THE EFFECTS OF PRIVATIZATION AND COMPETITIVE PRESSURE ON FIRMS' PRICE-COST MARGINS: MICRO EVIDENCE FROM EMERGING ECONOMIES

Jozef Konings, Patrick Van Cayseele, and Frederic Warzynski*

Abstract—This paper uses representative panel data on 1,701 Bulgarian and 2,047 Romanian manufacturing firms to analyze how price-cost margins are affected by privatization and competitive pressure. Privatization is associated with higher price-cost margins. This effect is stronger in highly competitive sectors, which suggests that the creation of competitive markets and privatization go together. It also suggests that privatized firms reduce costs rather than increase prices, as in highly competitive markets firms are more likely pricetakers. Import penetration is associated with lower price-cost margins in sectors where product market concentration is high, but in more competitive sectors this effect is reversed.

I. Introduction

The transition from a centrally planned to a market economy in central and eastern Europe and the former Soviet Union offers a unique natural experiment to analyze the effects of privatization and the emergence of competitive pressure on firm behavior. This paper uses representative firm-level data of two emerging economies, Bulgaria and Romania, to study how privatization and competitive pressure have affected price-cost margins. Unlike other emerging economies of central and eastern Europe, Bulgaria and Romania are slow reformers. Bulgaria is a small open economy with a population of 8 million and a GDP per capita of 1,513 USD in 1999. Romania is one of the largest central and eastern European countries, with a population of 22.3 million and a GDP per capita that is very close to the one in Bulgaria: 1,512 USD in 1999.

This paper is motivated by the rapid institutional changes that characterized most of the transition economies in the 1990s. Under communism, the central planner's bias in favor of large-scale production facilities resulted in a distorted firm size distribution relative to the one in market economies. For instance, whereas at the start of the transition process in most central and eastern European countries between 80% and 97% of the workforce was employed in companies with 500 or more workers, in most of the western European market economies this fraction varied between 40% and 62% (Roland, 2000). The transition from plan to market consisted of rapid price liberalization, by the removal of price controls and direct subsidies, and the creation of a large private sector, by allowing new firm startups and privatizing the state sector.

It is often argued in theoretical discussions of privatization of state-owned enterprises in central and eastern Europe that institutional restructuring should precede privatization.[1] Tirole (1991), among others, argues that privatization without preparatory "de-monopolization" would create a market dominated by private firms with considerable market power (monopoly power), as under central planning many products were produced by only a few production entities and imports were unlikely to be a significant competitive constraint. Li (1999) shows that the rapid decentralization and privatization of the state monopolized industrial structure can contribute to the severe output collapse observed in many transition economies. Joskow and Schmalensee (1995) and Joskow, Schmalensee, and Tsukanova (1994) point out that in the case of Russia product-level concentration of production created potential monopoly problems. Although restructuring prior to privatization would have been desirable in Russia, political and informational constraints largely precluded it.

These papers provide an argument for the traditional criticisms of privatization. Simply transferring from the state to the private sector may lead to substantial market power in firms, which may be exploited at the expense of the rest of society. This view of privatization, however, is static and ignores any positive dynamic effects that may arise from privatization.

In particular, the incomplete contracts approach, as developed by Grossman and Hart (1986) among others, offers some relevant insights. For example, Hart, Shleifer, and Vishny (1997) show that changing ownership from state to private alters the residual control rights, which raises the incentives for the new owners to invest in new and better technology.[2] Such catching-up investment may be very relevant for transition economies, given that most of the equipment state-owned enterprises worked with was obsolete due to lack of innovation under the communist rule. Schmidt (1996) also shows in an incomplete-contracts approach that privatization gives better cost-saving incentives to managers due to the harder budget constraints under

Received for publication March 28, 2003. Revision accepted for publication November 17, 2003.

* K.U. Leuven, Belgium, and CEPR, London; K. U. Leuven, Belgium; and Aarhus School of Business and Universidad Carlos III de Madrid, respectively.

This paper benefited from presentations at the EARIE conference, 2001; CERT, Heriot-Watt University Edinburgh; LICOS, University of Leuven; the IO and Development Seminar at Harvard University; the University of Michigan, Ann Arbor; and London Business School. We thank the editor and two anonymous referees for very helpful comments. We further thank Saul Estrin, Laszlo Halpern, Jim Levinsohn, Ariel Pakes, Werner Roeger, Mark Schankerman, Leo Sleuwaegen, Jan Svejnar, Hylke Vandenbussche, Marno Verbeek, Paul Walsh, Ciara Whelan, and Ana Xavier for useful comments and suggestions. We also acknowledge financial support of the FWO and the Research Council, K.U. Leuven.

[1] For a recent survey on the political economy of transition, discussing the sequencing of reforms, see Roland (2002).

[2] However, cost-cutting activities after privatization may have a negative effect on quality. For a nice overview of the arguments see Shleifer (1998) and Hart (2003).

The Review of Economics and Statistics, February 2005, 87(1): 124–134

private ownership, but at the expense of allocative efficiency.

In these cases, private ownership will be associated with higher price-cost margins, which may be driven by cheaper ways of producing and/or higher product quality, reflected in higher prices. If these new technologies diffuse easily and hence spillovers to other firms are substantial, welfare may improve.

Similar arguments can be made about the effects of increased competitive pressure on firms' price-cost margins. A large empirical literature has studied the effects of trade liberalization on firms' price-cost margins. Levinsohn (1993), Harrison (1994), and Krishna and Mitra (1998) all report reduced price-cost margins when firms are exposed to more import competition. Konings and Vandenbussche (2005) find evidence that firms' price-cost margins increase once they enjoy antidumping protection against foreign importers. These papers suggest that trade liberalization disciplines firms to price closer to marginal costs. In a dynamic context, however, the key question is whether trade protection will induce technologically backward producers to invest in catching up.[3] Rodrik (1992) points out that it may if the protection induces a larger effective market size and a larger payoff from marginal cost reductions for domestic firms. However, he also shows that protection may enhance collusion between domestic producers, which induces them to stick with old technologies.

A number of papers have studied the effects of privatization and competitive pressure on firm performance[4] in transition and developing economies, where performance was usually measured in an ad hoc way such as by labor productivity, growth in sales, or number of layoffs. In contrast, this paper studies whether increased competitive pressure, brought about by trade and price liberalization and by privatization of state-owned enterprises, has been associated with changing price-cost margins of firms.

It is particularly interesting to take the price-cost margin $(P - c)/P$, with P the product price and c the marginal cost of production, as a measure of performance, as it can be linked nicely to structural models of firm behavior. The price-cost margin is also known as the Lerner index of monopoly power and gives an indication of how competitive an industry is in terms of pricing close to marginal costs. Under perfect competition, the Lerner index is 0. A difficulty in using this measure, however, is that marginal costs are not observable. We therefore estimate price-cost margins using a method proposed by Roeger (1995), who starts from Hall (1988), showing that the presence of imperfect competition requires a markup adjustment in the primal Solow residual. The Hall (1988) type of approach suffers from a potential simultaneity bias between output growth and the growth in the input factors; Roeger overcomes this problem by subtracting the dual Solow residual from the primal. This implies that price-cost margins can be estimated consistently, without having to appeal to instrumental variables, which are usually hard to find in micro data. This approach can therefore be placed among the recent papers that aim to estimate total factor productivity consistently, such as Olley and Pakes (1996) and Levinsohn and Petrin (2003).

