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"Enterprise adjustment to competitive pressure in imperfect markets"

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Executive summary

The deepening and widening of international economic integration within the enlarging EU reduces the cross-border barriers to market competition and has a profound impact on firm behaviour. Workpackage 1 "Competitive pressure in the corporate sector, its institutional aspects and policy framework", aims at highlighting some of the implications of the growing competitive pressure on firm performance in some of the new EU members that joined the Union in 2004 (such as Hungary and Slovenia) and on the candidate countries that have set for themselves the target to do so in 2007 (Bulgaria and Romania).

During the second phase of research (undertaken in 2004) the focus of research turned to aspects of enterprise adjustment to competitive pressure in imperfect markets. The new EU member countries Hungary and Slovenia and, even more so, the EU candidates Bulgaria and Romania are countries that have undergone (and are still undergoing) a fundamental economic transformation from centrally planed to market economies. Their transitional markets are immature and still marred by numerous imperfections that affect all aspects of firm performance. The key research objective in WP1 during this phase was to examine empirically, and on a comparative basis, some important aspects of firm adjustment to competitive pressure, more specifically, the changes in productive efficiency and pricing policy.

The analysis of the changes in firms' productive efficiency was undertaken within the modelling framework of production functions and production frontiers. To assess the impact of competitive pressure on total factor productivity, the production/frontier functions are augmented into a functional form that contains exogenous "determinants" of productive efficiency. This allows to distinguish between the variation in output which is caused by variation in factor inputs and those changes in the level of output that are assumed to be attributed to the efficiency of resource transformation per se, i.e. the efficiency of the underlying production technology. In the augmented production functions we have utilized the set of quantitative measures of competitive pressure defined and computed during the first stage of the project. These models were been tested on the basis of enterprise data for three central and east European countries: Bulgaria, Hungary and Slovenia.

The analysis of the changes in firms' pricing policy was performed in the context of models of monopolistic pricing behavior. By its theoretical definition, the markup ratio reflects the pricing behaviour of firms endowed with market power and using that power to set prices higher than their marginal costs. Looked from the opposite angle, the markups can

be regarded as reflecting the degree of competition that firms face in the market. In other words, different levels of price markups (say, at the sectoral level) should be associated with varying nature and levels of competitive pressure (within each sector). To assess the impact of competitive pressure on firms' markups, we use varying coefficients models augmented with variables measuring competitive pressures. In the augmented equations we have utilized again the set of quantitative measures computed during the first stage of the project. These models were been tested on the basis of enterprise data for Bulgaria and Hungary.

The empirical results presented in the paper highlight some important specificities of the ongoing restructuring of the corporate sectors in the emerging market economies of Central and Eastern Europe. In particular, while the empirical results do confirm that competitive pressure affects the firms' adjustment process, the actual adjustment is not always in line with theoretical priors. This may be the result of both the existing market imperfections mentioned above but also may be related to the dramatic overall structural changes that are still underway in these economies.

According to the empirical results, the most powerful competitive pressures - pressures that have triggered the most discernible and strong responses by firms in Central and Eastern Europe – are those generated by foreign firms on the local markets. This occurs both through the emergence of foreign-dominated manufacturing firms that operate in the domestic manufacturing sectors, and through the competition effects induced through trade liberalisation, resulting in increasing import penetration of the domestic markets. As to the actual direction of these effects, the results are equivocal, suggesting the incidence of both positive and negative spillovers of foreign induced competitive pressure. On the one hand, there is strong evidence, suggesting that in some cases this type of competitive pressure is associated with active restructuring of the domestic firms that face it, leading to higher productive efficiency and welfare enhancing changes in pricing policies. On the other hand, there is also statistically significant evidence of the opposite outcomes: for example, in some cases higher (probably excessive) levels of import competition tend to be associated with declining efficiency of the domestic firms subject to this type of pressure; in other cases foreign controlled firms tend to exploit local market imperfections and to collect larger monopolistic rents than domestic firms.

The empirical results provide systematic evidence of the recurrence of one specific, and somewhat counterintuitive, feature of enterprise performance in the three Central and Eastern European countries. This is the empirical finding that market power per se (in terms of individual market share) does not seem to be associated with the emergence of

monopolistic deadweight such as excessive overpricing or efficiency losses. Rather, at this stage of economic transformation, Central and Eastern European firms tend to employ their market power to grow aggressively and to gain even larger market shares. On the other hand, we find relatively strong evidence that the sheer number of competitors in the segments of the product markets of these countries tends to have a healthy effect on enterprise performance, inducing efficiency gains and reducing price markups.

Finally, the empirical results for the three countries suggest that enterprise behaviour and performance changes with the stages of transition. There are notable changes in the nature of enterprise responses in a country that was less advanced in market reforms (at least in the period that we analyze, 1995-2001) as Bulgaria, compared to the more advanced Hungary and Slovenia. Advance in market reforms tends to strengthen the positive spillover effects associated with growing competitive pressure.

1. Introduction

Within the project "Competitive Pressure and its Social Consequences in EU Member States and in Associated Countries" Workpackage 1 "Competitive pressure in the corporate sector, its institutional aspects and policy framework", aims at highlighting some of the implications of the growing competitive pressure within an enlarged EU. The main focus of research is on the effects of competitive pressure in some of the new EU members that joined the Union in 2004 (such as Hungary and Slovenia) and on the candidate countries that have set for themselves the target to do so in 2007 (Bulgaria and Romania).

The deepening and widening of international economic integration within the enlarging EU reduces the cross-border barriers to market competition and has a profound impact on firm behaviour. WP1 seeks to provide a better understanding of the effect of the growing competitive pressure associated with economic integration on the performance of the enterprise sector in some of the new and prospective EU member states. The main research objective in WP1 is to analyze the effects of competitive pressure on the corporate sector in the context of the institutional and policy environment (the effect of the growing competitive pressure in these countries and the variety of firm-level responses), including the identification of different models and common patterns of enterprise adjustment, and the assessment of the impact of competition policy and its institutional framework on enterprise behaviour and performances.

During the first phase of research (undertaken in 2003) WP1 addressed issues related to the actual measurement of competitive pressure in the corporate sectors of the acceding countries. The main emphasis was on the definition of relevant and adequate quantifiable indicators which would reflect the level of competitive pressure that firms in these countries are subject to and on the actual quantification of these indicators for the participating countries which would allow not only to gauge the level of competitive pressure in the corporate sector of each country but also to make cross-country comparisons.

During the second phase of research (undertaken in 2004) the focus of research turned to aspects of enterprise adjustment to competitive pressure in imperfect markets. The new EU member countries Hungary and Slovenia and, even more so, the EU candidates Bulgaria and Romania are countries that have undergone (and are still undergoing) a fundamental economic transformation from centrally planed to market economies. Their transitional markets are immature and still marred by numerous imperfections that affect all aspects of firm performance, including the firms' price-setting mechanisms. The main research

objective in WP1 during this phase was develop research methodology that would allow to examine empirically, and on a comparative basis, the aspects of behaviour and adjustment of manufacturing firms to competitive pressure, in the environment of imperfect markets as well as to test this methodology on the basis of empirical data for the countries concerned.

2. The effect of competitive pressure on firm behaviour and performance

2.1. Conceptual issues

The notion of competition is central in economics as it forms the fundament of the market place. It is a basic underlying concept in economic theory as the role of competition in shaping the behaviour of economic agents is recognized, and reflected in (either explicitly, or implicitly), numerous theoretical models and derivations. It is also a key notion in economic policy as the understanding of the nature of competitive pressure and its impact on firms' behaviour and performance is a key factor behind piles of legislation and regulatory norms.

Some of the important results of the neoclassical production theory are derived under the standard assumptions of perfect competition in product and factor markets, sometimes coupled with that of constant returns to scale. These assumptions imply instantaneous adjustment by firms to competitive pressure resulting in the equalization of factor costs and the instantaneous economywide proliferation of homogeneous production technologies. Under perfect competition in efficient product and factor markets market, firms producing homogeneous products employ equally efficient productive technologies and at the same time set their prices at their marginal costs (which, under constant returns to scale, also equal their average costs). In other words, under perfect competition firms adjust their output level and cost structure so that to set their marginal costs equal to the exogenous price level.

The existence of competitive markets is generally considered as an essential prerequisite for productive efficiency and a fundamental requirement for the efficient allocation of resources in the economy. However, in reality the conditions of perfect competition are never met; all product and factor markets are characterized by various degrees of imperfection. While this is the case in all economies (including mature market economies), the frequency and severity of market imperfections is likely to be much more pronounced in immature economies such as the Central and Eastern European countries that are still undergoing the transformation from central planning to market economy.

The degrees of imperfection – as well as the degrees of competition – in the product and factor markets depends on a variety of factors that affect the behaviour of market participants. What concerns product markets, it is usually assumed that the most important among them are the market structure (in terms of market power) and the actual functioning of the market. The market structure and, in particular, the presence of firms (groups of firms) with monopolistic (oligopolistic) concentration of market power is considered as one of the main characteristics of the degree of market competition. It is a well known fact that Central and Eastern European countries inherited from the past highly distorted economic structures characterized by a high degree of monopolization; despite the ongoing restructuring, this legacy still affects the emerging new market structures in these countries.

Another factor that affects the level of competition in the product markets is the degree of openness of the economy in terms of the freedom of access by foreign firms to sell their products domestically. Traditionally competitive pressure was a notion that used to be de-limited into national boundaries. National borders served as effective barriers that safeguarded – to a different extent – domestic firms from international competition and cushioned the effect of competitive pressure coming from abroad. The opening up of the Central and Eastern European economies and, especially the process of their integration with the EU, changed considerably the nature of competitive pressure that local firms are facing as well as its impact on firms' behaviour. Competitive pressure in the local product markets increasingly arises not only from firms operating in the domestic market but also from the activities of foreign firms operation on the domestic markets as well as from imports per se. The efficient operation of the market mechanisms also affects the degree of competition in the product markets. For example, the existence of various market imperfections (such as information asymmetry, state intervention in the market or administrative controls over the operation of the market) may also affect the level of effective competitive pressure. The latter can be also substantially reduced due to various entry or exit barriers.

The varying degrees of competitive pressure in the product and factor markets affect firm performance; indeed firms respond to changing competitive pressure by adjusting their behaviour. However, the firms' response (consequently reflected in the behaviour and performance of individual firms) largely mirrors the incentive and governance structure at the micro level. Thus the competitive environment will only have the expected effect on enterprise performance and will contribute to the improvement of productive and macroeconomic allocative efficiency if the proper incentive and governance structures are in place at the micro level. In contrast, if the latter is distorted, this may instigate the emergence

of perverse behaviour, and the outcome (for example in terms of productive and allocative efficiency) may be different.

Another specific aspect of Central and Eastern European economies is the fact that while the firms' governance structures are rapidly changing, they also reflect the legacies of the past when all firms were state-owned. It is conventionally assumed that the transformation of ownership during the transition is a central component of the reform of governance structures. Both the privatization of the former state-owned enterprises (SOEs) and the emergence of new private companies play an important role for the establishment of proper governance structures based on entrepreneurship and leading to higher efficiency. However, many empirical studies have shown that the formation of the new governance structures tends to be a lengthy process. As indicated by the experience of some transition economies, some methods of privatization (in particular the voucher privatization) do not generate, at least in the initial phase, efficient governance structures. In addition, the incidence of soft micro budget constraints – an endemic phenomenon in the early years of transition – also tend to distort managerial incentives and erode the effect of competitive pressure.

The firms' adjustment in response to to competitive pressure can take various forms and can affect different facets of firm performance, such as the production technology (including the efficiency of factor utilization), the firm's capital structure, the demand for different production factors, the firm's pricing behaviour, etc. In this paper we focus on two types of adjustment: changes in productive efficiency and changes in pricing behaviour, which are among the most important features of the firms' response to changing competitive pressure.

Both the theoretical literature and empirical research suggest that, that when markets are imperfect, higher competition and competitive pressure enhance productivity and efficiency. Two main strands in the literature, based on two conjectures (Nickell, 1996; Djankov and Murrell, 2002):

- Productivity increases thanks to x-efficiency gains driven by competitive pressure. When competitive pressure is low, managerial effort if undersupplied which shifts the firm's production schedule away from the production frontier expressing the maximum amount of output obtainable with a given technology from a given mix of input quantities. The reverse occurs when competitive pressure rises because of the effect of factors such the emergence of opportunities for comparison and increased incentives for better performance including the threat of exit. Higher competition may also affect workers' effort, especially when they share

the rents associated with product markets. All of these factors may lead to improvements in the firm's technical efficiency.

- High competition within an industry brings about high overall productivity due to rationalization of the industry entailing reallocation of resources across firms: when firms compete for market share, resources move from less efficient to more efficient firms which grow faster and increase their market share. In addition, the threat of bankruptcy which can be accompanied by job loss also strengthens work incentives which may translate into higher labour productivity in individual firms and within the whole industry.

The departure from the standard assumptions of the neoclassical theory also has important implications with respects to pricing behaviour: the existence of market imperfections as well as the incidence of non-constant returns to scale affects both the derived theoretical results and the validity of the related empirical analysis. Thus it is a well known theoretical and empirical result that firms endowed with market power will charge a markup over their marginal costs. However, theory is somewhat ambiguous both regarding the size of this markup and the factors that affect this size. It is widely held that these aspects should be mostly regarded as empirical issues.

2.2 Firms' adjustment to competitive pressure in the transition from plan to market: an overview of the recent empirical literature

Given the variety of aspects of the firms' responses to changing competitive pressure, the firms' adjustment of to competitive pressure in the transition from plan to market has been the subject of extensive research.

On the basis of a comprehensive enterprise survey covering 3400 firms in 24 transition economies Carlin, Schaffer and Seabright (2004) and Carlin, Fries, Schaffer and Seabright (2001) find strong evidence of the power of competition in influencing firm performance. Both studies (which use a common dada set) highlight the power of competition in influencing firm innovation and growth. As to the more specific findings, the authors argue on the basis of their results that the presence of some market power together competitive pressure, especially from foreign suppliers, strongly and robustly enhances firm performance. At the same time, they also find evidence that firms in the transition economies may still be not fully prepared to face the full power of transboundary competitive pressure: due to the weakness of local firms too strong a competitive pressure may even possibly have a destructive impact on local markets (drain on firm performance). In a similar vein, the

results of the survey also highlight the danger of the incidence of unchallenged monopoly of single firms in these nascent markets; a much more healthy environment is that where at least two or three equally strong firms compete with each other.

Estrin, Konings, Zolkiewski and Angelucci (2001) analyse firm performance in three Central and Eastern European countries (Bulgaria, Poland and Romania) and in general find evidence that domestic competitive pressure is associated with better firm performance. More specifically, firms that faced strong competition from imports, were more likely to undertake active restructuring in order to raise their efficiency. But similarly to Carlin, Fries, Schaffer and Seabright (2001), they also find that if the technology gap between domestic firms and importers is too large, import competition may discourage enterprise restructuring. In addition, according to their findings, firm responsiveness to competitive pressure in the transition economies is closely associated with the quality of corporate governance. In particular, firms in which the state retained a controlling stake were much less responsive to competitive pressure that firms dominated by private ownership.

Hanousek, Kocenda and Svejnar (2004) have traced the performance of the large Czech firms for a period of several years and have attempted to identify the effect of privatization on firm performance. In the case of the Czech Republic, large-scale privatization was implemented through the voucher schemes which allowed to carry out the ownership change relatively quickly; however, the governance structure that emerged after it (with ownership concentrated in poorly managed privatization funds) was not conducive for restructuring. Consequently, the formal change in ownership did not have a straightforward effect for the strengthening of competition and the authors do not detect major change in the behaviour of privatised firms in the immediate aftermath of privatization. By contrast, the do find out that the performance of foreign controlled firms is notably superior to that of domestic firms.

With respect to the effect of competitive pressure on firm level productive efficiency, most of the related empirical research has generally followed the approach of jointly estimating these factors in the context of an augmented production function. The seminal paper by S. Nickell (1996) – who was among the first to address this issue empirically in a comprehensive and consistent manner – in a way has set some standards which have been followed in a number of recent studies based on deterministic functional forms. Nickell's approach is also appealing due to its relatively simplicity: it is based on a production function which is augmented to analyze the impact of a number of additional factors on: a) the level of productivity and b) the change in productivity. The operationalization of the analysis of the

determinants of firm level efficiency requires in principle to define a structural efficiency model. This is still a rather blank field in economic theory and most empirical studies rely on partial models that allow to estimate reduced form equations. Among the most commonly used in the analysis of the determinants of firm level efficiency are several factors which can be grouped into two main categories competition effects and governance effects.

Recently a growing body of empirical studies on firms' efficiency in the transition economies have turned to stochastic production frontiers. Due to the specificity of firm adjustment and performance during the transition (low starting levels of productive efficiency, substantial heterogeneity of performance across firms, time variability of productive efficiency due to restructuring) it is considered that this approach at least potentially has superior analytical power and may provide a better insight into the details of productivity change and its determinants. For example, Konings and Repkine (1998) use stochastic production frontier techniques to study the production efficiency of Bulgarian and Romanian firms and find evidence of large inefficiencies in both countries. Jones, Klinedinst and Rock (1998) apply the same approach in their analysis of the performance of Bulgarian manufacturing firms. Halpern and Kőrösi (2001a) also analyze the efficiency of Hungarian firms during period 1990-1997 by using production frontier techniques. Through the same approach, Piesse and Thirtle (2000) attempt to distinguish between technological and efficiency components of the TFP of Hungarian firms in the late 1980s – beginning of 1990s.

Grosfeld and Tressel (2002) have analysed the performance of large Polish firms listed on the Warsaw stock exchange. They find evidence that product market competition has a strong positive effect on firm performance, especially in privatized firms. In addition they find that product market competition and good governance tend to reinforce each other's effect (and hence are complements rather than substitutes) on firm performance. Orazem and Vodopivec (2003) analyze how the efficiency of Slovenian firms changed in response to competitive pressures and find strong evidence that market competition fosters efficiency. While their results show that during the transition most Slovenian firms managed to raise their efficiency, the degree of these changes was closely associated with the competitive pressure they were facing. They also show that market rising competition as a result of new entrants (such as foreign-owned firms, and importers) also raise the overall firm efficiency in the industry.

Some recent studies on the impact of competition on enterprise performance in the transition economies have revealed quite a divergent picture of this aspect of enterprise adjustment. In a comprehensive survey-based study, Konings (1997) analyzed the

relationship between competition and firm productivity in Hungary, Romania and Slovakia during the first phase of transition. The study did not find uniform patterns as regards the impact of competition on enterprise behaviour: the sample of the surveyed firms (more than 300 firms with different ownership status in the three countries) was rather heterogeneous across countries and ownership forms. One of the conclusions of the study, however, was that the impact of competition was the strongest in the case of newly established private firms whereas the results were mixed in SOEs and privatised firms. Halpern and Kőrösi (2001a) who analyze the impact of market structure on the efficiency of Hungarian firms during the period 1990-1997 find time-varying dynamics of firm efficiency during this period as well as considerable heterogeneity among the firms in their sample. One of the conclusions of the study is that the recent trend towards higher firm efficiency can be at least partly attributed to the greater competition in the domestic market, largely driven by firms with foreign participation.

Two studies on corporate performance in Russia come up with results similar to the above as to the evolution of competitive pressure during the transition and its impact on the efficiency of Russian firms. While an earlier study by Brown and Brown (1998) concludes that during the first years of transition market structure was not a significant determinant of firm performance in Russia, the later study by Brown and Earle (2000) finds strong evidence that competition on domestic product and labour market as well as import competition have had a positive effect on the total factor productivity of Russian firms.

