THE EFFECT OF COMPETITION AND OWNERSHIP STRUCTURE ON COMPANY PERFORMANCE IN ROMANIAN FOOD INDUSTRY – A LARGE-SAMPLE PANEL ESTIMATION FOR TRANSITION YEARS

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Abstract

In this paper I study company performance using a dataset of Romanian food industry over fifteen years of transition period. The factors analyzed in terms of their effect on performance are foreign and domestic competition and the type of ownership. The aim is to conduct a post-privatization, post-liberalization period analysis of competition and ownership effects in the Romanian food industry. I estimate a log-linearized production function augmented by competition and ownership variables, calculated using the national level four-digit NACE industry delimitation of the relevant market. I find some evidence that product market competition is counterproductive in this specific industry but to a lesser extent in the case of privately owned companies, having its effect differentiated between ownership forms. My study provides some further evidence towards the existence of a dominant firm with competitive fringe setup in Romanian food industry and to the complementary nature of ownership and competition effects.

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Introduction

There is still extensive research to be done before the performance of firms can be clearly explained through proposed explanatory factors, ranging from market competitiveness and R&D expenditures to the form of ownership or the nationality of private owners. One point in which the theoretical literature seems to agree is that corporate performance is enhanced by a competitive environment. More recently, there has been some empirical evidence to the validity of this theory (Earle and Estrin 1998, Grosfeld and Tressel 2002, S. J. Nickell 1996). The mechanism behind this supposed effect comes from general economic theory, where competition is not only thought to equalize prices with marginal costs leading to allocative efficiency, but it further incorporates a wide range of virtues, starting from selection of the most efficient firms to remain in the market and improving managerial incentives as a corporate governance tool (Grosfeld and Tressel 2002) to decreasing the adverse effects of specificity in inter-firm relationships (Blanchard and Kremer 1997). Another direction of research for explaining corporate performance is found in corporate governance literature, which aims at proving the theoretical finding that the form of ownership as well highly influences performance of firms.

The two separate research directions unite in studies which have found product market competition and ownership forms to be in a complementary relationship in terms of their effect on corporate performance (Grosfeld and Tressel 2002). Transition countries have already received some attention in terms of competition and ownership effects on firms' performance, due to the "quasi-experimental setup" (Brown and Earle 2000) that the sudden liberalization of their markets and trade brought about. There have been some studies conducted with the aim of shedding light on the effects of privatization on corporate performance (Brown, Earle and Telegdy 2006, Earle and Estrin 1998).

My thesis is constructed on the empirical findings from these previous studies and aims at a post-privatization, post-liberalization period analysis of competition and ownership effects in Romania. It completes the studies it is based on by allowing to observe the proposed effects on a much longer panel than previously used, and on more firm-year observations. Secondly, I conduct the analysis based on the more specific food industry, which has experienced the same sudden wave of liberalization of input and product markets as the other industries, but that also has, alongside of agriculture, a long tradition of protectionism from the state. Food industry has its importance reinforced since Romania's European Union integration in 2007, as it now constitutes, alongside of agriculture, part of the Common Agricultural Policy's focus[1]. Furthermore, food industry has gained significance over the years of transition, increasing its employment as a share in total manufacturing employment from 9.9% in 1992 to 11.6% in 2006[2] (see Table A1 in the Appendix).

Thirdly, the database I use includes detailed accounting data from firms' balance sheets and four-digit NACE[3] industry disaggregated import-export data. Finally, my study uses information concerning the type of ownership for the entire period observed and investigates the question of whether private or state ownership have been better for productivity improvement for companies. Using these ownership variables, my study separates the effects of private ownership by nationality (domestic or foreign) to check the extent to which previously found results in transition countries apply to the case of Romania. Additionally, I posit the hypothesis that ownership is a complement to competition in terms of its effect on performance and test for it by including interaction between controls for these two factors.

[1] The Common Agricultural Policy does not represent a priority research topic of this thesis, it is one of the factors considered for the choice of industry.

[2] Own calculations based on the Statistical Yearbook 2008, Romanian National Statistical Institute, 2009, Table 3.9: Civil Employment, by Activity of National Economy, at Level of NACE Division.

[3] The Classification of Economic Activities in the European Community (NACE), according to which the two-digit industry 15, "Manufacture of Food Products and Beverages", includes 33 specific industry branches.

My results show that within the food industry, product market competition has a negative effect on firm performance, but to a lesser extent for privately owned companies, either by domestic or foreign owners. Concerning the effect of foreign competition, I find that import penetration has a small but significant negative effect on company performance, with a pattern in its interaction effect favorable for privately owned companies, similarly to the pattern found in the case of domestic competition. Since the effects of ownership show a positive influence in case of both nationalities of private ownership, I conclude that competition and ownership incentives reinforce rather than substitute each other in the present case.

The paper is constructed as follows: Section I contextualizes the broader issue of Romanian industry restructuring during the transition years. The same section summarizes the theoretical arguments concerning the impact of the two forms of competition – domestic and foreign – on firm performance and the relationship between ownership and performance. Section II presents the empirical framework used to measure the effects of the factors mentioned and describes the food industry data set used for the study. The results obtained are presented in section III and the final section concludes the study.

I. Theoretical Background

In the broader economic literature, the role of competition is now widely accepted as that of a positive market mechanism that forces prices to equal marginal costs and helps discipline companies within the market. Microeconomic models of perfect competition describe a setup in which prices lie, in the beginning, above average cost and firms realize abnormal profits (Lipczynski and Wilson 2001). Under no entry barrier condition, newly entered firms depress prices sufficiently for firms in the market to earn "normal" profits. As abnormal profits are eliminated by competition, new entry will also cease, thus the long-run equilibrium in the point

of firms' minimum average costs is reached, leading to the most efficient use of firms' resources.

As suggested by Grosfeld and Tressel (2002) and Earle and Estrin (1998), the analysis of ownership structure can represent a complement in terms of its effects to the competition-performance relationship analysis. Product market competition is considered an efficient mechanism that theoretically leads to economic efficiency and increased performance of companies. However, most economists agree that it alone cannot solve the problems posed by separation of ownership and control, which are the central focus of corporate governance. Whereas corporate governance provides the assurance that investors who invest capital would receive it back, product market competition only decreases the extent to which managers can expropriate owners (Schleifer and Vishny 1997, 738).

Expropriation of owners leads to a decrease in performance of corporations and its extent depends, among other factors, on the concentration of ownership rights and on the type of the owner. Ownership concentration may mean a better alignment of control and cash flow rights, unless at a level where private benefits of control outweigh the gains from a well-performing firm, in which case it has been found to decrease performance (Grosfeld and Tressel 2002). Regarding its type, state ownership – characterized by a soft budget constraint and greater division between benefits and costs, with managers more likely to free-ride – was found to systematically decrease performance, in contrast to private ownership which was found to significantly improve it. This fact has been investigated in the case of transition economies to some extent through analysis of privatization effects (Earle and Estrin 1998, Brown, Earle and Telegdy 2006).

I.1 Competition and Ownership Effects on Corporate Performance

The importance of production decentralization and trade liberalization and their impact on company performance in transition economies has been analyzed in a number of studies

(Brown and Earle 2000, Estrin 2001). One of the reasons is that, as opposed to the relatively stable developed Western economies where markets function normally and market mechanisms force firms towards efficiency or exit, transition economies offer something like a natural experimental setup. Little or no variation in factors of interest in the case of developed countries confounds the results meant to underline effects of some of these factors, such as competition. Nickell (1996) finds no conclusive proof of the positive effects of competition on firm performance, using a sample of around 670 UK manufacturing companies. On the other hand, since the liberalization of markets as well as the privatization of a very large number of firms in a short time happened suddenly and affecting all or most sectors in transition countries, results from studies in these countries are believed to be reliable estimates of the market mechanisms' true effects.

The issue of competition has a specific significance in Romania which, as a Central and Eastern European transition economy, is part of a block of economies with a recent past of central planning. Firms in these countries faced, before their sudden liberalization, a distorted competition on the domestic market and virtually no competition by imports. In Romania, the detailed planning of the economic activity was done by the State Planning Committee, which, in its turn, took the orders of the Communist Party. The planning included determining the prices, the wages and the allocation of labor and setting up the material balances for the distribution of raw materials, capital goods and intermediate products (Demekas and Khan 1991). Hence, there was no functional market in the supply of goods, neither for intermediary goods for input, nor for final consumption. There was no real competition among firms, since they were non-autonomous in any of their decision making, regarding pricing, production process and planning or diversification of products. All firms could rather have been considered part of the same great state-owned industrial organization (Estrin 2001).