An additional advantage of this method is that it allows us to use the nominal value of data on sales and input factors, without having to deflate them with a price deflator. This is important because in an emerging economy it is not always clear what the appropriate price deflator is, given that prices were only recently liberalized and that prices themselves are outcomes of firm behavior.

Our main findings can be summarized as follows. We find that privatization is associated with higher price-cost margins than in state-owned enterprises, and this effect seems stronger for foreign-owned private firms. We also find that international competition, measured by import penetration, reduces price-cost margins, especially in highly concentrated sectors, but this effect reverses in lowly concentrated sectors. Finally, the effects of privatization are stronger in highly competitive sectors, which suggest that privatization results in cost cutting by the new owners, which is consistent with the recent incomplete contract theories on privatization. However, a full analysis of the dynamic effects of privatization is beyond the scope of this paper. Although in the long run privatization may lead to more innovation and better product quality, which may be reflected in higher price-cost margins, we focus mainly on the short-run effects of privatization. The main reason for our limited scope is the short time span of privatized firms in our data and the lack of information on firm-level innovation. We consider this to be a promising area for future research.

The rest of this paper is organized as follows. The next section describes the econometric approach. Section III discusses the data that we use, and section IV gives the results. Section V concludes the paper.

II. Background and Econometric Model

Our methodology is based on Roeger (1995), which starts from the approach that Hall (1988) introduced to estimate total factor productivity, showing that the presence of imperfect competition requires an adjustment in the computation of total factor productivity. Roeger's work was motivated by the apparent low correlation between the primal and dual Solow residuals. He shows that this lack of correlation can mostly be explained by the presence of imperfect competition. In doing so, however, Roeger also

[3] Tybout (2001) provides a comprehensive overview of the static and dynamic arguments for trade protection.

[4] Examples include La Porta and Lopez-De-Silanes (1999) for Mexico; Lizal, Singer and Svejnar (2001) and Kocenda and Svejnar (2002) for the Czech Republic; Brown and Earle (2001) for Russia; and Frydman et al. (1999), Claessens and Djankov (2002), Hersch, Kemme, and Bhandari (1994), Halpern and Körösi (1997), Dobrinsky (1996), and Walsh and Whelan (2001) for various central and eastern European economies. Surveys include Djankov and Murrell (2002) and Estrin (2002).

introduced a very elegant, consistent way to estimate price-cost margins, without having to worry about potential correlations between the unobserved productivity shocks and the input factors of production. This section introduces this methodology.[5]

We start from a standard production function $Q = \Theta_{it} \times F(N_{it}, K_{it}, M_{it})$, where i is an index for the firm, t is a time index, Q is output, F is a production function, Θ_{it} is the productivity term (or firm-level efficiency), N is labor input, K is capital input, and M is material input. If privatization is associated with access to better technology, improved product quality, and more incentives to engage in innovation, then the productivity term Θ_{it} should be higher after privatization. However, as we will demonstrate below, there is no need to assume this explicitly in our modeling strategy, as this productivity term will cancel out in our final equation.

Assuming constant returns to scale and perfect competition, the growth rate of output (the Solow output decomposition) is

$$\frac{\Delta Q_{it}}{Q_{it}} = \alpha_{Nit}\frac{\Delta N_{it}}{N_{it}} + \alpha_{Kit}\frac{\Delta K_{it}}{K_{it}} + \alpha_{Mit}\frac{\Delta M_{it}}{M_{it}} + \vartheta_{it}, \qquad (1)$$

where $\alpha_{Jit} = P_{Jit}J_{it}/P_{it}Q_{it}$ ($J = N, K, M$) is the cost share of inputs in turnover, P_J stands for the unit cost of input factor J, and $\vartheta_{it} = \Delta\Theta_{it}/\Theta_{it}$. Under imperfect competition equation (1) becomes (Hall, 1988)

$$\frac{\Delta Q_{it}}{Q_{it}} = \mu_{it}\left(\alpha_{Nit}\frac{\Delta N_{it}}{N_{it}} + \alpha_{Kit}\frac{\Delta K_{it}}{K_{it}} + \alpha_{Mit}\frac{\Delta M_{it}}{M_{it}}\right) + \vartheta_{it}, \qquad (2)$$

where $\mu = P/c$ is the markup of price over marginal cost. Another way to write it is

$$\frac{\Delta Q_{it}}{Q_{it}} - \alpha_{Nit}\frac{\Delta N_{it}}{N_{it}} - \alpha_{Mit}\frac{\Delta M_{it}}{M_{it}} - (1 - \alpha_{Nit} - \alpha_{Mit})\frac{\Delta K_{it}}{K_{it}} = \beta_{it}\left(\frac{\Delta Q_{it}}{Q_{it}} - \frac{\Delta K_{it}}{K_{it}}\right) + (1 - \beta_{it})\vartheta_{it}, \qquad (3)$$

where $\beta_{it} = (P_{it} - c_{it})/P_{it} = 1 - 1/\mu_{it}$ is the price-cost margin, or Lerner index, of firm i at time t, in which c_{it} stands for the marginal cost of firm i at time t.

The problem in estimating equations (2) or (3) as in Levinsohn (1993) and Harrison (1994) is that unobserved productivity shocks, captured by ϑ_{it}, may be correlated with the input factors K, M, and N. One way to deal with this problem is to use instrumental variables. However, often it will be difficult to find good instruments. Fixed effects can be used if the nature of the endogeneity is assumed to be constant over time. Some recent solutions have been proposed to deal with this problem in estimating production functions. Olley and Pakes (1996) show how to use investment to control for the potential correlation between input levels and the unobserved firm-specific productivity shocks. However, this method requires information on positive investment, which is often lacking and which would reduce the sample size considerably.