Several empirical studies have focused on the impact of competitive pressure on the restructuring and performance of Bulgarian firms during the transition. Djankov and Hoekman (2000, 1996) find a positive effect of the liberalization and opening up of the economy on firms' efficiency, stressing however, that this effect is stronger for the non-exporting firms which in the past were less exposed to competitive pressure. Jones, Klinedinst and Rock (1998) using stochastic production frontiers techniques report mixed evidence of the effect of competition on firm performance in 1989-1992: on the one hand, they find that private ownership (associated with better governance) has a positive impact on efficiency but the impact of other factors such as market structure and exposure to foreign markets was more ambiguous. On the other hand, a study of bank-enterprise relations in Bulgaria (Dobrinsky *et al.*, 2001) reveals that the protracted financial distress of Bulgarian firms during the transition and the absence of proper governance led to significant distortions in managerial motivation and incentives; in turn, these distorted incentives ware causing perverse responses of firms to competitive pressure.

Much of the empirical research on firms' pricing behaviour in imperfect markets is based on the notion of monopilisitic price formation, i.e., the existence of a price markuo over marginal cost. There are two possible straightforward approaches to the measurement of the firm's markups: one of them requires relevant data on the firm's output prices and marginal costs; the second necessitates the quantification of the price elasticity of demand faced by the firm. Roberts and Supina (1996, 2000) have applied the first of these approaches to analyze the price markups charged by different producers on a set of 13 homogeneous products. To do that they specify and estimate a cost function using plant level data and then construct estimates of the marginal cost that vary by plant. The individual firm-level markups can be then calculated using plant level output price data. Morrison (1992) uses a similar approach based on generalized Leontief cost and expenditure functions to analyze the markup behaviour of U.S. and Japanese firms. The second approach (based on the demand elasticity) has been explored in Justman (1987) and Shapiro (1987), among others. The main practical problem of these two approaches (and the reason why their application has been relatively limited) is that they require detailed firm-level price and cost information which, in general, is not readily available and may be difficult to obtain. However, non of these approaches have been so far applied to economies in transition, mostly due to the absence of adequate data.

Another strand in the empirical literature originates in the seminal paper by Hall (1988) who analyzed the implications of market power on productive efficiency, factor demand and pricing behaviour. Using a two-factor production function, Hall showed that under imperfect competition the primal Solow residual is not solely attributed to autonomous technical change, but may partly reflect monopolistic pricing behaviour. He used his derivation to estimate average industry markups using for this purpose longitudinal industry-level data. Hall's approach was tested and extended in a number of subsequent studies (Shapiro, 1987; Domowitz, Hubbard and Petersen, 1988, among others).

Roeger (1995) established that in the presence of market power (violating the conditions for perfect competition), the dual Solow residual can also be decomposed into two such components: one attributed to autonomous technical change and another one – to the markup charged by the monopolistic firm. Importantly, he derived an easily estimable equation from the emerging wedge between the primal and dual Solow residuals that can be used for direct estimation of price markups. One of the most attractive features of Roeger's approach is the fact that it is exceptionally undemanding with respect to data: thus in the case

of a two-sector production function its application only requires (firm- or industry-level) nominal values of value added, labour and capital costs.

Hall's work and, especially, Roeger's result inspired a series of empirical studies. Thus Oliveira Martins, Scarpetta and Pilat (1996) and Oliveira Martins and Scarpetta (1999) estimated sectoral markup ratios on the basis of longitudinal data for the OECD economies. Several studies related variations in markup ratios to the business cycle (Bloch and Olive, 2001; Linnemann, 1999; Weiss, 2000; Wu and Zhang, 2000). In a cross-country study, Hoekman, Kee and Olarreaga (2001) analyzed the impact of import competition and domestic market regulation on the formation of industry-level markups. Kee (2002) used an extension of Roeger's approach for the case of non-constant returns to scale (both Hall and Roeger assume constant returns to scale) to compute markups for Singapore's manufacturing industries, again on the basis of longitudinal sectoral data for 1974-90.

More recently the same method has been applied to firm-level data (using either cross-sectional or pooled enterprise data), which in principle opens wider opportunities to analyze micro behaviour. Basu and Fernald (1997) emphasize the importance of inter-sectoral heterogeneity when analyzing the relationship of markups and returns to scale, even from the macroeconomic viewpoint. This also facilitates the resolution of one rigid assumption incorporated in studies based on industry-level data, namely that the markups are either time-invariable or directly related to the business cycle. Using this type of data some studies have not only attempted to estimate markup ratios but have also tried to assess the impact of competitive pressure on their formation (Dobrinsky, Markov and Nikolov, 2001; Halpern and Kőrösi, 2001b; Konings, Van Cayseele and Warzynski, 2003). In a similar vein, Konings, Van Cayseele and Warzynski (2001b) seek to identify whether competition policy matters in shaping the firms' pricing behaviour.

3. Competitive pressure and the firms' productive efficiency in imperfect markets

3.1 Modelling framework

Firm level productive efficiency defines the capacity of different firms to convert the same mixes of input quantities into different quantities of output. Traditional empirical research on the productive efficiency of firms and it determinants has largely been based on the notion of total factor productivity (TFP) and TFP change in the broad sense. The adoption of this notion as a working assumption and its practical elaboration allows to

distinguish between the variation in output which is caused by variation in factor inputs and those changes in the level of output that are assumed to be attributed to the efficiency of resource transformation *per se*, i.e. the efficiency of the underlying production technology. The objective of empirical research is then to fit a production function on the observed data and to filter out the above two components of output variation. Although there are varieties of empirical approaches, conceptually most of them fall in the framework developed in the seminal works of Nickell, Wadhwani and Wall (1992) and Nickell (1996).

Depending on the assumptions about the properties of the production technology various techniques have been suggested for the quantitative evaluation of efficiency per se. One of the more traditional approach has been to define a pre-determined functional form for the production technology in which total factor productivity is treated a separable factor and estimate this function as the average function that fits the observed data.

(1) $q_j = f(A, \boldsymbol{X}_j, \boldsymbol{\beta}) \exp(\varepsilon_j)$

where q_j is output of firm j, $f(.)$ is a suitable functional form, $\boldsymbol{X}_j$ is a vector of firm j's inputs, T is the total factor productivity index, $\boldsymbol{\beta}$ is a vector of parameters to be estimated and ε_j is a normal random term with zero mean. The time index is omitted in all variables for simplicity.

This approach has numerous variations arising form the possible assumptions regarding the way total factor productivity is treated in the production function as well as its own functional form. The treatment of the residual term ε_j adds another source of variation: thus on the one side it may be assumed that ε_j merely reflects factors that are not captured by the production function but which are not necessarily related to TFP; on the other side one can believe that ε_j is an integral element of TFP due to the existence of factors that are not explicitly captured by T. For example such an assumption in the case when T is autonomous (multiplicably separable in f(.)) would imply that the true TFP is:

(2) $TFP = T \exp(\varepsilon_j)$

The assumption regarding the time variability of TFP ($T(t) \neq const$) also can result in different models and hence measures of efficiency. Actually the time derivative(s) of TFP are regarded as important dimensions of firm efficiency.

Relatively recently, with the elaboration of more sophisticated econometric approaches, the main focus of research has shifted to the attempts to estimate production frontiers which are closer to the theoretical definition of the production function as the function expressing the maximum amount of output obtainable with a given technology from a given mix of input quantities (Aigner, Lovell and Schmidt, 1977). The underlying assumption in empirical applications is that within a sample of firms (say, within an industry), the frontier defines the maximum level of output which is feasible at the given level of technological efficiency. The production frontier is usually assumed to be stochastic and hence, the positioning of firms *vis-à-vis* this frontier (the "distance" from the frontier) is considered to reflect the relative level of technical efficiency in individual firms:

(3) $q_j = f(\boldsymbol{X}_j, \boldsymbol{\beta}) \exp(v_j - u_j)$

where v_j is assumed to be a normal random variable with zero mean and u_j is an asymmetric non-negative random term which is assumed to be independently distributed (usually with a truncated normal distribution). In this specification the term $f(\boldsymbol{X}_j, \boldsymbol{\beta})$ defines the production frontier which reflects the "best practice" within the sample while the last term u_j represents the firm-specific (in)efficiencies vis-à-vis the production frontier.

Again, similarly to the above, in the case of stochastic production frontiers there can be a different treatment of the symmetric random term v_i in the sense whether it reflects or not components of efficiency that are not captured by other factors in the specification (Coelli, Prasada Rao and Battese, 1998). An assumption analogous to the one reflected in (2) would imply that the whole random term in (3) "exp $(v_j - u_j)$" represents firm (in)efficiency; an alternative hypothesis is that only u_j reflects technical (in)efficiency in its pure form. Also, the relative inefficiencies among subsets of firms can be treated in different ways. If the frontier is estimated over the whole sample of firms, then one can simply compute the resulting mean inefficiencies for any subset of firms; on the other hand it is also possible to estimate production frontiers for each subset of firms separately.

The next step in analyzing productivity is to seek for clues as to the determinants of the efficiency component of the variation of output. Most often this is done through augmenting the production function into a functional form that contains exogenous "determinants" of productive efficiency which allows to treat the latter as quasi factor inputs and estimate their effect in the context of the augmented production function.

In the case of the conventional production function this takes the form:

(4) $q_j = f\,[A(\boldsymbol{Z}_j), \boldsymbol{X}_j, \boldsymbol{\beta}]\ exp\ (v_j)$,

where $\boldsymbol{Z}_j$ is a vector of factors that are assumed to determine or affect firm level efficiency. The methodology is similar in the case of a stochastic production frontier. However, in the case of production frontiers there are two possible versions of augmenting the frontier. In the first approach, the functional form of the production frontier is augmented directly, by including additional variables to the main function:

(5) $q_j = f\,(\boldsymbol{X}_j, \boldsymbol{\beta}, \boldsymbol{Z}_j, \boldsymbol{\gamma})\ exp\ (v_j - u_j)$.

With a reference to the research goals of analyzing firms' responses to changing competitive pressure, $\boldsymbol{Z}_j$ will be again a vector of competition related variables factors. In this case they are assumed to determine or affect directly the level of the frontier but not the distance of the firm from this frontier (or inefficiency term) u_j. $\boldsymbol{\gamma}$ is a vector of estimable parameters.

The second possible approach is to estimate so called "inefficiency effects models". In this case it is attempted to explain the distance from the frontier (or inefficiency term) u_j through a set of augmenting variables:

(6) $q_j = f\,(\boldsymbol{X}_j, \boldsymbol{\beta})\ exp\ [v_j(\boldsymbol{Z}_j, \boldsymbol{\gamma}) - u_j]$

In order to operationalize these approaches for empirical purposes it is necessary to designate concrete functional specifications for the production technology and its extensions. The empirical work undertaken within the context of this workpackage has relied on some of the widely used functional specifications such as the Cobb-Douglas production function. However, we have used different modifications of this function such as two-factor and three factor specifications (defined over value-added or gross output, respectively). Omitting the fir index j, these specifications are as follows:

(7) $Y = A\ L^{\alpha_L} K^{\alpha_K}$,

(8) $Z = A\ L^{\alpha_L} M^{\alpha_M} K^{\alpha_K}$,

where *Y, Z, L, M* and *K* stand for real value added, real gross output (real sales), labor, intermediate and capital inputs, respectively, and *A* is the measure of productive efficiency (technical progress).

Apart from the above static specifications (which imply instantaneous adjustment over time), we have also used dynamic specifications (implying a gradual adjustment over time, which may be a more appropriate assumption for the conditions of imperfect markets):

(7a) $Y = A\ (Y\text{-}1)^{\sigma} L^{\beta_L} K^{\beta_K}$,

(8a) $Z = A\ (Y\text{-}1)^{\sigma} L^{\beta_L} M^{\beta_M} K^{\beta_K}$,

Furthermore, the specified production functions are augmented with variables that are supposed to capture the effect of competitive pressure on firm adjustment. There can also be different approaches to analyzing these effects. Thus by augmenting the production function and estimating it in levels (actually, log-levels) one we could seek to capture the effect of the augmenting factors on the level of technical efficiency. Alternatively if we estimate the PF in log differences we could try to capture the effect of the augmenting factors on the rate of change of technical efficiency.

The next specification problem is related to the actual augmenting factors. Within the context of this workpackage, we have utilized – to the extent possible –the set of quantitative measures of competitive pressure that we defined and computed during the first stage of the project (see D8). However, competitive pressure is not the only factor that affects firm level efficiency. Unless we model the determinants of productive efficiency in a broader context, we may face the problem of omitted variables. To address this issue, in addition to the set of indicators measuring competitive pressure and market structure, we have also employed in the extensions other, mostly firm-level variables (e.g. variables reflecting governance, financial pressure, restructuring, etc.) that are considered as relevant factors in shaping firms' production efficiency. In effect, by considering the two sets of variables in conjunction, we analyze the effect of competitive pressure within a broader model of productive efficiency.

The set of augmenting factors we used to extend the production function includes the following variables (for definitions of variables measuring competitive pressure, see D8):

1) MP_i – the import penetration ratio in sector i (defined over NACE 2- or 3-digit sectors). The expected sign of this coefficient is ambiguous. If higher level of import penetration is interpreted as higher level of import competition leading to

restructuring, then the expected sign of the coefficient is positive. However, an excessive level of import competition may have negative spillovers (Carlin, Schaffer and Seabright, 2004), implying a negative coefficient.

2) MS_{ij} – the firms' market share, within the firm's own market (the firm's share in total sales in the corresponding NACE sector, including imports). This variable reflects the impact of firm size on efficiency and in this sense has a dual interpretation. If we regard size as an indication of market power (which would probably reflect the main strand in the competition literature), then the coefficient should be expected to be negative as market power reduces the external pressure on the firms to achieve higher productive efficiency. However, there is also another strand in the literature, that of "efficient market strictures" (Demsetz, 1993) which assumes that "revealed" market structure reflects the growth of more efficient firms. According to this view, more efficient firms can be expected to grow faster than less efficient ones and hence have a higher market share. This duality leaves the determination of the market share as an empirical issue. Besides, there is a practical econometric implication: when estimating efficiency on the basis of an augmented production function, both the market share and the measures based on it (such as concentration) become endogenous.

3) C_i – a measure of the concentration of firms in sector i. It can be defined in various ways as: a) the Herfindhal index measured at different sectoral levels; b) the combined share of the several largest firms in the sector or c) the relative standards deviation of firms' sales in the sector. Again, there can be a dual interpretation of the impact of concentration on efficiency. The core strand in the competition literature would suggest that if a higher concentration measure reflects the incidence of monopolistic market power then the coefficient should be expected to be negative for the reasons mentioned above. In turn, the interpretation based on "efficient market structures" would suggest that an observed level of high concentration may reflect the growth of more efficient firms. Such an assumption adds considerable ambiguity as the expected sign of the market share coefficient.

4) F_i – a measure of foreign presence in sector i (the share of foreign-controlled firms in the sector's total sales). Similarly to import penetration, the expected sign of this coefficient is ambiguous. If higher level of foreign presence is interpreted as higher

level of competition leading to restructuring, then the expected sign of the coefficient is positive. However, an excessive level of foreign dominance may have negative spillovers on domestic firms (Carlin, Schaffer and Seabright, 2004), implying a negative coefficient.

5) FO_{ij} – a measure of foreign ownership in firm j (the share of foreign capital in the firm's statutory capital) (alternatively, dummy for foreign-controlled firms). In general, the expected coefficient is positive because it is assumed that foreign dominated firms employ more productive, modern technologies and are subject to better governance.

6) E_{ij} – a measure of the export activity of firm j (the share of exports in the firm's total sales) (alternatively, dummy for "actively exporting" firms). The expected coefficient is positive because it is assumed that exporting firms are exposed to (admittedly) higher competitive pressure on the international markets which forces them to restructure. It is expected that this would yield higher productivity than in firms that operate predominantly on the domestic market. On the other hand, it can be conjectured that the causality goes in the other direction; it is the more efficient firms that operate in foreign markets as well.

7) IA_{ij} – a measure of the investment activity of firm j (the share of fixed investment in a given year to the firm's total fixed assets in the same year) (alternatively, dummy for "actively investing" firms). High level of investment activity mirrors active restructuring which is assumed to lead to higher efficiency; assuming that this is associated with an effort to achieve a competitive edge, then the expected sign would be positive. Again, this interpretation implies possible endogeneity of this variable.

8) D_{ij} – the firm's long-term debt ratio (the share of long-term debt in total assets). For transition economies, the Millier-Modigliani notion of the neutrality of the firm's capital structure is not expected to hold due to the numerous market imperfections and the inherent inefficiencies of the financial systems. Rather this leverage indicator is expected to mirror financial pressure on heavily indebted firms and, eventually, the incidence of soft budget constraints reducing competitive pressure (Dobrinsky et al., 2001c). In this interpretation, the expected sign is negative.

9) SD_i – sectoral dummy for sector i. By including this dummy in the specification we seek to capture the effect of sector-specific effects not captured by other variables.

10) TD – time dummy for years. By including this dummy in the specification we seek to capture the effect of economy-wide shocks.

That the augmenting variables fall into four categories:

- time-varying, industry-specific factors: 1), 2), 3).
- time-invariant, industry-specific factors: 9).
- time-varying, firm-specific factors: 4), 5), 6), 7), 8).

In choosing the actual set of explanatory variables, one needs to take into account both the availability of data and considerations regarding the possible endogeneity (in this regard, the most obvious suspects are E_{ij} and IA_{ij})

In addition, by using fixed-effects techniques in estimation, it is possible to capture also the effect of time-invariant, firm-specific factors.

Accordingly, the estimable form of the augmented production function in the case of gross output (real sales) will be specified as:

$$(9) \quad z_j = a_0 + a_1 l_j + a_2 m_j + a_3 k_i + a_4 mp_i + a_5 c_i + a_6 f_i + a_7 ms_{ij} + a_8 fo_{ij} + a_9 e_{ij} + \\ + a_{10} ia_{ij} + a_{11} d_{ij} + a_{12} SD_i + a_{13} TD + \varepsilon_j ,$$

where lower-case letter denote the natural logarithms of the corresponding variables.

It is possible to further enrich the specification by including interaction variables. One obvious candidate for interacting is the sectoral dummy(s). By interacting the sectoral dummies with all, of some of the, variables of competitive pressure it is possible to differentiate the effect of competitive pressure on firm-level efficiency across sectors.

The specification of the production frontier models for the case when the underlying production technology is defined by a Cobb-Douglas production function is identical to (9) with the exception of the error term which is defined in accordance with (3) – (6).

3.2 Empirical results

The models outlined above have been tested on the basis of enterprise data for three central and east European countries: Bulgaria, Hungary and Slovenia. Below is a brief description of the datasets used for this exercise.

Bulgaria:

The Bulgarian dataset comprises a comprehensive enterprise data base that has been compiled at the Centre for Economic and Strategic Research for more than 10 years. It consists of annual balance sheet data for individual enterprises and covers all Bulgarian enterprises that report to the National Statistical Institute in accordance with the "double entry" accounting method. The time period covered is from 1994/95 to 2002. The full data set is an unbalanced panel as different number of enterprises have reported in different years. The actual number of enterprises increases from some 20000 in 1995 to more than 80000 in 2002. The main components of the individual enterprise records are the annual balance sheets and profit-and-loss accounts of the enterprises. In addition to that the individual enterprise records contain are some supplementary documents with additional annual data. On top of that the dataset also contains sectoral data by NACE 2-digit and 3-digit sectors reported by the Bulgarian National Statistical Institute.

Hungary:

The Hungarian dataset is based on balance sheet information for Hungarian firms supplemented with sectoral data. The dataset consists of the profit and loss account and balance sheet data of a sample of Hungarian manufacturing firms for the same period, and covers manufacturing firms employing at least 10 people. The sample selection is, however, biased towards the large firms. The total number of manufacturing firms in the dataset ranges from some 3000 in 1994 to 5000 in 2001. This sample includes at least 15% of all Hungarian manufacturing firms in every year (usually more than 20%). However, the representation is much larger with respect to sales volume: the sample accounts for least 70% of all manufacturing sales in Hungary every year.