Under such conditions, when the previous political regime fell, the immediate need for effective policy responses that would successfully implement changes that would have led to an efficient restructuring, were obvious. However, in lack of a clear view for restructuring the economy and with a weak institutional setup, the policy responses that were eventually taken led to the reform to be based initially only on privatization of state-owned enterprises and the implementation of extensive trade liberalization[4]. A survey of transition economies' industrial policy including Romania points out this fact and adds that restructuring policy also meant applying continued protection from imports or state subsidies (Török 2007, 262) in some industries and for certain selected "champions" (i.e. large state-owned enterprises heavily protected by the government).

These features of Romanian industrial restructuring during transition years suggest that its policies have allowed for product market competition to develop very fast through privatization, new-firm establishments and trade liberalization, but in a selective manner that may influence the way in which it affects corporate performance within certain industries. Food industry has been a significant part of manufacturing and, as pointed out previously, its importance has been growing over the years. The fact that it has enjoyed prolonged protectionism by the state brings up the relevance of ownership form and its influence on corporate performance.

The effect of ownership form on corporate performance has been analyzed along with that of competition due to its power to discipline companies through the budget constraint mechanism (Earle and Estrin 1998) in a similar way to that of competition. Under state ownership, companies benefited of a soft budget constraint, which decreased managers' incentives to work for efficiency, knowing that the state would subsidize its companies even if they underperform as a consequence of managerial slack (Kornai 1992).

[4] As noted by Estrin (2001), by the year 1994, Romania had reached a score of 4 compared to the benchmark of 4+ in terms of trade and foreign exchange liberalization.

The sudden change from state to private ownership disciplines managers in a way similar to that of competition, which decreases rents and forces managers to increase productivity by making the production process more efficient. A binding budget constraint takes away the comfort of bailout and subsidy and, similarly to competition, it disciplines managers by financially constraining them to perform better (Earle and Estrin 1998). In the initial phase of sudden liberalization, an expected outcome can be that of an overall negative effect on company performance until efficiency is reached.

As noted in Earle and Estrin (1998), in Western economies the joint effect of a workably competitive capital, labor and factor market along with low state intervention or a hard budget constraint is exerted even for companies which are neither private, nor unsubsidized, but function in this environment. Such a stable environment poses difficulties for studying the effect of either of these mechanisms separately and, again, post-communist countries have been preferred as experimental setup.

I.1.1. Empirical Foundations

Based on these theoretical considerations, I look at two effects on corporate performance: effects of competition and ownership – decomposed by nationality – and then check the significance of a joint effect of the two. In terms of topic, approach to the measurement of these factors and method of analysis, I base my research on three studies focused on these factors. The first one, considered a benchmark in terms of methodology in the literature, is by Nickell (1996) and focuses solely on the interaction of competition and the productivity growth of firms. It points out measurement issues regarding a firm's market power which are relevant in the case of my study as well, as is presented further on in the paper.

The second study I use is by Grosfeld and Tressel (2002) and it analyzes the effects of two separate factors: product market competition and the corporate governance mechanism of ownership concentration. More importantly, their study considers the interacted effect of the

two factors, which are found to be complements rather than substitutes in terms of enhancing productivity of corporations.

The third paper I base my study on is by Estrin, Konings, Zolkiewski and Angelucci (2001). It relates to the previous two in that it analyses, as the Nickell study, the effects of domestic and international competitive pressure and ownership changes, but in three transition countries. It also explores the interaction of the two effects on firms' productivity, which relates it to the Grosfeld and Tressel study. This work offers a good analysis of competitive pressures from the market and ownership structures' effects on three transition countries, including Romania. Their findings, although based in the case of Romania on a restricted dataset of two years between 1997 and 1998, are a good starting point for any study on the topic. They show that the same mechanisms that enhance productivity of corporations in developed market economies, such as product market competition by imports, tend to have a counterproductive effect on firms in some transition economies, probably due to specific features related to privatization and liberalization policies adopted in the beginning of their transition period. Based on their findings, in Romania import competition exerts a negative effect on corporate performance and I find the same result on my data. However, differentiating between ownership forms, I find that the negative effect of import competition is significantly smaller for privately owned companies.

Studies in the topic of ownership's effect on firm performance have been conducted on data from transition economies mostly focused on the effects of privatization. Browne, Earle and Telegdy (2006) conduct a comprehensive study on privatization effects in four former communist countries: Russia, Ukraine, Romania and Hungary, using longitudinal data overlapping between the two political regimes, starting from central planning and stretching into the early 2000s. They find that Romania experienced a significant and positive productivity effect of privatization, whereas Russia and Ukraine, probably due to a less

successful mass privatization policy, gained little or negative outcomes from their quick privatization (Brown, Earle and Telegdy 2006). Their study loosely relates to the present paper, offering broad guidelines to place the findings from my study in the literature.

There are several patterns identifiable over the studies conducted on transition economies regarding aspects of competition and ownership. The two main patterns that allow for grouping of studies are a pattern in the data used and the second in the nature of the approach to analyzed factors. In terms of data used, I differentiate between two groups: the small-sample and the long panel estimation studies. Studies from the first group have been conducted in the early years of transition and are based on the analysis of smaller datasets (data for Romania and Bulgaria in Estrin, Konings, Zolkiewski, & Angelucci (2001), covers the years 1997-1998; Earle & Estrin (1998) analyze 1990 and 1994 data for Russian industrial firms), which show something that might be a less accurate image of the underlying mechanisms that lead to increasing productivity during transition. A cross-section study yields biased results as it does not control for sample selection, firm- or industry-specific characteristics, general economic trend, or other sources of bias[5]. Studies from the second group use long panel data, which seems to solve some of the estimation-related problems met in studies belonging to the first group. Grosfeld and Tressel (2001) obtain robust results for Polish manufacturing firms listed on the Warsaw Stock Exchange between the years 1991–1998. Following the empirical method used by Nickell (1996), they find that product market competition has a significant positive effect on firm performance and that it is in a mutually complementary relation with corporate governance, or form of proprietorship.

In terms of the nature of approach to the factors analyzed, there are some studies that apply a qualitative, whereas another group, more commonly, applies quantitative measurements. Studies in this second group cover both long and short panel estimations and imply some kind

[5] Brown, Earle & Telegdy (2006) include a detailed overview of possible biases and how longitudinal data helps eliminate a large part of those. A more detailed analysis of this issue is included in the following section.

of numerical measure of firm performance, usually productivity. This is preferred to using profits in most studies done recently because of the "notorious unreliability of accounting measures" (Brown and Earle 2000, 8), especially in transition countries where black economy and employment were common. Whereas output measured as sales is also based on accounting data from balance sheets, it is considered more reliable than profits, usually underreported for tax avoidance or other related reasons. Quantitative measures are applied for other relevant factors as well, such as foreign and domestic competition[6]. As a contrast, the qualitative group, made up more commonly of the studies based on short-period datasets[7], but overlapping to some extent with the long panel-data studies group as well, uses qualitative measures, such as managers' perception about competition faced by their enterprises or assessment of trade liberalization[8].

The methods used for total factor productivity are overwhelmingly panel methods: the two outstanding ones are using dynamic panel estimation with GMM, based on Nickell (1996), while there is a part of the literature that uses the method of simple total factor productivity estimation and a comparison of that through OLS, fixed-effects and random effects models for robustness check (the former group includes the study by Grosfeld and Tressel (2002), whereas the latter includes Estrin, Konings et al. (2001)). More on the choice of method is included in section III.

I.2 The Joint Effect of Competition and Ownership on Corporate Performance

As pointed out in the beginning of this section, the main study that links competition- and ownership effects together is the one by Grosfeld and Tressel (2002) on a panel of 200 non-

[6] Most of the studies finding significant results are included here; based on Nickell (1996): (Brown and Earle 2000), , (Estrin, Konings, et al. 2001) all use TFP or TFP growth models, Earle and Estrin (Earle and Estrin 1998) use an average labor productivity model

[7] For example, the study by Earle and Estrin (1998) surveys managers regarding their perceptions about their direct competitors

[8] Estrin (2001) uses empirical evidence for a non-econometrical analysis of transition countries in terms of trade liberalization or the extent to which privatization has been achieved,

financial companies listed over the period 1991-1998 on the Warsaw Stock Exchange. This study focuses on finding the impact of competition on firm performance measured by productivity growth rate and proposes to disentangle the effects of ownership concentration and product market competition on performance measured this way. Using the method suggested by Nickell (1996), they estimate the parameters of the model by differencing to eliminate the firm-fixed effects and by using lagged measure of output and production factors as instruments in order to eliminate simultaneity bias. Their estimations suggest that in Poland, competition positively influences productivity growth, and that, more importantly, its effect depends on the ownership structure of the firms considered – meaning not only its origin – state or private – but the concentration of shareholder power as well.

The starting point for my study is this work, as the possibility of analyzing the effect of competition and ownership type and structure on performance as substitutes or complements has not been explored so far for Romanian data. Earle and Estrin (1998) touch on the subject through their analysis of increased competition, hardened budget constraint and privatization effects on corporate performance and find that competition and privatization are complements, which suggests that ownership form and competition should be complements as well.

