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The Effects of Privatization and International Competitive Pressure on Firms' Price-Cost Margins: Micro Evidence from Emerging Economies

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MICRO EVIDENCE FROM EMERGING ECONOMIES[1]

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Abstract

This paper uses representative firm level panel data of 1,701 Bulgarian and 2,047 Romanian manufacturing firms to estimate price-cost margins and to analyze how these are affected by privatization and increased competitive pressure. The estimation method used, which is based on Roeger (1995), deals with potential endogeneity problems that are associated with estimating firm performance, by making use of the properties of the primal and dual Solow residual.

We find that privatization is associated with higher price-cost margins in both Bulgaria and Romania. Moreover, foreign owned firms have higher markups than domestic privatized firms. Our results suggest that the sequencing of reforms, such as demonopolization prior to privatization and the establishment of competition policy, may be important. In addition, our results give support to the idea that opening to trade has a disciplining effect on firms' market power. We find that increased import penetration is associated with lower price-cost margins in sectors where product market concentration is relatively high.

Our results can be of relevance for other emerging economies, such as China and Vietnam, which still have to undergo major privatization programs.

Keywords: market power, 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. The methodology that we use, based on Roeger (1995), has the advantage that it allows estimation of price-cost margins consistently, without having to appeal to instrumental variables techniques. This is a major advantage when instrumental variables are hard to find as is often the case 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 (2002).

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 Eastern 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[2]. Restructuring, i.e. breaking-up large state owned enterprises before privatization takes place, is required both to enhance organizational efficiency as well as to create market structures, which are reasonably competitive. Tirole (1991) among others has argued that privatization without first '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 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. This provides an argument for critics of privatization: If governments are concerned with maximizing social welfare state owned enterprises are likely to price close to marginal costs. Simply transferring the state sector to the private sector without first breaking-up these large firms could lead to substantial market power in firms in pursuit of profit maximization at the expense of social welfare. Lizal, Singer and Svejnar (2001) study the effects of enterprise break-ups in Czechoslovakia and point out the important countervailing effect brought about by increased competition stemming from the break-ups of large firms with monopolistic power and from the opening up of the formerly planned economies to world trade.

[2] For a recent survey on the political economy of transition, discussing the sequencing of reforms, see

While a number of papers have studied the effects of privatization and competitive pressure on firm performance[3] in transition economies (see for an excellent survey Djankov and Murrell, 2002), there is hardly any work that analyzes these effects on the price-cost margins of firms, which is a measure for market power, in transition economies. This paper fills this gap and studies whether privatization of state owned enterprises has been associated with increased price-cost margins of firms in emerging economies. In addition, we investigate whether the opening up to trade and in particular the increased import competition has had an effect on price-cost margins. The results in this paper can be interpreted as an analysis of the effects of privatization on allocative efficiency (i.e. pricing at marginal costs) and could provide an argument for sequencing of reforms[4], which may be relevant for other emerging economies that still have to undergo massive privatization programs, such as China and Vietnam. Alternatively, the results may be interpreted as an analysis of privatization and competitive pressure on firm performance, measured by price markups.

A number of papers so far have focused on the effects of privatization on firm performance, where performance is measured either by sales growth, the number of layoffs, labor productivity or total factor productivity[5]. An important problem with this work has been the potential endogeneity related to the explanatory variables in the various models. For instance, unobserved productivity shocks may have an effect both on the input factors and the output, which can lead to biased estimates in total factor productivity. Finding good instruments turns out to be very difficult as argued

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Roland (2002)

[3] Firm performance in these studies is measured in an ad hoc way by growth in sales, number of layoffs or labor productivity.

[4] For a theoretical discussion of sequencing of reforms see Dewatripont and Roland (1992, 1995).

by Olley and Pakes (1996) and Levinsohn and Petrin (2002). Furthermore, if private ownership and productivity shocks are correlated, the effect of privatization is not correctly estimated either. This paper, in contrast, estimates the price-cost margins of firms by using a method that avoids such endogeneity problems. We estimate price-cost margins using a method proposed by Roeger (1995) which is based on Hall's (1988) method of estimating price-cost margins and on exploiting properties of the primal and dual Solow residual. 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.

We use a representative sample of 1,701 Bulgarian and 2,047 Romanian manufacturing firms to estimate the price-cost margins of privatized, state owned and foreign owned firms[6]. Previous 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. Our observations cover the period 1994-98, however, the information available for ownership (the fraction of shares held by private domestic owners, foreign owners and the state) refers only to the years 1997 and 1998. This apparent weakness of the data on ownership is not that serious as all firms in Bulgaria and Romania were initially state owned enterprises and most of the privatizations took

[5] La Porta and Lopez-De-Silanes (1999) for Mexico, Kocenda and Svejnar (2002) for the Czech Republic, Frydman et al. (1999) , Claessens and Djankov (2001) and Walsh and Whelan (2001) for various transition economies.

place in the second half of the 1990s. Claessens and Djankov (2001) point out that Bulgaria and Romania privatized only 6.8% and 7.3% of their manufacturing sector during the period 1992-95. Furthermore, the fact that we still have two years of ownership information allows us to control for unobserved firm level fixed effects in our analysis, which may capture potential firm level heterogeneity or selectivity effects of ownership changes, not captured by our estimation methodology.