To deal with the potential endogeneity of the error term in equation (3) we follow Roeger (1995) in using a similar expression to equation (3), but derived from the price-based, or dual, Solow residual:

$$\alpha_{Nit}\frac{\Delta P_{Nit}}{P_{Nit}} + \alpha_{Mit}\frac{\Delta P_{Mit}}{P_{Mit}} + (1 - \alpha_{Nit} - \alpha_{Mit})\frac{\Delta P_{Kit}}{P_{Kit}} - \frac{\Delta P_{it}}{P_{it}} = -\beta_{it}\left(\frac{\Delta P_{it}}{P_{it}} - \frac{\Delta P_{Kit}}{P_{Kit}}\right) + (1 - \beta_{it})\vartheta_{it}. \qquad (4)$$

Then, subtracting equation (4) from (3), we get

$$\left(\frac{\Delta Q_{it}}{Q_{it}} + \frac{\Delta P_{it}}{P_{it}}\right) - \alpha_{Nit}\left(\frac{\Delta N_{it}}{N_{it}} + \frac{\Delta P_{Nit}}{P_{Nit}}\right) - \alpha_{Mit} \times \left(\frac{\Delta M_{it}}{M_{it}} + \frac{\Delta P_{Mit}}{P_{Mit}}\right) - (1 - \alpha_{Nit} - \alpha_{Mit})\left(\frac{\Delta K_{it}}{K_{it}} + \frac{\Delta P_{Kit}}{P_{Kit}}\right) = \beta_{it}\left[\left(\frac{\Delta Q_{it}}{Q_{it}} + \frac{\Delta P_{it}}{P_{it}}\right) - \left(\frac{\Delta K_{it}}{K_{it}} + \frac{\Delta P_{Kit}}{P_{Kit}}\right)\right]. \qquad (5)$$

Note that the error term capturing unobserved productivity shocks has canceled out, and therefore β, the Lerner index, can be estimated consistently. Note also that any shifts in technology that affect the production function due to privatization are controlled for, as the productivity terms have canceled out.

Equation (5) shows that in order to obtain an estimate of the price-cost margin, we need information on sales growth, growth in the wage bill, growth in material costs, and growth in the value of capital. The company accounts information we have on Bulgarian and Romanian firms allowed us to get firm-level data on these variables. The income statements provided us the information on sales, the wage bill, and material costs in consecutive years. For capital we used the book value of the fixed tangible assets taken from the balance sheet; for the rental price of capital (P_{Kit}) we followed Hall and Jorgenson (1967) and Hsieh (2002), taking $P_{Kit} = P_I(r_{it} + \delta_{it})$, where P_I stands for the index of investment goods prices, measured at the country level, r_{it} stands for the real interest rate for each period, and δ stands for the depreciation rate, measured at the firm level (see the Data Appendix for details).

Rewriting the left-hand side of equation (5) as Δy, which is the difference between the primal and the dual Solow residual, and the right-hand side as Δx, and adding a white

[5] A maintained assumption in this approach is that of profit maximization and cost minimization. Evidence for transition economies shows that early on in the transition, firms did move to profit maximization strategies (e.g., Lizal & Svejnar, 2002). Also, Aghion, Blanchard, and Burgess (1994) show that state-owned enterprises started to engage in profit-maximizing strategies prior to privatization.

noise error term ε_{it}, we obtain a very simple testable equation:

$$\Delta y_{it} = \beta_{it}\Delta x_{it} + \varepsilon_{it}. \tag{5'}$$

For empirical tractability we further need to make the assumption, as is done in all applications of this type [see Levinsohn (1993) for further arguments], that the markups are the same for all firms within the same sector or group of firms that we will consider. It is not possible to estimate a markup for each firm separately, because we would not have enough degrees of freedom. To assess the effect of trade, product market concentration, and ownership on firms' price-cost margins $\beta_{it} = (P_{it} - c_{it})/P_{it}$, we interact Δx with sector-level data on concentration and import penetration, and firm-level data on ownership. Then equation (5′) can be written as

$$\begin{aligned}\Delta y_{it} = {} & \beta_1\Delta x_{it} + \beta_2\Delta x_{it} \times IMP_{jt} + \beta_3\Delta x_{it} \times HERF_{jt} \\ & + \beta_4\Delta x_{it} \times PRIV_{it} + \beta_5\Delta x_{it} \times FOR_{it} + \beta_6\Delta x_{it} \\ & \times HERF_{jt} \times IMP_{jt} + \gamma_1 HERF_{jt} + \gamma_2 IMP_{jt} \\ & + \gamma_3 PRIV_{it} + \gamma_4 FOR_{it} + \beta_i + \varepsilon_{it},\end{aligned} \tag{6}$$

where $HERF_{jt}$ stands for the Herfindahl index of concentration in sector j at time t, measured at the three-digit NACE level of industrial classification. It can be seen as a measure of *domestic* competition, as it does not include import penetration. IMP_{jt} stands for the import penetration in sector j at time t, measured at the three-digit NACE level; $PRIV_{it}$ is a dummy equal to 1 if firm i is more than 50% owned by private domestic shareholders in year t, and FOR_{it} is a dummy equal to 1 if the firm is more than 50% owned by foreign shareholders in year t.[6] We include the ownership variables and competition variables also separately in equation (6) to capture any difference between the primal and the dual Solow residual that is not explained by market power. Finally, β_i stands for an unobservable firm-level fixed effect, which may capture unobserved sunk costs, quality of the managers, and other fixed factors we may not observe. Such fixed effects control also for the potential selection effects into privatization, provided that the probability of privatization remains constant over the sample period.

At this stage, however, we need to make a number of critical remarks concerning this method. First, the error term in equation (6) should in principle be zero, given that the productivity shocks in equation (5) canceled out. Roeger (1995) points out a number of reasons for having a nonzero error term in (6), but they would not cause a problem for consistent estimation.

[6] We also experimented with using the full fraction of shares held by each ownership category, rather than a dummy indicating majority ownership. The results remained robust.

In particular, measurement error of the labor input is one potential source of a nonzero error term. We measure labor input as the number of workers in a particular firm, without taking into account the number of hours they work. Because hours worked appear only on the left-hand side of equation (5), this measurement error does not constitute a problem for the estimations. There may, however, also be measurement error in the capital stock, which appears both on the left and the right side in equation (5). We believe that the potential measurement error in the capital stock is rather limited. In transition economies it is often claimed that firms were operating with an obsolete capital stock, which may cause some error when just the tangible fixed assets of a firm are considered as the measure for capital. However, in constructing our value of the capital stock we have used the actual depreciation rate at the firm level. We used the total amount of depreciations to construct the depreciation rate, which takes into account increased depreciations as a consequence of the transition. In addition we also experimented with applying the Roeger method assuming that capital is fixed. This implies that the terms related to capital drop out in equation (5). Our main results remained robust.

Another concern with the current specification is that in transition countries, especially in the state-owned enterprises, labor hoarding may be present, which may also result in a nonzero error term in equation (6). Shapiro (1987) argues that the primal and the dual Solow residual are affected differently by the state of demand. Labor hoarding occurs when demand is low, but workers are not sacked. This may happen during recessions or in state-owned enterprises. Roeger (1995) extends his model and shows that an extra term in equation (5) capturing such demand effects must be added to control for labor hoarding. We add controls for cyclical demand effects, by using year dummies, but in addition we also add controls for different demand effects in private versus state-owned enterprises, by including the ownership dummies separately in our regression, as can be seen in equation (6).

