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Comments Welcome

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Enterprise Restructuring and Performance in the Transition

1. Introduction

As the Central and East European (CEE) countries embarked on the transition from plan to market in the early 1990s, restructuring of state owned enterprises (SOEs) became one of the fundamental goals. Indeed, since 1990 policy makers and advisors have spent much time discussing the optimal forms, timing and sequencing of restructuring.¹ A number of models have been developed to examine economic implications of various forms of restructuring and the European Union made the restructuring of CEE firms a matter of its policy by insisting that CEE enterprises must become competitive before CEE countries qualify for Union membership.

From the standpoint of (a) altering the size and number of firms and (b) introducing new management, one of the most important forms of restructuring observed during the CEE transition was the massive breakup of SOEs in Czechoslovakia and to a lesser extent in Hungary in the early 1990s. In Czechoslovakia, many divisions (subsidiaries) of large SOEs applied in the 1990-91 period to their supervisory ministries for permission to split off from their "master enterprise". The ensuing process of negotiations among government officials, top managers of the SOEs and divisional managers resulted in a phenomenal wave of spinoffs, giving rise to a large number of new firms led by new top management. In particular, Czechoslovakia started in 1990 with about 700 industrial enterprises employing more than 25 workers. By mid 1992 the number of industrial firms in this

¹ The most hotly debated issues with respect to restructuring have related to the timing, extent and method of restructuring of state owned enterprises. On timing, the arguments have revolved around the question of whether price liberalization should be preceded by SOE restructuring or whether liberalization of prices is needed first in order to send correct signals for restructuring and privatization. With respect to the extent and method, one strand of the debate has focused on whether the SOEs tend to be too large and need to be broken up into smaller units or whether their size is appropriate for the world market. A related discussion concentrated on the issue of manager's interests in this stage of transition. Answers to these questions in turn guide public policy on who should lead enterprise restructuring -- existing managers, the supervisory ministries or external institutions such as foreign investors or management companies.

category virtually tripled to about 2000.² The timing of this restructuring preceded other major reforms, as prices were under state control in 1990 and even in 1991, when prices were already by and large free, the state still owned the firms.³

The question that naturally arises is whether the observed breakups have had systematic economic effects in the sense that they improved or worsened the performance of the spun off subsidiaries and/or the remaining master enterprises. In this paper we address this issue using enterprise-level data related to the major wave of breakups of Czechoslovak SOEs during the 1990-1991 period. We build on the work of Lizal et al. (1995) by using a better data set and superior analytical techniques to address the issue. First, Lizal et al. (1995) employ data from the 1990-91 period only, thus making it difficult to assess the performance of the various units after the breakups. For the present investigation, we have collected the relevant data for 1992 and we are hence able to examine the effects of breakups on enterprise performance in both 1991 and 1992. Second, Lizal et al. (1995) did not have data on value added of firms and thus had to use total output as a proxy. In preparing the present paper, we have constructed data on value added and are thus able to estimate the effect of spinoffs using a more meaningful measure of enterprise performance. Third, while Lizal et al. (1995) estimated the effect of the spinoff by comparing the performance of master enterprises that experienced spinoffs to those that did not, we use the performance of firms that did not experience spinoffs as a base to which we compare the performance of both the master enterprises that experienced spinoffs and the spun off subsidiaries. Fourth, the estimates of Lizal et al. (1995) suggest that the effect of a spinoff on performance is negative for both the spun off units and the remaining master enterprises, a result that is inconsistent with their model. In the present paper, we provide a justification for such an outcome. Finally, while Lizal et. al (1995) capture the effect of a spinoff as either an intercept effect or an affine function of the share of spinoff in employment of the original firm, we allow for a simultaneous effect of both

² The latter number included newly created firms as well. However, a significant part of the growth of firms is due to the breakups of SOEs.

³ Yet as discussed by Josef Kotrba (1995) and Alena Zemplerova and Josef Stibal (1995), the outcome of the process of enterprise breakups had important implications for the structure of industry and the subsequent program of privatization.

the intercept shift and the employment share. This more flexible functional form permits us to identify a performance effect that is positive for small spinoffs but declines with the size of the spinoff and for large spinoffs becomes negative.

2. The Conceptual Framework for Spinoffs and Breakups

The extensive literature on the desirability of takeovers, mergers, spinoffs, and breakups of firms in market economies focuses on the tradeoff between transaction costs via markets and the internal inefficiencies within organizations.⁴ While these aspects of the problem are relevant in the context of the transition, our discussion above indicates that the conceptual framework of enterprise breakups in the transition requires a focus on the different goals and interactions of the management of the SOE, management of the divisions (subsidiaries) and the government.