The fact that we are able to make a distinction between privatized, foreign and state owned firms, allows us to assess whether foreign ownership is associated with higher price-cost margins relative to domestic private ownership and state ownership. In the context of transition economies this distinction may be relevant as most of the privatization took place through voucher give-away schemes, resulting in insider (employee) owned firms, which arguably did not affect firm behavior in a substantial way at least not early on in the transition (Boycko, Shleifer and Vishny, 1996; Estrin, 2002). Foreign ownership can be viewed as an ownership structure characterized by outside owners, which may have different effects on firms' pricing behavior than domestic privatized firms (Frydman et al, 1999).

Our main findings can be summarized as follows. We find that privatization is associated with higher price-cost margins relative to state owned enterprises. Furthermore, we find that foreign owned firms have the highest market power. We also find that international competition, measured by import penetration reduces price-cost margins especially in highly concentrated sectors. Our results are robust to various estimation techniques and specifications.

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

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

II.1 The 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 market power in firms 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 market power in firms. 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[7].

We start from a standard production function $Q_{it} = \Theta_{it} F(N_{it}, K_{it}, M_{it})$, where i is a firm index for the firm, t is a time index, Q stands for output, F is a production

[7] Konings and Vandenbussche (2002) use the same approach to estimate the effects of anti-dumping protection on firms' market power. A maintained assumption in this approach is one of profit and cost

function, Θ is Hicks neutral technological progress, N is labor input, K is capital input and M is material input. Assuming constant returns to scale and perfect competition the growth rate of output (the Solow output decomposition) is:

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

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

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

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

where $\mu = \frac{p}{c}$ is the markup of price over marginal cost.

Another way to write it is[8]:

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

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

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)

(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, the difficulty exists often exactly in finding 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. Levinsohn and Petrin (2002) demonstrate that like investment, intermediate inputs can also solve this simultaneity problem. While these new approaches to estimate production functions seem very fruitful and have been used to study the impact of trade liberalization on productivity performance as in Pavcnik (2002), the maintained assumption is that perfect competition characterizes the product market. Our concern regarding the Central and East European economies we are studying here, Bulgaria and Romania, however, is to analyze whether privatization and increased competitive pressure have had an effect on the price-cost margins of firms. So, we are interested in whether firms deviate from pricing behavior that exists under perfect competition.

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)

[8] Note that under constant returns to scale and imperfect competition $\alpha_n+\alpha_m+\alpha_k=1/\mu$

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

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

(5)

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

Note that the error term capturing unobserved productivity shocks has cancelled out and therefore β, the Lerner index, can consistently be estimated using OLS.

Rewriting the left hand side as Δy, which is the difference between the primal and the dual Solow residual, and the right hand side as Δx, we obtain a very simple testable equation:

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

where ε_{it} is a white noise error term. Strictly speaking, the error term, ε_{it}, should be zero given that the productivity shocks in (5) cancelled out. However, as pointed out by Roeger (1995), there may be a number of reasons for having a non-zero error term in (5'). Mismeasurement of the labor input is one potential source for a non-zero error term. In particular, 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), these measurement errors do not constitute a problem for the estimations. Another source of a non-zero error term could be due to misspecification analysis, in particular, the presence of excess capacity and labor hoarding could result in a different specification. Roeger (1995) points out that both in the case of excess capacity and labor hoarding the difference between the primal and the dual Solow residual is cyclical, which would be captured by the error term. We will use year dummies to capture such potential demand effects.We shall use Eq. (5') to estimate price-cost margins, captured by $\beta_{it} = (P_{it} - c_{it})/P_{it}$, as an indicator of market power. To assess the effect of trade, concentration and ownership, we interact Δx with sector level data about concentration, import shares, and firm level information about ownership[9].

The Roeger (1995) method is particularly well suited to estimate market power in firms if one has access to company accounts data where both output and input factors are reported in nominal values. Deflation of variables using price indexes is no longer needed in order to estimate price-cost margins. There exist also a number of alternative, complementary approaches to estimate markups as discussed in Bresnahan (1989), which we will not pursue here[10]. These alternative approaches require price information in order to estimate demand functions directly, while we have access to the actual company account data, which does not contain sufficient information to estimate demand functions. 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

[9] This means that we assume that market power varies with ownership and competition, which implies that we need to add these variables separately as well in equation (5'), apart from the interactions with Δx (see Oliveira Martins and Scarpetta, 1999).
[10] For a recent application of these alternative methods see Verboven (2002).

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.

Equation (5) shows that in order to obtain an estimate of the price-cost margin, we need information on sales growth[11], growth in the wage bill, growth in material costs and growth in the value of capital[12]. The company accounts information we have of Bulgarian and Romanian firms allowed us to get firm level data on these variables. The profit and loss account provided us the information on sales, the wage bill and material costs in consecutive years.[13] 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, δ stands for the depreciation rate, measured at the firm level (see data appendix for details on sources). The Roeger method assumes that capital is flexible and that a change in the value of capital may be associated with a change in the marginal costs. We have also experimented with assuming that capital is fixed, but this does not alter our basic results (reported in tables A1 and A2 of the appendix).

[11] Note that $\frac{\Delta x_{it}}{x_{it}} + \frac{\Delta y_{it}}{y_{it}} = \Delta \ln(x)_{it} + \Delta \ln(y)_{it} = \Delta \ln(xy)_{it}$ which is the growth rate of xy.

[12] Sales refers to $P_{it}.Q_{it}$; the wage bill to $P_{Nit}N_{it}$; material costs are $P_{Mit}.M_{it}$ and the value of capital is $P_{Kit}.K_{it}$.

[13] The Profit & Loss account for European firms can be compared to the Income Statement for US firms.