A further criticism is the maintained assumption of constant returns to scale in this method. Not allowing for varying returns to scale may result in an upward or downward bias in the markup levels, according to returns to scale are decreasing or increasing, as shown by Basu and Fernald (1997). Basu and Fernald, using U.S. manufacturing data, find firm-level returns to scale to be constant or slightly decreasing. In view of that result, we would expect Roeger's (1995) estimates on firm-level data to show (if any bias at all) an upward bias stemming from decreasing returns at the firm level. At first sight it seems this bias in the level estimates need not necessarily affect the change in markups, which is what we want to focus on in this paper. However, taking into account that state-owned firms in transition economies were operating at very large scales, presumably at decreasing returns, we infer that privatization has resulted in downsizing, which may have increased the returns to

scale somewhat, in which case Roeger's (1995) estimates are bound to be underestimates of the true changes in markups.

Finally, the fact that we use company accounts data also implies that we are not able to trace the financial flows associated with individual products, and, as we have data on medium and large firms, they are likely to be multiproduct firms. Nevertheless, it is reasonable to assume that if a firm has product market power over one of its product, it is likely to have market power over its other products as well. Alternatively, we can view our estimates of price-cost margins as an average firm effect, which is the focus of our paper: We want to assess whether the big institutional changes, like privatization and the opening up of markets to international trade, have had an impact on the average price-cost margins of firms in transition economies.

III. Data

Our data are derived from a commercial database named Amadeus, collected by the consultancy Bureau van Dijk. The database consists of company accounts reported to national statistical offices for European companies for which at least one of the following criteria is satisfied: total turnover or assets of at least $12 million, or total employment of at least 150. Financial and operational information is available for 1994 through 1998, and we retrieve all manufacturing companies in Bulgaria and Romania for which unconsolidated accounts were available: 1,701 Bulgarian and 2,047 Romanian firms.[7] The Data Appendix provides more details on the peculiarities of these data. Earlier studies mostly had to rely on small samples of firms—usually of a few hundred—collected through surveys (Hersch et al., 1994; Frydman et al., 1999; Walsh & Whelan, 2001). The sample in this paper contains virtually the entire population of medium and large enterprises in manufacturing in Bulgaria and Romania.

The ownership information per firm in the data set refers only to the years 1997 and 1998. It would have been interesting to analyze the effects of ownership on market power from 1994 onward, but most of the privatizations in Bulgaria and Romania started only after 1997. Claessens and Djankov (2002) pointed out that only around 7% of the state owned enterprises in manufacturing were privatized in the first half of the 1990s; the mass privatizations were only from 1997 onward. To check the robustness of our results we will also report estimates for the entire sample period 1994–1998, making the assumption that all firms before 1997 in our sample were still state-owned.

Table 1 shows the fraction of firms in our sample that can be classified as majority owned private, majority-owned foreign, and majority-owned state firms. Note that the previous of majority-owned state firms in Romania (42%) is greater than in Bulgaria (21%). Based on our sample, for Bulgaria 73% of total value added in manufacturing is produced by the private sector in 1998 (59% in 1997), which accounts for 72% of total employment in manufacturing in 1998 (59% in 1997). This compares with official numbers reported by the EBRD of a private-sector share in GDP of 65% and a private-sector share in employment of 61% in 1998. In Romania the private-sector share of value added in our sample corresponds to 52% in 1998 (45% in 1997), and the employment share to 42% in 1998 (42% in 1997). This compares with official numbers in 1998 of 60% and 62%, respectively.

TABLE 1.—TYPES OF OWNERSHIP

Type of Firm	Percentage of Firms in Sample	
	Bulgaria	Romania
Majority domestic private	74	47
Majority foreign	6	11
Majority state	20	42

In table 2 we show the summary statistics of the variables retrieved from the company accounts. The Data Appendix describes the definitions and measurement issues of the various variables that we employ. We note that the average firm size in terms of employment is about the same in Bulgaria and Romania. Furthermore, foreign and state firms are larger in terms of employment on average than private domestic ones. We can also note that the sales revenue for foreign firms, both in Bulgaria and Romania, is the largest.

IV. Results

Table 3 shows the estimates of price-cost margins for each individual sector in Bulgaria and Romania. We can note that average price-cost margins vary between sectors, but also between countries. For most sectors in Bulgaria we find higher price-cost margins than in Romania. Furthermore, the estimated differences in price-cost margins between sectors are different in the two countries. For instance, the average price-cost margin in textiles is estimated at almost 20% in Bulgaria, but only 10% in Romania. The rank correlation of sectors' price-cost margins between Bulgaria and Romania is only 0.004. This suggests that institutional features, rather than technological, are likely an important factor explaining why price-cost margins vary between sectors. Though we do not explicitly consider institutional changes such as the implementation of competition policy, laws that enhance new firm entry, trade policy, and mass privatization programs, the outcomes of such reforms are likely going to be reflected in increased competitive pressure and privatization.

In our further analysis we pool the data across sectors and test how the average price-cost margin varies with sector characteristics related to competitive pressure on the one hand and with firm characteristics related to ownership on

[7] This number is reduced in the analysis as we make use of information on the capital stock in firms, which is often missing.

TABLE 2.—SUMMARY STATISTICS

	Full Sample		Majority Private Domestic		Majority Foreign		Majority State	
	Bulgaria	Romania	Bulgaria	Romania	Bulgaria	Romania	Bulgaria	Romania
Employment	493	469	392	378	730	690	595	624
	(981)	(1,028)	(641)	(699)	(648)	(558)	(1,377)	(1,525)
Sales	6,634	7,853	4,934	5,173	12,312	10,786	9,085	9,231
	(42,850)	(52,524)	(18,918)	(21,441)	(19,172)	(11,962)	(39,604)	(43,535)
Wage bill	876	1,012	784	829	1,726	1,856	1,414	1,541
	(3,250)	(3,901)	(2,615)	(2,962)	(2,066)	(2,135)	(4,609)	(5,109)
Material costs	4,162	5,170	2,817	3,030	7,592	7,066	5,851	6,117
	(31,967)	(39,348)	(13,705)	(15,625)	(13,032)	(8,995)	(27,560)	(30,418)
Tangible fixed assets	2,664	2,975	2,333	2,464	4,784	5,211	4,672	4,717
	(12,017)	(14,032)	(11,588)	(13,060)	(5,991)	(6,316)	(14,349)	(15,603)
Depreciation rate	0.14	0.08	0.16	0.10	0.18	0.14	0.11	0.06
	(0.22)	(0.17)	(0.22)	(0.28)	(0.15)	(0.15)	(0.10)	(0.08)

Note: Standard deviations in parentheses; values expressed in thousands of dollars.

the other hand, as shown in equation (6). We start with a discussion of the effects of competitive pressure, then we discuss the effects of ownership, and finally we try to assess whether the main effect of privatization is on cost cutting or on price increases.