Slovenia:

The Slovenian estimations are based on the comprehensive firm-level dataset on trade and capital flows for 1994-2002 compiled by the Bank of Slovenia. It is focused on the manufacturing sector where it covers the overwhelming part of the country's corporate sector (apart from small firms with less than 10 employees). The number of manufacturing firms covered in the dataset increases from 995 in 1994 to 1,382 in 2002.

Part A of the Annex presents some selected descriptive statistics for the manufacturing firms in the three countries, in particular, some indicators of competitive

pressure used in the current study. The structural changes in the corporate sectors of these economies as well as the accompanying changes in competitive pressure are discussed in more detail in D8 (2003).

Some selected estimation results on the effect of competitive pressure on the firms' productive efficiency are presented in Part B1 of the Annex. The tables in the annex are ordered by country, in alphabetical order. Within each country, the tables present the estimation results for different specifications of the production function and production frontiers.

The estimations for Bulgaria and Hungary have been performed using exactly identical specifications and estimation periods which allow direct cross-country comparisons of the results. Due to data availability, the specifications used in the case of Slovenia are slightly different; nevertheless, they also follow broadly similar methodology and variables and also allow cross-country comparisons.

Below we present some specific characteristics of the estimation procedures and results for the three countries.

Bulgaria:

The augmented production functions (as specified in (9)) for Bulgarian firms were estimated on the basis of an unbalanced panel of enterprise data for the period 1995-2001. Various techniques were tested for these estimations, including OLS, fixed effects (FE) and random effects model. In the main, the results obtained on the basis of different estimation techniques produced broadly similar results as regards the effect of competitive pressure on firm level efficiency. For this reason we report here only the results obtained using OLS techniques, presented in tables B1-B1 and B1-B2 (for output defined as value added or sales, respectively).

The estimations have been performed in log-levels suggesting that the results only allows to measure the impact of the augmenting factors, including competitive pressure, on the level of total factor productivity, but not on the changes in the level of productive efficiency over time. To reduce the effect of a possible simultaneity bias related to the investment variable, the latter has been taken with a one year lag.

The specification of the augmented stochastic frontier production functions is analogous to that of the production function except for the fact that the zero-mean, normally distributed error term ε_j in both cases is replaced by $(v_j - u_j)$ which are distributed as spelled

out above. The estimated frontier models were defined in accordance with the model specification suggested by Battese and Coelli (1995) are expressed as:

(10) $y_{jt} = x_{jt}\beta + (v_{jt} - u_{jt})$ $,i=1,...,N,\ t=1,...,T,$

where y_{jt} is (the logarithm of) the production of the *j-th* firm at time *t*; x_{jt} is a $k\times1$ vector of (transformations of the) input quantities of the *j-th* firm in the *t-th* time period; β is a vector of unknown parameters; and $v_{jt} - u_{jt}$ are the random variables as defined above

The u_{jt} terms which account for the technical (in)efficiency in production are non-negative random variables which and are assumed to be independently distributed as truncations at zero of the $N(m_{it},\sigma_u^2)$ distribution:

(11) $m_{it} = z_{it}\delta,$

where z_{it} is a $k\times1$ vector of variables which may influence the efficiency of a firm; and δ is an $1\times k$ vector of parameters to be estimated. We have used the parameterisation suggested by Battese and Corra (1977), replacing σ_v^2 and σ_u^2 with $\sigma^2=\sigma_v^2+\sigma_u^2$ and $\gamma=\sigma_u^2/(\sigma_v^2+\sigma_u^2)$. The parameters of the stochastic frontier production function model were estimated using maximum-likelihood estimates using the FRONTIER 4.1 software package (Coelli, 1994).

It should be noted that the stochastic frontiers estimated on the basis of pooled enterprise data are in general extremely sensitive to the presence of outliers in the upper range of the productive efficiency. As the technique seeks to establish the "best practice" among the data, an efficiency outlier results in shifting of the frontier which is equivalent to shifting of the estimated efficiency of the remaining firms in the sample. Since the quality of our data is somewhat dubious (it is not possible to verify the reliability of the source data) we have chosen to truncate the sample during the estimation procedure by removing the most extreme cases of efficiency outliers.

Hypothesis test based on the generalized likelihood-ratio (LR) test were conducted to check the functional form and to determine the presence of inefficiencies. The likelihood test statistic: $LR = -2*(LLF_R-LLF_U)$, (where LLF_R – is the loglikelihood function for restricted model LLF_U – the loglikelihood function for unrestricted model) has approximately χ^2_q distribution with q equal to the number of restrictions. It has been shown that any LR test

involving a null hypothesis that includes the restriction that $\gamma = 0$ has a mixed χ^2 distribution with appropriate critical values (Kodde and Palm, 1986).

The third column from the right in tables B1-B3 and B1-B4 presents the results of LR tests of the hypothesis that the technical efficiency effects are not simply random errors. The key parameter is $\gamma = \sigma_u^2/(\sigma_v^2+\sigma_u^2)$, which takes values in the interval (0,1). If $\gamma = 0$, it means that the model does not detect technical efficiency; hence, the null hypothesis is that of $\gamma = 0$, indicating that the OLS estimation of equation (9) is adequate representation of the data. The closer γ to unity, the more likely the frontier model is appropriate. The final column reports the estimated average level of efficiency for each sector in the sense of the distance from the estimated "best practice" production frontier. (The reported values are computed as one minus the average inefficiency effect, based on the results for each sector).

The estimation results for the two types of production functions (with output defined as value added or sales, respectively) produce broadly similar results as regards the effects of competitive pressure on productive efficiency. In the production function based on value added the competition effects are slightly more pronounced than in the case of sales. Probably the most important general result – based on the specific features of the estimation results for Bulgaria – is that during the estimation period competitive pressure (as measured by our competition variables) does <u>not</u> seem to have played a major role in driving the changes in productive efficiency of Bulgarian firms. This can be traced by analysing the estimated coefficients for each individual variable of competitive pressure.

Import penetration has been estimated with different signs for different sectors, but negative signs prevail (although not always significant). This suggests that the effect of opening through foreign competition through trade liberalization leading to increased foreign presence on domestic markets in the majority of cases has affected negatively the productive efficiency of local manufacturers. Such an outcome is more in line with the conjecture that an excessive level of import competition may have negative spillovers (Carlin, Schaffer and Seabright, 2004) (rather than the hypothesis that higher level of import competition would lead to restructuring). It may also suggest that the speed of trade liberalisation in Bulgaria has been excessive preventing local firms to adjust.

The coefficients of the market concentration variable in most cases are statistically insignificant suggesting relatively little effect on productive efficiency. Among the few cases when it is statistically significant, there are positive as well as negative coefficients, hinting at divergent directions of impact. Anyway, there are more negative coefficients which are in

line with the prior that larger dispersion of production (equivalent to weaker monopolistic market power within the corresponding segments of the product markets) should be associated with higher productive efficiency.

The majority of the coefficients of the dummy variable indicating foreign control are positive but they are not always statistically significant, hinting at a relatively limited effect of foreign ownership on firm performance in Bulgaria in this period. Anyway, the positive coefficients are in line with the prior that foreign presence (interpreted as higher level of competition) should lead to efficiency-enhancing restructuring.

The coefficients of the market share variable in most cases are positive and statistically significant. These results (suggesting that larger firms tend to have higher efficiency) are in discord with the hypothesis that market power reduces the external pressure on the firms to achieve higher productive efficiency. By contrast, they are to some degree consistent with the "efficient market strictures" hypothesis mentioned above. One possible interpretation for that is that the immature Bulgarian markets are characterised by very dynamic changes of entry and exit in which the more efficient firms tend to gain larger market shares.

The coefficients of the export variable are also estimated with different signs but in the prevailing number of cases it is positive; in many cases when it is positive, it is also statistically significant. While these coefficients probably provide the strongest evidence that competitive pressure tends to be associated with higher efficiency (although, as argued above, the direction of causality is unclear).

The lagged investment variable has also been estimated with different signs. Nevertheless, in a prevailing number of cases when it is statistically significant, the coefficient is positive, which is in line with the prior that active restructuring which should lead to higher efficiency. Debt does not seem to exert a systematic effect on firms' efficiency.

The estimation results regarding the determinants of productive (in)efficiency as given in tables B1-B3 and B1-B4 are basically rather similar to those in the case of the conventional production functions: in both cases the signs of most coefficients indicate a broadly similar direction of impact. Among the more specific outcomes one could point out that the production frontiers suggest a somewhat stronger positive impact of foreign control on productive efficiency but a somewhat lower impact of the exposure to export markets.

Hungary:

The Hungarian estimations were performed for the period 1995-2001 on the basis of an unbalanced panel of manufacturing firms. The specification of the estimated equations as well as the estimation techniques were identical to those applied in the case of Bulgaria to ensure full comparability of the results. Accordingly, the methodological comments made above apply to the case of Hungary as well. The actual estiamtion results for the Hungarian manufacturing firms are presented in tables B1-H1 to B1-H4 of the Annex.

The augmented Cobb-Douglas production function gives a good description of the production process in Hungary. The production process was largely characterised by constant return to scale after 1995. (Halpern and Kőrösi (1998) and (2001a) showed that diminishing returns prevailed in the earlier transition period.) Material costs dominate the production function when the dependent variable is sales; these production functions fit extremely well. Obviously, the same absolute distance from the production frontier appears to be a larger relative inefficiency when the dependent variable is the value added. However, the two functions also give a substantially different efficiency ranking of the sectors, which indicates that the production frontier depends on the materials, thus, material input may not be fully exogenous.

Investment activity and indebtness play little direct role in the production. Variables, representing the overal market environment of the firm (market concentration and import penetration, both measured at the 4 digit sectoral level) have a rather uncertain effect. They are frequently significant, but their sign is ambigous, indicating, that the effect of competitive pressure also depends on the technology used in the sectors.

The three important qualifying variables: market share, foreign ownership and export performance, are all measured at the firm level. They are significant for the majority of the sectors, and typically play a positive role, when significant, contributing to the higher efficiency of the resource allocation. Notably, compared to the results for Bulgaria, the positive association between governance related competitive pressure and competitive pressure related to the exposure to export markets is much more pronounced in the case of Hungary. Similarly to the Bulgarian results larger firms tend to display higher productive efficiency.

Slovenia:

The empirical analysis of the productive efficiency of Slovenian firms in general follows the approach outlined in the previous section which incorporates the underlying idea that, given imperfect markets, higher competition and competitive pressure tend to enhance

firms' productivity and efficiency. At the same time, there are some specificities, related to the availability of data and some specific characteristics of Slovenia's economic environment.

The econometric estimation is also based on a production function approach and both static and dynamic estimation technique have been used. The model had the following general specification:

$$(12)\quad y_{it} = \alpha k_{it} + \beta l_{it} + \delta_t + (\eta_i + v_{it} + m_{it}), \qquad r = \alpha+\beta \neq 1$$
$$v_{it} = \rho v_{i,t-1} + \mathbf{a}_{it} + e_{it} \qquad |\rho| < 1$$
$$e_{it}, m_{it} \approx MA(0)$$

where:

y_{it}, k_{it}, l_{it} are log value added, log capital stock and log labor inputs, respectively.

v_{it} is an autoregressive part of productivity shock, $\mathbf{a}_{it}$ is identified productivity shock and m_{it} represent serially uncorrelated measurement errors.

Inputs are potentially correlated with firm-specific effects, and with both productivity shocks ($\mathbf{a}_{it}$, e_{it}) and measurement errors (m_{it}).

Given the AR(1) process in v_{it}, a firm's response to positive productivity shock in the past ($v_{it} > 0$) by using more inputs in the period t clearly violates the OLS assumption on strict exogeneity between inputs and the error term, i.e. $E(\mathbf{z}_{it}' u_{it}) \neq 0$ (where $\mathbf{z}_{it}$ is a matrix of inputs).

In order to resolve the problem of simultaneity of investment decisions and productivity shocks, one should estimate a dynamic version of the model (12):

$$(13)\quad y_{it} = \rho y_{i,t-1} + \alpha k_{it} - \rho\alpha k_{i,t-1} + \beta l_{it} - \rho\beta l_{i,t-1} + (\delta_t - \rho\delta_{t-1}) + \gamma \mathbf{a}_{it} + \eta_i(1-\rho) + e_{it} + m_{it} - \rho m_{i,t-1})$$

where firm's productivity shocks $\mathbf{a}_{it}$ are determined as:

$$\mathbf{a}_{it} = f^i(\mathbf{G}_{it}, \mathbf{Z}_{jt})$$
$$(14)\quad (IFDI_{it}, OFDI_{it}, Exsh_{it}, MS_{it}) \in \mathbf{G}_{it}$$
$$(RStd_{jt}, MP_{jt}, No\_im_{jt}, Tar_{jt}) \in \mathbf{Z}_{jt}$$

where $\mathbf{G}_{it}$ accounts for technology determinants internal to the firm, and $\mathbf{Z}_{it}$ accounts for competitive pressure factors external to the firm.

More specifically, the firm-level variables used to take into account for firms' capability to respond to outside competitive pressures were:

1) $IFDI_{it}$ – a dummy whether a firm i is foreign owned,
2) $OFDI_{it}$ – a dummy whether a firm i has affiliates abroad. The rationale for including this additional variable to the specification is based on the findings by some authors that more productive firms tend to expand their activity through outward FDI. In fact this type of internationalization of business activity through outward FDI has been increasing in Slovenia in recent years.
3) $Exsh_{it}$ –share of exports in the firm's total sales,
4) MS_{it} – the firms' home market share (the firm's share in total sales in the corresponding NACE sector).

The variables accounting for competitive pressure factors external to the firm were:

5) MP_{jt} – the import penetration ratio in sector j,
6) $RStd_{jt}$ – a measure of the concentration of firms in sector j (relative standard deviation of firms' sales in the sector),
7) No_im_{jt} – number of imported products within sector j. This is another indicator that measures competitive pressure faced by local firms.
8) Tar_{jt} – average import duty rate in sector j. The reason for including this additional variable is the fact that import tariffs in Slovenia have decreased dramatically over the period 1994 – 2002 in all sectors except in food industry (15), leading to higher competitive pressures within sectors.

There are several ways to deal with the endogeneity problem. Olley and Pakes (1996) suggest to use investment expenditure serve as a proxy for unobservable technological shocks. Levinsohn and Petrin (2003) have used expenditure for materials serve as a proxy for unobservable technological shocks. Blundell and Bond (2000) argue about the need to apply a system-GMM estimator, which in addition to lagged levels uses also lagged first differences as instruments for equations in levels. In this case the model is estimated in first differences, so the corresponding instruments for ΔX_{it-1} are (X_{it-2}, X_{it-3}, …) and (ΔX_{it-2}, ΔX_{it-3}, …)

In the estimations for Slovenia the basic specification has been estimated by OLS and fixed effects (FE) panel techniques. In addition, the Blundell-Bond sys-GMM technique has

been used in order to deal with the endogeneity problem. The Olley-Pakes approach does not seem to be a robust technique when dealing with sectors with less important capital investment, while the Levinsohn-Petrin estimations in the case of sector-wide estimations may lead to quite noisy and not sustainable results. The latter serves also as a way of robustness check of results obtained by applying OLS and FE estimations.

The estimation results shown in tables B1-S1 to B1-S3 indicate that firms dominated by foreign ownership and firms with larger market shares tend to exhibit higher productive efficiency. This pattern is almost generally valid for firms in all sectors and is robust to different econometric methods (system-GMM which helps to deal with the simultaneity problem does not alter this pattern). Somewhat counterintuitively, more internationalized firms (i.e. firms with larger export orientation and with affiliates abroad) in general do not seem to gain specific advantages from this strategy. Positive productivity gains can be observed only in selected sectors, such as metal processing (27), machinery (29) and electrical appliances (30). Among external competitive pressures, import penetration seem to contribute to productivity especially in textiles (15), wood processing (20), plastics and non-minerals (25, 26) and transport equipment (35). On the other hand, high tariff protection leads generally to lower productivity in almost all sectors.

4. Competitive pressure and the firms' pricing behaviour in imperfect markets

4.1 Modelling framework

It is a well-established result in production theory that under perfect competition in efficient product and factor markets market, firms producing homogeneous products set their prices at their marginal costs. In addition, if the production technology is characterized by constant returns to scale, and there are no dynamic effects, average costs equal marginal costs and hence the output price. The assumptions of perfect competition and constant returns to scale – as well as the theoretical results derived in a framework that incorporates them – are often applied in empirical studies as well, including microeconomic studies based on firm-level data. However, recent theoretical advances as well as the related empirical research have shown that the departure from these standard assumptions may have important implications with respects to the derived theoretical behavioural characteristics and the validity of the conclusions based on the related empirical analysis. Relaxing some of the

assumptions of perfect competition and constant returns to scale has led to various extensions of the standards neoclassical results.

In a world of imperfect competition, the incidence of a monopolist endowed with market power may result in a shift of the equilibrium point away from its would-be position under perfect competition. If the demand curve faced by a monopolist producing product y is downward sloping, the equilibrium price p_y will exceed the marginal cost μ by a markup θ ($\theta > 1$) which depends on the price elasticity of demand η:

(15) $\theta = p_y / \mu = 1/(1 + 1/\eta)$ (1)

In other words, monopolistic firms may use their market power to set prices above their marginal costs.

Mark-up pricing can also be described by the so-called Lerner index:

(16) $B = (p_y - \mu)/p_y$

By virtue of the above definitions:

(17) $B = 1 - 1/\theta$,or $\theta = 1/(1 - B)$

While price markups over marginal costs are considered to be important characteristics of firms' behaviour in imperfect markets, they are not directly observable. Apart from the theoretically justifiable expectation that $\theta > 1$ (as the elasticity of demand η for a downward sloping demand curve is negative) there are no other priors as to the values of the markups. Their actual measurement has long interested empirical economists and various approaches to their indirect estimation have been suggested in the literature. The differences in approaching the measurement issue stem both from the underlying theoretical methodology and from the specific objective of the measurement exercise (e.g. to quantify the markups charged by individual firms on individual products, or to measure the average markups of individual firms, or to estimate the average markups across specific industries).

Among the first papers that challenged some of the standard neoclassical assumptions was the seminal work by Hall (1988). He questioned the assumption of perfect competition on product markets, and tested the equality of prices and marginal costs (under the assumption of constant returns to scale) using longitudinal industry-level data for this

purpose. His empirical results provided strong evidence against the joint hypothesis of perfect competition and constant returns to scale. He also showed that the primal Solow residual can be decomposed into two parts: a price markup and a technological change component. In another seminal paper, Roeger (1995) elaborated further Hall's approach, preserving the assumption of constant returns to scale. He established that, similarly to the primal, the dual Solow residual can also be decomposed into two such components. Moreover, he argued that the presence of market power – a violation of the conditions for perfect competition – induces a wedge between the primal and the dual residuals.

This approach is illustrated in the following framework. Assume that output in a representative firm j is defined by a homogeneous production function with constant returns to scale:

(18) $Y_j = T_j F(L_j K_j)$,

where K_j and L_j stand for capital and labor inputs, accordingly, and T_j is a measure of productive efficiency. Profit maximization yields:

(19) $\alpha = (MF/ML)(L/Y) = s_{wj}$;

i.e., the elasticity of output with respect to labor equals s_{wj}, the share of labor costs in the total firm's revenue. The Solow residual, derived from (18) and (19), reflects the rate of change of total factor productivity (s_j) in the case of perfect competition, and takes the well known form of:

(20) $s_j = d y_j - \alpha (d l_j) - (1-\alpha)(d k_j)$,

where lower case indicates logarithms and "*d*" denotes the (logarithmic) differences approximating growth rates.

If the firm operates under imperfect competition and prices deviate from marginal costs, the Solow residual of equation (20) can also be decomposed into:

(21) $s_j = B (d y_j - d k_j) + (1 - B) dt_j$,

where is the above mentioned Lerner index.