II. The Empirical Formulation and the Data

Following the method proposed by Konings et al (2001), I analyze the performance of over 33,000 firms representing the complete set of food industry firms, using a log-linearized production function estimation, augmented by competition and ownership variables. I use data for fifteen years starting from 1992, a period that spans from the early years of transition to the year preceding the country's integration with the European Union, seeking answer to the question whether on the long run, market and foreign trade liberalization can have a steadily

positive influence on company performance and how this effect interacts with firms' ownership.

I use panel data of enterprises forming the Romanian food industry, during a period of 15 years of transition and pre-European accession. My aim is to attain two goals: to shed further light on the way competition and ownership have interacted with firms' performance over the transition years and to identify specificities of this particular industry. In this section, I introduce the data and the estimation method used, with a detailed presentation of problems met in the process.

II.1 Data

The analysis presented in this work draws on an annual census-type data available for food industry firms in Romania. One of the contributions of this work is that the analysis has been undertaken on a much longer panel than in previous studies, with a greater number of companies and at a four-digit industry level, with the aim of shedding light on competition effects on firm performance within food industry in a transition country. The total number of firms over the 15 years I work with ever present in the sample is of 33,136 firms, representing the almost complete population of firms in the two-digit industry[9]. The average life duration of the firms over the sample is 6.75 years, making 222,011 firm-years available for analysis.

I look at an unbalanced panel in order to eliminate self-selection of the best-performing firms (into survival), and to include as well those which were eliminated from the market due to their lesser competitiveness or by other, endogenous factors. Production and firm specific data with a four-digit industry precision are from the Romanian Statistical Office and the Romanian Commerce Chamber. Their basic data sources are financial statements associated with tax reporting to the Ministry of Finance. The data are available for all entities using double-sided book-keeping. In addition, accounting data were supplemented by the National

[9] based on the NACE - Classification of Economic Activities in the European Community, the two-digit industry 15 includes 33 specific industries of the "Manufacture of Food Products and Beverages"

Institute for Statistics' enterprise registry and the State Ownership Fund's portfolio and transactions data. These were completed by four-digit NACE industry-level foreign trade data (import and export values), from the Romanian National Institute for Statistics.

Table 1 shows the number of firms used for estimations after eliminating the entries without reporting on sales. The initial number of firms in the two-digit food industry over the 15 years of the observation was 33,136. Dropping the observations with missing values for key variables or a missing four-digit disaggregated NACE code, 27,308 firms remain in the sample. The reason for a missing four-digit NACE code can be either due to data collection or to the firm producing a wider scale of products through production processes categorized into several, different four-digit coded groups. Missing sales reporting, on the other hand, may be caused by the firm being legally existent in those years, but inactive, not having begun or having suspended its activity in the years deleted. This is suggested also by the fact that most entries deleted from the sample had missing values for most or all variables of interest, such as sales, employment or costs. Keeping them in the sample would have caused results regarding productivity effects to be estimated as having smaller effect than in reality, as the productivity effects I aimed to identify would not manifest in the case of inactive firms or firms keeping their legal entity but planning to exit or already exited production. The observations dropped do not reduce the sample greatly and having an almost complete dataset of the firms within the analyzed two-digit industry, there is no reason to believe there was sample selection that would bias the results in any way.

The variables used for estimating the production function are firms' capital, material expenses and employment. The former three have been taken adjusted with two-digit industry specific producer price indices for inflation and are expressed in thousands of new Romanian Lei (RON).

Table 1: Number of Firms active in Food Industry Each Year, Total Employment in the Sample Firms Compared to Average Number of Employees Yearly in the Industry

Year	Firms	Total Employment	Average Number of Employees in Industry*
1992	550	280 354	243 000
1993	1 736	282 736	255 000
1994	3 373	244 353	244 000
1995	5 557	243 203	231 000
1996	7 188	258 599	219 000
1997	8 668	252 561	213 000
1998	9 816	233 936	214 000
1999	9 379	210 641	187 000
2000	9 786	202 622	169 000
2001	9 662	192 156	160 000
2002	10 355	193 005	163 000
2003	10 347	195 561	162 000
2004	10 504	199 630	161 000
2005	10 226	200 462	166 000
2006	10 082	203 026	175 000

*Average number of employees represents a simple arithmetic mean resulted from the sum of daily employees number, including from the weekly rest days, legal holidays and other nonworking days divided to the total calendar days of the year (365 days). The data was taken from the Statistical Yearbook 2008, Chapter 3. Labour Market (Romanian National Statistical Office Bucharest, 2009)

Table 1 shows the number of firms used for the estimations after eliminating the entries without reporting of sales. The table further shows average number of employees in the two-digit industry, calculated as a simple arithmetic mean of hours worked to total days in calendar

year[10]. This number is smaller than the total employment added up in my sample in every year of the sample observations, which proves its representativeness for the industry. Looking at employment within the sample, it is at a relatively steady level over the years, with a slow decrease, but steadily above 200,000 in the first eight years and around the same size with small fluctuations until 2006. The the number of firms shows a clear upward trend, which is attributable to the increased entry of small firms over the years.

Table 2: Three-digit sub-industries of industry NACE 15 and the number of firms within each group

NACE 3-digit	Industry	Total Firms
151	Production, processing and preserving of meat and meat products	4425
152	Processing and preserving of fish and fish products	136
153	Processing and preserving of fish and fish products	1159
154	Manufacture of vegetable and animal oils and fats	704
155	Manufacture of dairy products	2271
156	Manufacture of grain mill products, starches and starch products	3861
157	Manufacture of prepared animal feeds	330
158	Manufacture of other food products	3204
1581*	Manufacture of bread; manufacture of fresh pastry goods and cakes	10105
159	Manufacture of beverages	3133

*Since the group of firms from this four-digit NACE category was, by far, the largest, I included it separately in the analysis and introduced a separate dummy for the branch

The distribution of firms across industries within food and beverage manufacturing is quite uneven, as shown in Table 2. The largest four-digit industry is the one of bread and fresh pastries' manufacturing, which comprises 34.45% of all the firms in the industry. On the other extreme of the scale is the industry of preserving and processing fish (NACE code 152), which has 0.5% of all the firms in the industry, most of them grouped in the South-Eastern region of

[10] The indicator is published yearly by the Romanian National Statistical Institute.

Romania, around the Black Sea shore[11]. The other industries are more homogeneous in terms of firm distribution.

II.2. Estimation Method

The data used allows to measure total factor productivity and to add controls to identify the effects of domestic and foreign competition, as well as that of ownership structure. The novelty of this paper is that I estimate the described effects on a long panel that spans over a more heterogeneous period than those from previous studies, applied to one specific industry that bears major significance for the country (see Table 1). I do not make any specific assumption regarding the returns of the production function and I take into account firm heterogeneity effects as well as industry-specific effects, to investigate the robustness of competition and ownership effects on productivity across a variety of measurement specifications.

I follow the broader literature on the effects of competition and ownership (including privatization) in reduced-form equations for firm-performance, while trying to account for potential problems of unobserved heterogeneity across firms by including firm FE, and selection bias with the use of unbalanced panel, that excludes the possibility of looking only at those firms that were efficient enough to survive (Estrin, Konings, et al. 2001, Earle and Estrin 1998) . The log-linear production function I estimate, completed by controls for foreign and domestic competition, as well as for ownership effects, may be written in the following general form:

$$y_{it} = \propto_0 + \propto_1 + \alpha_2 \log(k_{it}) + \alpha_3 \log(n_{it}) + \alpha_4 \log(m_{it}) + \alpha_5 c_{it} + \alpha_6 w_{it} + \alpha_7 year_i + \varepsilon_{it} \quad (1)$$

where i indexes firms from 1 to N, j indexes industries from 1 to J, and t indexes time periods (years) from 1 to T; y_{it} is the ln(output); n_{it} is ln(employment), m_{it} is ln(material

[11]information based on the variable *county* from the data set, which contains county codes that were initially intended to be used for a geographic definition of the market, as done on data for Russia (Earle and Estrin 1998). The idea has been dropped due to the highly uneven distribution of firms between markets defined such. A geographical fragmentation could make sense in an analysis of several three-digit disaggregated industries of manufacturing, not exclusively on manufacturing of food products.

costs)[12] k_{it} is ln(capital stock)[13] $year_i$ is a vector of aggregate time variables and α_7 is the vector of associated year-specific slopes and ε_{it} is an idiosyncratic error. Dimensions of the other factors vary across specifications: c_{it} is a vector of competition measures, w_{it} is a vector of ownership measures.