A. *The Effect of Competitive Pressure on Price-Cost Margins*

To test whether increased competitive pressure in transition countries has affected the price-cost margins of firms, we use two measures to proxy for competitive pressure. The first relates to domestic competition and is the three-digit Herfindahl index of concentration. For homogeneous oligopoly models it can be shown that there exists a negative relationship between the number of firms in an industry and the price-cost margin (e.g., Sutton, 1991). There exists also empirical evidence that concentration is positively related to price-cost margins (e.g., Domowitz, Hubbard, & Petersen, 1988). Our second measure of competitive pressure relates to international competition, which we measure by import penetration at the three-digit NACE level.[8] We expect import penetration to have a negative effect on price-cost margins, yielding more competitive pricing behavior of firms (e.g., Tybout, 2001).

The first two columns of table 4 show the results of our baseline model specified in equation (6). We can note that both in Bulgaria and in Romania the average price-cost margin is estimated higher in highly concentrated sectors. Highly concentrated sectors reflect less competitive pressure, which allows firms to exert some of their monopoly power, which is reflected in higher price-cost margins. In 1998 the average Herfindahl index is 18% in Bulgaria, which suggests that the average price-cost margin in sectors with a concentration level of 18% or more is at least equal

[8] Though import penetration may be an outcome variable and hence changes in import tariffs may be a more desirable measure of international competitive pressure, such data were not available at the level of disaggregation that we used in our analysis.

TABLE 3.—ESTIMATES OF PRICE-COST MARGINS IN DIFFERENT SECTORS

NACE Code	Description	Bulgaria	Romania
15	Food and beverages	0.19 (0.017)**	0.11 (0.006)**
16	Tobacco	0.21 (0.030)**	—
17	Textiles	0.19 (0.016)**	0.10 (0.007)**
18	Wearing apparel; fur	0.20 (0.022)**	0.20 (0.015)**
19	Leather, luggage, and footwear	0.19 (0.039)**	0.16 (0.013)**
20	Wood, straw, and plaiting materials	0.06 (0.036)*	0.006 (0.004)
21	Pulp, paper, and paper products	0.14 (0.017)**	0.15 (0.033)**
22	Publishing, printing, and media	0.42 (0.330)	0.33 (0.046)**
23	Coke, refined petroleum products, nuclear fuel	—	0.15 (0.013)**
24	Chemicals and chemical products	0.19 (0.021)**	0.13 (0.015)**
25	Rubber and plastic products	0.24 (0.038)**	0.14 (0.012)**
26	Other nonmetallic mineral products	0.15 (0.016)**	0.16 (0.006)**
27	Basic metals	0.21 (0.028)**	0.12 (0.009)**
28	Fabricated metal products	0.17 (0.023)**	0.17 (0.009)**
29	Machinery and equipment n.e.c.	0.18 (0.020)**	0.17 (0.006)**
30	Office machinery and computers	0.19 (0.019)**	0.31 (0.025)**
31	Electrical machinery and apparatus n.e.c.	0.15 (0.018)**	0.17 (0.008)**
32	Radio, TV, and communication equipment	0.40 (0.20)	0.13 (0.018)**
33	Medical, precision, and optical instruments	0.16 (0.026)**	0.10 (0.025)**
34	Motor vehicles, trailers, and semitrailers	0.005 (0.041)	0.17 (0.010)**
35	Other transport equipment	0.27 (0.17)	0.11 (0.018)**
36	Furniture, manufacturing n.e.c.	0.21 (0.036)**	0.13 (0.013)**

Note: Standard errors in parentheses; ** (*) denotes statistically significant at the 5% (10%) level.

TABLE 4.—RESULTS

	Baseline Model		Robustness Checks: Sample 1994–1998		Capital Fixed	
	Bulgaria (1)	Romania (2)	Bulgaria (3)	Romania (4)	Bulgaria (5)	Romania (6)
Price-cost margin	0.124**	0.015**	0.17**	0.069**	0.16**	0.21**
	(0.029)	(0.003)	(0.01)	(0.004)	(0.03)	(0.016)
Effect of import penetration	0.059	0.035**	−0.05	0.018**	−0.15**	0.014*
	(0.042)	(0.006)	(0.03)	(0.003)	(0.058)	(0.009)
Effect of Herfindahl index	0.226**	0.356**	0.18**	0.29**	−0.04	0.11
	(0.087)	(0.046)	(0.08)	(0.04)	(0.12)	(0.10)
Effect of private domestic firms	0.037*	0.118**	0.03**	0.085**	0.04**	0.055**
	(0.018)	(0.008)	(0.01)	(0.006)	(0.02)	(0.014)
Effect of foreign firms	0.071**	0.133**	0.05*	0.165**	0.09**	0.148**
	(0.032)	(0.023)	(0.03)	(0.02)	(0.04)	(0.02)
Effect of import penetration × Herfindahl	−0.560**	−0.18**	−0.14	−0.07**	0.05	−0.013
	(0.195)	(0.034)	(0.16)	(0.04)	(0.30)	(0.06)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-test (private = foreign)	0.26	0.54	0.46	0.001	0.25	0.0004
R^2 within	0.78	0.61	0.73	0.59	0.32	0.58
R^2 between	0.36	0.39	0.24	0.38	0.10	0.27
R^2 overall	0.59	0.52	0.46	0.52	0.20	0.42
No. of observations	1,084	1,748	1,454	2,939	1,877	2,877

Note: Standard errors in parentheses, ** (*) denotes statistically significant at the 5% (10%) level. The variables import penetration, Herfindahl index, and private and foreign ownership are also included separately as additional control factors. The estimates refer to equation (6).

to 16% (12.4% + 0.226 × 0.18). In less than 3 years the Herfindahl index in Bulgarian manufacturing has dropped by a factor of almost 2 (in 1995 it was 30% on average). This suggests that the reduction in product market concentration has contributed to pricing more competitively. The coefficient 0.226 suggests that a reduction in product market concentration of 10 percentage points is equivalent to a reduction in the average price-cost margin of 2.2 percentage points. In Romania also, we find that product market concentration and price-cost margins are positively correlated. In 1998 the average Herfindahl index is 14% in Romania, which means that the average price-cost margin in sectors with a concentration level of 14% or higher is at least equal to 6.5% (1.5% + 0.36 × 0.14).

From these estimates we may infer that due to new-firm entry or enterprise breakups, resulting in lower product market concentration levels, price-cost margins in firms in Bulgaria and Romania have declined during the transition process, suggesting that competitive pressure seems to discipline firms' pricing behavior.

The effect of international competitive pressure, measured by the interaction term with import penetration in equation (6), is less straightforward. For Bulgaria, in table 4, we find a positive, but insignificant, direct effect of import penetration, whereas in Romania the direct effect of import penetration is even positive and statistically significant, with a point estimate of 0.035. Both in Bulgaria and Romania import penetration went up over the sample period. By 1998 the average import penetration in Bulgaria was 42% (compared to 35% in 1995), whereas in Romania by 1998 average import penetration was 36% (compared to 30% in 1995). This positive effect of import penetration is surprising. However, when we look at the interaction between the Herfindahl index and import penetration, we find that import penetration has a negative effect on price-cost margins in highly concentrated sectors both in Bulgaria and in Romania. To check whether this effect is driven by an endogeneity problem related to imports, we also ran the specification with import penetration lagging by 2 years, but our results remained the same, and so we omit them here for brevity.

