (0.125)	-0.049* (2.012)	0.061* (2.654)	0.122* (5.358)	0.165* (4.902)	0.059* (2.951)	0.094* (3.235)
3rd Quartile Initial TFP Level	-0.006 (0.015)	-0.047** (1.897)	0.039** (1.689)	0.076* (3.395)	0.086* (2.546)	0.024 (1.215)	0.075* (2.672)
Dummy 1994	-0.072* (2.725)	0.091** (1.789)	-0.033* (2.245)	0.044* (2.641)	0.023 (1.023)	0.052* (4.016)	0.043* (2.456)
Dummy 1995	0.037 (1.405)	-0.110* (4.345)	-0.019 (1.275)	0.065* (3.835)	0.107* (4.672)	-0.098* (6.539)	0.078* (4.256)
1st Year Privatization	0.037 (0.318)	0.063 (1.186)	0.062* (2.201)	0.028 (0.938)	-0.302* (3.652)	0.218* (13.571)	0.062 (1.243)
2nd Year Privatization	0.487* (4.543)	0.196* (7.596)	0.134* (5.412)	0.064* (2.842)	0.253* (3.192)	0.296* (17.005)	0.286* (7.836)
3rd Year Privatization	0.523* (4.872)	-0.041 (0.743)	0.076* (2.972)	0.241* (5.314)	0.203* (2.041)	0.076* (3.642)	0.309* (10.291)
4th Year Privatization	0.247 (1.615)	0.178* (4.563)	-0.059 (1.601)	0.142* (2.405)	0.256* (1.985)	0.256* (10.246)	0.081* (2.428)
5th Year Privatization	0.423 (1.445)	0.067 (0.326)	-0.182* (2.142)	-0.032 (0.043)	0.126 (0.382)	0.345* (2.245)	-0.123* (2.642)
Sample Size	2484	2118	3132	2820	3192	2649	2289
R ²	0.093	0.126	0.146	0.157	0.162	0.252	0.207

The estimates are heteroskedasticity consistent. t-Statistics shown in parentheses. * Significant at the 95% level. ** Significant at the 90% level.

Table 6: Estimation Results on Initial Conditions, Privatization and Financial Discipline
(TFP-growth, country-panels, random effects model)

Country	Bulgaria	Czech Rep.	Hungary	Poland	Romania	Slovakia	Slovenia
Constant	-0.012 (0.198)	0.027 (0.564)	0.053 (1.031)	-0.129** (1.731)	-0.148* (2.096)	-0.082 (2.035)	0.017 (0.305)
Size Dummies included	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector Dummies included	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1st Quartile Initial TFP Level	0.017 (0.448)	0.030 (1.161)	0.149* (6.605)	0.166* (7.287)	0.259* (7.594)	0.059* (3.041)	0.146* (4.869)
2nd Quartile Initial TFP Level	0.004 (0.109)	-0.051* (2.033)	0.071* (3.165)	0.118* (5.245)	0.162* (4.824)	0.059* (3.002)	0.095* (3.212)
3rd Quartile Initial TFP Level	-0.008 (0.021)	-0.048** (1.908)	0.043** (1.922)	0.073* (3.245)	0.086* (2.559)	0.021 (1.065)	0.075* (2.696)
Dummy 1994	-0.075* (2.812)	0.091** (1.819)	-0.039* (2.705)	0.034* (2.082)	0.011 (0.438)	0.052* (4.016)	0.036** (1.859)
Dummy 1995	0.040 (1.478)	-0.115* (4.527)	-0.033* (2.035)	0.055* (3.245)	0.116* (3.798)	-0.098* (6.539)	0.059* (2.887)
1st Year Privatization	0.035 (0.298)	0.061 (1.145)	0.054* (1.968)	0.022 (0.998)	-0.301* (3.612)	0.218* (13.510)	0.061 (1.221)
2nd Year Privatization	0.483* (4.495)	0.189* (7.508)	0.123* (5.125)	0.062* (2.775)	0.255* (3.191)	0.293* (17.052)	0.282* (7.851)
3rd Year Privatization	0.525* (4.864)	-0.043 (0.795)	0.075* (3.025)	0.241* (5.382)	0.205* (2.082)	0.074* (3.612)	0.309* (10.216)
4th Year Privatization	0.245 (1.608)	0.174* (4.485)	-0.061** (-1.715)	0.147* (2.494)	0.259 (1.506)	0.255* (10.099)	0.082* (2.467)
5th Year Privatization	0.401 (1.374)	0.063 (0.313)	-0.164** (1.942)	-0.032 (0.415)	0.109 (0.275)	0.336* (2.168)	-0.127* (-2.768)
Bank Financing 1993	-0.025 (0.827)	-0.047 (1.485)	0.191* (6.724)	-0.202* (9.415)	0.024 (0.062)	-0.218 (1.498)	-0.021 (0.829)
Bank Financing 1994	-0.043** (1.953)	-0.004 (0.192)	0.192* (5.358)	-0.005 (0.258)	-0.102** (3.528)	-0.019 (1.102)	-0.012 (0.597)
Bank Financing 1995	-0.057* (2.063)	0.064* (2.854)	0.163* (5.976)	0.015 (0.718)	-0.142* (3.075)	0.057* (3.939)	0.088* (2.536)
Sample Size	2484	2118	3132	2820	3192	2649	2289
R ²	0.097	0.131	0.162	0.181	0.164	0.256	0.213