The preferred form of the model contains controls for all of these factors and it can be written in the following form (equation (2)) :

$$y_{it} = \propto_0 + \alpha_2 k_{it} + \alpha_3 n_{it} + \alpha_4 m_{it} + \alpha_5 CR5_{jt} + \alpha_6 IP_{jt} + \alpha_7 FO_{it} + \alpha_8 DO_{it} + \alpha_9 DO_{it} *$$

$$CR5_{jt} + \alpha_{10} FO_{it} * CR5_{jt} + \alpha_{11} DO_{it} * IP_{jt} + \alpha_{12} FO_{it} * IP_{jt} + \alpha_{12} year + \alpha_{13} ind_j + a_i + \varepsilon_{it},$$

where CR5 is the five-firm industry concentration, IP is import penetration, FO and DO are dummy variables for foreign and domestic private ownership[14], a_i are firm-specific error terms and ε_{it} is an idiosyncratic error.

To construct the final, most augmented version of the model from equation (2), I first compared, in order to choose the suitable measure of market concentration, the Herfindahl-Hirschman index (HHI) and the five-firm industry concentration ratio (CR5) against each other, both calculated for the national level four-digit NACE industry defined market. I investigate several alternative specifications for the competition variables, the outputs from regressions estimated with market competition variables other than the HHI and CR5 can be found in the Appendix table A4[15]. Since only the coefficient on CR5 is found to be significant, I use as basic regression model the one that has CR5 controlling for market concentration (or inverse competition) and I augment the basic model first with import penetration (IP) to control for foreign competition. Further augmented forms of the model include a dummy variable to control for private ownership (variable PO, which takes on the value 1 if the majority owner is

[12] Approximated using the Material Costs entry from the firms' balance sheets
[13] Approximated using the Fixed Assets entry from the firms' balance sheets
[14] Regression model (4) contains these two variables in the more aggregate dummy variable PO (private owner), which takes on the value 1 for majority private ownership, both foreign or domestic.
[15] I compare for the effect of the three-firm industry concentration ratio (CR3) and that of a variable counting yearly entries into a market, but find they are not significant.

private), and in more augmented forms, two dummy variables replacing PO, that separately control for the effect of domestic- and foreign private ownership (variable DO, equal to 1 if company is owned by majority domestic private entity and variable FO, equal to 1 if the majority private owner is foreign-based). I add the interaction terms I use to control for the joint effect of ownership and competition in two steps. A first regression model includes the terms that control for the joint effect of product market concentration with ownership and in a second one I add the interactions between import penetration and the two forms of private ownership. The last model, corresponding to the one described by equation (2), controls for all factors simultaneously and is my preferred form of the model. The construction and use of competition variables is described in detail in the next subsection

I estimate the equation specifications first by OLS, then by FE estimation. In the first estimation I assume no firm heterogeneity and take into consideration only industry-specific effects by introducing three-digit industry dummies[16] and time effects through year dummies. The FE model removes any fixed differences in productivity across firms. This model should absorb all firm-specific effects that cause for differences to exist in firms' efficiency levels.

II.1.1Constructing Competition and Ownership Variables

There are several difficulties in finding a variable that properly identifies product market competition. The most straightforward measure is market share, or the share of firm's sales in total market sales. The market share of a firm, or overall, industry level market concentration ratios have been found in multiple cases to have an adverse effect on firm performance. Nickell (1996) found on a sample of UK manufacturing firms between 1972-1986 little evidence that market share has a clear-cut negative effect on TFP and TFP growth. In spite of the inconclusive findings, his method turned benchmark to following studies on the topic due to his

[16] Nickell (1996) uses two-digit industry dummies to account for industry-specific effects both when he uses three-digit industry calculated variables, to account for fixed effects of the same industries, only at a higher aggregation level.

solution to market share endogeneity. Later studies using larger data sets, some of them applying Nickell's method on transition countries were able to show that product market concentration indeed counteracts to firm productivity (Grosfeld and Tressel 2002).

In case of this variable, as mentioned, there are two main problems posed by its nature. The first issue that has to be met in computing all of the other competition measures as well, is the decision of what to consider relevant market of a firm. The relevant market is necessary for calculation of market power, which is far from simple[17]. It depends on the industry it belongs to, the country's infrastructure, product type and several other factors, related to whether the firm meets its competitors on a local (city, vicinity), regional, country level or other levels, and whether it is a two-, three- or four-digit industry's market that has to be taken into consideration. In an analysis of U.K. manufacturing firms, Nickell (1996) utilizes three-digit industry sales as the denominator for calculating a firm's market share but points out that this is "far" from the one corresponding to the relevant market. Additionally, this approach fails to address differences that exist in terms of what can be considered relevant market for individual companies within industries. In another study of Polish manufacturing firms, Grosfeld and Tressel (2002) use both two- and four-digit sales denominated measures of market-share. However, due to the restricted number of firms in their sample that are active in certain four-digit industries having very specific nature of some of these branches, they prefer the former version.

In this paper, I follow Grosfeld and Tressel's (2002) approach to controlling for product market competition and I look into several measures of competition, using four-digit industry sales as denominator. Based on the firms' distribution across industry branches, I consider the definition of the relevant market as that of national level four-digit industry to be more

[17] Nickell (1996) analyzes deeper this issue and argues that his measure of market share ratio calculated using three-digit industry sales as denominator is "far from the correct measure because the three-digit industry does not represent anything like the <market>. More particularly, the ratio of the true market size to the measured market size could vary enormously from firm to firm, even within an <industry>." (Nickell 1996, 733).

suitable[18]. The three-digit industry on a country level is not specific enough to satisfy the notion of relevant market. Again, following Nickell (1996), I do not consider a definition of the market by its geographical scope, due to the large cross-industrial differences, but opt for a national level four-digit industry-year definition.

How a four-digit industry defined market is justifiable can be seen through the example I pointed out in the previous sub-section: that of bread and fresh pastry producers (NACE code 1581), having their market defined as one or two counties at most, but usually even as a smaller, strictly local geographical area. The group of meat producers and preservers (NACE code 1511) – also a significantly large group, collecting a share of 15.1% of total food industrial firms – stands in a stark contrast to the previous one. Even though their number is smaller than that of bakeries, the competition that they face, in reality, is represented by the almost complete population of firms in their group. Unlike bakeries, firms processing meat and producing meat products are more likely to sell their goods on a larger geographical market, even stretching across the country. Thus, the competition they face is likely to be larger than that of bakeries in spite of the more reduced number of firms within this industry-year defined market, since they all are more likely to compete against each other. Hence, a market share calculation or a market concentration ratio of the industry calculated using the four-digit industry output as denominator is more likely to approximate the real-life value of those.

Stepping on to the second issue, the share of sales held by a firm within its market/industry is simultaneous, on the one hand, with performance calculated as sales quantity multiplied by the price of products and on the other hand, on a longer term dependent on the firm's performance. As pointed out by Nickell (1996), the best performing firms can increase their market share over time and gain enough power to also influence prices. To deal with the problems of simultaneity and correlation, both the Grosfeld and Tressel (2002) and the Nickell

[18] All of the estimations presented in my thesis have been performed using both three- and four-digit industry disaggregated variables. However, the results obtained pointed to the latter disaggregation to be the better one, hence I concentrated on those – results from three-digit estimations are available upon request.

(1996) studies use the dynamic panel estimated by GMM. The former includes the measure for market share lagged by one period as an explanatory variable. The latter uses the second lag of market share along with lags of the dependent variable as instruments. The method they use has the positive feature that it allows for an improved understanding of the dynamic of adjustment by productivity to product market competition changes (Baltagi 1996).

In this paper I use the measures of market concentration applied by Grosfeld and Tressel (2002) to control for domestic product market competition. These are market share (not included in the preferred model), the Herfindahl-Hirschman concentration index[19] and the CR3, CR5 market concentration ratios for four-digit disaggregated industries. The first variable, market share, is a firm-level market power measure, calculated as the ratio of firm's sales to total sales in a four-digit industry. It shows the extent to which a firm can influence the prices in its market. Hence it is an inverse competition measure. However, due to its simultaneity and correlation with contemporaneous sales – increased market share also leads to higher sales in that year through higher prices due to high enough market power to influence prices, which can be misinterpreted as increased productivity – it yields unreliable results and it was not included in the preferred estimation form. This measure, on the other hand, was used to calculate the industry-level competition measures listed next. The Appendix Table A2 contains all the variables' descriptive statistics.