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. It is not possible to estimate for each firm separately a markup because we would not have enough degrees of freedom.

II.2 Hypotheses

We seek to test two key hypotheses which are of general relevance, also for market economies: Our first hypothesis that we seek to test is related to the ownership structure of firms. If the government is concerned about allocative efficiency, we would expect that state firms would set prices close to marginal costs. State owned enterprises are considered to cure market failures by implementing pricing policies that take account of social marginal costs (Shapiro and Willig, 1990). Given that the communist economies were characterized by state monopolies and mass privatization often took place without breaking up the firms in smaller units prior to privatization we may expect that price-cost margins will increase after privatization. Furthermore, transition implied a move from revenue maximization under soft budget constraints, to profit maximization under hard budget constraints, which is likely to give rise to different pricing behavior of privatized firms (Estrin and Hare, 1992). There has been a debate, however, about the relative performance of privatized versus state firms. While some papers show there is not much difference between these two categories because most of the privatization occurred through give away schemes, others demonstrate that privatization has led to better firm performance (Frydman et al, 1997; for an overview see Estrin, 2002). An alternative way of interpreting this first

hypothesis is that we are testing the relative performance of firms as a function of the ownership structure, where performance is measured as the price-cost margin of firms. If privatized firms engage in more restructuring, relative to state owned enterprises, costs may be reduced more without falling prices. This would also result in a higher price-cost margin. In testing this hypothesis we will make a distinction between domestic private owned firms and foreign firms.

Our second hypothesis is related to the effects of increased competitive pressure on market power. It is generally believed that increased competitive pressure should discipline firm pricing behavior. Levinsohn (1993), Harrison (1994), Krishna and Mitra (1998) all report pricing behavior closer to marginal costs when firms are exposed to more import competition. Konings and Vandenbussche (2002) find evidence that firms' market power increases once they enjoy protection from international competition. To test whether increased competitive pressure in transition countries has had an impact on the pricing behavior 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 level[14]. We expect import penetration to have a negative impact on price-cost margins, yielding more competitive pricing behavior of firms (e.g. Tybout, 2001).

[14] The Nace classification level is the European system of classifying sectors,.

We test these hypotheses by interacting in equation (5') Δx with the various proxies for competitive pressure and ownership. This allows us to test directly whether competitive pressure and ownership matters for the average price-cost margin in firms. Or equation (5') can be written as

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

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, 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 also experimented with using the full fraction of shares held by each ownership category, rather than a dummy indicating majority ownership. Finally, ε_{it} is a white noise error term. 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. Equation (6) is estimated using OLS and fixed effects estimators. The latter may capture any unobserved firm level heterogeneity and measurement error that is constant over time. In our regressions we will also include year dummies to control for common aggregate shocks.

III. Data

III.1. Background on Bulgaria and Romania

Both Bulgaria and Romania are former Soviet economies that like the other Central and East European emerging economies started market oriented reforms in the early 1990s. However, unlike other emerging economies of Central and Eastern Europe, such as Hungary, Poland and the Czech Republic, the planned reforms were often postponed or there was no clear-cut policy due to political instability. Like most transition economies, Bulgaria and Romania suffered from a steep output collapse in the early 1990s and a slow recovery thereafter. However, in both countries current real GDP levels are still below their pre-transition level of real GDP. Bulgaria is a small open economy with a population of 8 million and GDP per capita of 1,513 USD in 1999. Its trade share in GDP is 73%. Romania is a larger economy with a population of 22.3 million and GDP per capita of 1,512 USD in 1999 (EBRD, 2002). Its trade share in GDP is 53%.

Both countries can be considered as slow reformers, lagging behind the other transition economies. This is also one of the reasons why Bulgaria and Romania are no part of the first wave of Central and East European countries joining the EU. Both countries are very comparable in terms of implementing institutional reforms. Both countries have installed competition policy authorities, but its effectiveness has not been very high, as indicated by the EBRD index of competition policy. This index is based on an in depth survey of various competition policy actions in the transition economies. Bulgaria, just as Romania, has a score of 2.3 out of a maximum score of 5, in 1999 (EBRD, 2002). In both countries enterprise reforms were slow to occur.

Despite the significant progress in building the legislative and regulatory framework to support private sector activity towards the end of the 1990s, there is still a significant scope to improve the effectiveness of its application and implementation. Both countries still have to go through a number of privatization rounds of their state owned enterprises. By 1999, 70% of GDP in Bulgaria was produced in the private sector (i.e. privatized and de novo private firms), this compares to 60% in Romania.

III.2. The Firm Level Data

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 US or the Exstat data base in the UK. The data base is commercialized under the name "Amadeus" by Bureau Van Dijk (BvD), a firm listed on the Brussels' Stock Exchange, specialized in harmonizing and uniformizing company accounts data of European firms. The Amadeus data include the information of the balance sheets and income statements of companies above a certain size in the EU and in a number of Central and Eastern Europe. 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. Finally, we also compared our data with data from the official yearbooks to check the representativeness. Furthermore, incentives to misreport information by companies are minimal as this is regarded as fraud which may lead to substantial fines. Even in case that there was some underreporting of

some values, like the official wage bill or the number of employees working in the firm, our method of estimation may capture some of that by using fixed effects estimations.