Roeger (1995), using the dual cost function, derived a similar expression for the dual, or price based Solow residual s^*_j:

(22) $s^*_j = - d\,p_j + \alpha\,(d\,w_j) + (1-\alpha)\,(d\,r_j) = - B\,(d\,p_j - d\,r_j) + (1 - B)\,dt_j$

where P_j , W_j and $_j$ denote firm's price, labor and capital costs, lower case stands for logarithms and "d" for the logarithmic differences.

Subtracting (22) from (21), the last terms of the two right hand expressions, containing the efficiency term, cancel out, and after some manipulation and adding an error term, a simple expression is obtained, which is at the same time very convenient for estimation:

(23) $s_j - s^*_j = (d\,y_j + d\,p_j) - \alpha\,(d\,l_j + d\,w_j) - (1-\alpha)\,(d\,k_j + d\,r_j) =$
$= B\,[(d\,y_j + d\,p_j) - (d\,k_j + d\,r_j)] + \varepsilon_j$

The sums in parentheses are the logarithmic differences of the corresponding nominal values: $d\,y^*_j = d\,y_j + d\,p_j$; $d\,l^*_j = d\,l_j + d\,w_j$; $d\,k^*_j = d\,k_j + d\,r_j$, where y^*_j, l^*_j and k^*_j denote the logarithms of nominal values of value added, labor and capital costs, accordingly.

Denoting:

(24) $v^*_j = d\,y^*_j - \alpha\,(d\,l^*_j) - (1-\alpha)\,(d\,k^*_j)$

(25) $q^*_j = d\,y^*_j - d\,k^*_j$,

the final expression for the estimable equation becomes:

(26) $v^*_j = B\,q^*_j + \varepsilon_j$.

By its theoretical definition, the markup ratio reflects the pricing behaviour of firms endowed with market power and using that power to set prices higher than their marginal costs. Hence, looked from the opposite angle, if the markup ratios are measurable, then they themselves can be regarded as reflecting the degree of competition that firms face in the market. In terms of the conceptual framework of this study, such a conjecture suggests that the measured sectoral markups are shaped under the impact of competitive pressure. In other

words, different levels of price markups (say, at the sectoral level) should be associated with varying nature and levels of competitive pressure (within each sector).

To test this conjecture, similarly to the approach applied in analyzing productive efficiency, we extend the models of markup formation with variables defining and measuring competitive pressure within manufacturing sectors. The main goal of this exercise is to analyse to what extent competition and market structure affect the firms' pricing behaviour. As the markup is just a transformed value of the Lerner index, which is a single parameter estimated in the model, we rather assume that this parameter is not constant over the entire sample. We employ a simple varying coefficient panel model:

$$(27) \quad v^*_j = B_j(\boldsymbol{Z_j})\, q^*_j + \varepsilon_j,$$

where $\boldsymbol{Z}_j$ is a vector of variables reflecting market structure and competition, such as market share, firm concentration within sectors, import penetration, exposure to export markets, firm's governance, etc., and B_j is a linear function of its arguments. This approach provides an opportunity to analyze the competition-related determinants of the markup ratios.

$\boldsymbol{Z}_j$ may in principle comprise a broad set of variables. However, in the context of the overall analysis of enterprise adjustment under competitive pressure (including also productive efficiency) and in view of ensuring cross-country comparability of the estimates, we have restricted our choice to the competition-related variables evaluated during the previous phase of the project (see D8) and such used in in analysis of production efficiency. The actual set of augmenting variables includes:

1) M_{ik} is the import penetration ratio in sector i. If the estimations are performed at the NACE 2-digit level, then the import penetration variable should be defined at a lower level of disaggregation - NACE-3 or NACE-4 digit levels. The sign of the coefficient of this variable is undefined. If the degree of import penetration is assumed to indicate higher competition, then the coefficient should have a negative sign. However, if importers themselves are endowed with market power, the sign may be positive. Notably, these effects can also change over time.

2) O_{ij} is an ownership variable associated with foreign ownership. It can be defined either as the share of foreign ownership in the firms' statutory capital, or as a dummy taking the value of 1 for foreign controlled firms and 0 otherwise (this was the

preferred definition in estimations). As foreign firms optimise their behaviour globally, not in the local market, thus their pricing behaviour may differ from domestic firms, we can expect that ownership structure had strong effect on markup ratios. However, the sign of this variable is ambiguous. On the one hand, if foreign ownership is assumed to be associated with better governance and proper incentive structures (and hence higher competitive pressure), then the expected sign of the coefficient of this variable is negative. However, if foreign firms use their market power to extract rents from the local market, the sign will be positive.

3) C_{ik} is a measure of the concentration of firms in sector *i*. It can be defined in various ways as: a) the Herfindhal index measured at different sectoral levels; b) the combined share of the several largest firms in the sector or c) the relative standards deviation of firms' sales in the sector. After experimenting with different definitions of concentration, in the estimations reported below we have used the third definition. Again, if the estimations are performed at the NACE 2-digit level, then the relative standard deviation of sales should be defined at a lower level of disaggretation - NACE-3 or NACE-4 digit levels. The prior is that higher concentration results in larger market power in the hands of fewer firms who will be more likely to exercise it in price setting, hence the expected sign of the coefficient is positive.

4) MS_{ij} is the firms' market share, within the firm's own market (the firm's share in total sales in the corresponding NACE sector, including imports). The market share is intended to capture market power and the prior is that monopolistic firms endowed with market power would tend to exercise this power resulting in higher price markups. This would suggest a positive sign of the respective coefficient.

5) E_{ij} is the firm's ratio of exports to sales (alternatively, a dummy for exporting firms taking values of 1 if the ratio exports/sales" is larger that a pre-defined threshold and 0 otherwise). Assuming that larger exposure to the international markets is indicative of higher competitive pressure, the coefficient of this variable can be expected to be positive. However, what we observe in our data is the aggregate pricing policy of these firms (covering exports as well as domestic sales) and since exporting firms may have discriminating pricing policies on these two segments of their market, there may be more ambiguity as to this aggregate outcome.

6) D_{ij} is the firm's long-term debt ratio (the share of long-term debt in total assets). We assume that this indicator mirrors financial pressure on heavily indebted firms and, possibly, the incidence of soft budget constraints reducing competitive pressure. In this interpretation, the expected sign is positive.

7) LD_{ij} is a dummy for firms with a low quick ratio. It takes a value of 1 if the firm's quick ratio (the ratio between the sum of accounts receivable and liquid assets to the firm's current liabilities) is smaller than 1 (the critical level of the quick ratio) in year t and is 0 otherwise. We assume that this indicator mirrors financial pressure on firms and also, possibly, the incidence of soft budget constraints reducing competitive pressure. In this interpretation, the expected sign is positive.

4.2 Empirical results

The varying coefficient model seeking to capture the effect of competitive pressure on the firms' pricing behaviour was tested on enterprise data for Bulgaria and Hungary using the enterprise datasets described in section 3.2 above. Again in the case of this empirical assessment we employed an exactly identical specification for the two countries and estimated it for exactly the same time period which allows direct cross-county comparisons of the results.

Similarly to the assessment of productive efficiency, in studying the effect of competitive pressure on firms' pricing behaviour, we employed different specifications (e.g. with output defined as value added or sales) and tested different estimation techniques. Most of the results from these tests pointed towards broadly similar directions of impact and for this reasons we have limited the selection of estimation results for presentation in part B2 of the Annex, tables B2-B and B2-H to two representative estimations. The estimations reported here were performed on panels of manufacturing sectors grouped at the NACE-2 digit level and refer to output defined as sales.

The estimation results clearly indicate different behavioural patterns with respect to price formation in the two countries. The most conspicuous case of difference is the effect of foreign ownership on price formation. In the case of Hungary, ownership was the most powerful factor shaping pricing behaviour, significantly influencing markups in most sectors. In general, as indicated by various empirical studies, during the period of estimation, foreign

direct investment has been one of the most important factors shaping market structure in the case of Hungary but not so much so in Bulgaria. In the case of Hungary its effect on prices is almost always positive and statistically significant, suggesting that foreign controlled firms tend to charge larger price markups than local firms. In turn the higher markups of the foreign-owned firms indicate that foreign owned firms seem to have a larger chance for exploiting market imperfections and can collect larger rents than domestic firms in the same apparent market position. As many foreign-owned firms are Hungarian subsidiaries of multinationals, this may just indicate that their true market power cannot be correctly assessed from the balance sheets of this Hungarian subsidiary. In the case of Bulgaria, in the majority of sectors foreign ownership is not estimated as a statistically significant determinant of pricing behaviour. Moreover, when it is statistically significant, its coefficient in most cases is negative (with a few exceptions in the value added based estimations). This hints at the other interpretation of the impact of foreign ownership outlined above, namely the governance effect, and the absence of pricing mechanisms similar to those in Hungary. Indeed, at least in the period that we cover, there was no massive influx of multinationals to Bulgaria and foreign controlled firms were often small stand-alone businesses.

Similarly, there are differences between the estimates for the two countries with respect to import penetration. As noted, import penetration may well have an ambiguous and time dependent effect: on the one hand it may measure foreign competition, which should limit the ability of firms for charging prices with high markups. However, especially in sectors dominated by multinationals, the measured level of import penetration may just be the natural consequence of the internationally organised production process of multinational firms, in which case it will not have a negative effect on price markups. Both of these can be more often observed in the case of Hungary. In Bulgaria, due to the reasons outlined above, it is unlikely that the measured degree of import penetration results from the involvement in international production networks; it rather reflects the effect of the ongoing liberalisation of foreign trade. Hence the estimated coefficients should reflect the impact of import competition on the pricing behaviour of local producers. The results, however, suggest different directions of this impact: there are both positive and negative, statistically significant coefficients. This suggests divergent direction of impact in different manufacturing sectors. In some sectors higher competition induced by import penetration has led to the shrinking of profit margins (negative coefficients). In other cases, importers endowed with market power may have themselves take advantage of it (positive signs).

The effect market concentration on price formation is more or less in line with the prior, especially in the case of Bulgaria. A negative coefficient for the market concentration variable suggests that larger dispersion of production (equivalent to weaker monopolistic market power within the corresponding segments of the product markets) is associated with relatively lower price markups (which is our prior). According to the estimation results for Bulgaria, this is indeed the case for the majority of the manufacturing sectors. There are also cases with positive coefficients but they are often statistically insignificant. In Hungary the pattern is broadly similar, but the tendency of large dispersion of production being associated with lower markups is not so well pronounced and is far from uniform.

One of the surprising empirical outcomes is that our estimation results do not provide strong evidence suggesting that market power (as measured by market share) tends to be associated with higher price markups (as implied by the conjecture of monopolistic price formation). These results are mixed for both countries and there are cases of positive as well as negative association between market share and price markups.

Similarly, there is no uniform pattern in the effect of the exposure to export markets on price formation: the specificities prevailing in each individual sector of the two countries seem to be shaping different directions of impact.

There are notable differences between Bulgaria and Hungary with respect to the estimated coefficients of the debt variable. In Bulgaria, in the majority of cases the estimated coefficients are positive and statistically significant. This is in line with the prior that financially distressed firms, moreover when not subject to hard budget constraints (high leverage may be interpreted as revealing soft credit constraints), both of which effectively reducing competitive pressure, may show up in monopolistic price formation. Indeed, as Bulgaria has been lagging behind in enterprise restructuring in this period, this is an outcome that is consistent with the general pattern of enterprise behaviour in this period (see Dobrinsky et al., 2001c). In the case of Hungary, with enterprise and bank restructuring more advanced, budget constraints on firms in this period were significantly hardened. Accordingly, we do not find much evidence of the effect of debt on price formation.

5. Concluding remarks

Firms in the Central and Eastern European countries that just joined, or are about to join the EU (such as Hungary, Slovenia and Bulgaria) are facing growing competitive pressure, especially in the single EU market. At the same time, product, capital and labour markets in these economies are still immature markets and are characterized by numerous

imperfections. In this paper we propose research methodology for the analysis of different aspects of enterprise behaviour and adjustment to competitive pressure in an environment of imperfect markets. We apply this methodology on empirical data comprising large enterprise datasets to analyze, in a comparative perspective, the adjustment of firms in some of these economies to the growing competitive pressure. In accordance with the research agenda of the COMPPRESS Workpackage 1, we focus on two main aspects of enterprise adjustment to competitive pressure: 1) the changes in firm-level efficiency and 2) the effect on the firms' pricing behaviour. The analysis of these aspects of enterprise adjustment using identical or similar methodology, provides a unique opportunity for a comparative study of the mechanisms of firm's behavior in a transitional environment.

The COMPPRESS project as a whole, and WP1 in particular, employ different quantitative indicators to measure the level and intensity of competitive pressure in the manufacturing sectors of the Central and Eastern European economies. Most likely, this set of indicators cannot be considered as fully exhaustive and probably some aspects of competition-related developments in these economies have not been reflected in it. As the empirical analysis of enterprise adjustment in the manufacturing sectors of the Central and Eastern European countries has been performed on the basis of these indicators of competitive pressure, this is one possible caveat that needs to be borne in mind when interpreting the results.

The empirical results presented in the paper highlight some important specificities of the ongoing restructuring of the corporate sectors in the emerging market economies of Central and Eastern Europe. In particular, while the empirical results do confirm that competitive pressure affects the firms' adjustment process, the actual adjustment is not always in line with theoretical priors. This may be the result of both the existing market imperfections mentioned above but also may be related to the dramatic overall structural changes that are still underway in these economies. One specific feature that emerges from the empirical findings is that the actual enterprise responses to competitive pressure may differ in the stages of economic transformation in these countries. For all these reasons the in-depth empirical analysis based on micro data is a valuable (and probably remains unique) source of information about the specificities of the actual adjustment process.

According to the empirical results presented in the paper, the most powerful competitive pressures, pressures that have triggered the most discernible and strong responses by firms in Central and Eastern Europe, are those generated by foreign firms on the local markets. This occurs both through the emergence of foreign-dominated manufacturing firms

that operate in the domestic manufacturing sectors, and through the competition effects induced through trade liberalisation, resulting in increasing import penetration of the domestic markets. As to the actual direction of these effects, the results are equivocal, suggesting the incidence of both positive and negative spillovers of foreign induced competitive pressure. On the one hand, there is strong evidence, suggesting that in some cases this type of competitive pressure is associated with active restructuring of the domestic firms that face it, leading to higher productive efficiency and welfare enhancing changes in pricing policies. On the other hand, there is also statistically significant evidence of the opposite outcomes: for example, in some cases higher (probably excessive) levels of import competition tend to be associated with declining efficiency of the domestic firms subject to this type of pressure; in other cases foreign controlled firms tend to exploit local market imperfections and to collect larger monopolistic rents than domestic firms.

The empirical results provide systematic evidence of the recurrence of one specific, and somewhat counterintuitive, feature of enterprise performance in the three Central and Eastern European countries. This is the empirical finding that market power per se (in terms of individual market share) does not seem to be associated with the emergence of monopolistic deadweight such as excessive overpricing or efficiency losses. Rather, at this stage of economic transformation, Central and Eastern European firms tend to employ their market power to grow aggressively and to gain even larger market shares. On the other hand, we find relatively strong evidence that the sheer number of competitors in the segments of the product markets of these countries tends to have a healthy effect on enterprise performance, inducing efficiency gains and reducing price markups.

Finally, as noted above, the empirical results for the three countries suggest that enterprise behaviour and performance changes with the stages of transition. There are notable changes in the nature of enterprise responses in a country that was less advanced in market reforms (at least in the period that we analyze, 1995-2001) as Bulgaria, compared to the more advanced Hungary and Slovenia. Advance in market reforms tends to strengthen the positive spillover effects associated with growing competitive pressure.

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A N N E X

ESTIMATING ENTERPRISE ADJUSTMENT TO COMPETITIVE PRESSURE

Part A. Selected Descriptive Statistics for the Manufacturing Firms in Bulgaria, Hungary and Slovenia

Table A1-B. Number of firms by NACE-2: Bulgaria

NACE 2-digit sectors	1995	1996	1997	1998	1999	2000	2001
15 : Manufacture of food products and beverages	942	1530	1776	2014	2198	2331	2530
16 : Manufacture of tobacco products	25	31	27	31	30	31	32
17 : Manufacture of textiles	187	246	251	273	322	328	357
18 : Manufacture of wearing apparel; dressing and dyeing of fur	423	726	853	999	1153	1239	1431
19 : Tanning and dressing of leather; manufacture of luggage and footwear	98	144	167	199	229	243	250
20 : Manufacture of wood and wood products, except furniture; articles of straw	187	443	527	522	622	619	650
21 : Manufacture of pulp, paper and paper products	78	121	129	171	182	216	239
22 : Publishing, printing and reproduction of recorded media	379	580	641	680	729	778	820
23 : Manufacture of coke, refined petroleum products and nuclear fuel	8	8	9	9	12	12	14
24 : Manufacture of chemicals and chemical products	148	278	317	345	377	417	428
25 : Manufacture of rubber and plastic products	129	335	389	381	439	454	488
26 : Manufacture of other non-metallic mineral products	192	279	299	311	360	372	398
27 : Manufacture of basic metals	85	114	111	119	134	150	168
28 : Manufacture of fabricated metal products, except machinery and equipment	351	698	723	759	872	914	967
29 : Manufacture of machinery and equipment n.e.c.	453	727	772	817	937	976	1024
30 : Manufacture of office machinery and computers	53	78	98	84	83	81	86
31 : Manufacture of electrical machinery and apparatus n.e.c.	137	255	263	294	337	362	387
32 : Manufacture of radio, television and communication equipment and apparatus	91	150	154	145	141	125	132
33 : Manufacture of medical, precision and optical instruments, watches and clocks	107	162	175	206	231	415	473
34 : Manufacture of motor vehicles, trailers and semi-trailers	38	63	64	71	76	76	83
35 : Manufacture of other transport equipment	43	74	75	84	130	144	146
36 : Manufacture of furniture; manufacturing n.e.c.	262	417	470	476	561	625	656
37 : Recycling	4	4	7	9	8	9	16
All manufacturing firms	4420	7463	8297	8999	10163	10917	11775

Table A1-H. Number of firms by NACE-2: Hungary

NACE 2-digit sectors	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
15 : Manufacture of food products and beverages	1510	1996	2224	2377	2508	2663	2773	2818	2923	3178
16 : Manufacture of tobacco products	5	6	6	6	7	7	7	7	7	7
17 : Manufacture of textiles	420	501	518	582	656	755	805	787	761	842
18 : Manufacture of wearing apparel; dressing and dyeing of fur	707	796	791	847	957	1042	1166	1217	1280	1489
19 : Tanning and dressing of leather; manufacture of luggage and footwear	259	296	289	307	328	363	373	378	380	411
20 : Manufacture of wood and wood products, except furniture; articles of straw	599	739	779	860	1000	1141	1232	1283	1340	1551
21 : Manufacture of pulp, paper and paper products	110	134	158	176	195	219	246	257	276	318
22 : Publishing, printing and reproduction of recorded media	1367	1596	1685	1866	2148	2495	2662	2771	3022	3521
23 : Manufacture of coke, refined petroleum products and nuclear fuel	2	6	8	11	7	8	9	9	9	9
24 : Manufacture of chemicals and chemical products	346	400	404	445	471	518	516	532	553	576
25 : Manufacture of rubber and plastic products	558	678	706	762	861	979	1026	1087	1133	1231
26 : Manufacture of other non-metallic mineral products	415	482	511	540	616	691	738	775	825	952
27 : Manufacture of basic metals	146	176	181	192	215	220	241	242	243	254
28 : Manufacture of fabricated metal products, except machinery and equipment	1365	1591	1709	1867	2140	2432	2647	2795	3055	3466
29 : Manufacture of machinery and equipment n.e.c.	1399	1555	1577	1621	1798	1967	2038	2040	2029	2199
30 : Manufacture of office machinery and computers	85	95	95	102	124	144	160	168	184	198
31 : Manufacture of electrical machinery and apparatus n.e.c.	388	463	479	525	587	672	703	722	715	768
32 : Manufacture of radio, television and communication equipment and apparatus	295	342	364	389	445	499	519	530	542	609
33 : Manufacture of medical, precision and optical instruments, watches and clocks	420	494	545	588	665	735	792	815	858	955
34 : Manufacture of motor vehicles, trailers and semi-trailers	131	165	164	185	193	215	230	243	258	259
35 : Manufacture of other transport equipment	70	73	78	85	104	120	131	129	144	171
36 : Manufacture of furniture; manufacturing n.e.c.	517	609	634	702	838	949	1035	1111	1187	1464
37 : Recycling	32	41	48	54	73	93	104	114	127	132
All manufacturing firms	11146	13234	13953	15089	16936	18927	20153	20830	21851	24560