For our purposes, the relevant studies in the transition context are those of Aghion et al. (1994), Shleifer and Vishny (1994), Prasnikar et al. (1994), and Lizal et al. (1995). These studies focus on bargaining between the relevant decisionmakers -- depending on the context these are managers, government officials (politicians), workers, and new private owners. Shleifer and Vishny (1994) for instance model the interaction between firms and politicians as a bargaining game about employment, subsidies and bribes. They focus on privatization which limits the usefulness of their model for analyzing other forms of restructuring, but their framework is useful for our purposes in that it points to the possibility of appropriation of concealed profits by certain decisionmakers.

Aghion et al. (1994) assume that the payoffs to managers consist of a share of enterprise profits and that restructuring consists of layoffs of unproductive workers. The managers therefore weigh the tradeoff between the increase in profits brought about by layoffs and the probability of being fired due to employee discontent or privatization.

Prasnikar et al. (1994) use a cooperative bargaining framework and also focus on the tradeoffs faced by principal decisionmakers in the firms in transition economies.

⁴ See e.g., Coase (1937), Alchian and Demsetz (1972), Williamson (1975, 1985), Chandler (1977), Klein et al. (1978), Grossman and Hart (1986), Hart and Moore (1990), and Radner and Van Zandt (1992).

They model and estimate the impact of varying the power of managers, workers and government on the firm's employment, wages and profit. Given diverse preferences of the three groups of decisionmakers, legal and institutional changes that shift the relative power of these actors yield different degrees of restructuring in terms of the level of employment, wages and profits.

Like the other studies, Lizal et al. (1995) assume that the salaries of managers consist of a share of enterprise profit and they develop a model of a sequential game with perfect information on the side of the firm to derive predictions about the occurrence and outcome of spinoffs.

We build on Lizal et al. (1995) and the other studies by noting that in a standard framework, if spinoffs are driven by self-interest of at least one group of decisionmakers, the effects of breakups on performance should either be positive for both the master enterprise and the subsidiary, or positive for one and neutral or negative for the other. To begin with, if the large (politically motivated) SOEs suffer from diseconomies of scale or other inefficiencies, breakups will result in a superior performance of both the spun off units and the resulting (smaller) master enterprises. Since one cannot observe the relative performance of different parts of the firm before the spinoff, the estimated effect of the spinoff may also be brought about by the inherently different performance levels of the spun off and remaining parts of the original firm. The effect will thus be positive for the spun off unit and negative for the remaining master enterprise if the spun off division is a better performer than the rest of the firm and prior to the spinoff it cross-subsidized the rest of the firm. The effect will be positive for the spun off unit and insignificant for the remaining master enterprise if the spun off division was equally performing as the rest of the firm but can improve its performance as a result of the breakup. Should the spun off unit be an inferior performer to the rest of the firm, the spinoff will have a positive effect on the recorded performance indicators of the master enterprise and a negative effect on the performance of the spun off unit unless the spinoff results in a better performance of the spun off division. Clearly, the combination of differential ex ante performance and possibility of improving performance through unbundling of uneconomically large firms means that at least one part of the original firm should record better performance as a result of the spinoff.

Lizal et al. (1995) and most other studies assume that the manager has an incentive to improve enterprise performance and they do not analyze one important aspect of the transition process which we explore in this paper. Evidence from the transition economies indicates that total profit usually consists of a reported part, appropriated primarily by the government, and a concealed part, appropriated by the top management (for example through the widely used "resale principle").⁵ In this situation, restructuring defined as a spinoff of a subsidiary need not be driven by efficiency considerations, but rather by the desire of middle-level managers to spin off their subsidiaries, become top-level managers in these units, and appropriate concealed profits. In this framework it is possible to explain why spinoffs and breakups need not have positive effects on observed performance (e.g., in terms of observed profits) of either the remaining master enterprise or of the newly spun off subsidiary. Since restructuring entails fixed administrative and other costs, the breakup may even have negative effects on indicators such as value added and profitability.

3. The Empirical Analysis

The outline of the empirical part of the paper is as follows. In Section 3.1. we describe the data and discuss our ability to identify the breakups and the pairs of master enterprises and spun off subsidiaries. In Section 3.2. we present the general econometric models that we use, while in Section 3.3 we discuss particular estimating equations and estimating techniques. The main results of our empirical analysis are presented in Section 3.4.

3.1. The Data and Identification of Breakups

Our empirical analysis is based on quarterly and annual data reported by Czechoslovak industrial enterprises to Czechoslovakia's Federal Statistical Office and Ministry of Finance during the 1990-92 period. The data cover all industrial enterprises

⁵ The principle works as follows: The SOE sells its goods at a low price to a private company owned or controlled by the top management, which then sells the goods at a market price or buys them back for the same SOE at a market or above market price. Individual stories and reports of scandals based on this principle have been frequently reported in the media of transition economies.

employing more than 25 employees. As mentioned earlier, at the start of 1990 the data set included about 700 enterprises, while in mid-1992 it covered approximately 2000 firms.