The estimates are heteroskedasticity consistent. t-Statistics shown in parentheses. * Significant at the 95% level. ** Significant at the 90% level.

Table 7: Estimation Results on Other Government Policies
(TFP-growth, superpanel, random effects model)

		Region				
Constant		-0.062* (-2.798)				
Size Dummies Included		Yes				
Sector Dummies Included		Yes				
Initial TFP level 1993		0.115* (10.427)				
Initial TFP level 1994		0.067* (6.178)				
Initial TFP Level 1995		0.036* (3.357)				
1st Year privatization		0.106* (7.667)				
2nd Year privatization		0.185* (14.698)				
3rd Year privatization		0.134* (8.734)				
4th Year privatization		0.096* (4.967)				
5th Year privatization		0.041 (1.105)				
Bank Financing 1993		-0.026* (2.227)				
Bank Financing 1994		-0.021* (2.185)				
Bank Financing 1995		0.016 (1.498)				
Country-Time Dummies						
Year	Bulgaria	Czech Republic	Hungary	Poland	Romania	Slovakia
1992-93	-0.041* (-2.108)	0.068* (3.015)	-0.036 (-0.851)	-0.022 (-1.201)	-0.125* (-7.165)	0.038* (1.978)
1993-94	-0.112* (-5.831)	0.236* (2.105)	-0.021 (-0.096)	-0.082 (-0.425)	-0.096* (-5.436)	0.056* (2.698)
1994-95	0.213* (3.641)	0.175* (2.615)	0.039 (1.028)	0.045** (1.705)	0.152* (2.806)	0.084** (1.857)
Sample Size		18684				
R ²		0.147				

The estimates are heteroskedasticity consistent. t-Statistics shown in parentheses. * Significant at the 95% level.
** Significant at the 90% level.

Figure 1: Firm Size Statistics (Number of Employees, 1992)