Table A1-S. Number of firms by NACE-2: Slovenia

NACE 2-digit sectors	1994	1995	1996	1997	1998	1999	2000	2001	2002
15 : Manufacture of food products and beverages	91	98	103	114	118	118	111	101	101
16 : Manufacture of tobacco products	53	63	67	75	74	73	73	73	71
17 : Manufacture of textiles	53	56	59	65	67	66	63	54	55
18 : Manufacture of wearing apparel; dressing and dyeing of fur	16	20	22	26	23	24	22	19	17
19 : Tanning and dressing of leather; manufacture of luggage and footwear	64	73	85	85	84	86	84	89	83
20 : Manufacture of wood and wood products, except furniture; articles of straw	21	24	26	28	30	32	33	32	32
21 : Manufacture of pulp, paper and paper products	59	69	73	79	87	88	88	83	83
22 : Publishing, printing and reproduction of recorded media	2	2	2	3	3	3	3	3	3
23 : Manufacture of coke, refined petroleum products and nuclear fuel	49	54	57	53	55	55	52	53	53
24 : Manufacture of chemicals and chemical products	53	65	70	71	84	87	85	89	91
25 : Manufacture of rubber and plastic products	52	53	56	60	62	62	64	61	66
26 : Manufacture of other non-metallic mineral products	18	22	23	26	28	31	33	32	31
27 : Manufacture of basic metals	121	145	160	183	185	207	207	211	217
28 : Manufacture of fabricated metal products, except machinery and equipment	102	116	131	130	133	136	134	135	138
29 : Manufacture of machinery and equipment n.e.c.	15	17	16	20	20	18	19	19	20
30 : Manufacture of office machinery and computers	55	61	63	67	75	74	78	80	80
31 : Manufacture of electrical machinery and apparatus n.e.c.	23	28	34	36	37	38	39	36	36
32 : Manufacture of radio, television and communication equipment and apparatus	41	51	51	53	55	57	59	54	55
33 : Manufacture of medical, precision and optical instruments, watches and clocks	29	32	36	34	39	36	34	32	32
34 : Manufacture of motor vehicles, trailers and semi-trailers	5	6	6	6	6	6	4	5	7
35 : Manufacture of other transport equipment	65	72	83	90	96	102	99	96	98
36 : Manufacture of furniture; manufacturing n.e.c.	8	9	11	12	11	11	12	12	13
37 : Recycling	91	98	103	114	118	118	111	101	101
All manufacturing firms	**995**	**1136**	**1234**	**1316**	**1372**	**1410**	**1396**	**1369**	**1382**

Table A2-B. Herfindahl index by NACE sectors (%): Bulgaria

NACE 2-digit sectors	1995	1996	1997	1998	1999	2000	2001
15 : Manufacture of food products and beverages	0.006	0.006	0.006	0.006	0.006	0.006	0.006
16 : Manufacture of tobacco products	0.090	0.093	0.133	0.119	0.157	0.175	0.201
17 : Manufacture of textiles	0.020	0.022	0.022	0.020	0.023	0.021	0.029
18 : Manufacture of wearing apparel; dressing and dyeing of fur	0.016	0.016	0.012	0.009	0.007	0.006	0.005
19 : Tanning and dressing of leather; manufacture of luggage and footwear	0.050	0.060	0.046	0.034	0.027	0.032	0.028
20 : Manufacture of wood and wood products, except furniture; articles of straw	0.048	0.059	0.048	0.048	0.037	0.045	0.032
21 : Manufacture of pulp, paper and paper products	0.067	0.064	0.071	0.061	0.054	0.054	0.053
22 : Publishing, printing and reproduction of recorded media	0.132	0.120	0.125	0.056	0.045	0.046	0.041
23 : Manufacture of coke, refined petroleum products and nuclear fuel	0.804	0.942	0.949	0.480	0.908	0.956	0.812
24 : Manufacture of chemicals and chemical products	0.062	0.068	0.061	0.043	0.041	0.051	0.051
25 : Manufacture of rubber and plastic products	0.091	0.084	0.078	0.052	0.040	0.038	0.038
26 : Manufacture of other non-metallic mineral products	0.035	0.038	0.045	0.032	0.035	0.042	0.044
27 : Manufacture of basic metals	0.254	0.226	0.275	0.132	0.216	0.230	0.186
28 : Manufacture of fabricated metal products, except machinery and equipment	0.049	0.028	0.063	0.031	0.018	0.023	0.033
29 : Manufacture of machinery and equipment n.e.c.	0.034	0.025	0.037	0.028	0.027	0.025	0.023
30 : Manufacture of office machinery and computers	0.110	0.112	0.102	0.096	0.083	0.089	0.077
31 : Manufacture of electrical machinery and apparatus n.e.c.	0.060	0.055	0.056	0.047	0.046	0.060	0.037
32 : Manufacture of radio, television and communication equipment and apparatus	0.056	0.037	0.035	0.045	0.045	0.078	0.175
33 : Manufacture of medical, precision and optical instruments, watches and clocks	0.078	0.086	0.041	0.026	0.035	0.028	0.032
34 : Manufacture of motor vehicles, trailers and semi-trailers	0.095	0.127	0.102	0.100	0.069	0.084	0.067
35 : Manufacture of other transport equipment	0.325	0.232	0.284	0.395	0.086	0.114	0.088
36 : Manufacture of furniture; manufacturing n.e.c.	0.015	0.016	0.015	0.015	0.016	0.016	0.014
37 : Recycling	0.391	0.565	0.516	0.245	0.301	0.359	0.693

Table A2-H. Herfindahl index by NACE sectors (%): Hungary

NACE 2-digit sectors	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
15 : Manufacture of food products and beverages	0.006	0.006	0.006	0.006	0.007	0.008	0.008	0.008	0.008	0.008
16 : Manufacture of tobacco products	0.268	0.278	0.263	0.270	0.244	0.276	0.275	0.272	0.272	0.315
17 : Manufacture of textiles	0.023	0.024	0.025	0.024	0.029	0.024	0.018	0.017	0.040	0.017
18 : Manufacture of wearing apparel; dressing and dyeing of fur	0.011	0.009	0.011	0.013	0.014	0.013	0.012	0.030	0.042	0.061
19 : Tanning and dressing of leather; manufacture of luggage and footwear	0.039	0.033	0.029	0.025	0.025	0.025	0.038	0.041	0.037	0.039
20 : Manufacture of wood and wood products, except furniture; articles of straw	0.021	0.024	0.025	0.026	0.026	0.028	0.028	0.026	0.024	0.026
21 : Manufacture of pulp, paper and paper products	0.114	0.089	0.083	0.082	0.073	0.077	0.078	0.077	0.086	0.087
22 : Publishing, printing and reproduction of recorded media	0.011	0.009	0.008	0.009	0.008	0.008	0.008	0.007	0.007	0.007
23 : Manufacture of coke, refined petroleum products and nuclear fuel	0.000	0.899	0.898	0.939	0.913	0.940	0.944	0.947	0.875	0.904
24 : Manufacture of chemicals and chemical products	0.064	0.053	0.054	0.060	0.055	0.060	0.053	0.053	0.067	0.062
25 : Manufacture of rubber and plastic products	0.074	0.018	0.017	0.016	0.015	0.015	0.014	0.013	0.012	0.011
26 : Manufacture of other non-metallic mineral products	0.019	0.018	0.017	0.019	0.017	0.019	0.020	0.019	0.022	0.021
27 : Manufacture of basic metals	0.129	0.143	0.146	0.115	0.117	0.122	0.118	0.118	0.132	0.114
28 : Manufacture of fabricated metal products, except machinery and equipment	0.011	0.009	0.009	0.011	0.009	0.008	0.007	0.006	0.006	0.005
29 : Manufacture of machinery and equipment n.e.c.	0.023	0.020	0.018	0.018	0.017	0.020	0.016	0.022	0.025	0.024
30 : Manufacture of office machinery and computers	0.100	0.111	0.129	0.115	0.384	0.544	0.534	0.556	0.810	0.709
31 : Manufacture of electrical machinery and apparatus n.e.c.	0.096	0.079	0.097	0.094	0.076	0.079	0.077	0.076	0.087	0.162
32 : Manufacture of radio, television and communication equipment and apparatus	0.051	0.050	0.065	0.070	0.105	0.185	0.154	0.118	0.138	0.201
33 : Manufacture of medical, precision and optical instruments, watches and clocks	0.045	0.039	0.027	0.033	0.032	0.025	0.020	0.016	0.018	0.017
34 : Manufacture of motor vehicles, trailers and semi-trailers	0.217	0.170	0.174	0.199	0.170	0.167	0.255	0.312	0.315	0.283
35 : Manufacture of other transport equipment	0.093	0.087	0.089	0.092	0.081	0.075	0.077	0.089	0.092	0.085
36 : Manufacture of furniture; manufacturing n.e.c.	0.014	0.014	0.013	0.014	0.012	0.012	0.011	0.012	0.012	0.013
37 : Recycling	0.237	0.175	0.187	0.158	0.117	0.105	0.122	0.135	0.110	0.122

Table A2-S. Herfindahl index by NACE sectors (%): Slovenia

NACE 2-digit sectors	1994	1995	1996	1997	1998	1999	2000	2001	2002
15 : Manufacture of food products and beverages	0.031	0.031	0.032	0.032	0.031	0.030	0.035	0.039	0.039
16 : Manufacture of tobacco products	0.040	0.050	0.061	0.071	0.103	0.142	0.223	0.267	0.246
17 : Manufacture of textiles	0.186	0.169	0.169	0.159	0.159	0.151	0.150	0.171	0.175
18 : Manufacture of wearing apparel; dressing and dyeing of fur	0.183	0.177	0.169	0.192	0.170	0.138	0.148	0.146	0.138
19 : Tanning and dressing of leather; manufacture of luggage and footwear	0.043	0.038	0.036	0.036	0.036	0.034	0.036	0.034	0.034
20 : Manufacture of wood and wood products, except furniture; articles of straw	0.121	0.115	0.115	0.110	0.117	0.104	0.107	0.112	0.109
21 : Manufacture of pulp, paper and paper products	0.058	0.052	0.046	0.046	0.045	0.044	0.047	0.051	0.052
22 : Publishing, printing and reproduction of recorded media	0.502	0.529	0.511	0.859	0.823	0.848	0.862	0.788	0.782
23 : Manufacture of coke, refined petroleum products and nuclear fuel	0.111	0.099	0.101	0.104	0.105	0.101	0.101	0.106	0.113
24 : Manufacture of chemicals and chemical products	0.241	0.211	0.193	0.179	0.100	0.109	0.124	0.113	0.115
25 : Manufacture of rubber and plastic products	0.048	0.045	0.046	0.044	0.044	0.045	0.046	0.047	0.050
26 : Manufacture of other non-metallic mineral products	0.152	0.155	0.143	0.149	0.125	0.128	0.140	0.140	0.134
27 : Manufacture of basic metals	0.047	0.044	0.041	0.033	0.032	0.029	0.029	0.030	0.032
28 : Manufacture of fabricated metal products, except machinery and equipment	0.039	0.033	0.032	0.036	0.041	0.038	0.039	0.041	0.046
29 : Manufacture of machinery and equipment n.e.c.	0.121	0.102	0.092	0.084	0.093	0.095	0.092	0.100	0.093
30 : Manufacture of office machinery and computers	0.066	0.066	0.060	0.059	0.058	0.058	0.062	0.063	0.062
31 : Manufacture of electrical machinery and apparatus n.e.c.	0.210	0.205	0.195	0.206	0.181	0.181	0.167	0.203	0.204
32 : Manufacture of radio, television and communication equipment and apparatus	0.173	0.156	0.151	0.126	0.120	0.127	0.129	0.133	0.128
33 : Manufacture of medical, precision and optical instruments, watches and clocks	0.547	0.591	0.649	0.638	0.658	0.672	0.627	0.607	0.485
34 : Manufacture of motor vehicles, trailers and semi-trailers	0.289	0.239	0.240	0.242	0.348	0.325	0.425	0.432	0.359
35 : Manufacture of other transport equipment	0.050	0.042	0.040	0.038	0.034	0.034	0.028	0.029	0.030
36 : Manufacture of furniture; manufacturing n.e.c.	0.197	0.190	0.181	0.172	0.180	0.174	0.170	0.197	0.159
37 : Recycling	0.031	0.031	0.032	0.032	0.031	0.030	0.035	0.039	0.039

Table A3-B. Import penetration ratios by NACE-2: Bulgaria

NACE 2-digit sectors	1995	1996	1997	1998	1999	2000	2001
15 : Manufacture of food products and beverages	0.178	0.149	0.171	0.156	0.132	0.149	0.165
16 : Manufacture of tobacco products	0.095	0.129	0.078	0.118	0.120	0.124	0.027
17 : Manufacture of textiles	0.225	0.256	0.240	0.337	0.737	0.791	0.818
18 : Manufacture of wearing apparel; dressing and dyeing of fur	0.301	0.314	0.367	0.447	0.511	0.511	0.566
19 : Tanning and dressing of leather; manufacture of luggage and footwear	0.289	0.398	0.412	0.442	0.665	0.699	0.707
20 : Manufacture of wood and wood products, except furniture; articles of straw	0.190	0.225	0.214	0.219	0.188	0.221	0.236
21 : Manufacture of pulp, paper and paper products	0.464	0.470	0.429	0.505	0.523	0.576	0.606
22 : Publishing, printing and reproduction of recorded media	0.101	0.117	0.114	0.124	0.160	0.120	0.091
23 : Manufacture of coke, refined petroleum products and nuclear fuel	0.135	0.083	0.096	0.869	0.086	0.136	0.504
24 : Manufacture of chemicals and chemical products	0.535	0.486	0.341	0.576	0.540	0.595	0.617
25 : Manufacture of rubber and plastic products	0.315	0.323	0.348	0.422	0.514	0.556	0.591
26 : Manufacture of other non-metallic mineral products	0.166	0.180	0.152	0.157	0.172	0.237	0.260
27 : Manufacture of basic metals	0.273	0.248	0.173	0.481	0.240	0.448	0.495
28 : Manufacture of fabricated metal products, except machinery and equipment	0.278	0.316	0.265	0.269	0.354	0.396	0.473
29 : Manufacture of machinery and equipment n.e.c.	0.491	0.450	0.458	0.530	0.537	0.606	0.618
30 : Manufacture of office machinery and computers	0.595	0.734	0.586	0.738	0.772	0.770	0.821
31 : Manufacture of electrical machinery and apparatus n.e.c.	0.369	0.408	0.328	0.438	0.466	0.476	0.565
32 : Manufacture of radio, television and communication equipment and apparatus	0.644	0.703	0.763	0.821	0.848	0.823	0.835
33 : Manufacture of medical, precision and optical instruments, watches and clocks	0.726	0.734	0.770	0.770	0.742	0.774	0.784
34 : Manufacture of motor vehicles, trailers and semi-trailers	0.839	0.766	0.783	0.864	0.948	0.943	0.963
35 : Manufacture of other transport equipment	0.399	0.204	0.172	0.459	0.426	0.555	0.590
36 : Manufacture of furniture; manufacturing n.e.c.	0.344	0.352	0.384	0.439	0.452	0.516	0.485
37 : Recycling	-	-	-	-	-	-	-
All manufacturing firms	0.322	0.296	0.262	0.401	0.390	0.433	0.522

Table A3-H. Import penetration ratios by NACE-2: Hungary

NACE 2-digit sectors	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
15 : Manufacture of food products and beverages	0.083	0.095	0.110	0.099	0.096	0.122	0.133	0.113	0.125	0.123
16 : Manufacture of tobacco products	0.019	0.013	0.020	0.032	0.067	0.055	0.040	0.038	0.038	0.014
17 : Manufacture of textiles	0.668	0.699	0.750	0.777	0.540	0.548	0.761	0.772	0.762	0.796
18 : Manufacture of wearing apparel; dressing and dyeing of fur	0.487	0.481	0.485	0.508	0.616	0.585	0.611	0.637	0.650	0.651
19 : Tanning and dressing of leather; manufacture of luggage and footwear	0.626	0.659	0.728	0.740	0.804	0.802	0.823	0.842	0.854	0.846
20 : Manufacture of wood and wood products, except furniture; articles of straw	0.293	0.283	0.331	0.342	0.349	0.385	0.410	0.414	0.448	0.442
21 : Manufacture of pulp, paper and paper products	0.447	0.445	0.491	0.475	0.493	0.532	0.561	0.583	0.627	0.605
22 : Publishing, printing and reproduction of recorded media	0.093	0.097	0.103	0.102	0.091	0.098	0.157	0.152	0.153	0.129
23 : Manufacture of coke, refined petroleum products and nuclear fuel	0.068	0.138	0.181	0.136	0.123	0.099	0.103	0.107	0.130	0.093
24 : Manufacture of chemicals and chemical products	0.534	0.515	0.545	0.562	0.565	0.592	0.646	0.666	0.657	0.656
25 : Manufacture of rubber and plastic products	0.419	0.402	0.439	0.448	0.473	0.552	0.586	0.615	0.624	0.595
26 : Manufacture of other non-metallic mineral products	0.219	0.235	0.263	0.238	0.269	0.294	0.347	0.350	0.355	0.342
27 : Manufacture of basic metals	0.428	0.479	0.526	0.514	0.528	0.574	0.596	0.603	0.608	0.612
28 : Manufacture of fabricated metal products, except machinery and equipment	0.308	0.323	0.364	0.316	0.357	0.413	0.454	0.484	0.490	0.497
29 : Manufacture of machinery and equipment n.e.c.	0.626	0.600	0.652	0.629	0.616	0.682	0.726	0.751	0.752	0.747
30 : Manufacture of office machinery and computers	0.729	0.765	0.772	0.764	0.758	0.893	0.891	0.905	0.923	0.907
31 : Manufacture of electrical machinery and apparatus n.e.c.	0.438	0.410	0.499	0.533	0.587	0.706	0.725	0.723	0.791	0.781
32 : Manufacture of radio, television and communication equipment and apparatus	0.660	0.609	0.612	0.586	0.650	0.793	0.838	0.823	0.824	0.883
33 : Manufacture of medical, precision and optical instruments, watches and clocks	0.664	0.622	0.652	0.633	0.586	0.614	0.639	0.687	0.731	0.715
34 : Manufacture of motor vehicles, trailers and semi-trailers	0.676	0.644	0.664	0.654	0.689	0.794	0.853	0.873	0.887	0.868
35 : Manufacture of other transport equipment	0.615	0.895	0.733	0.644	0.497	0.381	0.381	0.413	0.516	0.555
36 : Manufacture of furniture; manufacturing n.e.c.	0.457	0.424	0.500	0.507	0.532	0.583	0.593	0.628	0.640	0.615
37 : Recycling	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000