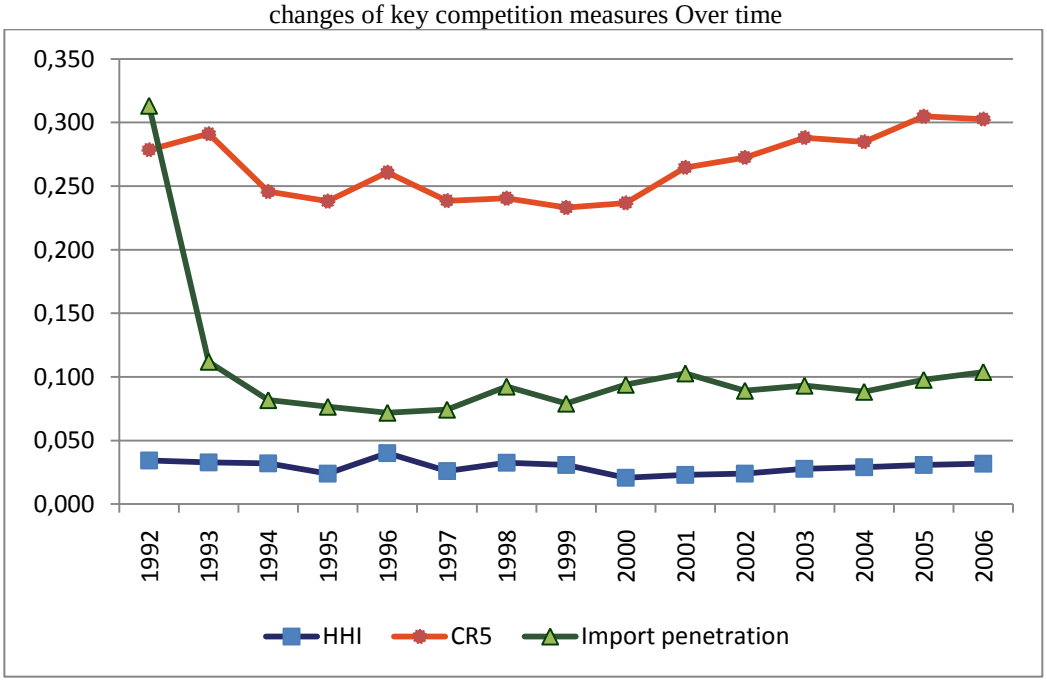
The remaining variables used for measuring market concentration are industry-level measures. The CR3 and CR5 three- and five-firm sales concentration ratios within the four-digit disaggregated industry were calculated as the joint market share owned by the leading three and, respectively, five firms within the markets defined as national four-digit industry. A fourth variable counts entries to industries each year and aims at measuring competition by

[19] There are two versions for calculating the Herfindahl-Hirschman index: according to the first, the HHI is the sum of squared market shares of the 50 largest companies in a market; in the second version, the HHI is represented by the sum of squared market shares of all firms competing in a market. I use the latter. A perfectly competitive market would have a HHI close to zero, whereas a monopolistic market has a HHI close to or equal to 1.

newly entering firms. The entry into four-digit industry defined markets in each year thus controls for the effects of new entries on the productivity of firms already active in the industry. However, this variable was found to have significant zero effects on firm performance and has not been included in any of the preferred specifications[20].

I used one variable to control for foreign competition by imports, the industry-specific import penetration ratio. This is defined as the share of imports in the sum of domestic production and imports, excluding exports[21]. The variable was calculated using four-digit industry disaggregated data for defining the relevant measure of industry-specific domestic production and that of imports and exports. Import and export data are expressed in thousands of RON similarly to sales, capital and material expenses[22], while import penetration is expressed as a ratio.

Figure 1
changes of key competition measures Over time

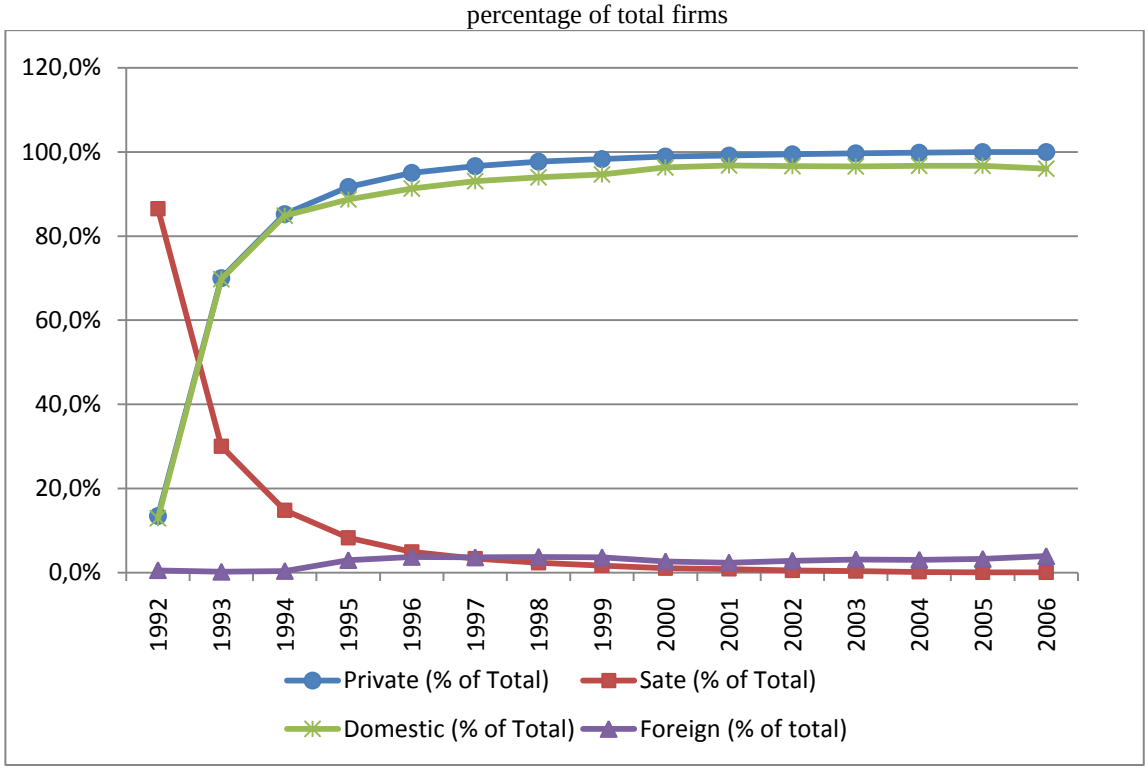


[20] estimated equations using entry are in the Appendix Table Ax
[21] import penetration=import/(total output + imports - exports)
[22] To make import-export data comparable to sales data from the industrial database, the initial values of exports and imports, expressed in Euros, were converted into RON using an indirect conversion from Euros to Dollars and then from Dollars to Euros using real exchange rates for the period 1992-1998, following the Romanian National Statistical Institute's method. For the years 1999-2006 I used direct Euro-RON real exchange rate for conversion. I used industry-specific producer price indices for the Euro and Dollar expressed quantities, taken from the IFS database. The final calculations were made using foreign trade data expressed in thousand RON, as those for sales.

As shown in Figure 1, there is an increase in five-firm concentration ratio, whereas the HHI index seems to change less over the years, showing a slight decreasing trend after the mid 90s. This suggests that while overall food industry markets are fairly competitive, the leading firms have grown bigger in terms of their market power over the years. Import penetration is at its highest level of 31.3% during the first years of the observed period, mirroring the sudden foreign trade liberalization paired with the initial disorganization phase of domestic production and then experiences a fast and clear downward trend until reaching its minimum of 7.7% in 1995. From that point on, it increases steadily, reaching the level of 10.4% in 2006. This is due to increased national production directed towards both exports and domestic consumption.

To control for ownership effects, I used three binary variables, the variable for private ownership, PO, and its nationality-differentiated versions DO and FO, for domestic and foreign private ownership. The value of these dummies equals 1 if the (majority) ownership rights are in the hands of private entities – persons or other privately owned companies. In the case of the nationality-differentiated private ownership dummies this refers to whether the owners are (majority) domestic or foreign private entities. Figure 2 shows how the distribution of firms has changed between the different forms of ownership over the years. It contains the two categories of private and state owned firms in percentage terms and it is visible that whereas in 1992 there were less than 14% private and over 86% state owned firms, these proportions suddenly changed in 1993, to 70% private and 30% state owned, as a results of the privatization policies introduced. By 1999, the percentage of privately owned companies reached 99% and remained steadily at that level. The figure contains data on private ownership disaggregated between domestic and foreign origin. Whereas foreign ownership remains significantly low in this industry throughout the observed years, there is a sudden jump in 1995 from 0.4% to almost 4%, with this proportion remaining more or less constant to the end.

Figure 2
distribution of firms between the different types of ownership over the years of the observations as percentage of total firms



The definition of the variables has bearing on the interpretation of the results. All variables defined at industry level were calculated for both three- and four-digit industry disaggregated level in order to find the more suitable approximation for what could be considered an appropriate measure for a firm's market. The next section contains more explanation on how these two definitions of the market alter the results.