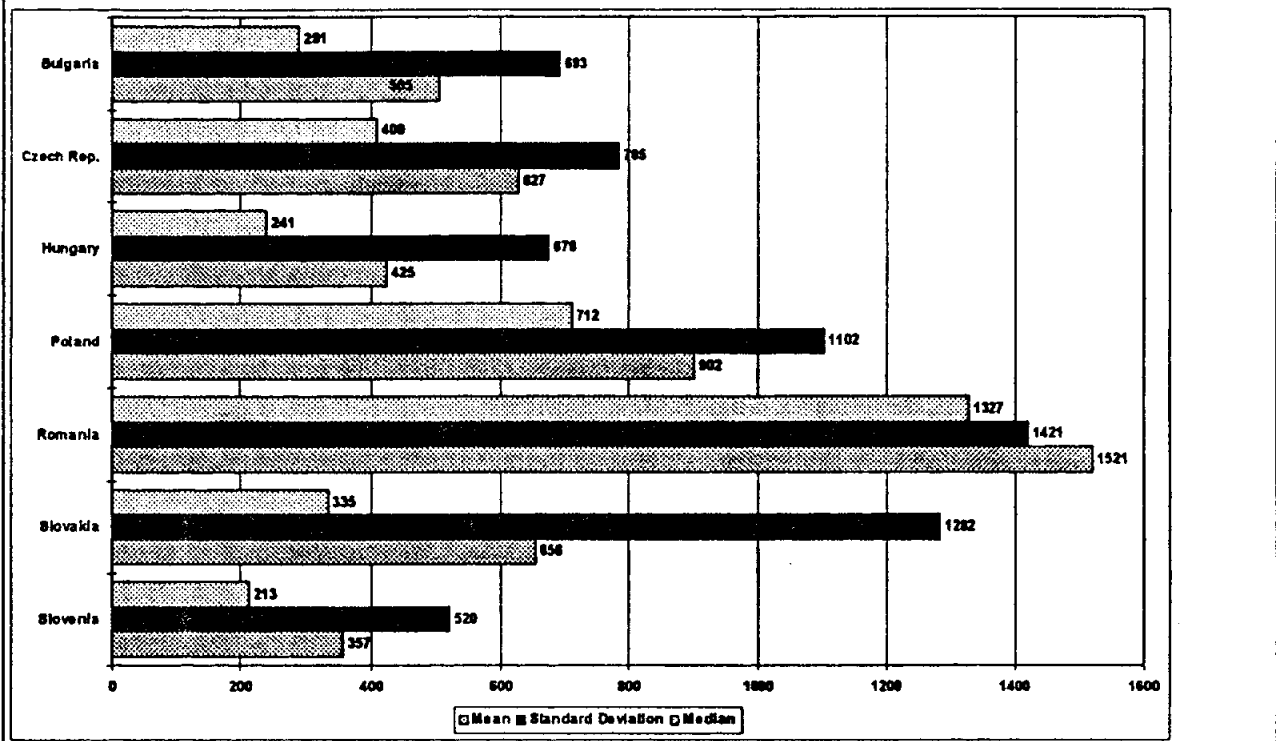


Figure 2: Average Restructuring Indicators (in %)