The data set was carefully assembled but unfortunately it contains no explicit indicator of organizational changes such as breakups of enterprises since the data collection instrument was designed under central planning and no unplanned changes of industrial structure were expected to occur. As a result, major changes such as a sudden decline in production brought about by the firm's loss of the Soviet market cannot be readily distinguished from changes brought about by a breakup of the enterprise.

In order to identify the breakups, we exploited a special feature of the Czechoslovak system of statistical reporting. The system required enterprises to report preceding year's values of variables together with current values in most of their reports. Enterprises experiencing spinoffs were required to report the preceding year's values corresponding to the **remaining** (post-spinoff) part of the enterprise. If a breakup occurred, the remaining master enterprise therefore reported both current and preceding year's data corresponding to its new (smaller) size. For instance, as we show in the hypothetical example in Table 1, if an enterprise with 700 employees spun off a unit with 400 employees in the second quarter of 1991, it was to report employment of 700 in all quarters of the 1990 and the first quarter of 1991, but only 300 employees as the current and last year's value from the second quarter of 1991 on. In contrast, if an otherwise identical enterprise reduced employment by 400 employees without a spinoff in the second quarter of 1991, it was to report 700 employees in all quarters of 1990 and the first quarter of 1991, 300 employees as the current value from the second quarter of 1991 on and 700 employees as last year's employment in 1991 and the first quarter of 1992. Using quarter by quarter comparisons, we thus identified the breakups and the quarter of their occurrence.

As can be seen from Table 2, using the quarterly data set, we are able to identify 451 enterprises that were present in the data set continuously from the first quarter of 1990 to the fourth quarter of 1991. Using in addition monthly data furnished by the firms, we were able to increase this number to 476 of the unsplit and master enterprises. However, we had to drop about 80 of the 476 firms as we found the

quality of their data inadequate. Some observations were also lost as we proceeded to collect data for the same set of firms for 1992. Overall, in most regressions we use data for 373 firms for 1991 and about 260 firms for 1992.

Using the above mentioned procedure for identifying spinoffs, eliminating firms that did not fill out questionnaires reliably and ignoring potential spinoffs involving less than 5% of the labor force or fewer than 5 employees,⁶ we were able to identify 152 firms that experienced spinoffs. The distribution of these spinoffs by quarter is given in Table 3. As can be seen from the table, the majority of the spinoffs occurred in the first quarter of 1991 and, to a lesser extent, in the last quarter of 1990. In our empirical investigation, we use data from firms that experienced spinoffs in the first quarter of 1991. This resolves the problem of endogeneity of right-hand side variables that could arise since we use 1990 values as exogenous variables for 1991 and 1992 regressions. As can be seen from Tables 3 and 4, there were 78 spinoffs in the first quarter of 1991, of which 66 yield usable data for empirical analysis in 1991 and around 50 in 1992.

The data exercise performed so far allows us to compare the performance of master enterprises that experienced spinoffs to the performance of those that did not. However, it does not permit us to link the spun off units to their former master enterprises and calculate the relative size of the spinoffs. In order to establish this link, we carried out puzzle-like comparisons of the values of variables such as labor in newly established companies with the decrease in the values of these variables in the master enterprises that were identified as experiencing spinoffs. In doing so, we were also forced to impose the assumption that the spun off units operate in the same or similar industry as the master enterprise. This exercise enabled us to identify unambiguously 28 pairs of masters and spun off subsidiaries, 27 of which were usable in our empirical work.⁷

⁶By imposing the lowerbound on the acceptable size of the spinoff, we eliminated cases where our matching could be affected by minor discrepancies and reporting errors, as well as by the massive entry of small de novo enterprises (see Zemlinerova and Stibal (1995)).

⁷The rules we used in constructing the data set may cause one more and one less serious problem. The potentially serious problem is that an error in filling out a questionnaire may be taken to represent a spinoff. We tried to prevent this erroneous

3.2. The Econometric Models

Since comparisons of means indicate that in 1990 there were no significant differences in performance between firms that later experienced spinoffs and those that did not, our empirical strategy is to estimate the performance effect of a spinoff by comparing the performance of enterprises that were present throughout the 1990-92 period but did not experience any spinoffs to the performance of (a) master enterprises that experienced spinoffs and (b) the newly spun off subsidiaries. The method essentially consists of comparing the performance of a treatment group (enterprises involved in a spinoff) to a control group (enterprises not undergoing a breakup). It goes beyond a simple comparison of means by controlling for the relevant pre-spinoff conditions in these firms. Moreover, we estimate the effect of the spinoff on performance as a linear function of the size of the spinoff. In particular, using data on the spun off subsidiaries and master enterprises that experienced breakups as well as those that did not, we estimate coefficients α_0 , α_1 and β in the following model:

$$\pi_i = \beta'X_i + \alpha_0d_i + \alpha_1df_i + \theta_i, \quad (1)$$

where i indexes firms, π_i is a measure of enterprise performance (defined below), X_i are variables controlling for pre-spinoff conditions (discussed below), d_i is a dummy coded 1 if the enterprise is a spun off subsidiary or a master firm that experienced a spinoff and zero otherwise, and df_i is a variable measuring the share of a spinoff within the former master enterprise. In our empirical work, we have defined df_i as the share that the labor force of the spun off subsidiary represents in the total labor force of the master enterprise. The average, minimum and maximum values of this variable

identification by carrying out careful consistency checks of our questionnaires and we dropped firms that were not filling out the questionnaires in a reliable way. The potentially less serious problem is that the procedure used neglects spinoffs that were minor in size and thus did not exceed the critical values of 5% of the labor force and 5 employees. Since we are interested in estimating the effects of significant organizational changes, this appears to be a minor problem. Finally, in cases when more than 50% of an enterprise splits off, the question arises as to which part constitutes the master enterprise and which part is the subsidiary. We verified with the Czechoslovak Federal Statistical Office that the former master enterprises (top management units) retained their before-split identification numbers. We were therefore able to identify enterprises that were formerly the superior (top management) units within the pre-spinoff enterprise.

are reported in Table 4. The values of \mathbf{d}_i and \mathbf{df}_i are obviously zero for firms that did not experience spinoffs.

If unobserved random characteristics of an enterprise did not influence the occurrence of a spinoff and the value of the share variable, the usual estimation methods such as the ordinary least squares (OLS) would give us consistent estimates of α 's and β . However, the process of determination of \mathbf{d}_i and \mathbf{df}_i is most likely correlated with unobserved characteristics of the enterprise, such as the ability of management and know-how. As a result, it is likely that

$$E(\mathbf{e}_i|\mathbf{d}_i) \neq 0, E(\mathbf{e}_i|\mathbf{df}_i) \neq 0. \quad (2)$$

The error term in equation (1) is hence likely to be correlated with the right hand side variables \mathbf{d}_i and \mathbf{df}_i and OLS estimates are likely to be inconsistent. The solutions for this problem are well known (see e.g., Madalla (1983) or Heckman and Singer (1985)), with the simplest and most robust one being the use of instrumental variables (IVs), where the instruments for \mathbf{d}_i and \mathbf{df}_i are variables that are correlated with \mathbf{d}_i and \mathbf{df}_i but not with \mathbf{e}_i . Theoretically, one might want to use the more efficient MLE estimates but, in the presence of a dummy variable for the split and a variable denoting the share of split, MLE requires numerical integration and is sensitive to misspecification. Moreover, since the relative advantage of the MLE method is based on large sample properties and we have fewer than 400 observations, we prefer to use the robust IV approach.

3.3. The Empirical Specifications

Enterprise performance may be measured in a number of ways. In order to provide a relatively broad set of tests, we have used the following six indicators of performance:

- 1) Value Added/Labor,⁸
- 2) Profit/Labor,

⁸ Since the CSO data sets do not contain value added, we have used proxy defined as profit plus labor costs.

- 3) Profit/Net Capital,⁹,
- 4) Log (Output/Labor),
- 5) Log (Output/Net Capital),
- 6) Turnover/Total Cost.

Indicators using profit and value added are not expressed in logarithms since they occasionally contain negative values. The remaining three indicators are expressed in logarithms. The performance variables are based on 1991 and 1992 annual data and values are expressed in thousands of Czechoslovak crowns. In view of the fact that (a) insiders have the possibility to conceal profits, (b) firms selling finished products have higher gross output and turnover (sales) than otherwise identical firms producing intermediate goods and (c) the value of capital was set arbitrarily during the period of central planning, we view value added per worker as the most appropriate indicator of performance.

Our control variables X_i refer to 1990 and are: labor (number of employees), labor squared, net capital, net capital squared, net capital per labor, net capital per labor squared, and industry dummies for seven industries (heavy industry; machinery; production of building materials; production of pulp, wood processing and paper; glass and ceramics; food and beverages; and textile and leather). We thus use a simple but flexible additive form which represents a second-order approximation to any production function, controlling for industry-specific effects as well as the labor input of each enterprise, its level of net capital, and the technical level of its machinery before the split. It should be noted that since we are using 1990 X_i s to control for pre-split performance, we do not encounter the standard problem of endogeneity that would arise if we used current period (1991 and 1992) values of X_i s. In fact, in 1990 the values of these variables were still completely predetermined by the centrally planned system. In sum, in our framework, both spun off subsidiaries and all master enterprises were assigned 1990 values of X_i that correspond to the enterprise from which they evolved.

⁹ Net capital = Gross capital - Depreciation.

