The Effects of Privatization and Competitive Pressure on Firms’ Price-Cost Margins: Micro Evidence from Emerging Economies
THE EFFECTS OF PRIVATIZATION AND COMPETITIVE PRESSURE ON FIRMS’ PRICE-COST MARGINS:

MICRO EVIDENCE FROM EMERGING ECONOMIES\textsuperscript{1}

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Abstract

This paper uses representative panel data of 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. This also suggests that privatized firms reduce costs, rather than increase prices, as in highly competitive markets firms are more likely price-takers.

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.

Keywords: competition, privatization, firm performance, transition

JEL Code: L1, L33, P3, P5
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 has had an effect on 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 East European countries, with a population of 22.3 million and a GDP per capita that is very comparable 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, while at the start of the transition process in most Central and East European countries between 80 and 97% of the workforce was employed in companies with 500 or more workers, in most of the West European market economies this fraction varied between 40 and 62% (Roland, 2000). The transition process 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 start-ups 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. Tirole (1991) among others argues that privatization without first ‘de-monomopolization’ 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 high output collapse observed in many transition economies. Joskow and Schmalensee (1995) and Joskow et al. (1994) point out that in the case of Russia product-level concentration of production created potential monopoly problems. While restructuring prior to privatization would have been desirable in Russia,
political and informational constraints precluded widespread restructuring before privatization.

These papers provide an argument for the traditional criticisms of privatization. Simply transferring 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 due to 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\textsuperscript{3}. 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 a 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 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 easily diffuse 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), Krishna and Mitra (1998) all report reduced price-cost margins when firms are exposed to more import competition. Konings and Vandenbussche (2002) find evidence that firms’ price-cost margins increase once they enjoy anti-dumping 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\textsuperscript{4}. Rodrik (1992) points out that it may if the protection induces a higher effective market size and a higher pay-off 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 in transition and developing economies, where performance was usually measured in an ad hoc way such as labor productivity, growth in sales or the number of layoffs. In contrast, this paper studies whether increased competitive pressure, brought about by trade and price liberalization, and 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 or $P - c$, with $P$ the product price and $c$ the marginal cost of production, as a measure of performance as it can nicely be linked to structural models of firm behavior. The price-cost margin is also known as the Lerner index of monopoly power and gives an indication about how competitive an industry is in terms of pricing close to marginal costs. Under perfect competition, the Lerner index is zero. 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. While 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 in the recent set of papers that aim to estimate total factor productivity consistently as in 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 should be, 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 relative to state owned enterprises and this
effect seems stronger for private foreign owned 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 behavior of 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. While 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 relatively 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 residual. He shows that this lack of correlation can mostly be explained by the presence of imperfect competition. In doing so, however, Roeger also introduced a very elegant way to estimate price-cost margins in a consistent way, without having to worry about potential correlations between the unobserved productivity shocks and the input factors of production. This section introduces this methodology.

We start from a standard production function

\[ Q_i = \Theta_i F (N_i, K_i, M_i) \]

where \( i \) is a firm index for the firm, \( t \) is a time index, \( Q \) stands for output, \( F \) is a production function, \( \Theta_i \) 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 having access to better technology, improved product quality and leading to more incentives to engage in innovation, then the productivity term, \( \Theta_i \), would be higher
after privatization. However, as we will demonstrate below, there is no need to take 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:

\[
\frac{\Delta Q_{it}}{Q_{it}} = \alpha_{N_{it}} \frac{\Delta N_{it}}{N_{it}} + \alpha_{K_{it}} \frac{\Delta K_{it}}{K_{it}} + \alpha_{M_{it}} \frac{\Delta M_{it}}{M_{it}} + \vartheta_{it} \]

where \( \alpha_{j_{it}} = \frac{P_{j_{it}} J_{j_{it}}}{P_{it} Q_{it}} \) (J=N,K,M) is the cost share of inputs in turnover, \( P_j \) stands for the unit cost of input factor \( j \) and \( \vartheta_{it} = \frac{\Delta \Theta_{it}}{\Theta_{it}} \).

Under imperfect competition (1) becomes (Hall, 1988):

\[
\frac{\Delta Q_{it}}{Q_{it}} = \mu_{it} \left( \alpha_{N_{it}} \frac{\Delta N_{it}}{N_{it}} + \alpha_{K_{it}} \frac{\Delta K_{it}}{K_{it}} + \alpha_{M_{it}} \frac{\Delta M_{it}}{M_{it}} \right) + \vartheta_{it}
\]

where \( \mu = \frac{P}{c} \) is the markup of price over marginal cost.