In interpreting these results we need to distinguish between two potential effects that may affect price-cost margins. There may be an effect on prices and an effect on marginal costs. On the one hand, from the international trade literature mentioned earlier we would expect that international competitive pressure has some depressing effect on prices. Especially for firms operating in markets where they occupy a dominant position, keeping such a dominant position by cutting prices in response to international entry seems a natural effect. This is the likely effect that we pick up from the negative coefficient on the interaction term between import penetration and product market concentration. It is especially in the highly concentrated sectors that increased import penetration has a negative effect on prices. Thus in sectors where domestic competition was traditionally weak, as reflected in high concentration levels, opening up to trade helps to enhance pricing closer to marginal costs.

The positive direct effect of import penetration in Romania in highly competitive sectors, where firms are more likely pricetakers, suggests that the main effect is on cutting marginal costs. The increased competitive pressure that emerges from the international market may push firms to engage in more restructuring and innovative activities, which makes them more cost-efficient.

B. The Effect of Private Ownership on Price-Cost Margins

In table 4 we find for both Bulgaria and Romania that domestically owned private firms have higher price-cost margins. For Bulgaria, the point estimate of 0.037 suggests that privatization to domestic owners is associated with an increase in the average price-cost margin to 16% (0.124 + 0.037). For Romania, this effect is bigger. The increase in price-cost margins when firms are privatized to domestic owners is estimated at 12 percentage points. Thus private domestic Romanian firms have an average price-cost margin of 13.5% (1.5% + 11.8%). Also, privatization of state owned enterprises to foreign owned firms increases price-cost margins. A point estimate of 0.071 in Bulgaria and of 0.133 in Romania suggests that the average price-cost margin in foreign firms is almost 20% and 15% for Bulgaria and Romania respectively. Although the difference is not statistically significant, it is interesting to note that our point estimates of foreign private ownership are larger than those of private domestic ownership, which suggests that foreign firms either are more cost-efficient or set higher prices than domestic ones.

In table 4 we also report some further robustness checks of our results. First, as mentioned earlier, the ownership data only refer to the years 1997 and 1998. We have no information on the nature of ownership prior to 1997. However, from the institutional changes that took place in Bulgaria and Romania we know that there was little privatization prior to 1997. As a first robustness check we assume that all firms prior to 1997 were state-owned. Although this is clearly a wrong assumption (some firms were privatized prior to 1997), the results should not be too different, given that most of the privatizations took place from 1997 on. Any effect that we pick up should be a lower bound on the true effect of privatization on price-cost margins. The results for the full sample running between 1994 and 1998 are reported in columns (3) and (4) in table 4. Our earlier results are confirmed. Private ownership is associated with higher price-cost margins, and the largest effect is with foreign ownership. We also experimented with just using a balanced panel, not reported here for brevity; again our main results remain robust.

A second robustness check is related to the assumption about the capital stock in firms. The maintained assumption is that capital is fully flexible. This may be realistic in macro data, but it is less obvious at the firm level. Furthermore, measurement error in the capital stock may potentially bias our results as discussed in section II. As a robustness check we therefore assumed that capital is fixed, which implies that the terms related to capital drop out in equation (5). We would expect that not taking into account the costs that are associated with the use of capital would result in an overestimation of the price-cost margins, but such a bias is less likely for the change in price-cost margins due to privatization. In the last two columns of table 4 we report the results of this extra robustness check. We can note that the average price-cost margin is indeed estimated higher, as we would expect. However, we also note that the effect of private and foreign ownership on price-cost margins remains positive and the point estimates are very similar to the ones reported in our baseline model. The effects of competitive pressure have become more marginal, but this is not surprising if competitive pressure and the intensity of capital usage are correlated.

C. Cost-Cutting or Price-Raising Effects of Privatization?

The estimates of increased price-cost margins do not allow us to disentangle whether the main effect of privatization is on cost-cutting behavior or on increasing prices. In an attempt to disentangle these two effects, we split our sample into two roughly equal subsamples, a highly competitive sector versus a lowly competitive sector, based on the value of the Herfindahl index of concentration that puts half of the sample observations in one group and the other half in the other group. The highly competitive subsample is characterized by sectors for which the Herfindahl index is lower than 5%. We also experimented with other cutoffs of the Herfindahl index, but our results remained qualitatively the same. We report the results in table 5.

Our earlier result that price-cost margins are lower on average in highly competitive sectors (low concentration levels) is confirmed. In the highly competitive sectors in Bulgaria and Romania pricing is closer to marginal costs than in the lowly competitive sectors (high concentration levels). More interestingly, the effect of privatization is much stronger in the highly competitive sectors. In particular, privatization in the highly competitive sectors in Bulgaria raises price-cost margins by almost 10 percentage points, whereas in the lowly competitive sectors there is no statistically significant effect of privatization. In Romania, likewise, the effect of domestic privatization is more than

TABLE 5.—RESULTS FOR HIGHLY VERSUS LOWLY COMPETITIVE SECTORS

	Bulgaria		Romania	
	Highly Competitive	Lowly Competitive	Highly Competitive	Lowly Competitive
Price-cost margin	0.08**	0.18**	0.02**	0.12**
	(0.03)	(0.03)	(0.003)	(0.006)
Effect of private domestic firms	0.095**	−0.0001	0.14**	0.062**
	(0.026)	(0.022)	(0.009)	(0.01)
Effect of foreign firms	0.058	0.041	0.157**	0.097**
	(0.12)	(0.035)	(0.031)	(0.033)
Year dummies	Yes	Yes	Yes	Yes
F-test (private = foreign)	0.76	0.18	0.61	0.31
R^2 within	0.75	0.79	0.56	0.72
R^2 between	0.43	0.44	0.51	0.31
R^2 overall	0.60	0.63	0.53	0.55
No. of observations	541	660	955	874

Note: Robust standard errors in parentheses; ** (*) denotes statistically significant at the 5% (10%) level. The variables private and foreign ownership are also included separately as additional control factors.

twice as strong in the highly competitive sectors as in the lowly competitive sectors. A similar pattern emerges when we consider foreign ownership in the Romanian sample. For Bulgaria, the effects of foreign ownership are not that clear-cut. We find a positive, but not significant, effect of foreign ownership in both subsamples, and they are not very different from each other.