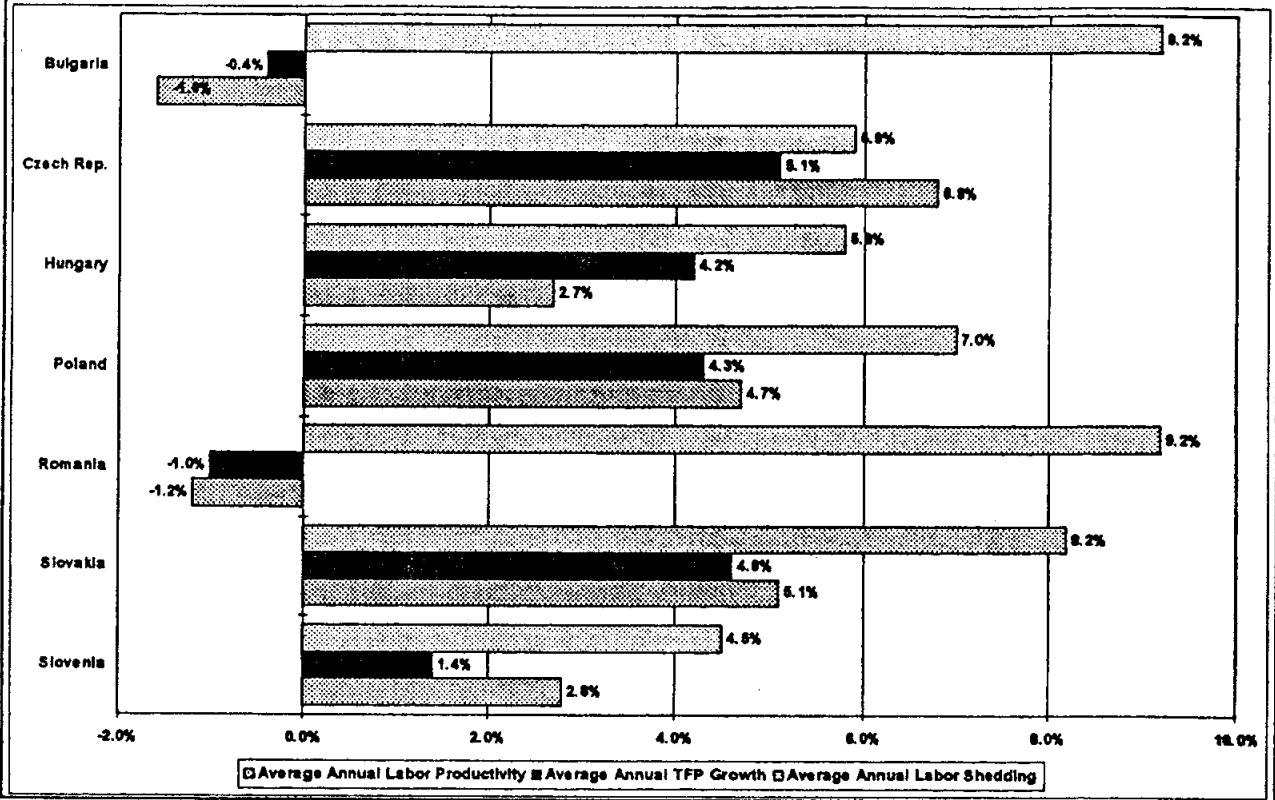


Figure 3: Labor Productivity (in PPP US\$)