Another way to write it is:

\[
\frac{\Delta Q_{it}}{Q_{it}} = \alpha_{N_{it}} \frac{\Delta N_{it}}{N_{it}} - \alpha_{M_{it}} \frac{\Delta M_{it}}{M_{it}} - (1 - \alpha_{N_{it}} - \alpha_{M_{it}}) \frac{\Delta K_{it}}{K_{it}} = \beta_{it} \left( \frac{\Delta Q_{it}}{Q_{it}} - \frac{\Delta K_{it}}{K_{it}} \right) + (1 - \beta_{it}) \vartheta_{it}
\]

where \( \beta_{it} = \frac{P_{it} - c_{it}}{P_{it}} = 1 - \frac{1}{\mu_{it}} \) is the price-cost margin or Lerner index of firm \( i \) at time \( t \), where \( c_{it} \) stands for the marginal cost of firm \( i \) at time \( t \). The problem in estimating (2) or (3) as in Levinsohn (1993) and Harrison (1994) is that unobserved productivity shocks, captured by \( \vartheta_{it} \), 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 (3) we follow Roeger (1995) by using a similar expression as in (3), but derived from the price based or dual Solow residual:

$$(4)$$

$$\alpha_{N_{it}} \frac{\Delta P^*_N}{P^*_N} + \alpha_{M_{it}} \frac{\Delta P^*_M}{P^*_M} + \left(1 - \alpha_{N_{it}} - \alpha_{M_{it}}\right) \frac{\Delta P^*_K}{P^*_K} = -\beta_{it} \left(\frac{\Delta P^*_u}{P^*_u} - \frac{\Delta P^*_K}{P^*_K}\right) + (1 - \beta_{it}) \delta_{it}$$

Then subtracting (4) from (3) we get:

$$(5)$$

$$\left(\frac{\Delta Q_{it}}{Q_{it}} + \frac{\Delta P^*_u}{P^*_u}\right) - \alpha_{N_{it}} \left(\frac{\Delta N_{it}}{N_{it}} + \frac{\Delta P^*_N}{P^*_N}\right) - \alpha_{M_{it}} \left(\frac{\Delta M_{it}}{M_{it}} + \frac{\Delta P^*_M}{P^*_M}\right) - (1 - \alpha_{N_{it}} - \alpha_{M_{it}}) \left(\frac{\Delta K_{it}}{K_{it}} + \frac{\Delta P^*_K}{P^*_K}\right)$$

$$= \beta_{it} \left[\left(\frac{\Delta Q_{it}}{Q_{it}} + \frac{\Delta P^*_u}{P^*_u}\right) - \left(\frac{\Delta K_{it}}{K_{it}} + \frac{\Delta P^*_K}{P^*_K}\right)\right]$$

Note that the error term capturing unobserved productivity shocks has cancelled out and therefore $\beta_{it}$, the Lerner index, can consistently be estimated. Note also that any shifts in technology that affect the production function due to privatization are controlled for as the productivity terms have cancelled 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 of 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 Jorgenson and Hall (1967) and Hsieh (2002), or $P_{Kit} = P_i(r_{it} + \delta_{it})$, 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, \( \delta \) stands for the depreciation rate, measured at the firm level (see data appendix for details).

Rewriting the left hand side in (5) as \( \Delta y \), which is the difference between the primal and the dual Solow residual, and the right hand side as \( \Delta x \) and adding a white noise error term, \( \varepsilon_{it} \), we obtain a very simple testable equation:

\[
(5') \quad \Delta y_{it} = \beta_{it} \Delta x_{it} + \varepsilon_{it},
\]

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 for each firm separately a markup 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 \( \Delta x \) with sector level data about concentration, import penetration, and firm level information about ownership. Or equation (5’) can be written as

\[
\Delta y_{it} = \beta_1 \Delta x_{it} + \beta_2 \Delta x_{it} \times IMP_{jt} + \beta_3 \Delta x_{it} \times HERF_{jt} + \beta_4 \Delta x_{it} \times PRIV_{it} \\
+ \beta_5 \Delta x_{it} \times FOR_{it} + \beta_6 \Delta x_{it} \times HERF_{jt} \times IMP_{jt} \\
+ \gamma_1 HERF_{jt} + \gamma_2 IMP_{jt} + \gamma_3 PRIV_{it} + \gamma_4 FOR_{it} + \beta + \varepsilon_{it}
\]

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 one if the firm \( i \) is owned for more than 50% by private domestic shareholders in year \( t \), \( FOR_{it} \) is a dummy equal to one if the firm is owned for more than 50% by foreign shareholders in year \( t \). We include the ownership variables and competition variables also separately in (6) to capture any difference between the primal and the dual Solow residual that is not explained by market power. Finally, \( \beta \) 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 that probability of privatization remains constant over the sample period.