We retrieved detailed information of 2,047 Romanian firms and 1,701 Bulgarian firms that operate in the manufacturing sector between 1994 and 1998. The data were provided to BvD by the Chamber of Commerce and Industry in Romania and Creditreform in Bulgaria. All the variables are taken from the annual company accounts which were made consistent across countries by BvD. To be included in "Amadeus" at least one of the following criteria has to be satisfied: employees greater than 100, total assets and sales exceed 8 and 16 million USD, respectively. These inclusion criteria suggest that we would only capture the medium and large firms. In tables 1 and 2 we compare the employment and sales coverage of the Amadeus data for Bulgaria and Romania with the total employment and sales in manufacturing reported in the statistical yearbooks of these two countries. We note that our data cover most of the employment and sales in manufacturing in both countries. In table 2 we can also see that the Amadeus data are quite representative at the 2 digit NACE sector level. So despite the inclusion criteria it seems that we are using a representative firm level data set for Bulgarian and Romanian manufacturing firms. This is not surprising as the size distribution of firms in the emerging countries is skewed in favor of the medium and large firms. In our analysis, the number of firms used drops as we require information on the capital stock in firms, which is often not provided. We also experimented with estimates not using the capital stock and our basic results remained qualitatively the same.

The company accounts data cover the period 1994-98. Apart from the standard data provided in company accounts, the data also includes information on the

ownership structure of firms, however, as mentioned before, this information was only available for the years 1997 and 1998. So, our main analysis that relates to the ownership effects will only refer 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 1996. Claessens and Djankov (2001) pointed out that only around 7% of the state owned enterprises in manufacturing was 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. This is likely to bias our results in favor of finding no effect of privatization, given that it is realistic to believe that a number of the firms in our sample were already privatized. Nevertheless, given that we have a representative sample it is also likely that it is only a small fraction of firms that are not measured correctly. This exercise is just done as a robustness check for our main results, which refer to the years 1997 and 1998, the years for which we have full information on the ownership status of firms.

The information on ownership is collected directly from the companies. Furthermore 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.

In particular, we know the fraction of shares in the firm that is owned by the state, by the private domestic investors and by foreigners. Table 3 shows the average fraction of shares held in each category in the sample. Note that the average fraction of shares held by private domestic owners is 65% in Bulgaria and 50% in Romania . If we look at shareholding in private firms only we observe that private investors retain on average 80% of the total shares in private firms in Bulgaria and 58% in Romania. The fraction of shares held by foreign owners is only 4% on average in Bulgaria, while this is 10% in Romania. This reflects the relative small fraction of firms that do have some foreign participation. However, if we look at the average fraction of shares held by foreign owners in firms with some foreign participation only, then the average foreign share holding is larger than 65% in both countries. In our analysis we use categorical variables for each ownership category, defined according to majority ownership stakes. Table 4 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 5 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

IV.1 Basic Estimates of Price-Cost Margins

We first start with reporting the estimates of firms' price-cost margins for both countries based on estimating equation (5') using a fixed effects estimator[15]. We estimate equation (5') using fixed effects to control for potential firm heterogeneity and measurement error that may be present in the data. We experimented also with simple OLS estimates, but that gave qualitatively the same results. For our main analyses we will report both OLS and Fixed Effects estimates. Furthermore, all equations include year dummies to control for macro demand shocks. In tables 6 and 7 we report estimates of average price-cost margins for the entire manufacturing sector and for each individual sector separately for Bulgaria and Romania respectively. We can note that on average the estimated price-cost margin in

Bulgarian manufacturing, with an estimated price-cost margin or Lerner index of 17%, is higher than the one in Romanian manufacturing, with a Lerner index of only 7%. We also computed the rank correlation between the Bulgarian and Romanian price-cost margins in each two digit sector to check whether similar sectors would have similar markups across countries, which would suggest that market power to a large extent is determined by technological factors characterizing the particular sector, rather than institutional factors. The spearman rank correlation between the estimated price-cost margins in Romania and Bulgaria is -0.012 and not statistically significant. This suggests that institutional differences, such as the degree of privatization and the opening up to international competition that characterize the different countries are likely to be more important for explaining differences in price-cost margins between the two countries. We explore these issues below in section IV.2.

In order to check whether the estimates are affected by the maintained assumption that capital is flexible, we experimented with assuming that capital at the firm level is fixed, which would imply that the change in capital term in equation (5) would be equal to zero. Tables A1 and A2 report the estimates for the manufacturing sector as a whole and for each two digit sector separately. We can note that by and large the estimated pattern of price-cost margins in the various sectors in Bulgaria and Romania is similar to the one reported in tables 6 and 7. For the entire manufacturing sector the average price-cost margin is estimated at 16% in Bulgaria and 10% in Romania. This compares to 17% and 7% respectively if the maintained assumption of a flexible capital stock is used. Given that the capital stock is in fact fluctuating from year to year in most firms, this is probably not a bad maintained assumption.