These results offer a useful guide for interpretation. In particular, given that in highly competitive sectors prices are close to marginal costs and that price-setting behavior is more difficult, the increase in price-cost margins is likely to reflect a reduction in marginal costs. This gives support to the idea that privatization brings about more incentives to engage in restructuring aimed at reducing costs, as suggested by the incomplete contracts literature discussed in the introduction. The absence of any increase in price-cost margins in the lowly competitive sectors in Bulgaria suggests that privatization is not related to increasing prices. For a small open economy this is also less likely, given that international competition is an extra force guaranteeing contestability of markets. In Romania, we find also evidence of increased price-cost margins in the lowly competitive sectors, although the increase is much lower. This too could reflect cost-cutting, but at the same time it could also reflect increased prices, which could be a consequence of exploiting a dominant market position. Given the weak implementation of competition policy in Romania, this is not an unrealistic interpretation. However, increased prices could also result from an increase in the quality of the product. In the short time span that we analyze, though, this is less likely, as it takes time before firms can innovate and change their product mix.

The findings in table 5 are in line with theoretical predictions using an incomplete contracts approach to analyze the costs and benefits of privatization, such as those of Schmidt (1996). He shows that the comparative advantage of privatization goes up if there is more competition, as more product market competition reduces the incentives for governments to subsidize privatized high-cost firms. This implies that the budget constraint of the manager under privatization becomes harder, which increases the incentives of managers to cut costs. Our results also give support for theoretical models emphasizing the complementarity and sequencing of reforms (e.g., Dewatripont & Roland, 1992, 1995). The effects of privatization and increased competitive pressure are similar with respect to incentives to engage in restructuring which makes the firm more cost-effective. Both increase the risk of bankruptcy, which may discipline managerial behavior. However, if firms are privatized in an environment where product market competition is weak, also the incentive-enhancing aspects of changing corporate governance may be diluted. Thus our results suggest that increasing competitive pressure in markets first would enhance the effects that may be generated through privatization. This is of relevance for countries, such as China and Vietnam, where mass privatization programs still have to start.

V. Conclusion

In this paper we have used representative firm-level panel data to analyze how price-cost margins vary with domestic and international competitive pressure and with private, foreign, and state ownership in Bulgarian and Romanian manufacturing industries.

We find that price-cost margins in highly competitive markets are lower than in lowly competitive markets, a regularity that is also found for well-developed market economies. Furthermore, we find some evidence that import competition depresses firms' price-cost margins, but only in sectors where product market competition is weak. This suggests that opening to trade guarantees contestability of markets and hence disciplines firms pricing behavior.

We further find that privatized firms, both domestically and foreign owned have higher price-cost margins than state firms. This effect holds mainly in highly competitive sectors, which suggests that it is mainly cost cutting that privatized firms engage in, resulting in higher price-cost margins. It also suggests that privatizing state-owned enterprises without creating a competitive market environment may have little effect, which gives support for the sequencing of reforms that may be relevant for other emerging economies that still have to privatize most of their state-owned enterprises, such as China and Vietnam.

Our results are based on a short-run analysis of privatization. A long-run analysis would require longer time series, which would allow an analysis of privatization in a dynamic context. In particular, whether privatization contributes to increased innovative activities, resulting in better-quality products, remains an important area for future research.

REFERENCES

Aghion, Philippe, Olivier Blanchard, and Robin Burgess, "The Behavior of State Firms in eastern Europe, Pre-privatisation," *European Economic Review* 38 (1994), 1179–1361.

Basu, Susanto, and John G. Fernald, "Returns to scale in U.S. Production: Estimates and implications," *Journal of Political Economy* 105 (1997), 249–284.

Brown, David, and John Earle, "Privatization, Competition and Transition Policy Strategies: Theory and Evidence from Russian Firms," CEPR discussion Paper 2758 (2001).

Claessens, Stijn, and Simon Djankov, "Privatization Benefits in eastern Europe," *Journal of Public Economics* 83 (2002), 307–457.

Dewatripont, Mathias, and Gérard Roland, "The Virtues of Gradualism and Legitimacy in the Transition to a Market Economy," *Economic Journal* 102 (1992), 291300.

Dewatripont, Mathias, and Gérard Roland, "The Design of Reform Packages under Uncertainty," *American Economic Review* 83 (1995), 107–123.

Djankov, Simon and Peter Murrell, "Enterprise Restructuring in Transition," *Journal of Economic Literature* XL (2002), 739–792.

Dobrinsky, Rumen, "Enterprise Restructuring and Adjustment in the Transition to Market Economy: Lessons from Central and Eastern Europe," *Economics of Transition* 4 (1996), 230–252.