There are however a number of critical remarks concerning this method we want to point out at this stage. First, the error term in (6) should in principle be zero, given that the productivity shocks in (5) cancelled out. Roeger (1995) points out a number of reasons for having a non-zero error term in (6), but which would not cause a problem for consistent estimation.

In particular, measurement error of the labor input is one potential source for a non-zero 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. Since 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 right hand side in (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 non-zero error term in (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 (5) capturing such demand effects must be added to control for labor hoarding. We will 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 (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 depending on whether returns to scale are respectively, decreasing or increasing, as shown by Basu & Fernald (1997). Basu & Fernald (1997), 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 the Roeger (1995) estimates on firm level data, if any bias, to show an upward bias stemming from decreasing returns at the firm level. At first sight this bias in the levels estimates should 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, privatization has resulted in downsizing which may have increased the returns to scale somewhat, in which case the Roeger (1995) estimates are bound to be an underestimate 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 of medium and large sized firms they are likely to be multi-product 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. The data appendix provides more details on the peculiarities of this data. Earlier studies mostly had to rely on small samples of firms - usually of a few hundreds - collected through surveys (Hersch et al., 1993; Frydman et al. 1999; Walsh and Whelan, 2001). The sample in this paper contains virtually the entire population of medium and large sized enterprises in manufacturing in Bulgaria and Romania.

The ownership information per firm in the data set refers only to the years 1997 and 1998. While it would have been interesting to analyze the effects of ownership on market power from 1994 onwards, 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 while the mass privatizations started only from 1997 onwards. To check the robustness of our results we will also report estimates for the entire sample period 1994-98 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 presence of majority owned state firms in Romania (42%) is more important 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.

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 both countries. For instance, the average price-cost margins in ‘Textiles’ is estimated at almost 20% in Bulgaria, while 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. While we do not consider explicitly institutional changes, such as the implementation of competition policy, laws that enhance new firm entry, trade policy, mass privatization programs, etc., 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 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.

IV.1 The Effect of Competitive pressure on Price-Cost Margins

To test whether increased competitive pressure in transition countries has had an impact on 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 et al, 1988). Our second measure of competitive pressure relates to international competition, which we measure by import penetration at the three digit NACE level⁹. We expect import penetration to have a negative impact 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 to 16% \((12.4\% + 0.226 \times 0.18)\). 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 of 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. Also in Romania 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% \((1.5\% + 0.36 \times 0.14)\).

From these estimates we may infer that due to new firm entry or enterprise break-ups, 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, while 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% (this compares to 35% in 1995), while 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 potentially driven by an endogeneity problem related to imports, we also ran the specification with lagging import
penetration by two years, but our results remained the same and so we do not report 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 where increased import penetration has a negative effect on prices. Thus in sectors where domestic competition was traditionally weak, 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 and hence where firms are more likely price takers 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.

IV.2 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 not statistically significant from each other, 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 are either more cost efficient or that they 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 refers 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 has been limited privatization prior to 1997. As a first robustness check we assume that all firms prior to 1997 were state owned. While this is clearly a wrong assumption as some firms have been 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 to 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. While this may be realistic in macro data, this may be 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.
IV.3. 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 in two sub-samples, a highly competitive sector versus a lowly competitive sector. We split the sample in two roughly equal sized sub-samples, 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 sub-sample is characterized by sectors for which the Herfindahl index is lower than 5%. We also experimented with other cut-offs 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, compared to 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, while in the lowly competitive sectors there is no statistically significant effect of privatization. Also in Romania the effect of domestic privatization is more than two times as strong in the highly competitive sectors compared to 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 sub-samples 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 could reflect also 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 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 give also support for theoretical models emphasizing the complementarity and sequencing of reforms (e.g. Dewatripont and Roland, 1992, 1995). The effects of privatization and increased competitive pressure are similar in terms of affecting 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 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 compared to 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 relative to state firms. This effect holds up 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