Table A3-S. Import penetration ratios by NACE-2: Slovenia

NACE 2-digit sectors	1994	1995	1996	1997	1998	1999	2000	2001	2002
15 : Manufacture of food products and beverages	0.225	0.235	0.153	0.171	0.196	0.184	0.213	0.195	0.221
16 : Manufacture of tobacco products	0.556	0.529	0.487	0.509	0.522	0.506	0.423	0.390	0.379
17 : Manufacture of textiles	0.982	0.942	0.730	0.800	0.801	0.757	0.915	0.942	0.844
18 : Manufacture of wearing apparel; dressing and dyeing of fur	0.465	0.465	0.494	0.555	0.449	0.467	0.540	0.560	0.596
19 : Tanning and dressing of leather; manufacture of luggage and footwear	0.181	0.184	0.144	0.149	0.157	0.175	0.203	0.228	0.226
20 : Manufacture of wood and wood products, except furniture; articles of straw	0.424	0.463	0.330	0.386	0.326	0.398	0.430	0.404	0.413
21 : Manufacture of pulp, paper and paper products	0.114	0.119	0.086	0.092	0.105	0.123	0.133	0.148	0.126
22 : Publishing, printing and reproduction of recorded media	0.328	0.232	0.236	0.021	0.028	0.409	0.581	0.282	0.259
23 : Manufacture of coke, refined petroleum products and nuclear fuel	0.372	0.387	0.333	0.335	0.355	0.345	0.415	0.389	0.372
24 : Manufacture of chemicals and chemical products	0.444	0.485	0.437	0.404	0.418	0.433	0.473	0.465	0.456
25 : Manufacture of rubber and plastic products	0.163	0.208	0.182	0.189	0.207	0.208	0.212	0.238	0.239
26 : Manufacture of other non-metallic mineral products	0.389	0.357	0.423	0.386	0.410	0.378	0.402	0.423	0.408
27 : Manufacture of basic metals	0.266	0.268	0.270	0.289	0.294	0.280	0.292	0.291	0.304
28 : Manufacture of fabricated metal products, except machinery and equipment	0.337	0.310	0.288	0.349	0.331	0.317	0.346	0.367	0.346
29 : Manufacture of machinery and equipment n.e.c.	0.308	0.336	0.229	0.249	0.240	0.258	0.254	0.275	0.341
30 : Manufacture of office machinery and computers	0.336	0.341	0.282	0.301	0.323	0.314	0.362	0.354	0.349
31 : Manufacture of electrical machinery and apparatus n.e.c.	0.444	0.454	0.443	0.368	0.397	0.401	0.563	0.425	0.405
32 : Manufacture of radio, television and communication equipment and apparatus	0.279	0.303	0.322	0.296	0.304	0.298	0.311	0.319	0.318
33 : Manufacture of medical, precision and optical instruments, watches and clocks	0.604	0.635	0.643	0.659	0.688	0.671	0.715	0.698	0.677
34 : Manufacture of motor vehicles, trailers and semi-trailers	0.221	0.180	0.156	0.144	0.123	0.172	0.258	0.278	0.363
35 : Manufacture of other transport equipment	0.233	0.241	0.208	0.227	0.210	0.240	0.255	0.249	0.249
36 : Manufacture of furniture; manufacturing n.e.c.	0.024	0.021	0.026	0.030	0.038	0.022	0.037	0.102	0.028
37 : Recycling	0.225	0.235	0.153	0.171	0.196	0.184	0.213	0.195	0.221
All manufacturing firms	0.350	0.350	0.314	0.314	0.315	0.334	0.379	0.365	0.360

Part B. Selected Estimation Results on the Adjustment of Manufacturing Firms in Bulgaria, Hungary and Slovenia to Competitive Pressure

B1. The Effect of Competitive Pressure on the Firms' Productive Efficiency

Table B1-B1. Bulgaria: estimated augmented Cobb-Douglas PF by NACE-2 digit manufacturing sectors, panel OLS estimations for 1995-2001
Dependent variable: Y=value added=f(K,L)

NACE 2-digit sectors	Const.	L	K	Import penetration	Market concentration (rel. std deviation of sales)	Dummy for foreign controlled firms	Market share	Export share	Lagged IA	Debt ratio	R2	N obs.
1995 - 2001												
15	4.714 ***	0.761 ***	0.240 ***	-0.729 ***	-0.184 ***	0.112 *	1.844 ***	0.145 *	0.101 **	-0.052	0.779	5581
16	6.815 ***	0.492 ***	0.241 ***			-0.212	4.334 ***	0.271	0.080	-0.634	0.851	146
17	4.383 ***	0.693 ***	0.221 ***	-0.243 **	-0.019	0.175	0.554 ***	0.190 *	0.136	-0.161	0.872	921
18	4.119 ***	0.689 ***	0.244 ***	-0.158 *	-0.004	0.018	1.939 ***	0.112 ***	-0.013	0.083	0.857	2693
19	3.889 ***	0.687 ***	0.274 ***	0.091	0.094	0.015	2.945 ***	-0.089	0.015	-0.047	0.863	579
20	4.412 ***	0.685 ***	0.187 ***	0.128	0.084	-0.093	2.476 ***	0.172 *	-0.027	0.530 ***	0.762	1147
21	4.406 ***	0.568 ***	0.292 ***	-0.047	0.001	-0.210	1.394 ***	1.068 ***	0.080	0.059	0.817	514
22	4.293 ***	0.665 ***	0.232 ***	0.712 ***	0.076 *	0.081	2.546 ***	0.682 *	0.136 *	0.010	0.747	1268
23	7.349 ***	0.465 *	0.145		-0.449		1.871 *	5.118 **	0.081	3.089	0.936	29
24	5.195 ***	0.636 ***	0.244 ***	-0.608 ***	-0.040	0.205 *	1.383 ***	0.302 **	0.055	-0.006	0.875	974
25	4.330 ***	0.611 ***	0.261 ***	-0.140	0.079 *	0.208 *	1.394 ***	0.233	-0.063	0.062	0.818	1109
26	4.422 ***	0.751 ***	0.205 ***	-0.017	0.015	0.058	0.886 ***	-0.137	0.188 **	-0.018	0.865	941
27	4.816 ***	0.771 ***	0.157 ***	0.348 **	-0.038	-0.429 *	1.258 ***	-0.160	0.363 **	-0.561 **	0.854	388
28	4.338 ***	0.700 ***	0.197 ***	0.004	0.069 **	0.292 ***	1.626 ***	0.185 *	0.155 **	0.233 *	0.777	1982
29	5.075 ***	0.646 ***	0.213 ***	-0.557 ***	-0.062 **	0.469 ***	1.653 ***	0.300 ***	0.215 ***	-0.074	0.847	2343
30	5.648 ***	0.619 ***	0.173 ***	-1.619	0.385	0.798	1.767 **	-0.492	-0.260	0.234	0.700	161
31	5.282 ***	0.536 ***	0.240 ***	-0.655 ***	-0.033	0.576 ***	2.515 ***	0.115	0.239 **	-0.035	0.823	875
32	4.762 ***	0.524 ***	0.296 ***	-0.872	0.143 *	0.305	1.827 ***	0.114	0.358 **	0.040	0.831	248
33	5.061 ***	0.622 ***	0.164 ***	0.234 *	0.043	1.143 ***	1.574 ***	0.290	-0.245 *	-0.152	0.727	491
34	4.243 ***	0.600 ***	0.280 ***	-0.803	0.418 ***	-0.199	2.647 ***	0.195	-0.020	0.477	0.848	213
35	4.348 ***	0.721 ***	0.234 ***	-0.561 *	0.036	0.501 **	0.560	0.639 ***	0.395 **	-0.097	0.880	196
36	4.163 ***	0.726 ***	0.191 ***	-0.039	0.177 ***	0.010	1.635 ***	0.214 ***	0.047	-0.132	0.801	1237

Notes: * significant at 10%;** significant at 5%;*** significant at 1%. Estimated year dummies not reported.

Table B1-B2. Bulgaria: estimated augmented Cobb-Douglas PF by NACE-2 digit manufacturing sectors, panel OLS estimations for 1995-2001
Dependent variable: Z=sales=f(K,L,M)

NACE 2-digit sectors	Const.	L	K	M	Import penetration	Market concentration (rel. std deviation of sales)	Dummy for foreign controlled firms	Market share	Export share	Lagged investment	Debt ratio	R2	N obs.
1995 - 2001													
15	1.810 ***	0.126 ***	0.062 ***	0.776 ***	-0.161 ***	-0.057 ***	0.022	0.412 ***	-0.022	-0.003	0.026	0.965	5581
16	3.124 ***	0.127 ***	0.050 **	0.694 ***			-0.066	1.684 ***	0.081	-0.060	-0.319	0.973	146
17	2.071 ***	0.177 ***	0.035 ***	0.734 ***	-0.052	-0.011	0.102 *	0.089	0.120 ***	0.026	0.028	0.979	921
18	2.331 ***	0.259 ***	0.098 ***	0.615 ***	-0.075 *	0.017	0.016	0.546 ***	0.069 ***	-0.027	0.024	0.954	2693
19	2.284 ***	0.230 ***	0.070 ***	0.668 ***	-0.062	-0.018	-0.036	0.907 ***	-0.007	0.016	0.049	0.972	579
20	2.001 ***	0.158 ***	0.045 ***	0.726 ***	0.065	0.033	-0.042	0.834 ***	0.017	-0.022	0.181 ***	0.957	1147
21	1.635 ***	0.116 ***	0.047 ***	0.796 ***	-0.018	-0.022	-0.066	0.204 *	0.277 **	-0.011	-0.032	0.978	514
22	1.812 ***	0.145 ***	0.070 ***	0.733 ***	0.180 *	0.037 **	-0.045	0.729 ***	0.305 **	0.043	-0.040	0.955	1268
23	2.297 ***	0.005	0.041	0.849 ***		-0.406 **		0.474 **	0.883	-0.005	0.336	0.997	29
24	1.851 ***	0.081 ***	0.076 ***	0.775 ***	-0.151 ***	-0.001	0.038	0.354 ***	0.102 **	-0.050	-0.042	0.982	974
25	1.983 ***	0.126 ***	0.069 ***	0.727 ***	-0.014	0.037 **	0.039	0.487 ***	0.096	-0.058 *	0.055	0.966	1109
26	1.666 ***	0.115 ***	0.053 ***	0.789 ***	0.086 *	-0.004	-0.023	0.245 ***	-0.032	0.020	-0.046	0.980	941
27	1.367 ***	0.101 ***	0.020	0.849 ***	0.000	0.035	-0.078	0.248 ***	-0.102	0.060	-0.027	0.986	388
28	1.983 ***	0.164 ***	0.063 ***	0.715 ***	0.045	0.022	0.068	0.517 ***	0.050	0.023	0.054	0.954	1982
29	2.269 ***	0.176 ***	0.059 ***	0.712 ***	-0.191 ***	-0.032 ***	0.168 ***	0.505 ***	0.039	0.053 **	-0.013	0.966	2343
30	2.121 ***	0.191 ***	0.005	0.730 ***	-0.120	0.190	0.220	0.569 *	-0.063	-0.093	0.046	0.954	161
31	2.125 ***	0.105 ***	0.074 ***	0.737 ***	-0.122	-0.012	0.126 **	0.646 ***	0.040	0.029	0.004	0.967	875
32	2.471 ***	0.134 ***	0.136 ***	0.646 ***	-0.314	0.027	0.008	0.599 *	-0.023	0.282 ***	0.151	0.945	248
33	2.423 ***	0.195 ***	0.026 *	0.696 ***	0.097	0.046	0.381 ***	0.428 **	0.073	-0.116 *	0.068	0.932	491
34	1.001 ***	0.082 **	0.092 ***	0.826 ***	0.089	0.022	-0.216 *	0.206	-0.149	-0.102	0.287 **	0.973	213
35	1.865 ***	0.177 ***	0.054 ***	0.744 ***	-0.163 *	0.020	0.069	0.155	0.153 **	0.136 **	-0.041	0.984	196
36	1.733 ***	0.164 ***	0.049 ***	0.749 ***	0.113 **	0.034 *	0.030	0.408 ***	0.003	-0.037	-0.098 *	0.962	1237

Notes: * significant at 10%;** significant at 5%;*** significant at 1%. Estimated year dummies not reported.

Table B1-B3. Bulgaria: estimated augmented Cobb-Douglas production frontiers by NACE-2 digit manufacturing sectors, for 1995-2001
Dependent variable: Y=value added=f(K,L)

NACE 2-digit sectors	Const.	L	K	Import penetration	Market concentration (rel. std deviation of sales)	Dummy for foreign controlled firms	Market share	Export share	Lagged investment	Debt ratio	gamma	N obs.	mean eff.
1995 - 2001													
15	5.937 ***	0.608 ***	0.263 ***	-0.616 ***	-0.123 ***	0.109	3.242 ***	0.075	0.065 *	-0.010	0.812 ***	5581	0.43
16	5.264 ***	0.492 ***	0.229 ***	34.543 ***	-1.000 **	-0.161	4.917 ***	0.174	0.124	-0.695	0.606 ***	146	0.67
17	6.012 ***	0.572 ***	0.203 ***	-0.353 ***	-0.050	0.129	0.872 ***	0.125	0.010	-0.145	0.874 ***	921	0.46
18	5.057 ***	0.591 ***	0.258 ***	-0.242 ***	0.001	0.122 **	3.101 ***	0.081 **	-0.054	-0.026	0.790 ***	2693	0.55
19	4.758 ***	0.456 ***	0.362 ***	0.141	0.195 *	0.077	4.073 ***	-0.090	-0.084	0.390 **	0.857 ***	579	0.52
20	5.583 ***	0.588 ***	0.180 ***	0.028	0.092 *	-0.127	2.227 ***	0.139 *	-0.035	0.650 ***	0.790 ***	1147	0.49
21	5.649 ***	0.495 ***	0.276 ***	0.079	0.012	-0.090	1.620 ***	0.771 **	-0.005	0.070	0.713 ***	514	0.51
22	5.433 ***	0.495 ***	0.248 ***	0.811 ***	0.129 ***	0.373 **	3.122 ***	0.205	0.058	-0.029	0.849 ***	1268	0.43
24	6.366 ***	0.519 ***	0.269 ***	-0.720 ***	0.024	0.312 **	1.667 ***	0.191 *	0.006	-0.026	0.837 ***	974	0.45
25	5.738 ***	0.535 ***	0.245 ***	-0.200	0.027	0.346 **	1.489 ***	0.030	-0.121 *	0.064	0.804 ***	1109	0.48
26	6.187 ***	0.551 ***	0.225 ***	-0.125	-0.022	0.111	1.270 ***	0.076	-0.023	-0.002	0.906 ***	941	0.43
27	6.702 ***	0.511 ***	0.239 ***	0.078	-0.011	-0.907 ***	1.332 ***	-0.294	0.230 *	-0.296	0.928 ***	388	0.32
28	5.395 ***	0.549 ***	0.235 ***	0.151	0.045	0.345 ***	2.080 ***	0.151	0.112 **	0.271 **	0.804 ***	1982	0.48
29	6.095 ***	0.546 ***	0.223 ***	-0.489 ***	-0.044 *	0.635 ***	1.944 ***	0.130 *	0.211 ***	0.087	0.796 ***	2343	0.50
30	7.877 ***	0.592 ***	0.060	-0.770	0.029	0.632	2.521 ***	-0.728 *	-0.067	-0.437	0.888 ***	161	0.34
31	6.716 ***	0.359 ***	0.254 ***	-0.427 *	-0.030	0.795 ***	3.917 ***	0.077	0.026	-0.211	0.884 ***	875	0.43
32	5.776 ***	0.431 ***	0.330 ***	-0.763	0.089	0.288	2.030 ***	0.107	0.259 *	0.268	0.810 ***	248	0.47
33	6.721 ***	0.368 ***	0.231 ***	0.241	-0.006	0.755 **	1.907 ***	0.373 **	-0.249 ***	-0.250	0.906 ***	491	0.39
34	7.287 ***	0.364 ***	0.343 ***	-1.941 ***	0.029	-0.771 *	2.668 ***	-0.219	-0.019	0.188	0.918 ***	213	0.36
35	5.291 ***	0.644 ***	0.261 ***	-0.577 *	0.030	0.535 *	0.741 *	0.331	0.233	-0.311	0.734 ***	196	0.54
36	5.469 ***	0.621 ***	0.186 ***	-0.213 *	0.130 ***	0.197 *	2.666 ***	0.033	0.040	-0.163	0.774 ***	1237	0.52

Notes: * significant at 10%;** significant at 5%;*** significant at 1%. Estimated year dummies not reported.

Table B1-B4. Bulgaria: estimated augmented Cobb-Douglas production frontiers by NACE-2 digit manufacturing sectors, for 1995-2001
Dependent variable: Z=sales=f(K,L,M)

NACE 2-digit sectors	Const.	L	K	M	Import penetration	Market concentration (rel. std deviation of sales)	Dummy for foreign controlled firms	Market share	Export share	Lagged investment	Debt ratio	gamma	N obs.	mean eff.
1995 - 2001														
15	2.341 ***	0.104 ***	0.076 ***	0.747 ***	-0.129 ***	-0.045 ***	0.012	0.781 ***	-0.012	0.006	0.021	0.695 ***	5581	0.73
16	5.290 ***	0.150 ***	0.050 **	0.664 ***	10.417 ***	-2.394 ***	-0.034	1.986 ***	0.051	-0.063	-0.375 **	0.525 ***	146	0.85
17	3.442 ***	0.131 ***	0.007	0.691 ***	-0.119 ***	-0.007	0.062	0.249 ***	0.077 *	0.026	0.003	0.934 ***	921	0.60
18	2.864 ***	0.228 ***	0.108 ***	0.599 ***	-0.115 **	0.007	0.082 ***	1.215 ***	0.054 ***	-0.017	0.012	0.748 ***	2693	0.72
19	3.039 ***	0.176 ***	0.072 ***	0.641 ***	0.026	0.013	-0.070	1.599 ***	-0.015	-0.018	0.205 **	0.815 ***	579	0.71
20	2.417 ***	0.153 ***	0.050 ***	0.699 ***	0.053	0.042 *	-0.052	0.862 ***	0.017	-0.018	0.207 ***	0.508 ***	1147	0.81
21	2.007 ***	0.101 ***	0.055 ***	0.776 ***	0.004	-0.018	-0.063	0.265 *	0.247 **	-0.032	-0.030	0.530 ***	514	0.83
22	2.271 ***	0.131 ***	0.085 ***	0.696 ***	0.254 **	0.053 ***	-0.017	0.931 ***	0.219	0.038	-0.048	0.614 ***	1268	0.77
24	2.469 ***	0.060 ***	0.098 ***	0.733 ***	-0.197 ***	0.019	0.065	0.541 ***	0.090 *	-0.041	-0.095	0.731 ***	974	0.75
25	2.438 ***	0.119 ***	0.073 ***	0.704 ***	-0.012	0.039 **	0.075	0.562 ***	0.046	-0.065 **	0.060	0.571 ***	1109	0.78
26	2.405 ***	0.108 ***	0.067 ***	0.734 ***	-0.040	-0.008	-0.001	0.454 ***	-0.016	-0.009	-0.016	0.777 ***	941	0.77
27	1.739 ***	0.074 ***	0.016	0.848 ***	0.014	0.024	-0.127	0.366 ***	-0.054	0.082 *	-0.030	0.684 ***	388	0.79
28	2.586 ***	0.143 ***	0.079 ***	0.674 ***	0.094 *	0.005	0.081	0.789 ***	0.040	0.026	0.076	0.685 ***	1982	0.75
29	2.789 ***	0.169 ***	0.067 ***	0.679 ***	-0.151 ***	-0.027 **	0.254 ***	0.666 ***	0.018	0.069 ***	0.012	0.696 ***	2343	0.76
30	2.936 ***	0.152 ***	0.008	0.671 ***	0.446	0.159	-0.079	0.756 ***	-0.010	0.021	-0.322	0.934 ***	161	0.58
31	3.067 ***	0.073 ***	0.104 ***	0.66 ***	0.027	-0.027	0.195 ***	1.393 ***	0.026	-0.010	-0.069	0.859 ***	875	0.68
32	3.526 ***	0.097 ***	0.199 ***	0.558 ***	-0.325	0.027	-0.032	0.928 **	-0.066	0.212 **	0.718 ***	0.869 ***	248	0.60
33	3.323 ***	0.153 ***	0.062 ***	0.636 ***	0.116	0.000	0.310 **	0.651 **	0.170 *	-0.093 *	0.054	0.815 ***	491	0.66
34	1.752 ***	0.070 **	0.113 ***	0.791 ***	-0.255	-0.005	-0.339 ***	0.784 ***	-0.091	-0.055	0.235 *	0.752 ***	213	0.75
35	2.138 ***	0.187 ***	0.048 ***	0.736 ***	-0.190 *	0.013	0.103	0.212	0.095	0.123 **	-0.059	0.522 ***	196	0.84
36	2.086 ***	0.154 ***	0.054 ***	0.733 ***	0.084 *	0.028	0.097 **	0.634 ***	-0.040	-0.033	-0.102 *	0.541 ***	1237	0.82

Notes: * significant at 10%;** significant at 5%;*** significant at 1%. Estimated year dummies not reported.