In instrumenting d_i and df_i , the crucial source of identification was dummy variables for individual supervisory ministries that made the final decisions about the proposed spinoffs (Federal Ministry of the Economy, Czech Ministries of Industry, Machinery, and Construction, and the Slovak Ministries of Economy and Industry). Since the ministries decided whether the split was to be approved or not and how exactly it was going to be carried out, the ministry dummy variables are correlated with (and hence good predictors of) the variable measuring the share of the spinoff and the dummy variable denoting the occurrence of the spinoff.¹⁰ Moreover, since the ministries were separate for the Czech and Slovak Republics, the ministry dummies also serve as dummies for the two republics.¹¹

3.4. Empirical Results

3.4.1. The Effects of Split on Master Enterprises

In this section we present coefficient estimates of equation (1) based on data from master enterprises that experienced spinoffs and those that did not. The results are based on samples that have 373 firm-level observations in 1991 and approximately 260 observations in 1992. About 20% of these firms experienced a spinoff.

In Tables 6 and 7 we present the estimated coefficients α_0 and α_1 , giving the effect of the spinoff on the performance measures listed in the lefthand side column of these tables. Table 6 gives the estimates for 1991 and Table 7 for 1992. As mentioned earlier, both sets of estimates are conditioned on the before-split (1990)

¹⁰ Note that the correlations between industry dummies used in the X_i vector of control variables and the ministry dummies identifying the effect of the spinoff variables are fortunately quite low. Although in the case of one industry the correlation coefficient reached 0.78, all other correlation coefficients were below 0.4.

¹¹ Moreover, using finer regional dummies for the location of the enterprise would be inefficient as it would to a large extent capture the place of registration of the enterprise rather than the location of its operations. For example, a significant portion of enterprises has always registered in the capital cities of Prague and Bratislava, but carried out production in locations other than the capital. This tendency is also more prevalent among the larger companies that we analyze.

characteristics of these enterprises. We present only the the consistent and robust IV estimates.¹²

As can be seen from Table 6, three of the six estimates of α_0 and α_1 are significant. In particular the estimates of the effect of a spinoff on the master enterprise's 1991 value added per worker, profit per worker and the ratio of turnover to cost suggest that the effect is declining with the size of the spinoff, being positive for small spinoffs but becoming negative for spinoffs that exceed about one-third of the labor force of the original firm. The IV estimates for the logarithm of output/labor, profit/net capital and the logarithm of output/net capital are all insignificant.

The estimates reported in Table 7 refer to 1992 and they are based on a smaller sample of approximately 260 observations.¹³ As may be seen from the table, with the smaller sample size and a longer time lag between the spinoff and the measurement of performance, the estimated effects (except for the logarithm of output/labor) are statistically insignificant.

3.4.2. Effects of a Spinoff on the Subsidiary

In this section we focus on the difference between the performance of spun off subsidiaries and the performance of enterprises that did not experience spinoffs. The total sample size is about the same as before (334 observations for 1991 and approximately 220 observations for 1992), but there are at most 27 observations on the spun off subsidiaries. As mentioned earlier, in the case spun off subsidiaries the left-hand side variables are performance variables of the subsidiary in 1991 and 1992, while the right-hand side variables are the 1990 (before split) values of the X_1 variables of the master enterprise in which the spinoff occurred. The estimates of α_0 and α_1 may hence be interpreted as reflecting the difference between the performance of a subsidiary in 1991 and 1992 and the performance of an enterprise that did not undergo spinoff but had the same characteristics as the enterprise from which the subsidiary split in 1990.

¹² The corresponding OLS estimates, which we generated for the sake of comparison, were similar and less significant.

¹³ The number of observations for 1992 always differs slightly by the availability of the particular left hand side variables in our files.

In Table 8 we present estimates of the effects of the spinoff on the performance of the spun off units in 1991. As in the case of master enterprises, we find that the effect of a spinoff on the newly independent subsidiary's value added per worker, profit per worker and the ratio of turnover to cost is a negative function of the relative size of the spinoff, being positive for relatively small spinoffs and negative for spinoffs exceeding about one-third of the labor force of the original firm. The IV estimates for the logarithm of output/labor and the logarithm output/net capital are on the boundary of significance and profit/net capital is again insignificant.

The estimates of the effects of spinoffs on 1992 performance of the spun off subsidiaries are given in Table 9. In contrast to Table 7, which reported insignificant 1992 effects of spinoffs on the master enterprises, the IV estimates in Table 9 show significant downward sloping effects on profit/labor and the logarithm of output/labor in the spun off units. Estimates of the spinoff effects on the remaining four indicators are insignificant. There is hence again evidence of a weakening of the effect of spinoffs over time, but the evidence is less clear-cut than in the case of the master enterprises.