Table 1: Types of Ownership (percentage of firms in the sample)

<table>
<thead>
<tr>
<th>Type of firm</th>
<th>Bulgaria</th>
<th>Romania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Majority Domestic Private</td>
<td>74 %</td>
<td>47%</td>
</tr>
<tr>
<td>Majority Foreign</td>
<td>6%</td>
<td>11%</td>
</tr>
<tr>
<td>Majority State</td>
<td>20 %</td>
<td>42%</td>
</tr>
</tbody>
</table>
Table 2: Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>Full sample</th>
<th>Majority Private domestic</th>
<th>Majority Foreign</th>
<th>Majority State</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bulgaria</td>
<td>Romania</td>
<td>Bulgaria</td>
<td>Romania</td>
</tr>
<tr>
<td>Employment</td>
<td>493 (981)</td>
<td>469 (1028)</td>
<td>392 (641)</td>
<td>378 (699)</td>
</tr>
<tr>
<td>Sales</td>
<td>6634 (42850)</td>
<td>7853 (52524)</td>
<td>4934 (18918)</td>
<td>5173 (21441)</td>
</tr>
<tr>
<td>Wage Bill</td>
<td>876 (3250)</td>
<td>1012 (3901)</td>
<td>784 (2615)</td>
<td>829 (2962)</td>
</tr>
<tr>
<td>Material Costs</td>
<td>4162 (31967)</td>
<td>5170 (39348)</td>
<td>2817 (13705)</td>
<td>3030 (15625)</td>
</tr>
<tr>
<td>Tangible Fixed Assets</td>
<td>2664 (12017)</td>
<td>2975 (14032)</td>
<td>2333 (11588)</td>
<td>2464 (13060)</td>
</tr>
<tr>
<td>Depreciation rate</td>
<td>0.14 (0.22)</td>
<td>0.08 (0.17)</td>
<td>0.16 (0.22)</td>
<td>0.10 (0.28)</td>
</tr>
</tbody>
</table>

Note: Standard errors in parentheses; values expressed in thousands of $
Table 3:
Estimates of Price-Cost Margins in Different Sectors

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

Note: standard errors in parentheses, **/* denotes statistically significant at the 5%/10% level
### Table 4: Results

<table>
<thead>
<tr>
<th></th>
<th>Baseline Model</th>
<th>Robustness Checks Sample 1994-1998</th>
<th>Robustness Checks Capital Fixed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bulgaria</td>
<td>Romania</td>
<td>Bulgaria</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td><strong>Price-Cost Margin</strong></td>
<td>0.124** (0.029)</td>
<td>0.015** (0.003)</td>
<td>0.17** (0.01)</td>
</tr>
<tr>
<td><strong>The effect of import</strong></td>
<td>-0.05 (0.03)</td>
<td>0.018** (0.003)</td>
<td>-0.15** (0.058)</td>
</tr>
<tr>
<td><strong>The effect of the Herfindahl index</strong></td>
<td>-0.04 (0.12)</td>
<td>0.941** (0.046)</td>
<td>0.29** (0.04)</td>
</tr>
<tr>
<td><strong>The effect of Private Domestic Firms</strong></td>
<td>0.037* (0.018)</td>
<td>0.118** (0.008)</td>
<td>0.085** (0.006)</td>
</tr>
<tr>
<td><strong>The effect of Foreign Firms</strong></td>
<td>0.071** (0.032)</td>
<td>0.133** (0.023)</td>
<td>0.165** (0.02)</td>
</tr>
<tr>
<td><strong>The effect of Import Penetration x Herfindahl</strong></td>
<td>-0.560** (0.195)</td>
<td>-0.18** (0.034)</td>
<td>-0.07** (0.04)</td>
</tr>
<tr>
<td><strong>Year dummies</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>F-test</strong></td>
<td>0.26</td>
<td>0.54</td>
<td>0.46</td>
</tr>
<tr>
<td><strong>R² within</strong></td>
<td>0.78</td>
<td>0.61</td>
<td>0.73</td>
</tr>
<tr>
<td><strong>R² between</strong></td>
<td>0.36</td>
<td>0.39</td>
<td>0.24</td>
</tr>
<tr>
<td><strong>R² overall</strong></td>
<td>0.59</td>
<td>0.52</td>
<td>0.46</td>
</tr>
<tr>
<td><strong># observations</strong></td>
<td>1084</td>
<td>1748</td>
<td>1454</td>
</tr>
</tbody>
</table>