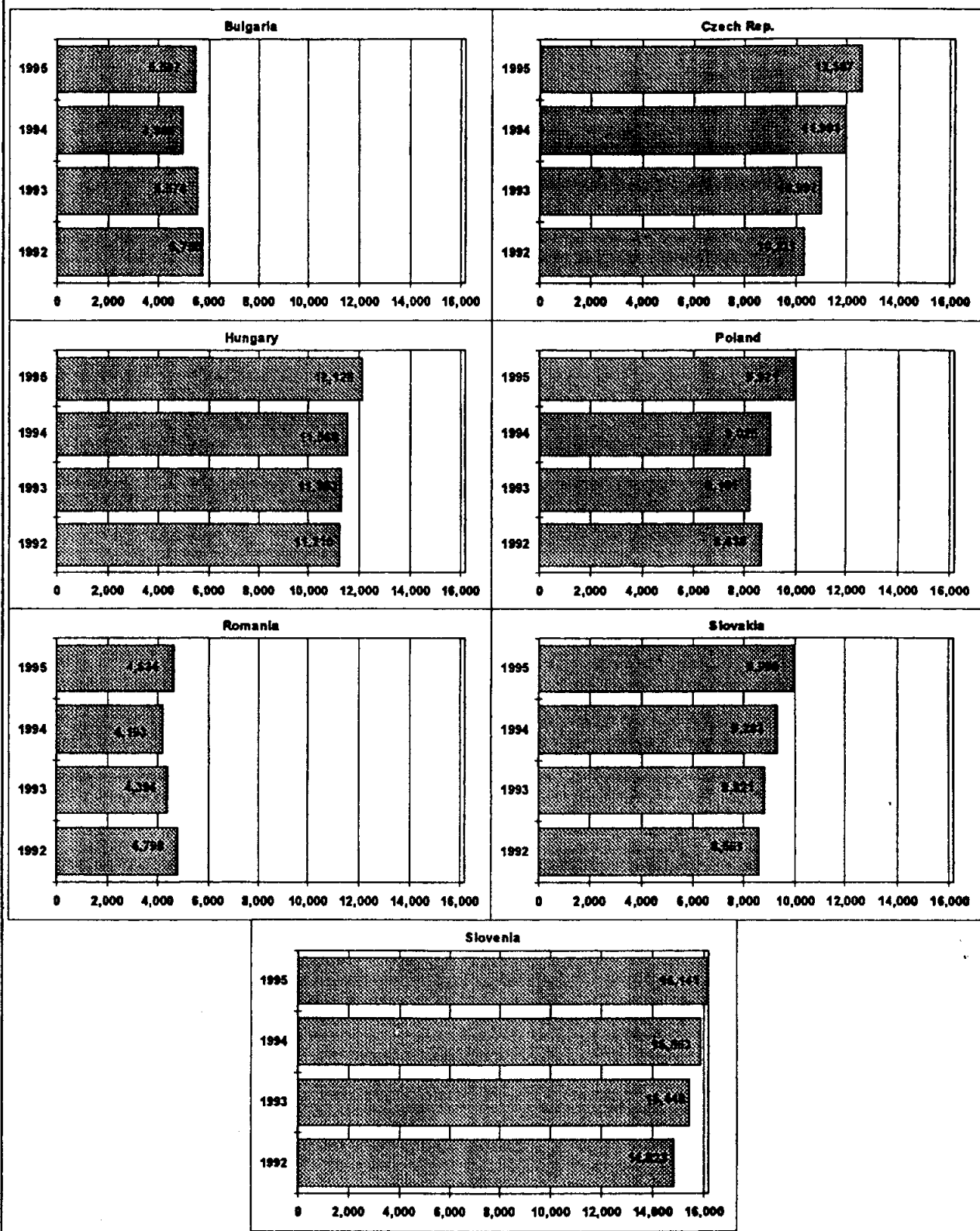


Figure 4: Operating Profitability (Share of total revenues)

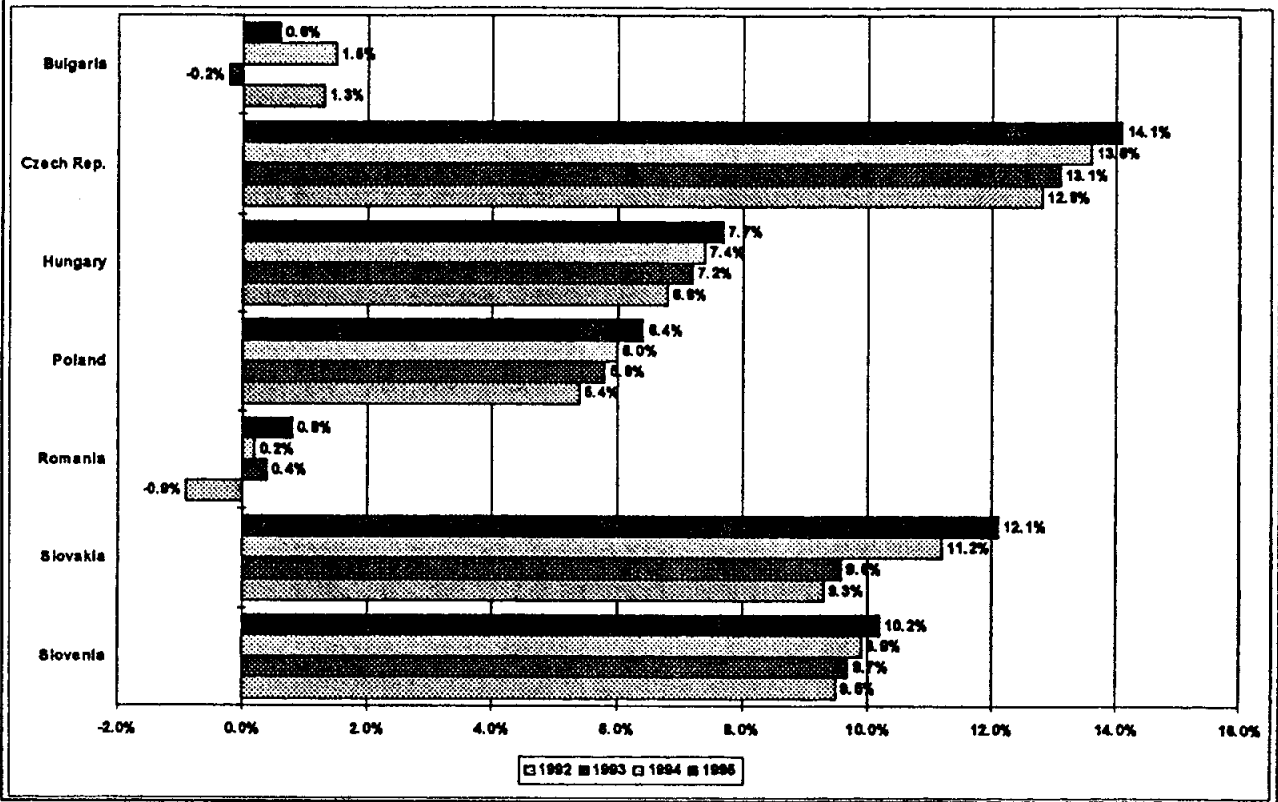


Figure 5: Total Factor Productivity (OLS estimates, White correction)