Overall, our most interesting findings are that (a) the short-term (1991) effect of the spinoff is significant for three of the six indicators of enterprise performance, (b) the effect is positive for small values of spinoffs and declines with the size of the spinoff and (c) the estimated effects are similar for the spun off subsidiaries and the remaining master enterprises.

3.4.3 Joint Estimates and Critical Values of a Spinoff

In view of the similar estimates obtained for the spun off units and the remaining master firms, we have also carried out joint estimates and tested the hypothesis of equality of the effects of the spinoff for these two sets of firms. The estimates for 1991 and 1992 are presented in Tables 10 and 11, respectively. As can be seen from these tables, the joint estimates are similar to those found in individual regressions earlier. Moreover, as the p values in the last columns of Table 10 and 11 indicate, on the basis of $X^2_{(2)}$ tests one cannot reject the hypothesis that for each performance indicator the effect of the split is identical for the spun off subsidiaries and the remaining master firms.

Using the estimated coefficients from Tables 6-11, in Table 12 we calculate the critical size of a spinoff, defined as that size (measured in terms of the share of labor of the original master enterprise that was spun off) at which the effect of the spinoff on performance becomes zero. For the three performance indicators that registered the most significant effects in 1991 (value added/labor, profit/labor and turnover/cost), the 1991 joint estimates of the critical size of the spinoff is ranging from 34% to 45%. This means that the effect of the spinoff is estimated to be positive within a sizable range of spinoff values, including the average spinoff size of 28% in our sample (see Table 4). This in turn suggests that the large SOEs suffered from strong diseconomies of scale. In future research, it will be of interest to explore why the effect becomes negative at higher values of spinoffs. One conjecture is that larger spinoffs generate greater competition and thus reduce the profits as well as value added in these firms.

4. Concluding Observations

In terms of altering the number and size of firms, as well as bringing in new top management, the most important restructuring observed in a number of the transition economies was the major breakup of large state owned enterprises (SOEs) into smaller units. Our econometric estimates suggest that the major wave of breakups of SOEs that took place in Czechoslovakia in the early 1990s had a significant immediate (1991) effect on productive efficiency and profitability of industrial firms. The effect was positive for small to average size spinoffs and negative for large ones. One also cannot reject the hypothesis that the estimated effect of spinoffs on performance was identical for the spun off subsidiaries and the master enterprises that experienced the spinoffs. Our findings are based on better data and methodology than the study by Lizal et al. (1995) which found negative or insignificant effects of spinoffs on performance.

We have fewer observations for 1992 and while the point estimates are similar to those for 1991, the associated standard errors are large and generate fewer significant results. Finally, it must be noted that even in 1991 the estimated effect is statistically insignificant for three other (less precisely measured) indicators of

performance. These measures are mainly based on net capital, the value of which was set arbitrarily under the centrally planned system.

In terms of the conceptual framework presented in Section 2, our findings suggest that the large firms created under the centrally planned system suffered from inefficiencies that were alleviated by the breakups of these firms into smaller units. Our results also indicate that dissipation of profits by management was not so pervasive as to eliminate the positive effect of spinoffs on reported profits. In future research, it will be of interest to examine systematically the theoretical underpinnings of our findings. At present, we interpret the results as showing that smaller spinoffs alleviated inherited inefficiencies. We also conjecture that larger spinoffs created duopolistic competition that tended to reduce prices and hence also value added of the master and spun off enterprises.

Table 1: An Example of Identification of a Spinoff

Reports from Year by the Type	Reported Variable	Quarters			
		I.	II.	III.	IV.
1990 by Both Types	Current Labor	700	700	700	700
1991 by the Firm with Spun off Subsidiary (Master Enterprise)	1990 Labor	700	300	300	300
1991 by the Firm with Layoffs	1990 Labor	700	700	700	700
1991 Both Types	Current Labor	700	300	300	300

Note: Comparison of a spinoff of size of 400 employees that took place in the first quarter of 1991 and layoffs of 400 employees in the same period.

Table 2: Number of Enterprises in the Sample

Quarters	Total Number of Enterprises	Number of Continuously Present Enterprises *
I/90	647	451
II/90	856	518
III/90	1197	957
IV/90	1365	1135
I/91	1552	1418
II/91	1694	1613
III/91	1818	1656
IV/91	1855	1855

Note: * The number of enterprises that were in the data set from the indicated quarter until the end of 1991.

Table 3: Number of Spinoffs in 8 Consecutive Quarters of 1990 - 1991

Quatr.	I.-II.	II.-III.	III.-IV.	IV.-V.	V.-VI.	VI.-VII.	VII.-VIII.
Number	8	0	57	78	2	6	1

Table 4: The Average Size of the Spinoff of Master Enterprise

	Average Spinoff	Standard Deviation	Number of Spinoff of Master Enterprises / Total Available Sample (Typical)	Minimum Spinoff	Maximum Spinoff
Whole Sample 1990	31.1%	17.0%	118/432	5.3%	70.8%
Analyzed 1991	28.3%	15.6%	66/373	5.3%	68.2%
Analyzed 1992	29.5%	16.7%	50/260	5.3%	68.2%

Notes: The size of a spinoff is measured as percentage of the master enterprise in terms of labor.
 Number of enterprises in regressions vary in 1992 because of unavailability of a particular LHS for given enterprise.