Domowitz, Ian, Glenn R. Hubbard, and Bruce C. Petersen, "Market Structure and Cyclical Fluctuations in U.S. Manufacturing," this REVIEW, 70 (1988), 55–66.
Estrin, Saul, "Competition and Corporate Governance in Transition," *Journal of Economic Perspectives* 16 (2002), 101–124.
Frydman, Roman, Cheryl Gray, Marek Hessel, and Andrzej Rapaczynski, "When Does Privatization Work? The Impact of Private Ownership on Corporate Governance in the Transition Economies," *Quarterly Journal of Economics* 14 (1999), 1153–1191.
Grossman, Sanford J., and Olivier Hart, "The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration," *Journal of Political Economy* 94 (1986), 691–710.
Hall, Robert E., "The Relation between Price and Marginal Cost in U.S. Industry," *Journal of Political Economy* 96 (1988), 921–947.
Hall, Robert E., and Dale Jorgenson, "Tax Policy and Investment Behavior," *American Economic Review* 57 (1967), 638–655.
Halpern, Laszlo, and Gabor Körösi, "Market Power and Firm Size in Transition, an Econometric Analysis of Hungarian Exporting Firms" in L. Halpern and C. Wyplosz (Eds.), *Hungary: Towards a Market Economy* (Cambridge University Press, 1997).
Harrison, Ann E., "Productivity, Imperfect Competition and Trade Reform," *Journal of International Economics* 36 (1994), 53–73
Hart, Olivier, "Incomplete Contracts and Public Ownership: Remarks, and an Application to Public-Private Partnerships," *Economic Journal* 113 (2003), C69–C76.
Hart, Olivier, Andrei Shleifer, and Robert Vishny, "The Proper Scope of Government: Theory and an Application to Prisons," *Quarterly Journal of Economics* 112 (1997), 1127–1162.
Hersch, Philip, David Kemme, and Jagdeep Bhandari, "Competition in Transition Economies: Determinants of Price-Cost Margins in Private Sector Manufacturing in Eastern Europe," *Southern Economic Journal* 61 (1994), 356–366.
Hsieh, Chang-Tai, "What Explains the Industrial Revolution in east Asia? Evidence from the Factor Markets," *American Economic Review* 92 (2002), 502–528.
Joskow, Paul, and Richard Schmalensee, "Privatization in Russia: What Should Be a Firm?," *International Journal of the Economics of Business* 2 (1995), 297327.
Joskow, Paul, Richard Schmalensee, and Natalia Tsukanova, "Competition Policy in Russia During and After Privatization," *Brookings Papers on Economic Activity: Microeconomics* (1994), 301–381.
Kocenda, Evzen, and Jan Svejnar, "Ownership and Corporate Performance after Large Scale Privatization," William Davidson Institute Working Paper, Ann Arbor, MI (2002)
Konings, Jozef, and Hylke Vandenbussche, "Does Antidumping Protection Raise Market Power? Evidence from Firm Level Data," *Journal of International Economics*, in press (2005).
Krishna, Pravin, and Devashish Mitra, "Trade Liberalization, Market Discipline and Productivity Growth: New Evidence from India," *Journal of Development Economics* 56 (1998), 447–462.
La Porta, Rafael, and Florencio Lopez-De-Silanes, "The Benefits of Privatization: Evidence from Mexico," *Quarterly Journal of Economics* 114 (1999), 1193–1242.
Levinsohn, James, "Testing the Imports-as-Market-Discipline Hypothesis," *Journal of International Economics* 35 (1993), 1–22.
Levinsohn, James, and Amil Petrin, "Estimating Production Functions Using Inputs to Control for Unobservables," *Review of Economic Studies* 70 (2003), 317–339.
Li, Wei, "A Tale of Two Reforms," *Rand Journal of Economics* 30 (1999), 120–137.
Lizal, Lubomir, Miroslav Singer, and Jan Svejnar, "Enterprise Breakups and Performance during the Transition from Plan to Market," this REVIEW, 83 (2001), 92–99.
Lizal, Lubomir, and Jan Svejnar, "Investment, Credit Rationing, and the Soft Budget Constraint: Evidence from Czech Panel Data," this REVIEW, 84 (2002), 353–370.
Olley, Steven, and Ariel Pakes, "The Dynamics of Productivity in the Telecommunications Equipment Industry," *Econometrica* 64 (1996), 1263–1298.
Rodrik, Dani, "Closing the Productivity Gap: Does Trade Liberalization Really Help?" (pp. 155–175), in Gerald Helleiner (Ed.), *Trade Policy, Industrialization and Development: New Perspectives* (Oxford: Clarendon Press, 1992).
Roeger, Werner, "Can Imperfect Competition Explain the Difference between Primal and Dual Productivity Measures? Estimates for U.S. Manufacturing," *Journal of Political Economy* 103 (1995), 316–330.
Roland, Gérard, *Transition and Economics: Politics, Markets and Firms*. (Cambridge, MA: MIT Press, 2000).
Roland, Gérard, "The Political Economy of Transition," *Journal of Economic Perspectives* 16 (2002), 29–51.
Schmidt, Klaus M.,"The Costs and Benefits of Privatization: An Incomplete Contracts Approach," *Journal of Law, Economics and Organization* 12 (1996), 1–25.
Shapiro, Matthew D., "Are Cyclical Fluctuations in Productivity Due More to Supply Shocks or Demand Shocks?" *American Economic Review Papers and Proceedings* 77 (1987), 118–124.
Shleifer, Andrei, "State versus Private Ownership," *Journal of Economic Perspectives* 12 (1998), 133–151.
Sutton, John, *Sunk Costs and Market Structure* (Cambridge, MA: MIT Press, 1991).
Tirole, Jean, "Privatization in eastern Europe: Incentives and the Economics of Transition," in Olivier Blanchard and Stanley Fischer (Eds,), *The NBER Macroeconomics Annual 1991* (Cambridge, MA: MIT Press, 1991).
Tybout, James R., "Plant- and Firm-Level Evidence on 'new' Trade Theories," NBER working paper no. 8418 (2001).
Walsh, Patrick P., and Ciarra Whelan, "Firm Performance and the Political Economy of Corporate Governance: Survey Evidence for Bulgaria, Hungary, Slovakia and Slovenia," *Economic Systems* 25 (2001), 85–112.

DATA APPENDIX

We make use of a commercial database of company accounts, comparable to other company account data sets such as the Compustat database in the United States or the Exstat database in the United Kingdom. The database is commercialized under the name "Amadeus" by Bureau van Dijk (BvD) (www.bvdep.com). The Amadeus data include the information of the balance sheets and income statements of medium and large companies in the Eastern Union and in a number of central and eastern European countries. We retrieved detailed information on 2,047 Romanian firms and 1,701 Bulgarian firms that operated in the manufacturing sector between 1994 and 1998. The quality of the data of Romanian and Bulgarian firms is among the best in the Amadeus data set. We checked this by taking random samples of firms to verify the consistency and accuracy of reporting. We verified it by checking annual reports of firms, and we conducted a number of postal surveys in which we inquired about the values of a number of variables and compared them with what was reported in the Amadeus files. Incentives to misreport information by companies are minimal, as that is regarded as fraud and may lead to substantial fines. We also compared our data with data from the official yearbooks to check how representative they were. In particular, the Amadeus data cover 66% (82%) and 70% (69%) of total manufacturing employment (sales) in Bulgaria and Romania, respectively.

1. Data on Output and Input Factors

- PQ = operating revenue in thousands of local currency.
- $P_M M$ = costs of material inputs in thousands of local currency.
- $P_N N$ = cost of employees in thousands of local currency, including employer and employee social contributions.
- K = net tangible fixed assets, including machinery, equipment, and buildings, evaluated at book value in thousands of local currency.
- The price of capital is defined as $P_K = P(r + \delta_{it})$, where P_I is the index of investment goods prices; r is a firm-specific real interest rate, computed as the interest paid relative to total debt minus the inflation rate based on the consumer price index; and δ is a firm-specific depreciation rate, computed as the total amount of depreciations in year t divided by net tangible fixed assets in year $t - 1$. The investment goods price index is taken from the E.U. AMECO database provided to us by Werner Roeger.

2. Data on Ownership

The information on ownership is collected directly from the companies. BvD merges the ownership data it receives from all its information providers (including those of all other European countries) into one big database. This information is then analyzed to identify each cross-border holding or subsidiary link by the national identification number of the companies involved. This allows us to have information about the nationality of the ownership, foreign or domestic. Firms for which we could not trace ownership information in the Amadeus data set were dropped from the analysis. Thus the ownership information that we use should be a good measure of whether a firm is domestically privately owned, foreign-owned or state-owned. Because the ownership information is only recorded at the time that the data are collected by BvD, the ownership status does not vary, but refers to the latest data that were collected. We therefore used two different CD-ROMS, one referring to the data collected in the year 1997 and one referring to the data collected in 1998. This allowed us to trace the changes in ownership status. We define majority-owned private domestic firms as firms for which domestic investors own more than 50% of the shares. Majority-owned foreign firms are firms for which one or more foreign investors own more than 50% of the shares.

3. Data at the Sector Level

Sector-level information was provided by the respective National Statistical Offices. The Herfindahl index (HERF) is the sum of squared market share in a given three-digit NACE industry. The import share (IMP) is the ratio of imports to the sum of domestic sales and imports also in a given three-digit industry. These data were provided to us by Rumen Dobrisnki for Bulgaria and by Ion Anton for Romania, for which we gratefully thank them.