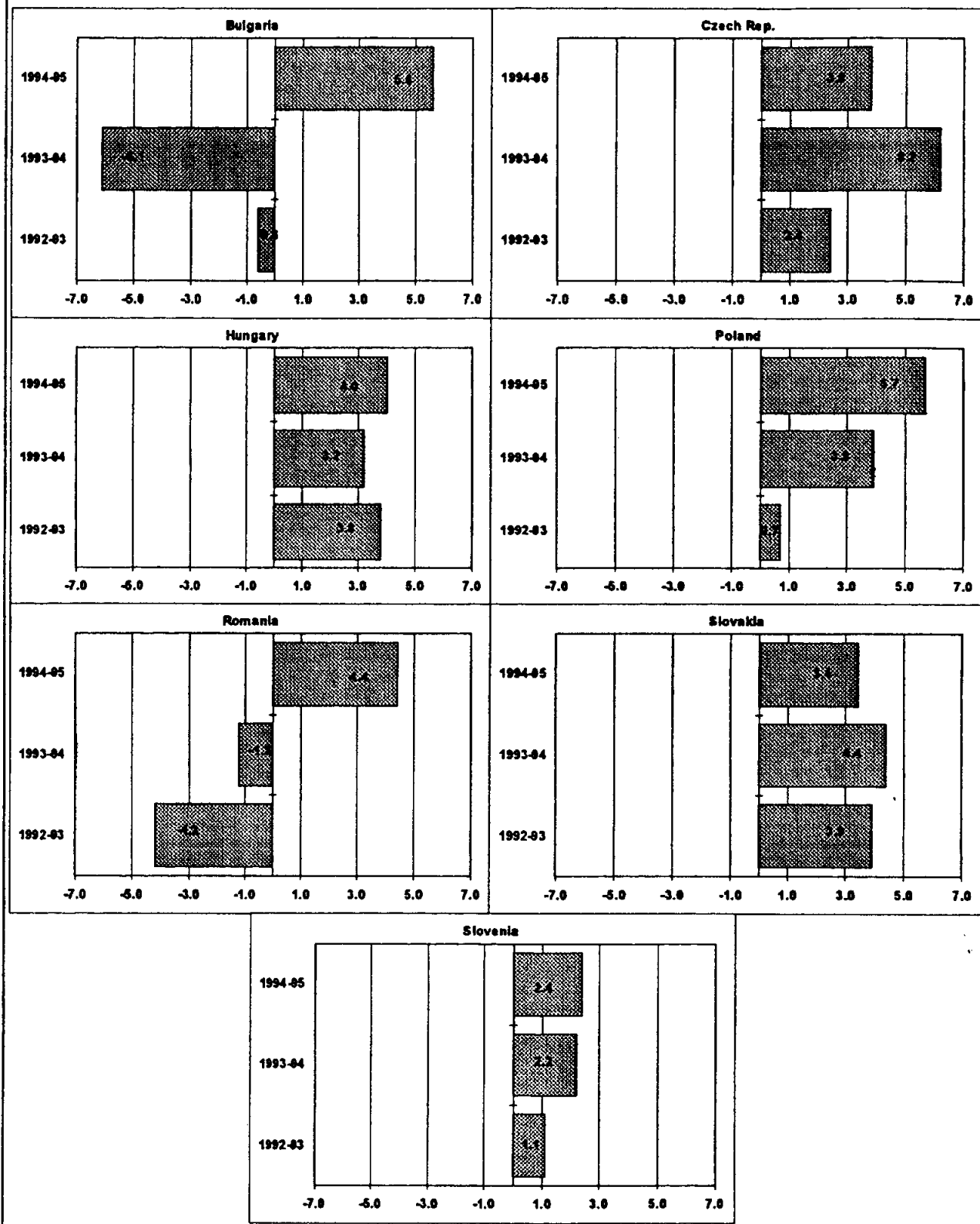


Figure 6: Total Factor Productivity (2SLS, White-correction)