[15] We also experimented with random effects, but the Hausman test rejected the random effects model

IV.2. The Effects of Ownership and Competition on Price-Cost Margins

Because we are interested in the effects of competitive pressure and ownership change on the average price-cost margin in firms we pool the data across sectors and test whether the average markup 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 measure competitive pressure at the three digit NACE level by the Herfindahl index and by import penetration. Tables 8 and 9 report estimates of equation (6) and slight variations of equation (6) for Bulgaria and Romania respectively. The first column again reports the estimate of the price-cost margin for the entire manufacturing sector, using both OLS and Fixed Effects, yielding virtually the same estimate. In the second column we test whether competitive pressure and ownership effects alter the estimated price-cost margin, while in the third column we add an interaction term between import penetration and product market concentration to test whether import competition has different effects in highly concentrated sector. We focus our discussion on the fixed effects results reported in column (3) of tables 8 and 9, which is our most preferred model given that it yields the best fit and seems to capture the most important effects. The ownership categories in that column are defined as dummies reflecting majority ownership stakes. We also experimented with using the actual fraction of shares owned by each category, but our results remained the same. For Bulgaria in table 8, we can note that the average price-cost margin, β_1, is estimated at 12%. However, the price-cost margin varies with the level of concentration in sectors. The positive effect of β_3 indicates that sectors with a higher Herfindahl index of concentration are

in favor of the fixed effects model.

characterized by higher price-cost margins, as we would expect. The average Herfindahl index in 1998 is 18% in Bulgaria, this compares to an average Herfindahl index of 30% in 1995. So sectors are becoming more competitive over time. 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 (table 9) we find that product market concentration and price-cost margins are positively correlated. The magnitude, however, is larger in Romania. The point estimate is 0.36, which would mean that a reduction in product market concentration of 10 percentage points would be associated with a drop in the average market power of 3.6 percentage points. The average Herfindahl index in Romania has declined from 17% in 1996 (the first year for which we had information on the Herfindahl index in Romania) to 14% in 1998. The fact that product market concentration in Romania is lower on average than in Bulgaria could be part of the explanation of the low average Lerner index in the Romanian manufacturing sector relative to the Bulgarian one.

The effect of international competition are given by β_2, For Bulgaria, in table 8, we find no statistically significant direct effect of import penetration on the price-cost margins of firms in column (3), while in Romania (table 9) the direct effect of import penetration is even positive, with a point estimate of 0.035. This seems to provide some evidence for the fact that international competition is not sufficient to lower market power of firms. However, when we look at the interaction between the Herfindahl index and import penetration, captured by β_6, we find that import penetration does have a disciplining effect on firm's price-cost margins, both in Bulgaria and in Romania. The negative coefficient indicates that the positive effect on price-cost margins of product market concentration, captured by β_3, is reduced by

increased imports. In other words, international competition seems to discipline firm behavior especially in highly concentrated sectors. 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. For Romania the positive direct effect of import penetration has a low point estimate, nevertheless, it indicates that in highly competitive sectors, i.e. where domestic product market concentration is low, increased imports in fact is associated with increased price-cost margins. This may in fact reflect that most of the effect of increased international competition feeds through the effects on generating cost-cutting strategies. Especially in sectors where competition is already high, increased international competition can push firms to lower their marginal costs and therefore markups go up. In contrast, in sectors where domestic competition is weaker the effect on pricing behavior, rather than on cost cutting strategies, may dominate.

We next look at the effects of ownership. Again we focus on our results obtained from the fixed effects model, although the results based on OLS are very similar. Fixed effects may capture some potential selection effects, not captured by our estimation method, or political lobbying which may have an effect on the ownership structure of firms, but which is not observable. By including fixed effects we indirectly control for such factors. For Bulgaria, in table 8, we find that domestically owned private firms have higher price-cost margins, captured by β_4. The point estimate of 0.037 suggests that privatization is associated with an increase in the average price-cost margin to 16% (0.124+0.037). Also the effect of foreign ownership, captured by β_5, indicates that foreign participation is associated with higher price-cost margins compared to state firms. A point estimate of 0.071 suggests that the average price-cost margin in foreign firms in Bulgaria is almost 20%. We

also experimented with using the actual ownership shares, rather than just ownership dummies, not reported here for brevity. Our ownership results were unaffected. Adachi (2000) shows theoretically that when there exists a cost difference above a certain threshold value between domestic firms and foreign entrants, foreign entrants increasingly exploit their cost advantage by raising price rather than investing in market share. That is, if the domestic firms have a high cost of production, irrespective of the degree of industry concentration, the foreign entrants do not price aggressively because their opponents are weak rivals. This explanation is in line with our findings.

In Romania, in table 9, we find similar results. Both private domestic firms and foreign owned firms have higher price-cost margins relative to state ownership enterprises. The estimated price-cost margin of privatized domestic firms in Romania is on average 13.5%, very similar to the price-cost margin of privatized firms in Bulgaria. Also in Romania, the price-cost margin of foreign firms is higher on average and estimated at 15%. These results also hold up if we use the entire fraction of shares held by each ownership type, not reported here for brevity.

In table 10 we report some further robustness checks of our results. We do two further experiments. 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. We therefore experiment with making the assumption 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 are reported in table 10. Our earlier results are confirmed. Privatization 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. Privatization is associated with higher price-cost margins and increased international competitive pressure is associated with lower price-cost margins, especially in highly concentrated sectors.

Our findings in this paper are in line with our priors: We would expect that state owned enterprises price closer to marginal costs as they are concerned with maximizing social welfare or allocative efficiency. Once state firms are being privatized we would also expect that privatized firms, if they can exert some market power, would increase prices above marginal costs. An alternative interpretation is that privatized and foreign owned firms have better performance measured in terms of their price-cost margins. Private firms are better in cutting costs relative to state firms, the latter category often characterized by over-manning levels and x-inefficiency. In this case, privatization would also result in higher price-cost margins. Our methodology, however, does not allow to disentangle these two effects.