Table 5: The Average Size of a Spun off Subsidiary

	Average Spunoff	Standard Deviation	Number of Spunoff Enterprises in the Sample	Minimum Spinoff	Maximum Spinoff
Subsidiary	28.7%	15.0%	27	8.1%	70.8%

Notes: The size of a spunoff subsidiary is measured as percentage of the former master enterprise in terms of labor.

Table 6: Estimates of the Effects of a Split on the Master in 1991

$$\pi_i = \beta'X_i + \alpha_0d_i + \alpha_1df_i + \theta_i, \quad (1)$$

Left Hand Side Variable	Important IV coefficients and Statistics			
	on dummy (α_0)	on share (α_1)	Adjusted R ²	Number of obs.
Value Added / Labor	206.04** (97.59)	-542.10** (251.19)	0.40	373
Profit / Labor	375.27** (175.91)	-722.90* (382.10)	0.22	373
Profit / Net Capital	21.09 (29.64)	-62.28 (62.67)	-0.04	373
log (Output/ Labor)	0.80 (0.89)	-2.78 (1.94)	0.36	373
log (Output / Net Capital)	1.25 (1.22)	-3.93 (2.65)	0.05	373
Turnover / Cost	0.74** (0.32)	-1.49* (0.78)	0.08	373

Notes:

- Values in parentheses are standard errors;
- * = significantly different from zero at 10% level of significance;
- ** = significantly different from zero at 5% level of significance;
- There are 66 splitted master enterprises in the samples.

Table 7: Estimates of the Effects of a Split on the Master in 1992

$$\pi_i = \beta'X_i + \alpha_0d_i + \alpha_1df_i + \epsilon_i, \quad (1)$$

Left Hand Side Variable	Important IV coefficients and Statistics			
	on dummy (α_0)	on share (α_1)	Adjusted R ²	Number of obs.
Value Added / Labor	167.07 (265.79)	-499.67 (545.20)	0.21	259
Profit / Labor	165.84 (263.58)	-492.39 (540.65)	0.20	262
Profit / Net Capital	0.15 (0.72)	-1.34 (1.48)	-0.01	368
log (Output / Labor)	2.25* (1.27)	-4.31* (2.61)	0.09	260
log (Output / Net Capital)	-0.57 (1.48)	0.75 (3.10)	0.09	256
Turnover / Cost	-0.37 (0.47)	-0.68 (0.96)	0.13	367

Notes:

- Values in parentheses are standard errors;
- * = significantly different from zero at 10% level of significance;
- ** = significantly different from zero at 5% level of significance;
- There are approximately 60 splitted master enterprises in the samples with 367 and 368 observations and about 50 in the other samples.

Table 8: Estimates of the Effects of a Split on the Subsidiary in 1991

$$\pi_i = \beta'X_i + \alpha_0d_i + \alpha_1df_i + \epsilon_i, \quad (1)$$

Left Hand Side Variable	Important IV coefficients and Statistics			
	on dummy (α_0)	on share (α_1)	Adjusted R ²	Number of obs.
Value Added / Labor	225.57* (123.44)	-732.54* (385.70)	0.18	334
Profit / Labor	434.72** (210.50)	-1375.61** (588.16)	0.09	334
Profit / Net Capital	34.18 (47.67)	-78.14 (133.34)	-0.04	334
log (Output / Labor)	2.02 (1.54)	-7.80* (4.30)	0.26	334
log (Output / Net Capital)	2.88 (2.12)	-10.90* (5.93)	0.02	334
Turnover / Cost	1.31** (0.53)	-3.81*** (1.48)	0.00	334

Notes:

- Values in parentheses are standard errors;
- * = significantly different from zero at 10% level of significance;
- ** = significantly different from zero at 5% level of significance;
- *** = significantly different from zero at 1% level of significance;
- There are 27 subsidiaries in the samples.