III. Results

The main results are obtained by performing OLS and FE estimations of the augmented production function as presented in equation (1) of the previous section and they are presented in Tables 3 and 4. The different levels of the basic production function regression model correspond to the specifications (1)–(7), using variables calculated at four-digit industry disaggregation (defined based on four-digit NACE industry branches). I put emphasis on Table 4, which contains the results from firm FE estimations of the specified regression models; the results from OLS estimations are shown in Table 3.

Equations (1)-(7) have the same structure in both tables. They contain a log-linear production function[23] which I augment gradually with measures of market concentration to check, first of all, the preferred measure for market concentration – I end up using the inverse measure of five-firm concentration of the market – and, secondly, the robustness of specification (7), which contains all elements from models (1)-(6) in one, controlling jointly for effects of competition, ownership and the joint effects of the two, in the form specified in equation (2) of the previous section.

All regression models in both OLS and FE estimation include three-digit industry dummies to control for industry-specific effects and year dummies to control for overall economic effects. The standard errors in all model estimations were adjusted for firm-clustering, i.e. heteroskedasticity-robust standard errors are reported. Further on, I present the results for model specifications (1) – (7) comparing the results between the two estimation methods, OLS and FE.

III.1. Competition Effects

Equations (1) – (2) test for which one of the market concentration measures is better; I compare the Herfindahl-Hirschman index (HHI) against the five-firm industry concentration ratio (CR5), both of which are inverse approximations of market competition. Additionally, I estimated market share (abandoned because of the problems described in section 3), the CR3 market concentration ratio and a variable counting the new entries into each industry, by year. The results from estimations using variables CR3, market share and industry entry are reported in Table A4 in the Appendix.

[23] The coefficients on the production factors log(capital), log(costs) and log(employment) are reported in the Appendix table A4. The coefficients on these variables exhibit the expected sign and are significant, which is evidence of robustness of the specifications analyzed, but I do not discuss any of them in detail, since they are not of central importance in the present paper.

Table 3: Estimated Productivity Effects of Competition and Ownership (by OLS)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
HHI	0.126						
	(0.093)						
CR5		-0.003	-0.004	-0.005	-0.007	-0.025	0.286
		(0.005)	(0.005)	(0.005)	(0.005)	(0.185)	(0.200)
IP			0.195***	0.193***	0.186***	0.186***	-0.540***
			(0.062)	(0.061)	(0.060)	(0.060)	(0.199)
Priv				0.669***			
				(0.043)			
FO					1.010***	1.003***	0.951***
					(0.047)	(0.075)	(0.076)
DO					0.693***	0.687***	0.691***
					(0.035)	(0.068)	(0.066)
FO*CR5						0.019	-0.299
						(0.185)	(0.201)
DO*CR5						0.017	-0.294
						(0.185)	(0.200)
DO*IP							0.724***
							(0.198)
FO*IP							1.186***
							(0.284)
Observations	74,682	74,666	74,666	74,665	74,659	74,659	74,659
R-squared	0.892	0.892	0.892	0.893	0.894	0.894	0.894

NOTE – Estimated coefficients (and their standard errors) are shown for controls of market concentration (HHI, CR5), for a measure of foreign competition (import penetration in the four-digit industry), on the two types of private ownership (Priv=1 if majority owner is private, Foreign=1 if majority owner is foreign, Domestic=1 if majority owner is domestic) and for interaction effects of private ownership with foreign and domestic competition. The dependent variable is log(output) and independent variables include log(capital) and log(employment), as well as full sets of industry dummies and year dummies. The regressions were run using OLS. The reported statistics are adjusted for heteroskedasticity.

*Significant at 10 percent.

** Significant at 5 percent.

*** Significant at 1 percent.

Table 4: Estimated productivity effects of Competition and Ownership (by FE)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
HHI	0.092						
	(0.074)						
CR5		0.017	0.016	0.016	0.016	0.462***	0.707***
		(0.013)	(0.013)	(0.013)	(0.013)	(0.147)	(0.177)
IP			-0.119*	-0.126**	-0.138**	-0.140**	-0.925***
			(0.062)	(0.062)	(0.062)	(0.062)	(0.247)
Priv				0.125***			
				(0.031)			
FO					0.196***	0.350***	0.339***
					(0.042)	(0.065)	(0.065)
DO					0.145***	0.293***	0.277***
					(0.033)	(0.060)	(0.058)
FO*CR5						-0.449***	-0.694***
						(0.148)	(0.178)
DO*CR5						-0.444***	-0.690***
						(0.147)	(0.177)
DO*IP							0.820***
							(0.246)
FO*IP							0.732**
							(0.323)
Observations	74,682	74,666	74,666	74,665	74,659	74,659	74,659
R-squared	0.886	0.886	0.886	0.886	0.886	0.886	0.886

NOTE – Estimated coefficients (and their standard errors) are shown for controls of market concentration (HHI, CR5), for a measure of foreign competition (import penetration in the four-digit industry), on the two types of private ownership (Priv=e1if majority owner is pirvate, Foreign=1 if majority owner is foreign, Domestic=1 if majority owner is domestic) and for interaction effects of private ownership with foreign and domestic competition. The dependent variable is log(output) and independent variables include log(capital) and log(employment), as well as full sets of industry dummies and year dummies. The regressions were run with firm fixed effects. All statistics are adjusted for clustering on firms. The fixed effects are statistically significantly different from zero at the .0001 level).

*Significant at 10 percent.

** Significant at 5 percent.

*** Significant at 1 percent.

The coefficient on HHI is counter-intuitively positive and insignificant across the two estimations (Tables 3 and 4, model (1)). In regression model (2) I test for whether the five-firm concentration ratio calculated for markets defined corresponding to national level four-digit industries (CR5) determines output in a more significant way, which then becomes my variable of choice for market concentration. The coefficient on the variable yields the expected negative

sign only when estimated by OLS, although its coefficient is very small, showing a 0.3% decrease in the firm's output when market concentration increases by 1 percentage point. In the same time, the FE estimation yields a positive coefficient, showing a 1.7% increase of output at a 1 percentage point increase in market concentration. Both coefficients are rather small, however, and neither of them is significant, which led to adding of further controls that augment the basic regression model in order to identify other significant factors.

Model specification (3) augments the previous one with the variable import penetration (IP) to test, additionally, for the effect of foreign competition on firms within an industry. The coefficient on import penetration is positive and highly significant (at the 1% significance level) when estimated by OLS (Table 3), implying that 1 percentage point increase in import penetration causes output to increase by 19.5%. But the same coefficient is negative when the model is estimated by FE and it is significant at a lower, 10% significance level (Table 4). Its magnitude is also smaller, implying 11.9% decrease in output caused by one percentage point larger import penetration. In subsequent models, the coefficient on import penetration preserves its negative sign throughout the models estimated by FE and gains in significance (from 1% to 5% significance level) as further controls for ownership effects are added.

However, there are reasons to believe that besides the industry fixed-effects (absorbed by three-digit industry dummies) and year fixed-effects (controlled for by year dummies) there are important firm-specific factors that need to be taken into account. Thus, I consider the negative, but less significant coefficients from the FE estimation to be more robust. These do not contradict the previous findings on Romanian data by Estrin, Konings, Zolkiewski & Angelucci (2001), who have also found a negative effect of import penetration on corporate performance. A negative effect of import penetration on firm performance is evidence of a technological or productivity gap between domestic and foreign enterprises, which puts domestic companies into a comparatively disadvantageous position. The fact that I find a negative impact of

competition on a much longer panel than Estrin, Konings, et al. (2001) and stretching into a later period, suggests that the technological and productivity gap between foreign and domestic firms is prolonged over time.

III.2. Ownership Effects

In regression models (4)-(5) I augment the previous versions with controls for ownership effects. Namely, in equation (4) I add a binary variable to control for effects of private ownership on corporate performance (variable Priv, which takes on the value 1 for firms under majority private ownership). I obtain a positive and a highly statistically significant coefficient on this variable, in both OLS and FE estimations of its effect. According to the OLS estimation (Table 3, model (4)) considering along with domestic product market concentration and ownership effect only industry-specific and overall economic factors, private firms have a 66.9% higher output than state-owned firms (the coefficient is statistically significant at the 1% level). However, as previously pointed out, the OLS estimation is not reliable due to unobserved firm heterogeneity. The FE estimate for private ownership's effect is of 12.5% increase in output measured as sales for private compared to state-owned firms, holding all other factors fixed and considering industry-, overall economic and firm-specific effects. The coefficient is significant at the 1% level (Table 4, model (4)).