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 use Roeger's (1995) method to estimate price-cost margins. This method has several advantages. Because it is based on the difference between the

primal and the dual Solow residual, unobserved productivity shocks cancel out, which allows us to estimate price-cost margins consistently, without having to worry about potential endogeneity of some of the explanatory variables used in the model. Furthermore this method does not require deflators for the variables as the nominal values of output are used to estimate market power. We find that the average price-cost margin in Romania is lower than in Bulgaria. This could be due to the fact that in Romania state ownership is still more prevalent and that state firms price closer to marginal costs. Product market concentration in Romania is also lower on average, which could be an additional reason why the estimated price-cost margin on average is lower in Romania than in Bulgaria.

We further find that privatized firms, both domestically owned and foreign owned have the higher price-cost margins relative to state firms. Furthermore, foreign firms outperform privatized domestic ones in terms of their price-cost margins. We also find that imports reduce firms' price-cost margins, especially in highly concentrated sectors. Highly concentrated sectors are also characterized by higher price-cost margins.

Our results indicate that privatization of large state owned enterprises could imply losses in allocative efficiency. An alternative interpretation of our results is that privatization is associated with firm restructuring (cutting costs), which is associated with higher firm performance, measured by price-cost margins. The results in this paper also suggest that sequencing of reforms may be important, which has relevance for those countries, such as China and Vietnam, that still have to start with privatizing their large state sector.

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Table 1: Comparison between Amadeus and National Statistics, 1998

	Bulgaria	*Romania*
Employment coverage	.66	.70
Sales Coverage	.82	.69

Note: Sales coverage ratio = total sales in Amadeus / total national sales. Employment coverage ratio = total employment in Amadeus / total national employment.

Table 2: Sales industry coverage using Amadeus data set, 1998

Industry code	*Bulgaria*	*Romania*
15	.51	.60
16	.80	.96
17	1	.87
18	.44	.51
19	.57	.54
20	.51	.41
21	.76	.75
22	.55	.30
23	-	1
24	.98	.69
25	.55	.84
26	.74	.79
27	1	.45
28	.56	.51
29	.64	.76
30	.23	.88
31	1	.63
32	1	.52
33	.50	.67
34	.67	.93
35	.87	.68
36	.43	.61
37	-	.75

Note: Sales coverage ratio = total industry sales in Amadeus / total national industry sales according to the 2-digit NACE industry classification. For Bulgaria, data on national industry sales are not available in sectors 23 and 37.

Table 3: Average Ownership Shares in Sample

Type of firm		
	Bulgaria	**Romania**
Average fraction of shares held by private domestic owners in entire sample	0.65 (0.38)	0.50 (0.39)
Average fraction in private firms only	0.80 (0.24)	0.58 (0.36)
Average fraction of shares held by foreign owners in entire sample	0.04 (0.17)	0.10 (0.27)
Average fraction held in foreign firms only	0.65 (0.26)	0.67 (0.29)
Average fraction of shares held by the state in entire sample	0.30 (0.36)	0.31 (0.33)
Average fraction held in state firms only	0.44 (0.36)	0.58 (0.22)

Note: standard deviations in parentheses

Table 4: Types of Ownership (percentage of firms in the sample)

Type of firm		
	Bulgaria	**Romania**
Majority Domestic Private	74 %	47%
Majority Foreign	6%	11%
Majority State	20 %	42%

Table 5: Summary statistics

Summary Statistics Bulgaria: Sample Means and Standard Deviations

	Full sample	Majority Private domestic	Majority Foreign	Majority State
Employment	493 (981)	392 (641)	730 (648)	595 (1377)
Sales	6634 (42850)	4934 (18918)	12312 (19172)	9085 (39604)
Wage Bill	876 (3250)	784 (2615)	1726 (2066)	1414 (4609)
Material Costs	4162 (31967)	2817 (13705)	7592 (13032)	5851 (27560)
Tangible Fixed Assets	2664 (12017)	2333 (11588)	4784 (5991)	4672 (14349)
Depreciation rate	0.14 (0.22)	0.16 (0.22)	0.18 (0.15)	0.11 (0.10)

Note: Standard deviations in parentheses; values expressed in thousands of $

Summary Statistics Romania: Sample Means and Standard Deviations

	Full sample	Majority Private domestic	Majority Foreign	Majority State
Employment	469 (1028)	378 (699)	690 (558)	624 (1525)
Sales	7853 (52524)	5173 (21441)	10786 (11962)	9231 (43535)
Wage Bill	1012 (3901)	829 (2962)	1856 (2135)	1541 (5109)
Material Costs	5170 (39348)	3030 (15625)	7066 (8995)	6117 (30418)
Tangible Fixed Assets	2975 (14032)	2464 (13060)	5211 (6316)	4717 (15603)
Depreciation rate	0.08 (0.17)	0.10 (0.28)	0.14 (0.15)	0.06 (0.08)

Note: Standard deviations in parentheses; values expressed in thousands of $

Table 6
Fixed Effects Results, Bulgaria

NACE Code	Description	Lerner Index	Nr. Obs.
-	All manufacturing	0.17** (0.006)	1,763
15	Food and Beverages	0.19** (0.017)	299
16	Tobacco	0.21** (0.030)	35
17	Textiles	0.19**(0.016)	201
18	Wearing apparel; fur	0.20**(0.022)	153
19	Leather, luggage and footwear	0.19** (0.039)	62
20	Wood, straw and plaiting materials	0.06* (0.036)	40
21	Pulp, paper and paper products	0.14**(0.017)	30
22	Publishing, printing and media	0.42 (0.330)	30
23	Coke, refined petroleum products, nuclear fuel	-	8
24	Chemicals and chemical products	0.19**(0.021)	94
25	Rubber and plastic products	0.24**(0.038)	38
26	Other non metallic mineral products	0.15**(0.016)	86
27	Basic metals	0.21**(0.028)	94
28	Fabricated metal products	0.17**(0.023)	113
29	Machinery and equipment n.e.c.	0.18**(0.020)	191
30	Office machinery and computers	0.19**(0.019)	6
31	Electrical machinery and apparatus n.e.c.	0.15**(0.018)	99
32	Radio, TV and communication equipment	0.40 (0.20)	24
33	Medical, precision and optical instruments	0.16** (0.026)	19
34	Motor vehicles, trailers and semi-trailers	0.005 (0.041)	34
35	Other transport equipment	0.27 (0.17)	16
36	Furniture, manufacturing n.e.c.	0.21** (0.036)	91