Table 9: Estimates of the Effects of a Split on the Subsidiary in 1992

$$\pi_i = \beta'X_i + \alpha_0d_i + \alpha_1df_i + \theta_i, \quad (1)$$

Left Hand Side Variable	Important IV coefficients and Statistics			
	on dummy (α_0)	on share (α_1)	Adjusted R ²	Number of obs.
Value Added / Labor	201.17 (468.67)	-713.58 (1399.9)	0.15	224
Profit / Labor	1230.90* (646.24)	-3717.06** (1894.59)	0.02	224
Profit / Net Capital	1.79 (1.16)	-4.60 (3.13)	-0.03	325
log (Output / Labor)	5.53** (2.69)	-18.04** (7.89)	0.16	222
log (Output / Net Capital)	3.92 (3.47)	-14.72 (10.12)	-0.01	218
Turnover / Cost	0.64 (0.77)	-3.33 (2.09)	0.00	324

Notes:

- Values in parentheses are standard errors;
- * = significantly different from zero at 10% level of significance;
- ** = significantly different from zero at 5% level of significance;
- There are 22 subsidiaries in the samples with 324 or 325 observations and 12 subsidiaries in the other samples.

Table 10: Joint Estimates of the Effects of a Split in 1991

$$\pi_i = \beta'X_i + \alpha_0d_i + \alpha_1df_i + \theta_i, \quad (1)$$

Left Hand Side Variable	Important IV coefficients and Statistics				
	on dummy (α_0)	on share (α_1)	Adjusted R ²	Number of obs.	Test p-value
Value Added / Labor	126.05* (65.63)	-375.67** (181.58)	0.46	400	0.43
Profit / Labor	242.83** (112.32)	-503.78** (240.84)	0.32	400	0.27
Profit / Net Capital	17.46 (21.14)	-45.69 (45.00)	-0.03	400	0.78
log (Output / Labor)	0.51 (0.67)	-2.21 (1.43)	0.37	400	0.56
log (Output / Net Capital)	0.61 (0.91)	-2.71 (1.95)	0.08	400	0.49
Turnover / Cost	0.53** (0.21)	-1.18** (0.53)	0.14	400	0.23

Notes:

- Values in parentheses are standard errors;
- * = significantly different from zero at 10% level of significance;
- ** = significantly different from zero at 5% level of significance;
- There are 27 subsidiaries and 66 splitted master enterprises in the samples.

Table 11: Joint Estimates of the Effects of a Split in 1992

$$\pi_i = \beta'X_i + \alpha_0d_i + \alpha_1df_i + \theta_i, \quad (1)$$

Left Hand Side Variable	Important IV coefficients and Statistics				
	on dummy (α_0)	on share (α_1)	Adjusted R ²	Number of obs.	Test p-value
Value Added / Labor	-7.55 (163.67)	-373.25 (423.35)	0.22	274	0.91
Profit / Labor	237.40 (210.81)	-696.37 (479.04)	0.17	274	0.22
Profit / Net Capital	0.38 (0.61)	-1.42 (1.26)	0.00	390	0.98
log (Output / Labor)	1.78* (0.92)	-4.28** (2.09)	0.14	272	0.18
log (Output / Net Capital)	-0.10 (1.20)	-0.50 (2.76)	0.07	268	0.13
Turnover / Cost	-0.12 (0.28)	-0.83 (0.68)	0.13	389	0.55

Notes:

- Values in parentheses are standard errors;
- * = significantly different from zero at 10% level of significance;
- ** = significantly different from zero at 5% level of significance;
- There are 22 subsidiaries and approx. 60 splitted master enterprises in the samples with 389 and 390 observations, 12 subsidiaries and approx. 50 splitted master enterprises in the other samples.

Table 12: Summary - The Critical Size of a Spinoff in Terms of % Size of Labor of the Master Firm

Type of Enterprise (Estimation)	Master		Subsidiary		Joint	
	1991	1992	1991	1992	1991	1992
Year \implies LHS Variable \downarrow						
Value Added / Labor	38.0*** (8.1)	33.4 (27.2)	30.8*** (6.2)	28.2 (19.4)	33.6*** (7.8)	-2.0 (45.9)
Profit / Labor	51.9*** (12.4)	33.7 (27.3)	31.6*** (5.9)	33.1*** (4.7)	42.8*** (11.8)	34.1** (15.0)
Profit / Net Capital	33.9 (23.4)	11.1 (43.7)	43.7 (29.7)	38.8*** (10.0)	38.2 (23.6)	26.5 (25.5)
log (Output / Labor)	28.7* (16.9)	52.3*** (15.2)	25.9*** (8.5)	30.8*** (4.1)	22.9 (18.9)	41.5*** (10.6)
log (Output / Net Capital)	31.9** (15.3)	75.8 (167)	26.4*** (8.3)	26.6*** (7.5)	22.5 (21.0)	-20.9 (347)
Turnover / Cost	49.5*** (11.5)	-54.9 (141.3)	34.3*** (4.5)	19.3 (12.3)	44.7*** (9.1)	-14.5 (45.1)

Notes:

- Values in parentheses are standard errors;
- Size of the spun off enterprise is measured in percent of the original (master) enterprise in terms of labor;
- * = significantly different from zero at 10% level of significance;
- ** = significantly different from zero at 5% level of significance;
- *** = significantly different from zero at 1% level of significance.

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