Regression model (5) in both tables disaggregates private ownership effects into foreign- and domestic private ownership effects, based on the private owner's nationality, through the binary variables FO (foreign private owner) and DO (domestic private owner), which I add replacing the variable Priv. The coefficients on the two variables in model (5) show that, holding all other factors fixed, both domestic and foreign private firms perform better than state-owned firms, with a slight advantage for foreign-owned firms. Across both FE and OLS estimations the coefficients are positive and highly significant (at the 1% level). The FE estimation identifies a small difference between the nationality effects of private ownership:

foreign firms' output is 19.6% higher than that of state firms', whereas for domestic firms this effect is 14.5%, 5 percentage points lower (Table 4, model (5)).

The OLS estimates, on the other hand, show a large difference between the nationality effects of private ownership. However, looking at the results from the OLS estimates, it becomes obvious how OLS overestimates the effects analyzed. In Table 3 the coefficients on both of the ownership variables are very high and positive, significant at the 1% level. In a log-level specification of the model (dependent variable is log(sales), whereas the dummy variables are in level), the coefficient on Foreign in equation (5), Table 3 implies a 101% higher output for a foreign-owned firm compared to a state owned one. The effect of domestic private ownership is a bit lower, at 66.9%, but still considerably high and statistically significant at 1% significance level). The coefficients of the two variables remain highly significant and similarly large positive when I add ownership-domestic competition interaction terms (equation (6)), but decrease slightly when controlling for ownership-foreign competition joint effect in equation (7). Such large coefficients estimated and the fact that FE estimation yields much smaller coefficients are evidence of the fact that the FE estimation is more accurate, as it absorbs some of the firm-specific effects that caused the ownership effect estimations to be upward biased when estimated by OLS.

III.3. Joint Effects of Competition and Ownership

In the final two equations, eq. (6)-(7), I further augment the previous models with interaction terms of nationality-differentiated ownership dummies and product market concentration (in eq. (6)) and of ownership dummies and import penetration (in eq. (7)) in order to test for interaction of product market competition, both foreign and domestic, with ownership in terms of their effects on output. The FE estimation of regression model (6) yields at least interesting results (Table 4, model (6)). Interacting the five-firm market concentration ratio with the nationality-differentiated private ownership dummies strengthens the variables'

counterintuitive positive coefficient (i.e. it increases from an insignificant 0.016 in model (5) to the value of 0.462 in model (6), significant at the 1% level). However, the coefficients on the two interaction terms are also highly significant but negative. This implies that, whereas market concentration enhances performance of state firms, compared to them both domestic and foreign private firms behave competitively and experience a decrease in their sales set in a market with the same level of product market concentration. This pattern also occurs in the OLS estimation results (Table 3, model (6)), although the coefficients on the interaction terms are not significant in this estimation.

The pattern found suggests that there may be a situation of dominant firm with a competitive fringe in some of the four-digit NACE industry defined markets. Using state-owned firms as base group for the estimations including ownership effects, this also suggests that the dominant firm or firms in those situations must be state-owned. Table 7 shows some evidence in favor of this explanation from the Meat Industry (NACE group 1511). As can be seen in the table, the mean of sales for state-owned firms exceeds that of privately owned firms and is above the mean of all firms, independently of their ownership form.

Regression model (7) is the most augmented form of the basic model: it contains the CR5 measure of market concentration, the IP, or import penetration for foreign competition, dummy variables that control for ownership effects (FO, DO) and interaction terms that control for the joint effects of ownership form with the two types of competition (FO*CR5, DO*CR5 for market concentration and ownership interaction and FO*IP, DO*IP for import penetration and ownership interaction). This form adds the terms that put ownership into interaction with foreign competition in order to test whether the hunch based on regression model (6) regarding the dominant firm with a competitive fringe effect is plausible. If so, model (7) should preserve the estimates on domestic competition and on its interaction terms with ownership dummies

and yield similar estimates for coefficients on foreign competition and its interaction terms with the ownership variables.

Table 5: Evidence of Dominant Firm with Competitive Fringe in the Industry of production and Preserving of Meat (NACE Code 1511)

Year	Mean of Total Sales (thou RON)	Mean of Total Sales by Private Firms (thou RON)	Mean of Total Sales by State Firms (thou RON)
1992	1.254	0.633	1.436695
1993	5.621	1.875	19.26427
1994	8.363	2.803	51.94011
1995	9.176	5.207	58.15226
1996	27.542	13.967	295.3134
1997	78.893	58.860	673.7836
1998	144.823	117.040	1096.234
1999	162.941	148.700	891.8651
2000	331.578	322.507	1156.41
2001	942.004	953.669	1369.666
2002	1193.532	1204.340	3172.013
2003	1298.628	1287.105	5325.247
2004	2249.477	2299.689	32.19217
2005	3054.587	3126.321	N/A
2006	3521.393	3609.461	N/A
		3134 such firms	96 such firms

As seen in Table 4, model (7), this indeed happens. The negative effect of import penetration remains negative and increases its magnitude and significance. Previously (in model (6)), the coefficient on IP was -0.140 (significant at the 5% level) and turned -0.925 (significant at the 1% level). The coefficient on the interaction term between foreign ownership and import penetration is 0.732 and highly significant (p>0.01), and that on the interaction between domestic ownership and import penetration is 0.820 and highly significant (p>0.01). Thus, based on FE estimations in Table 4, the effect of import penetration on domestic private firms is $\beta_{\text{domestic}} = -0.925 + 0.820 = -0.105$, on foreign private firms it is $\beta_{\text{foreign}} = -0.925 + 0.732 = -0.193$ and for state-owned firms it is $\beta_{\text{state}} = -0.925$. Basically, the overall effect of import penetration is negative on firms' performance, but to a significantly

lesser extent for privately owned firms, as compared to those owned by the state. In the case of product market concentration, the coefficients are as follows: $\beta_{\text{domestic}} = 0.707 - 0.690 = 0.017$, $\beta_{\text{foreign}} = 0.707 - 0.694 = 0.013$, and $\beta_{\text{state}} = 0.707$. Once again, the pattern points to the unusual market setup within food industry. The dominant state-owned firms gain 70.7% increase in sales from a 1 percentage point increase in market concentration holding all other factors fixed, while the competitively behaving private companies gain from the same concentration change significantly less. Domestically owned private firms have their sales increased by 1.7%, while the effect of the same market concentration change is 1.3%, 0.4 percentage points less for foreign-owned private companies.

III.4. Competition and Ownership – Substitutes or Complements?

I base my analysis of the relationship between ownership and competition on the preferred model specification (7) from Table 4[24]. Including the interaction terms that control for the joint effect of competition (through product market concentration and import penetration) with ownership is the approach used by Grosfeld and Tressel (2002) to assess the nature of this relationship. The coefficients on these terms show whether the two effects, through the incentives mechanism described in the literature, mutually reinforce each other, acting as complements, or can be substituted for one another. As described in the previous subsection, when I included the interaction terms, the coefficients on the competition variables on their own preserved their significance from the previous models (2)-(6) but I obtained significant coefficients on their interactions with ownership variables as well.

The reduced form estimated model (7) presents in the following way:

$\log(y) = \beta X + 0.707\, CR5 - 0.925\, IP + 0.339\, FO + 0.277\, DO - 0.694\, FO * CR5 - 0.690\, DO * CR5 + 0.820\, DO * IP + 0.732\, FO * IP + \beta\_ind\ ind + \beta\_t\ year + FE$, where the variables are as described earlier and X is a vector of all other variables.

[24] For clarity of explanation, I again restrict this description on the results obtained from the FE estimations in Table 4.

In the case of CR5 market concentration ratio, the positive ("bad") effect of higher concentration on sales is counterbalanced by the negative coefficients on the interactions of concentration with private ownership. I interpret this as a "good effect", when paired with the "good" ownership form (the one that increases, on its own, sales of firms), based on estimations of regression models (4)-(5)). For the base groups of state firms, as the β_{state} coefficient shows, the effect of product market concentration in very high, 70.7%, and highly significant. In any free market economy, this qualifies as a "bad" incentive on firms.

Similarly, the coefficients on import penetration and its interaction with the private ownership dummies suggest the existence of a complementarity rather than substitutability relationship between ownership and competition. The highly significant and strong negative effect of import penetration on state-owned firms ($\beta_{state} = -0.925$) is, again, counterbalanced in the case of privately owned firms, such that the negative effect in their case is significantly decreased ($\beta_{foreign} = -0.193,\ \beta_{domestic} = -0.105$).

The evidence presented points to the complementary nature of the relationship between ownership form and product market competition.

Conclusions

In this paper I analyzed through an augmented production function the behavior of companies in the Romanian food industry. I looked into their performance at the effect of domestic and foreign product market competition and the identity of their owners, disaggregating private ownership into foreign- and domestically based.

Firstly, I found that there is some evidence that firms in this industry respond negatively to an increased competition, but this is true to a lesser extent for those having private owners, either of domestic or foreign nationality. The effect of competition on firms is rather counterproductive in this industry; however, privately owned companies behave in a

competitive way and have their performance negatively influenced by import competition to a lesser extent compared to state-owned companies. The findings described and the results obtained on the effect of ownership provide strong evidence that private ownership has a statistically significant positive impact on firm performance, and the effect is even more pronounced when the private owner is of foreign nationality.