Table B1-H1. Hungary: estimated augmented Cobb-Douglas PF by NACE-2 digit manufacturing sectors, panel OLS estimations for 1995-2001
Dependent variable: Y=value added=f(K,L)

NACE 2-digit sectors	Const.	L	K	Import penetration	Market concentration (rel. std deviation of sales)	Dummy for foreign controlled firms	Market share	Export share	Lagged investment	Debt ratio	R2	N obs.
1995 - 2001												
15	-0.800 ***	0.702 ***	0.315 ***	0.174 *	-0.006	0.284 ***	1.374 ***	0.073	0.000	0.013 ***	0.831	5022
17	-0.591 ***	0.614 ***	0.334 ***	0.117 *	0.023 **	0.211 ***	0.306 ***	0.071	-0.002	-0.007	0.809	1349
18	-0.953 ***	0.742 ***	0.205 ***	0.117	-0.026 ***	0.154 ***	2.965 ***	0.366 ***	0.000	-0.020	0.845	2616
19	-1.456 ***	0.743 ***	0.152 ***	0.947 ***	0.043	0.023 ***	10.271 ***	0.427 ***	0.004	0.007	0.823	1050
20	-0.886 ***	0.663 ***	0.261 ***	0.578 ***	0.009	-.051	5.910 ***	0.442 ***	0.000	-0.007	0.804	1556
21	-0.094	0.722 ***	0.309 ***	-0.560 **	-0.072 **	0.348 ***	1.911 ***	-0.319 **	0.000	0.172 ***	0.855	455
22	-0.443 ***	0.610 ***	0.296 ***	-0.217	0.100 ***	0.801 ***	2.663 ***	0.255 *	0.000	0.031 ***	0.763	1877
24	-0.313 ***	0.560 ***	0.388 ***	0.249 *	0.040	0.318 ***	0.535 ***	0.144	0.004	-0.139 **	0.819	998
25	-0.644 *	0.651 ***	0.370 ***	0.338 ***	-0.003	0.334 ***	0.992 **	-0.029	0.000	-0.008	0.807	1800
26	-0.280 ***	0.661 ***	0.368 ***	0.318 ***	-0.146 ***	0.285 ***	0.722 ***	-0.186 **	0.001	-0.081 **	0.867	1335
27	-0.930 ***	0.816 ***	0.223 ***	0.286 ***	0.035	0.429 ***	0.236 **	0.097	0.004 *	-0.013	0.877	554
28	-0.429 ***	0.760 ***	0.209 ***	-0.080 **	-0.023 *	0.166 ***	2.430 ***	0.265 ***	0.000	0.000	0.766	4245
29	0.278 ***	0.723 ***	0.179 ***	-0.343 ***	-0.049 ***	0.317 ***	1.151 ***	0.195 ***	0.000	0.002	0.810	3136
30	0.533	0.410 ***	0.425 ***	0.757 *	0.039	0.083	0.256 ***	0.120	0.006	0.088 ***	0.849	152
31	-0.094	0.666 ***	0.303 ***	0.022	-0.012	0.153 ***	0.291 ***	-0.118 *	-0.001	-0.033	0.863	1254
32	-0.185	0.780 ***	0.183 ***	-0.255	0.046 *	0.567 ***	1.945 **	-0.297 ***	0.000	0.057 ***	0.830	754
33	-0.320	0.725 ***	0.310 ***	-0.716 ***	0.058	0.311 ***	0.402	-0.090	0.005 *	0.257 ***	0.793	900
34	-0.268	0.758 ***	0.326 ***	-0.382 **	-0.099 **	0.236 ***	0.987 ***	-0.042	0.007 **	-0.029	0.904	653

35	-0.357	0.691***	0.347***	-0.609**	0.042	-.021	1.007**	0.131	0.000	-0.161	0.802	209
36	-0.824***	0.733***	0.259***	0.085	-0.026	0.207***	1.372***	0.250***	-0.001	0.017*	0.808	1479
37	-0.350	0.655***	0.256***	0.000	0.306	-.369*	1.927***	0.298	0.198*	0.014*	0.771	97

Notes: * significant at 10%;** significant at 5%;*** significant at 1%. Estimated year dummies not reported.

Table B1-H2. Hungary: estimated augmented Cobb-Douglas PF by NACE-2 digit manufacturing sectors, panel OLS estimations for 1995-2001
Dependent variable: Z=sales=f(K,L,M)

NACE 2-digit sectors	Const.	L	K	M	Import penetration	Market concentration (rel. std deviation of sales)	Dummy for foreign controlled firms	Market share	Export share	Lagged investment	Debt ratio	R2	N obs.
1995 - 2001													
15	0.228 ***	0.135 ***	0.021 ***	0.863 ***	-0.009	0.003	0.046 ***	0.160 ***	0.037 ***	0.000	0.000	0.987	5312
17	0.480 ***	0.193 ***	0.067 ***	0.717 ***	0.041	0.017 ***	0.127 ***	0.068 **	0.095 ***	0.000	-0.003	0.959	1397
18	0.364 ***	0.327 ***	0.075 ***	0.587 ***	0.065	-0.022 ***	0.061 ***	1.079 ***	0.179 ***	0.000	-0.004	0.947	2649
19	0.184	0.350 ***	0.014	0.607 ***	0.311 ***	-0.021	-0.013	3.338 ***	0.292 ***	0.001	0.020 **	0.935	1082
20	0.358 ***	0.126 ***	0.034 ***	0.831 ***	0.073 **	0.003	-0.044 **	0.919 ***	0.138 ***	0.000	-0.006 *	0.976	1617
21	0.412 ***	0.131 ***	0.003	0.878 ***	-0.167 ***	-0.017 **	0.089 ***	0.177	0.039	0.000	-0.001 ***	0.989	469
22	0.415 ***	0.109 ***	0.042 ***	0.843 ***	0.004	0.016 **	0.087 ***	0.292 ***	0.225 ***	0.000	-0.001	0.974	1964
24	0.371 ***	0.086 ***	0.042 ***	0.882 ***	0.047	-0.018 **	0.061 ***	0.031	0.046 *	0.002 **	-0.011	0.985	1029
25	0.278 ***	0.132 ***	0.063 ***	0.816 ***	0.189 ***	0.020 **	0.059 ***	-0.119	0.075 ***	0.000	-0.007	0.979	1850
26	0.442 ***	0.196 ***	0.048 ***	0.785 ***	0.067 **	-0.029 ***	0.048 ***	0.259 ***	0.008	0.000	-0.022 *	0.980	1370
27	0.286 ***	0.178 ***	-0.016	0.847 ***	-0.014	0.003	0.133 ***	-0.023	0.111 ***	0.002	-0.039 ***	0.990	571
28	0.445 ***	0.201 ***	0.029 ***	0.777 ***	-0.025 *	-0.007	0.048 ***	0.290 ***	0.116 ***	0.000	-0.003	0.966	4321
29	0.608 ***	0.195 ***	0.012 ***	0.781 ***	-0.110 ***	-0.014 **	0.078 ***	-0.015	0.130 ***	0.000	-0.009 *	0.970	3193
30	0.510 ***	0.154 ***	0.056 **	0.800 ***	0.027	0.025 ***	-0.013	0.015	0.123	0.002	0.007	0.987	154
31	0.686 ***	0.186 ***	0.069 ***	0.713 ***	-0.008	-0.005	0.115 ***	0.064 **	0.083 ***	0.001	-0.020 *	0.980	1275
32	0.502 ***	0.262 ***	-0.012	0.786 ***	-0.123	-0.015	0.172 ***	0.188	-0.066	-0.001	0.001	0.963	790
33	0.325 **	0.237 ***	-0.002	0.800 ***	-0.001	0.021	0.007	0.037	0.073	0.000	-0.014	0.948	937
34	0.553 ***	0.195 ***	0.044 ***	0.774 ***	-0.061	-0.036 *	0.092 ***	0.232 ***	0.073 **	0.002 *	-0.010	0.986	667
35	0.624 ***	0.151 ***	0.062 ***	0.788 ***	-0.105	-0.020	-0.075	0.194	0.007	0.000	-0.028	0.983	214
36	0.412 ***	0.182 ***	0.039 ***	0.765 ***	0.026	-0.006	0.047 **	0.363 **	0.168 ***	0.000	0.003	0.969	1531
37	-0.227	0.187 ***	-0.114 ***	0.952 ***	0.000	0.154	-0.073 *	0.166	0.356 ***	0.017 ***	-0.005	0.975	117

Notes: * significant at 10%;** significant at 5%;*** significant at 1%. Estimated year dummies not reported.

Table B1-H3. Hungary: estimated augmented Cobb-Douglas production frontiers by NACE-2 digit manufacturing sectors, for 1995-2001
Dependent variable: Y=value added=f(K,L)

NACE 2-digit sectors	Const.	L	K	Import penetration	Market concentration (rel. std deviation of sales)	Dummy for foreign controlled firms	Market share	Export share	Lagged investment	Debt ratio	gamma	N obs.	mean eff.
1995 - 2001													
15	-0.088	0.667 ***	0.324 ***	0.152 *	0.013	0.337 ***	1.455 ***	0.172 ***	0.000	0.014 **	0.755 ***	5022	0.57
17	0.020	0.620 ***	0.334 ***	0.137 **	0.031 ***	0.195 ***	0.324 ***	0.011	-0.002	-0.005	0.762 ***	1349	0.61
18	-0.268 ***	0.715 ***	0.223 ***	0.046	-0.026 ***	0.143 ***	4.098 ***	0.288 ***	0.000	-0.009	0.816 ***	2616	0.62
19	-0.725 ***	0.688 ***	0.170 ***	0.817 ***	0.046	0.014	12.200 ***	0.404 ***	0.005	0.007	0.666 ***	1050	0.60
20	-0.074	0.607 ***	0.277 ***	0.475 ***	0.010	0.015	6.374 ***	0.432 ***	0.000	-0.009	0.831 ***	1556	0.52
21	0.574 ***	0.695 ***	0.307 ***	-0.486 **	-0.057 *	0.333 ***	2.279 ***	-0.313 *	0.000	0.159 *	0.800 ***	455	0.57
22	0.213 **	0.626 ***	0.286 ***	-0.323 **	0.093 ***	0.804 ***	3.076 ***	0.250 **	0.000	0.032 ***	0.731 ***	1877	0.57
24	0.733 ***	0.472 ***	0.419 ***	0.311 **	0.031	0.359 ***	0.800 ***	0.123	0.005	-0.109 **	0.843 ***	998	0.44
25	0.151	0.614 ***	0.378 ***	0.314 ***	-0.012	0.412 ***	1.061 **	-0.079	0.000	0.004	0.790 ***	1800	0.58
26	0.430 ***	0.615 ***	0.377 ***	0.309 ***	-0.128 ***	0.299 ***	0.870 ***	-0.108	0.001 **	-0.051 **	0.785 ***	1335	0.57
27	-0.182	0.755 ***	0.259 ***	0.315 ***	0.039	0.452 ***	0.233	0.032	0.004	-0.007	0.747 ***	554	0.63
28	0.156 **	0.738 ***	0.213 ***	-0.091 ***	-0.022 *	0.174 ***	2.616 ***	0.285 ***	0.000	0.006	0.640 ***	4245	0.64
29	0.761 ***	0.705 ***	0.184 ***	-0.351 **	-0.048 ***	0.319 ***	1.210 ***	0.209 ***	0.000	0.002	0.501 ***	3136	0.68
30	-0.206	0.462 ***	0.400 ***	0.773	0.025	-.024	0.269 **	0.014	-0.002	0.084	0.719 ***	152	0.97
31	0.476 ***	0.645 ***	0.317 ***	0.073	-0.003	0.166 ***	0.280 ***	-0.176 ***	0.000	-0.019	0.715 ***	1254	0.59
32	0.634 ***	0.741 ***	0.206 ***	-0.357 **	0.048 *	0.539 ***	2.293 ***	-0.290 ***	0.000	0.058 ***	0.672 ***	754	0.46
33	0.616 **	0.641 ***	0.337 ***	-0.606 ***	0.065	0.314 ***	0.837	-0.140	0.006 *	0.316 ***	0.814 ***	900	0.51
34	0.116	0.744 ***	0.332 ***	-0.392 **	-0.098 **	0.233 ***	0.993 ***	-0.032	0.007 **	-0.028	0.352 **	653	0.71
35	1.059 **	0.674 ***	0.224 ***	-0.003	-0.039	-.035	1.742 ***	0.034	0.001	-0.242 ***	1.000 ***	209	0.52
36	-0.188 *	0.719 ***	0.255 ***	0.074	-0.038 *	0.203 ***	1.820 ***	0.283 ***	0.000	0.017	0.672 ***	1479	0.65
37	0.993	0.575 ***	0.354 ***	0.000	-0.053	-.366	2.817 ***	0.186	0.267 **	0.014	1.000 ***	97	0.48

Notes: * significant at 10%;** significant at 5%;*** significant at 1%. Estimated year dummies not reported.

Table B1-H4. Hungary: estimated augmented Cobb-Douglas production frontiers by NACE-2 digit manufacturing sectors, for 1995-2001
Dependent variable: Z=sales=f(K,L,M)

NACE 2-digit sectors	Const.	L	K	M	Import penetration	Market concentration (rel. std deviation of sales)	Dummy for foreign controlled firms	Market share	Export share	Lagged investment	Debt ratio	gamma	N obs.	mean eff.
1995 - 2001														
15	0.332 ***	0.134 ***	0.025 ***	0.858 ***	-0.008	0.004	0.047 ***	0.165 ***	0.041 ***	0.000	0.000	0.269 ***	5312	0.91
17	0.767 ***	0.201 ***	0.077 ***	0.696 ***	0.032	0.016 ***	0.124 ***	0.069	0.077 **	0.000	-0.001	0.635 ***	1397	0.80
18	0.636 ***	0.326 ***	0.083 ***	0.574 ***	0.064 *	-0.022 ***	0.057 ***	1.361 ***	0.162 ***	0.000	-0.004	0.574 ***	2649	0.81
19	0.576 ***	0.320 ***	0.030 ***	0.599 ***	0.309 ***	-0.018	-0.014	3.840 ***	0.279 ***	0.002	0.019	0.679 ***	1082	0.75
20	0.645 ***	0.117 ***	0.052 ***	0.805 ***	0.047	-0.001	-0.024	1.047 ***	0.140 ***	0.000	-0.005	0.735 ***	1617	0.84
21	0.591 ***	0.141 ***	0.005	0.863 ***	-0.169 **	-0.019 **	0.092 ***	0.220	0.025	0.000	-0.001	0.601 ***	469	0.88
22	0.648 ***	0.117 ***	0.048 ***	0.821 ***	-0.028	0.019 **	0.097 ***	0.373 ***	0.297 ***	0.000	0.000	0.683 ***	1964	0.83
24	0.519 ***	0.084 ***	0.049 ***	0.875 ***	0.045	-0.018 *	0.061 ***	0.038	0.045	0.002 ***	-0.012	0.351 ***	1029	0.89
25	0.384 ***	0.133 ***	0.065 ***	0.811 ***	0.183 ***	0.021 **	0.062 ***	-0.109	0.075 ***	0.000	-0.007	0.264 ***	1850	0.91
26	0.601 ***	0.196 ***	0.052 ***	0.775 ***	0.072 ***	-0.028 ***	0.050 ***	0.282 ***	0.008	0.000	-0.021 ***	0.402 ***	1370	0.87
27	0.526 ***	0.161 ***	-0.001	0.837 ***	-0.007	0.006	0.138 ***	-0.022	0.099 ***	0.003	-0.030 ***	0.694 ***	571	0.87
28	0.533 ***	0.201 ***	0.029 ***	0.775 ***	-0.025 *	-0.006	0.049 ***	0.298 *	0.117 ***	0.000	-0.003	0.170 ***	4321	0.92
29	0.601	0.194 ***	0.010 ***	0.787 ***	-0.112 ***	-0.014 *	0.070 ***	-0.054	0.127 ***	0.000	-0.008	0.001	3193	0.99
30	0.867 ***	0.113 **	0.079 **	0.787 ***	0.090	0.022 *	0.019	0.006	0.208 **	0.006	0.012	0.775 ***	154	0.81
31	0.682	0.192 ***	0.065 ***	0.714 ***	-0.007	-0.005	0.112 ***	0.064	0.084 ***	0.001	-0.022 *	0.002	1275	0.99
32	1.006 ***	0.234 ***	0.025 ***	0.758 ***	-0.150	-0.018	0.189 ***	0.301	-0.039	-0.001 **	0.010 **	0.797 ***	790	0.71
33	0.777 ***	0.210 ***	0.033 ***	0.765 ***	-0.071	0.043	0.096 **	-0.151	0.063	0.000	-0.007	0.788 ***	937	0.72
34	0.870 ***	0.171 ***	0.069 ***	0.758 ***	-0.084	-0.034 **	0.095 ***	0.220 **	0.100 ***	0.002 **	-0.010	0.799 ***	667	0.80
35	0.984 ***	0.167 ***	0.069 ***	0.740 ***	-0.118	-0.024	-0.067	0.293 **	0.064	0.000	-0.040	0.850 ***	214	0.83
36	0.419	0.174 ***	0.035 ***	0.779 ***	0.052	-0.012	0.047 **	0.332 ***	0.157 ***	0.000	0.002	0.002	1531	0.99
37	0.494	0.140 ***	-0.032	0.877 ***	0.000	0.177	-0.115 ***	-0.084	0.186 *	0.022	-0.002	1.000 ***	117	0.84

Notes: * significant at 10%;** significant at 5%;*** significant at 1%. Estimated year dummies not reported.