Note: standard errors in parentheses, ***/** denotes statistically significant at the 5%/10% level. The variables Import penetration, the Herfindahl index, private and foreign ownership are also included separately as additional control factors. The estimates refer to equation (6).
Table 5:  
Results for Highly versus Lowly Competitive Sectors

<table>
<thead>
<tr>
<th></th>
<th>Bulgaria</th>
<th></th>
<th>Romania</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Highly Competitive</td>
<td>Lowly Competitive</td>
<td>Highly Competitive</td>
<td>Lowly Competitive</td>
</tr>
<tr>
<td>Price-cost Margin</td>
<td>0.08**</td>
<td>0.18**</td>
<td>0.02**</td>
<td>0.12**</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.03)</td>
<td>(0.003)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>The effect of Private Domestic Firms</td>
<td>0.095**</td>
<td>-0.0001</td>
<td>0.14**</td>
<td>0.062**</td>
</tr>
<tr>
<td></td>
<td>(0.026)</td>
<td>(0.022)</td>
<td>(0.009)</td>
<td>(0.01)</td>
</tr>
<tr>
<td>The effect of Foreign Firms</td>
<td>0.058</td>
<td>0.041</td>
<td>0.157**</td>
<td>0.097**</td>
</tr>
<tr>
<td></td>
<td>(0.12)</td>
<td>(0.035)</td>
<td>(0.031)</td>
<td>(0.033)</td>
</tr>
<tr>
<td>Year dummies</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>F-test (Private=Foreign)</td>
<td>0.76</td>
<td>0.18</td>
<td>0.61</td>
<td>0.31</td>
</tr>
<tr>
<td>R² within</td>
<td>0.75</td>
<td>0.79</td>
<td>0.56</td>
<td>0.72</td>
</tr>
<tr>
<td>R² between</td>
<td>0.43</td>
<td>0.44</td>
<td>0.51</td>
<td>0.31</td>
</tr>
<tr>
<td>R² overall</td>
<td>0.60</td>
<td>0.63</td>
<td>0.53</td>
<td>0.55</td>
</tr>
<tr>
<td># observations</td>
<td>541</td>
<td>660</td>
<td>955</td>
<td>874</td>
</tr>
</tbody>
</table>

Note: robust standard errors in parentheses, **/* denotes statistically significant at the 5%/10% The variables private and foreign ownership are also included separately as additional control factors.
DATA APPENDIX

We make use of a commercial data base of company accounts, comparable to other company account data sets such as the Compustat data base in the U.S. or the Exstat data base in the UK. The data base is commercialized under the name “Amadeus” by Bureau Van Dijk (www.bvdep.com). The Amadeus data include the information of the balance sheets and income statements of medium and large sized companies in the EU and in a number of Central and Eastern Europe. We retrieved detailed information of 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 this by checking annual reports of firms and we conducted a number of postal surveys in which we inquired after the value 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 this is regarded as fraud which 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.

Data on output and input factors:

- PQ=operating revenue in thousands of local currency
- PM= costs of material inputs in thousands of local currency
- PN= cost of employees in thousands of local currency, including employer and employee social contributions.
- K= net tangible fixed assets, including machinery, equipment, buildings, evaluated at book value in thousands of local currency.
- The price of capital is defined as, $P_k = P_t (r_t + \delta_t)$, where $P_t$ 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; $\delta$ 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 EU AMECO data base and provided to us by Werner Roeger.

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/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 private 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 data 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 in the firm. Majority owned foreign firms are firms for which one or more foreign investors own more than 50% of the shares in the firm.

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 3-digit NACE industry. The import share (IMP) is the ratio of imports over the sum of domestic sales and imports also in a given 3-digit industry. These data were provided to us by Rumen Dobrisnki for Bulgaria and Ion Anton for Romania, for which we gratefully thank them.
FOOTNOTES

1 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; 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, KULeuven.

2 For a recent survey on the political economy of transition, discussing the sequencing of reforms, see Roland (2002)

3 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).

4 Tybout (2000) provides a comprehensive overview of the static and dynamic arguments of trade protection.


6 A maintained assumption in this approach is one 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 and Svejnar, 2002). Also Aghion, Blanchard and Burgess (1994) show that state owned enterprises started to engage in profit maximizing strategies prior to privatization.

7 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.

8 This number reduces in the analysis as we make use of information of the capital stock in firms, which is often missing.

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