Secondly, the results I found on ownership-differentiated competition effects also point to the existence of a dominant firm with a competitive fringe setup in Romanian food industry. The same evidence suggests that ownership and competition incentives reinforce rather than substitute for each other, as the overall negative impact of import penetration is considerably lower for privately owned companies, and market concentration behaves according to the same pattern when accounting for the type of owner.

Finally, I do not look into ownership concentration effects, which, using more detailed ownership data than I have, may offer further insight into corporate governance mechanisms' workings on performance. I also do not handle thoroughly the question of whether competition and trade liberalization exercise their productivity effect rather on increasing company number in the industry and enforcing a natural selection of the more efficient ones into survival. These weaknesses pointed out represent possible tracks for further research.

APPENDIX

Table A1: Number of Firms active in Food Industry Each Year, Total Employment in the Industry

Year	Firms	Employment (% from Total Manufacturing)	Total Manufacturing Employment*
1992	550	282109 (10.04%)	2811000
1993	1736	287017 (11.08%)	2590000
1994	3373	249873 (10.30%)	2426000
1995	5557	250353 (11.42%)	2192000
1996	7188	268251 (12.49%)	2148000
1997	8668	261854 (12.89%)	2032000
1998	9816	243506 (12.77%)	1907000
1999	9379	218575 (13.17%)	1660000
2000	9786	209099 (13.40%)	1560000
2001	9662	198183 (12.46%)	1590000
2002	10355	193005 (12.11%)	1594000
2003	10347	195561 (12.37%)	1581000
2004	10504	199630 (13.39%)	1491000
2005	10226	200462 (14.07%)	1425000
2006	10082	203026 (14.41%)	1409000

*Data for Manufacturing Employment was taken from the Annual Statistical Report 2008, published by the Romanian National Statistical Institute in Bucharest, 2009

Table A2: Descriptive Statistics of All Variables

Variable	Symbol	Mean	Standard Deviation
sales	*y*	1075.622	11839.97
log(sales)	*log(y)*	3.249905	2.767749
capital	*k*	562.0335	6879.184
log(capital)	*log(k)*	2.154441	3.152258
employment	*n*	31.537	142.4133
log(employment)	*log(n)*	1.97494	1.510138
material expenses	*m*	643.852	6426.113
log(material expenses)	*log(m)*	2.391014	3.173957
market share	*mktshare*	0.004302	0.0323437
Herfindahl-Hirschman Index	*HHI*	0.0513451	0.0867854
3-firm market concentration ratio	*CR3*	0.2486453	0.1764049
5-firm market concentration ratio	CR5	0.3294545	0.7123687
import penetration	*IP*	0.0939426	0.1353754
industry new entries	*industry_entry*	159.8637	196.5748

Table A3: Means of Market Concentration Measure C5 and Foreign Competition Measure Import Penetration for the three-digit industries in the Sample

3 digit ind.	151		152		153		154		155		156	
Years, Mean of Indicator	C5	Import Penetration	C5	Import Penetration	C5	Import Penetration	C5	Import Penetration	C5	Import Penetration	C5	Import Penetration
92	0.306	0.054	0.866	0.201	0.268	0.143	0.544	0.281	0.261	0.110	0.583	0.234
93	0.468	0.067	0.782	0.425	0.198	0.127	0.563	0.339	0.241	0.136	0.433	0.218
94	0.436	0.072	0.821	0.427	0.251	0.099	0.590	0.201	0.269	0.088	0.311	0.156
95	0.284	0.106	0.669	0.510	0.252	0.183	0.522	0.182	0.233	0.081	0.317	0.145
96	0.417	0.027	0.659	0.543	0.350	0.124	0.487	0.165	0.223	0.066	0.191	0.082
97	0.240	0.053	0.646	0.542	0.545	0.129	0.423	0.175	0.237	0.050	0.205	0.150
98	0.220	0.121	0.671	0.789	0.684	0.129	0.461	0.161	0.227	0.092	0.187	0.145
99	0.178	0.089	0.752	0.737	0.672	0.146	0.477	0.120	0.243	0.069	0.206	0.137
100	0.172	0.116	0.692	0.688	0.331	0.365	0.604	0.131	0.300	0.075	0.270	0.158
101	0.162	0.153	0.626	0.698	0.307	0.428	0.624	0.131	0.324	0.067	0.273	0.163
102	0.191	0.152	0.590	0.694	0.302	0.421	0.643	0.186	0.354	0.063	0.293	0.121
103	0.188	0.160	0.565	0.609	0.418	0.316	0.598	0.175	0.347	0.060	0.349	0.119
104	0.185	0.204	0.664	0.617	0.453	0.336	0.564	0.162	0.352	0.050	0.389	0.083
105	0.191	0.273	0.738	0.653	0.480	0.333	0.591	0.169	0.361	0.051	0.404	0.106
106	0.183	0.247	0.680	0.639	0.533	0.371	0.605	0.220	0.362	0.059	0.421	0.131
Total	0.232	0.125	0.669	0.638	0.453	0.239	0.562	0.168	0.297	0.067	0.305	0.129

Table A3: (continued from previous page)
Means of Market Concentration Measure C5 and Foreign Competition Measure Import Penetration for the three-digit industries in the Sample

3 digit ind.	157		1581		158		159	
Years, Mean of Indicator	C5	Import Penetration	C5	Import Penetration	C5	Import Penetration	C5	Import Penetration
92	0.320	0.013	0.179	0.000	0.341	0.389	0.150	1.004
93	0.307	0.018	0.164	0.004	0.326	0.406	0.188	0.080
94	0.354	0.021	0.150	0.000	0.006	0.352	0.229	0.028
95	0.386	0.030	0.142	0.001	0.339	0.173	0.190	0.027
96	0.378	0.059	0.152	0.003	0.325	0.349	0.229	0.025
97	0.476	0.050	0.164	0.001	0.292	0.295	0.237	0.011
98	0.502	0.074	0.162	0.007	0.307	0.280	0.247	0.016
99	0.425	0.099	0.162	0.007	0.325	0.240	0.233	0.019
100	0.366	0.140	0.174	0.008	0.332	0.271	0.216	0.017
101	0.400	0.167	0.208	0.011	0.352	0.283	0.345	0.020
102	0.478	0.199	0.197	0.013	0.316	0.232	0.400	0.019
103	0.538	0.202	0.190	0.015	0.336	0.241	0.414	0.028
104	0.524	0.251	0.162	0.011	0.351	0.229	0.439	0.041
105	0.478	0.341	0.191	0.013	0.413	0.237	0.451	0.038
106	0.508	0.311	0.177	0.015	0.410	0.251	0.474	0.054
Total	0.445	0.159	0.176	0.010	0.334	0.263	0.315	0.036

Table A4: Regression Resulst of All FE Estimations

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
log(k)	0.070***	0.019***	0.070***	0.071***	0.070***	0.070***	0.071***	0.071***	0.071***	0.071***
	(0.004)	(0.002)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
log(m)	0.544***	0.176***	0.544***	0.546***	0.544***	0.544***	0.543***	0.542***	0.542***	0.542***
	(0.008)	(0.006)	(0.008)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
log(n)	0.326***	0.097***	0.326***	0.331***	0.326***	0.325***	0.328***	0.328***	0.328***	0.327***
	(0.009)	(0.005)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
HHI	0.092									
	(0.074)									
lmktshare		0.704***								
		(0.009)								
CR3			0.081							
			(0.050)							
industry_entry				0.000***						
				(0.000)						
CR5					0.017	0.016	0.016	0.016	0.462***	0.707***
					(0.013)	(0.013)	(0.013)	(0.013)	(0.147)	(0.177)
IP						-0.119*	-0.126**	-0.138**	-0.140**	-0.925***
						(0.062)	(0.062)	(0.062)	(0.062)	(0.247)
PO							0.125***			
							(0.031)			
FO								0.196**	0.350***	0.339***
								(0.042)	(0.065)	(0.065)

DO								0.145**	0.293***	0.277***
								(0.033)	(0.060)	(0.058)
FO*CR5									-0.449***	-0.694***
									(0.148)	(0.178)
DO*CR5									-0.444***	-0.690***
									(0.147)	(0.177)
DO*IP										0.820***
										(0.246)
FO*IP										0.732**
										(0.323)
Observations	74,682	80,631	74,682	80,631	74,666	74,666	74,665	74,659	74,659	74,659
R-squared	0.886	0.967	0.886	0.892	0.886	0.886	0.886	0.886	0.886	0.886

Robust standard errors are reported in in parentheses

*Significant at 10 percent.

** Significant at 5 percent.

*** Significant at 1 percent.

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