**: significant at the 1% critical level or lower; * significant at the 5% critical level or lower

Table 7
Fixed Effects Results, Romania

NACE Code	Description	Lerner Index	Nr. Obs.
-	All manufacturing	0.064** (0.002)	3,065
15	Food and Beverages	0.11** (0.006)	661
16	Tobacco	-	-
17	Textiles	0.10** (0.007)	357
18	Wearing apparel; fur	0.20**(0.015)	180
19	Leather, luggage and footwear	0.16**(0.013)	73
20	Wood, straw and plaiting materials	0.006 (0.004)	121
21	Pulp, paper and paper products	0.15**(0.033)	46
22	Publishing, printing and media	0.33**(0.046)	31
23	Coke, refined petroleum products, nuclear fuel	0.15**(0.013)	16
24	Chemicals and chemical products	0.13**(0.015)	137
25	Rubber and plastic products	0.14**(0.012)	101
26	Other non metallic mineral products	0.16**(0.006)	224
27	Basic metals	0.12**(0.009)	124
28	Fabricated metal products	0.17**(0.009)	213
29	Machinery and equipment n.e.c.	0.17**(0.006)	298
30	Office machinery and computers	0.31**(0.025)	13
31	Electrical machinery and apparatus n.e.c.	0.17**(0.008)	67
32	Radio, TV and communication equipment	0.13**(0.018)	19
33	Medical, precision and optical instruments	0.10**(0.025)	33
34	Motor vehicles, trailers and semi-trailers	0.17**(0.010)	79
35	Other transport equipment	0.11**(0.018)	52
36	Furniture, manufacturing n.e.c.	0.13**(0.013)	220

**: significant at the 1% critical level or lower; * significant at the 5% critical level or lower

Table 8
Results for Bulgaria
Estimates of equation (6)

	(1)		**(2)**		**(3)**	
	OLS	FE	OLS	FE	OLS	FE
β_1	0.110** (0.004)	0.167** (0.006)	0.122** (0.021)	0.146** (0.028)	0.103** (0.021)	0.124** (0.029)
β_2			-0.016 (0.027)	-0.021 (0.032)	0.046 (0.032)	0.059 (0.042)
β_3			0.131** (0.051)	0.059 (0.066)	0.293** (0.068)	0.226** (0.087)
β_4			0.054** (0.014)	0.037* (0.018)	0.055** (0.014)	0.037* (0.018)
β_5			0.085** (0.025)	0.077* (0.033)	0.083** (0.025)	0.071** (0.032)
β_6					-0.435** (0.124)	-0.560** (0.195)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
R2 within		0.71		0.77		0.78
R2 between		0.26		0.36		0.36
R2 overall	0.49	0.48	0.62	0.59	0.63	0.59
# observations	1763	1763	1084	1084	1084	1084

Note: standard errors in parentheses, **/* denotes respectively statistical significance at 1%/5%/. The variables Import penetration, the Herfindahl index, private and foreign ownership are also included separately in equations (2), (3) and (4) as additional control factors. The estimates refer to equation (6) or

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

Table 9
Results for Romania
Estimates of equation (6)

	(1)		(2)		(3)	
	OLS	FE	OLS	FE	OLS	FE
β_1	0.065** (0.002)	0.064** (0.002)	0.020** (0.002)	0.019** (0.003)	0.016** (0.002)	0.015** (0.003)
β_2			0.019** (0.003)	0.011** (0.004)	0.045** (0.004)	0.035** (0.006)
β_3			0.246** (0.030)	0.249** (0.042)	0.360** (0.031)	0.356** (0.046)
β_4			0.105** (0.005)	0.126** (0.007)	0.098** (0.004)	0.118** (0.008)
β_5			0.162** (0.016)	0.14** (0.024)	0.153** (0.016)	0.133** (0.023)
β_6			-	-	-0.20** (0.024)	-0.18** (0.034)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
R2 within		0.39		0.59		0.61
R2 between		0.30		0.38		0.39
R2 overall	0.37	0.37	0.52	0.49	0.54	0.52
# observations	3065	3065	1748	1748	1748	1748

Note: standard errors in parentheses, **/* denotes respectively statistical significance at 1%/5%/10% The variables Import penetration, the Herfindahl index, private and foreign ownership are also included separately in equations (2), (3) and (4) as additional control factors.
The estimates refer to equation (6) or

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

Table 10: Robustness Checks
Fixed Effects Estimates

	Bulgaria	**Romania**
	Full Sample	Full Sample
β_1	0.17** (0.01)	0.069** (0.004)
β_2	-0.05 (0.03)	0.018** (0.003)
β_3	0.18** (0.08)	0.29** (0.04)
β_4	0.03** (0.01)	0.085** (0.006)
β_5	0.05* (0.03)	0.165** (0.02)
β_6	-0.14 (0.16)	-0.07** (0.04)
Year dummies	Yes	Yes
R2 within	0.73	0.59
R2 between	0.24	0.38
R2 overall	0.46	0.52
Nr. Of observations	1454	2939