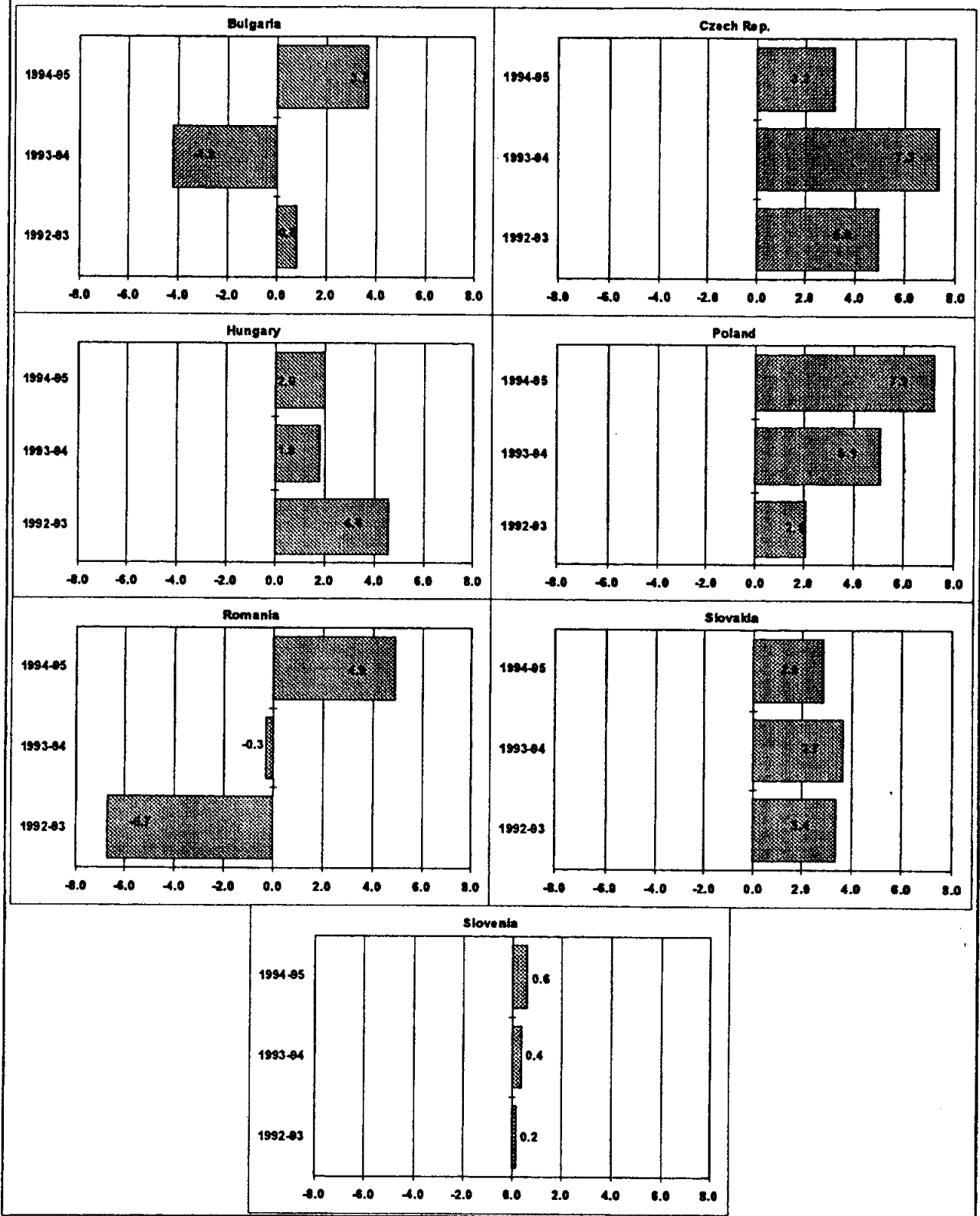


Figure 7: Convergence of Firm Performance (Standard deviation in TFP OLS estimations)