Table B1-S1. Slovenia: estimated augmented Cobb-Douglas PF by NACE-2 digit manufacturing sectors, panel OLS estimations for 1995-2002
Dependent variable: Y=value added=f(K,L)

NACE 2-digit sectors	L	K	Dummy foreign owned firms	Dummy foreign affiliates	Export share	Market share	Concentr. (rel. std deviation of sales)	Import penetr.	No. imp. products	Average import tarrif	Const.	No. obs.	Adj R2	AR(1)	AR(2)
15	0.731 ***	0.193 ***	0.299 ***	-0.024	-0.224	0.093 ***	0.195	0.213 **	0.472 ***	-0.035	5.430 ***	953	0.874	0.000 ***	0.000 ***
17	0.795 ***	0.090 ***	0.164 **	0.039	-0.114 ***	0.035 ***	-0.011	-0.171 *	0.066	-0.331	8.415 ***	585	0.878	0.000 ***	0.000 ***
18	0.821 ***	0.118 ***	0.004	-0.008	-0.023	0.015 ***	0.069	-0.021	0.228	-0.366 **	7.031 ***	534	0.903	0.000 ***	0.000 ***
19	0.657 ***	0.224 ***	0.408 **	0.057	-0.009	0.016	-0.065	-0.147	0.192	-0.383 **	7.654 ***	187	0.893	0.033 *	0.568
20	0.684 ***	0.119 ***	-0.225 **	-0.247 ***	0.144 **	0.149 ***	-0.828 ***	0.269 ***	-0.001	-0.594 ***	8.374 ***	725	0.848	0.000 ***	0.000 ***
21	0.599 ***	0.274 ***	0.254 ***	-0.146 *	-0.260 ***	0.043 ***	0.249	0.153	0.948	-0.572 ***	3.740	255	0.920	0.000 ***	0.003 ***
22	0.684 ***	0.260 ***	0.309 **	-0.088	-0.780 ***	0.083 ***	0.028	-0.002	0.092	-0.338	6.310 ***	707	0.821	0.000 ***	0.000 ***
24	0.606 ***	0.210 ***	0.154 ***	0.194 ***	-0.021	0.062 ***	0.029	0.030	-0.366 **	-1.011 ***	7.594 ***	479	0.893	0.000 ***	0.000 ***
25	0.707 ***	0.172 ***	0.097 *	0.131 *	-0.069	0.024 ***	0.026	0.162 *	0.083	-0.765 ***	6.551 ***	694	0.856	0.000 ***	0.000 ***
26	0.536 ***	0.226 ***	0.362 ***	-0.047	0.122	0.112 ***	0.473	0.362 **	0.517 ***	-0.087	4.424 ***	535	0.874	0.000 ***	0.000 ***
27	0.621 ***	0.190 ***	0.135	0.244 **	0.126 *	0.028 ***	-0.299	-0.030	-0.067	-1.100	9.324 ***	244	0.875	0.007 ***	0.024 **
28	0.660 ***	0.176 ***	0.164 ***	0.059	-0.058 *	0.095 ***	-0.674 **	0.314	-0.142 **	-0.263	7.414 ***	1628	0.829	0.000 ***	0.000 ***
29	0.676 ***	0.120 ***	0.188 ***	0.123 ***	0.076 *	0.111 ***	-0.054	-0.010	0.165	-1.003 ***	7.985 ***	1151	0.839	0.000 ***	0.000 ***
30	0.440 ***	0.207 ***	-0.381	-0.007	0.940 **	0.083 ***	0.216	0.033	1.233 **	-0.693 ***	5.069 **	164	0.659	0.017 **	0.076 *
31	0.597 ***	0.226 ***	0.218 ***	0.146 ***	0.000	0.068 ***	-0.310	0.115	0.182 **	-0.368	7.236 ***	633	0.930	0.000 ***	0.000 ***
32	0.666 ***	0.133 ***	0.129 *	0.283 ***	0.020	0.028 ***	0.008	0.014	0.040	-0.794 ***	7.774 ***	306	0.873	0.002 ***	0.003 ***
33	0.554 ***	0.260 ***	-0.029	0.066	-0.036	0.031 ***	-0.099	-0.057	-0.651 *	-1.219 ***	8.525 ***	476	0.828	0.000 ***	0.000 ***
34	0.891 ***	0.098 ***	0.366 ***	-0.018	-0.142 ***	0.007 **	-0.132 **	0.074 *	-0.348 **	-0.554 ***	9.080 ***	303	0.874	0.007 ***	0.003 ***
35	1.171 ***	0.075	-0.332	-0.314	0.080	0.000	-0.051	0.762 ***	0.958 *	-0.252	3.626	51	0.804	0.364	0.421
36	0.815 ***	0.107 ***	0.060	-0.012	-0.096	0.092 ***	-0.681 ***	-0.046	-0.436 **	-0.289 ***	9.123 ***	799	0.804	0.000 ***	0.001 ***

Notes: * significant at 10%;** significant at 5%;*** significant at 1%.

Table B1-S2. Slovenia: estimated augmented Cobb-Douglas PF by NACE-2 digit manufacturing sectors, panel estimations with fixed effects for 1995-2002
Dependent variable: Y=value added=f(K,L)

NACE 2-digit sectors	L	K	Dummy foreign owned firms	Dummy foreign affiliates	Export share	Market share	Concentr. (rel. std deviation of sales)	Import penetr.	No. imp. products	Average import tarrif	No. obs.	Adj R2	AR(1)	AR(2)
15	0.750 ***	0.118 **	0.142	-0.052	-0.473 **	0.194 **	0.219	0.214 ***	0.005 ***	-0.005	944	0.447	0.442	0.195
17	0.740 ***	-0.017	-0.003	0.060	-0.035	0.040 ***	-0.018	-0.184 ***	0.000	-0.045 ***	582	0.600	0.115	0.587
18	0.719 ***	0.078 **	-0.089 ***	-0.090	0.016	0.173 ***	0.109	-0.005	0.004	-0.014 *	526	0.581	0.054 *	0.042 **
19	0.454 ***	0.233	0.241	0.113	0.024	0.039 **	-0.040	-0.121	0.002	-0.040 ***	185	0.370	0.621	0.156
20	0.699 ***	0.136 ***	-0.316	-0.255 *	0.074	0.238 ***	-0.795 ***	0.261 ***	0.000	-0.049 ***	712	0.475	0.424	0.099 *
21	0.430 **	0.150 ***	0.075	-0.301 ***	-0.233	0.062 *	0.412 *	0.300 **	0.010 ***	-0.071 ***	255	0.667	0.023 **	0.607
22	0.472 ***	0.058	0.337	-0.003	0.794 **	0.238 ***	-0.026	-0.015	-0.001	-0.060 ***	696	0.435	0.866	0.084 *
24	0.701 ***	0.093	0.014	-0.051	-0.019	0.198 ***	-0.089	-0.016	-0.005 ***	-0.123 ***	478	0.622	0.115	0.338
25	0.589 ***	0.153 **	0.007	0.166	0.235	0.035 ***	0.031	0.153 **	0.001	-0.068 ***	685	0.620	0.052 *	0.279
26	0.405 ***	0.163 ***	-0.070	-0.162 *	0.207	0.133 **	0.434	0.389 ***	0.006 ***	-0.009	530	0.492	0.499	0.875
27	0.669 ***	0.256 ***	0.288	0.223 **	-0.020	-0.015	-0.265 *	-0.024	-0.001	-0.123 **	241	0.562	0.834	0.092 *
28	0.708 ***	0.158 ***	0.205 ***	0.092	0.244 ***	0.175 **	-0.375 **	0.221 **	-0.001	-0.035 ***	1607	0.680	0.619	0.000 ***
29	0.721 ***	0.140 ***	0.113	0.064	0.099	0.126 **	-0.002	-0.014	0.002 *	-0.083 ***	1143	0.611	0.310	0.015 **
30	1.110 ***	-0.114	-0.068	-0.021	1.278	0.087 ***	0.277	-0.106	0.004	-0.108 ***	160	0.740	0.788	0.185
31	0.594 ***	0.169 ***	0.090	0.131 *	0.099	0.123 ***	-0.230	0.100	0.001	-0.050 ***	622	0.711	0.027 **	0.043 **
32	1.067 ***	0.064	0.227 **	0.062	0.013	0.078 ***	0.037	0.012	0.001	-0.070 ***	302	0.776	0.774	0.461
33	0.566 ***	0.179 ***	-0.066	-0.310 **	0.032	0.130 **	-0.111	0.368 ***	-0.005 ***	-0.108 ***	467	0.697	0.207	0.238
34	1.168 ***	0.133 ***	0.162	0.190	0.036	0.006	-0.125 ***	-0.082	-0.002	-0.052 ***	300	0.699	0.821	0.804
35	1.497 ***	-0.069	0.447 **	0.013	0.284 **	0.003	-0.013	0.304 ***	0.007 **	-0.055	48	0.696	0.164	0.653
36	0.710 ***	0.091 ***	0.195	0.035	-0.167	0.106 **	-0.614 ***	0.002	-0.004 **	-0.026 ***	792	0.463	0.607	0.112

Notes: * significant at 10%;** significant at 5%;*** significant at 1%.

Table B1-S3. Slovenia: estimated augmented dynamic Cobb-Douglas PF by NACE-2 digit manufacturing sectors, system-GMM estimations for 1995-2002
Dependent variable: Y=value added=f(K,L)

NACE 2-digit sectors	Lagged dependent variable	L	K	Dummy foreign owned firms	Dummy foreign affiliates	Export share	Market share	Concentr. (rel. std deviation of sales)	Import penetr.	No. imp. products	Average import tarrif	Const.	No. obs.	Adj R2	AR(1)	AR(2)
15	0.428 ***	0.803 ***	-0.004	0.280 *	0.184 **	-0.339	0.049	0.245 *	0.087	0.319 ***	-0.007	1.873 ***	953	1.000	0.042 **	0.077 *
17	0.400 ***	0.828 ***	0.062	-0.022	0.098	-0.056	0.020 ***	-0.060	-0.206 ***	0.024	-0.292 **	5.952 ***	585	1.000	0.010 ***	0.817
18	0.393 ***	0.640 ***	0.114	0.031	0.187 **	-0.020	0.021 ***	0.043	0.015	-0.067	-0.075	5.132	534	1.000	0.001 ***	0.123
19	0.114	0.895 ***	0.335 **	0.482 ***	0.139	0.065	0.012	-0.079	-0.052	-0.098	-0.229 *	7.794 ***	187	0.752	0.006 ***	0.358
20	0.052	1.191 ***	0.138 **	0.117	-0.241	-0.031	0.153 ***	-0.388	0.304 ***	0.107	-0.356 **	6.677 ***	725	1.000	0.039 **	0.122
21	0.349 ***	0.511	0.309 **	-0.049	-0.157 **	0.206	0.047 ***	0.404	0.188	0.803 **	-0.396 ***	-4.330	255	0.789	0.001 ***	0.159
22	0.585 ***	0.382	0.301 *	0.064	-0.169 *	0.067	0.037	-0.227	-0.037	-0.115	0.006	3.472 **	707	0.000	0.000 ***	0.125
24	0.480 ***	0.398 ***	0.236	0.029	-0.123 *	0.175	0.046 ***	0.440 ***	0.038	0.155	-0.158	0.564	479	0.821	0.012 **	0.178
25	0.335 ***	0.772 ***	0.138 *	0.097	-0.048	0.180	0.025 ***	0.024	0.093 *	-0.072	-0.443 ***	5.538 ***	694	1.000	0.015 **	0.138
26	0.085	0.786 **	0.222 **	0.269	-0.186	0.073	0.147 ***	-0.059	0.649 **	0.766	0.147	0.056	535	1.000	0.034 **	0.376
27	0.223 ***	0.825 ***	0.221	-0.012	0.101	0.307 *	0.028 **	-0.139	-0.069	-0.288 **	-0.944 **	9.602 ***	244	0.113	0.001 ***	0.504
28	0.317 ***	0.775 ***	0.255 ***	0.111 *	0.094	-0.012	-0.008	0.275	-0.150	-0.153 **	-0.459 ***	6.343 ***	1628	0.998	0.000 ***	0.593
29	0.204 ***	0.801 ***	0.123	0.314 ***	0.118	0.287 *	0.080	-0.058	-0.064	0.156	-0.691 ***	5.748 ***	1151	1.000	0.001 ***	0.991
30	0.323 ***	0.816 **	-0.005	-0.818	0.139 **	0.971 **	0.059 ***	0.001	-0.045	0.460	-0.969 ***	3.236	164	1.000	0.003 ***	0.134
31	0.401 ***	0.461 ***	0.317 ***	0.182 *	0.122	-0.007	0.041 **	0.252	0.014	0.049	-0.274	2.963 *	633	1.000	0.000 ***	0.692
32	0.336 **	0.825 ***	0.070 **	0.021	0.178	0.036	0.028 ***	0.050	0.015	0.158 *	-0.547 **	4.023 **	306	0.991	0.001 ***	0.333
33	0.296 ***	0.570 **	0.241 **	-0.130	-0.133	0.021	0.050 ***	0.110	-0.170	-0.369	-0.845 ***	8.889 ***	476	1.000	0.001 ***	0.380
34	0.437 ***	1.041 ***	0.098	0.105	0.018	-0.002	0.001	-0.079	-0.111	-0.404 **	-0.380 ***	8.595 ***	303	1.000	0.015 **	0.146
35	-0.295 *	2.474 ***	-0.013 ***	0.652 ***	0.076	0.172	0.011 *	0.008	0.161 ***	0.533	-0.280	4.795	51	1.000	0.130	0.708
36	0.354 ***	0.673 ***	0.132	0.075	-0.056	0.140	0.096 ***	0.060	-0.014	-0.135	-0.233 ***	6.224 ***	799	1.000	0.003 ***	0.752

Notes: * significant at 10%;** significant at 5%;*** significant at 1%.

Part B. Selected Estimation Results on the Adjustment of Manufacturing Firms to Competitive Pressure

B2. The Effect of Competitive Pressure on the Firms' Pricing Behaviour

Table B2-B. Bulgaria: estimated mark-up equations by NACE-2 digit manufacturing sectors, based on Y=sales=f(K,L,M); panel estimations with varying coefficients and random effects

NACE 2-digit sectors	Const.	Import penetration	Dummy for foreign controlled firms	Market concentration (relative standard deviation of sales)	Market share	Export share	Debt ratio	R^2	Wald-test	Markup
1995-2001										
15	0.259 ***	-0.090 ***	0.020	-0.016 ***	0.026	-0.059 ***	0.028 ***	0.539	57.671 ***	1.268 ***
16	0.936 ***	1.129	-0.609	-0.434 ***	0.138	-0.092 **	-0.365 ***	0.712	68.445 ***	1.539 ***
17	0.146 ***	-0.002	-0.005	-0.007 ***	-0.066 **	0.107 ***	-0.006	0.608	54.466 ***	1.178 ***
18	0.136 ***	0.058 **	-0.069 ***	0.005 ***	0.170 *	-0.008	0.103 ***	0.505	77.178 ***	1.203 ***
19	0.044	0.103 ***	0.007	0.029	-0.031	-0.065 ***	0.202 ***	0.495	29.872 ***	1.158 ***
20	0.107 ***	0.129 ***	-0.024	-0.007 ***	-0.127	-0.028	0.256 ***	0.462	40.225 ***	1.135 ***
21	0.295 ***	-0.199 ***	-0.088 ***	-0.024 ***	0.039	0.079	0.224 ***	0.550	36.708 ***	1.228 ***
22	0.145 ***	-0.210 ***	-0.002	0.020 ***	0.284 ***	0.543 ***	-0.066 ***	0.642	140.131 ***	1.246 ***
23	0.059	0.200 *		-0.029	0.017	1.451 ***	0.419	0.977	90.923 ***	1.389 ***
24	0.092 **	0.057	0.035	0.004 **	0.215 ***	-0.047 **	-0.063	0.576	73.846 ***	1.184 ***
25	0.281 ***	-0.124 ***	-0.004	-0.021 ***	-0.101 **	-0.004	0.111 ***	0.706	47.312 ***	1.210 ***
26	0.089 ***	0.033	-0.030	0.017 ***	0.081 ***	-0.039	0.143 ***	0.535	43.269 ***	1.151 ***
27	0.132 ***	0.075 **	-0.051	-0.003 ***	-0.058	-0.105 **	0.224 ***	0.549	161.569 ***	1.153 ***
28	0.047 **	0.064 *	0.117 ***	0.036 **	-0.039	0.079 ***	0.086 ***	0.503	93.723 ***	1.181 ***
29	0.156 ***	-0.026	-0.013	0.002 ***	0.192 ***	-0.076 ***	0.229 ***	0.515	106.028 ***	1.194 ***
30	0.484	-0.383	-0.095	-0.061	-0.199 *	0.210 **	0.698 **	0.373	14.452 **	1.212 ***
31	0.077 **	0.089	0.036	-0.004 **	0.208 ***	0.026	-0.212 ***	0.525	54.835 ***	1.143 ***
32	0.466 *	-0.209	-0.114 **	-0.080 *	-0.152	0.330 ***	-0.194 **	0.567	36.614 ***	1.177 ***
33	0.041	0.021	-0.045 *	0.050	-0.110	-0.135 ***	0.086 ***	0.544	66.226 ***	1.147 ***
34	0.001		0.797	0.089	0.562 **	-0.285 **	0.265	0.449	12.669 **	1.239 ***
35	-0.007	0.139 ***	-0.094 **	0.038	-0.054	-0.123 **	0.791 ***	0.665	88.484 ***	1.148 ***
36	0.008	0.122 ***	0.087 ***	0.054	-0.015	-0.028	0.004	0.494	38.720 ***	1.171 ***
37										

Notes: * significant at 10%;** significant at 5%;*** significant at 1%.

Table B2-H. Hungary: estimated mark-up equations by NACE-2 digit manufacturing sectors, based on Y=sales=f(K,L,M); panel estimations with varying coefficients and random effects

NACE 2-digit sectors	Const.	Import penetration	Dummy for foreign controlled firms	Market concentration (relative standard deviation of sales)	Market share	Export share	Debt ratio	R^2	Wald-test	Markup
1995-2001										
15	0.06 **	-0.36	0.39 **	0.00	0.76 **	0.44 **	0.06	0.13	59.17 **	1.08 ***
16	-0.48	-5.42	0.77	6.89	0.39	-3.12	16.86	0.70	7.07	1.38 ***
17	0.17 **	0.82 **	0.25	-0.17 **	-0.11	-0.65 *	0.20	0.21	25.39 **	1.17 ***
18	0.15 **	-0.28	-0.07	0.03	-0.19	-0.46 **	-0.04	0.22	23.66 **	1.14 ***
19	0.06	-0.17	0.17	0.11	2.68	0.22	-0.03	0.17	7.05	1.12 ***
20	0.13 **	0.09	0.73 **	-0.13 *	2.93	-0.32	-0.08	0.16	21.71 **	1.11 ***
21	0.25 **	-0.13	0.21	-0.25 **	0.04	0.89 *	0.13	0.58	41.89 **	1.22 ***
22	0.14 **	-0.48	0.14	-0.01	-1.55 *	-0.60	-0.02	0.33	11.79	1.14 ***
23	0.22 **	-1.15 **	0.73 **	0.16	-0.85	-0.69 *	-0.10	0.41	65.55 **	1.24 ***
24	0.10 **	-0.05	0.11	0.07	1.13	0.49 **	0.09	0.34	22.34 **	1.16 ***
25	0.08 **	0.73 **	0.32 *	0.46 **	0.78	-0.54 *	0.58 **	0.58	69.31 **	1.32 ***
26	0.03	0.07	0.00	0.13	-0.65	1.49 **	0.06	0.30	38.99 **	1.12 ***
27	0.09 **	-0.02	0.18	0.12 *	1.93	0.68 **	-0.05	0.32	76.62 **	1.18 ***
28	0.09 **	0.51 **	0.25 **	0.01	0.57	0.09	-0.29 **	0.30	49.26 **	1.14 ***
29	-0.22	2.70	1.19	0.07	0.45	2.92	1.07	0.51	46.02 **	1.38 ***
30	0.10 **	0.47	0.35	0.06	-0.24	0.35	-0.03	0.34	22.04 **	1.23 ***
31	0.06	1.09	0.74	-0.08	-1.44	0.97	0.30	0.28	46.63 **	1.23 ***
32	0.22 **	-0.12	0.74 **	-0.19	-3.23	0.86 *	0.01	0.36	22.74 **	1.23 ***
33	0.21 **	-0.52	0.07	-0.08	1.50	-0.44	0.07	0.29	9.32	1.16 ***
34	0.14 **	-0.21	0.31	-0.03	-2.05	0.07	0.23	0.37	5.45	1.13 ***
35	0.13 **	-0.54	0.79 **	0.02	1.39	0.12	0.08	0.25	34.94 **	1.15 ***
36	-0.06	0.00	-0.34	0.35	0.12	0.26	-0.11	0.24	2.31	1.03 ***
37	0.06 **	-0.36	0.39 **	0.00	0.76 **	0.44 **	0.06	0.13	59.17 **	1.08

Notes: * significant at 5%; ** significant at 1%.