Note: standard errors in parentheses, **/* denotes respectively statistical significance at 5%/10% The variables Import penetration, the Herfindahl index, private and foreign ownership are also included separately in equations (2), (3) and (4) as additional control factors.
The estimates refer to equation (6) or

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

APPENDIX

Data Issues and Measurement of the variables

Firm level variables were computed using data from the Amadeus CD-Rom, commercialized by Bureau Van Dijck (www.bvdep.com) :

PQ=operating revenue in thousands of local currency

P_M M=CM= costs of materials in thousands of local currency

P_N N=CE= cost of employees in thousands of local currency

K= net tangible fixed assets, including machinery, equipment, buildings, etc. evaluated at book value in thousands of local currency

$$\alpha_N = \frac{CE}{PQ}$$

$$\alpha_M = \frac{CM}{PQ}$$

$P_K = P_I(r_{it} + \delta_{it})$ where P_I is the index of investment goods prices, r is a firm specific real interest rate, δ is a firm specific depreciation rate. The investment goods

price index is taken from the EU AMECO data base and provided to us by Werner Roeger.

r is defined as the ratio of interest paid over debt, minus the growth of the CPI, δ as depreciation over tangible fixed assets of the previous year.

FOREIGN=1 if a foreign investor owns more than 50% of the shares in the firm and equal to 0 otherwise

PRIV=1 if domestic investors own more than 50% of the shares in the firm and equal to 0 otherwise

Sector level information was provided by the respective National Statistical Offfices: the Herfindahl index (HERF) is the sum of squared market share in given 3-digit NACE Rev. 1 industry; the import share (IMP) is the ratio of imports over the sum of domestic sales and imports also in a given 3-digit NACE Rev. 1 industry.

Robustness Checks, assuming capital is fixed

Table A1: Estimates of Market Power in Bulgarian Manufacturing, Assuming Capital is fixed (fixed effects results)

NACE Code	Description	Lerner Index	Nr. Obs.
-	All manufacturing	0.16** (0.009)	3756
15	Food and Beverages	0.21** (0.03)	657
16	Tobacco	0.44** (0.13)	70
17	Textiles	0.18** (0.03)	386
18	Wearing apparel; fur	0.25** (0.03)	158
19	Leather, luggage and footwear	0.20** (0.03)	122
20	Wood, straw and plaiting materials	0.12* (0.05)	98
21	Pulp, paper and paper products	0.38**(0.06)	72
22	Publishing, printing and media	0.32*(0.14)	69
23	Coke, refined petroleum products, nuclear fuel	-	11
24	Chemicals and chemical products	-0.009 (0.04)	189
25	Rubber and plastic products	0.24**(0.05)	86
26	Other non metallic mineral products	-0.15 (0.06)	197
27	Basic metals	0.183*(0.09)	148
28	Fabricated metal products	0.18**(0.018)	256
29	Machinery and equipment n.e.c.	0.38**(0.049)	403
30	Office machinery and computers	0.099 (0.10)	14
31	Electrical machinery and apparatus n.e.c.	0.007 (0.013)	176
32	Radio, TV and communication equipment	0.67**(0.13)	52
33	Medical, precision and optical instruments	0.48**(0.11)	38
34	Motor vehicles, trailers and semi-trailers	0.24**(0.05)	58
35	Other transport equipment	0.79**(0.11)	39
36	Furniture, manufacturing n.e.c.	0.33**(0.05)	197

Note: the number of observations increases substantially as no information is used on capital, which is often missing in the data.

Table A2: Estimates of Market Power in Romanian Manufacturing, Assuming Capital is fixed (fixed effects results)

NACE Code	Description	Lerner Index	Nr. Obs.
-	All manufacturing	0.10**(0.004)	6946
15	Food and Beverages	0.069**(0.007)	1527
16	Tobacco	-	
17	Textiles	0.23**(0.017)	763
18	Wearing apparel; fur	0.21**(0.027)	617
19	Leather, luggage and footwear	0.16**(0.048)	268
20	Wood, straw and plaiting materials	0.26**(0.03)	282
21	Pulp, paper and paper products	0.24**(0.05)	78
22	Publishing, printing and media	-0.10* (0.04)	114
23	Coke, refined petroleum products, nuclear fuel	0.51**(0.047)	40
24	Chemicals and chemical products	0.19**(0.02)	72
25	Rubber and plastic products	0.43**(0.044)	219
26	Other non metallic mineral products	0.39**(0.02)	112
27	Basic metals	0.32**(0.020)	211
28	Fabricated metal products	0.20**(0.019)	498
29	Machinery and equipment n.e.c.	0.27**(0.029)	581
30	Office machinery and computers	0.33**(0.035)	33
31	Electrical machinery and apparatus n.e.c.	-0.20**(0.03)	140
32	Radio, TV and communication equipment	0.25**(0.05)	59
33	Medical, precision and optical instruments	-0.003 (0.042)	88
34	Motor vehicles, trailers and semi-trailers	0.17**(0.017)	161
35	Other transport equipment	0.38**(0.03)	122
36	Furniture, manufacturing n.e.c.	0.03**(0.006)	447

Note: the number of observations increases substantially as no information is used on capital, which is often missing in the data.

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