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Productivity effects of the ownership concentration in Polish employee-owned companies

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Abstract

Research background: The conducted empirical research on the influence of the degree of ownership concentration in the employee-owned companies on their sales revenues thematically fits into the issue of efficiency of the direct privatisation method, in particular giving a state-owned enterprise for use against payment.

Purpose of the article: The main goal of this article is to verify the research hypothesis stating that in employee-owned companies an increase in the degree of ownership concentration leads to an increase in sales revenues.

Methods: The empirical studies were carried out on a sample of 15 employee-owned companies from Mazowieckie Province, which concluded the agreement of giving a state-owned enterprise for use against payment from 2000 to 2004 and using the data from financial statements handed in by these entities to the National Court Register for a ten-year period after the privatisation year. The verification of research hypothesis was based on the estimation of a Cobb–Douglas production function by Ordinary Least Squares method for two variants, differing in the way of measuring the degree of ownership concentration in investigated employee-owned companies.

Findings & Value added: The research hypothesis formulated in this paper was verified negatively as the increase in the degree of ownership concentration in employee-owned companies caused the decrease in their sales revenues. The conducted empirical research

also suggests that sales revenues in examined employee-owned companies peak at some intermediate/optimal level of ownership concentration.

Introduction

The privatisation of state-owned enterprises in Poland is coming to the end, but still remains an important scientific and research problem for the simple reason that there is a strong need to systematically evaluate the efficiency of joint stock companies being the result of this process. Joint stock companies established in the privatisation process, including employee-owned companies, are an integral part of Polish socio-economic reality and their functioning and development largely depend on opportunities and threats posed by legal conditions of the implemented privatisation method.

The employee-owned company is a joint stock company set up by employees of the directly privatised state-owned enterprise to take its assets in the use against payment (compare Baehr, 1993, p. 52; Górka, 1991, p. 91; Jawłowski, 2001, p. 55; Kozarzewski, 1998, pp. 25–26; Lexicon, 1998, p. 195; Nadratowska, 1990, p. 54; Surdykowska, 1996, p. 128; Włodyka, 1996, p. 657). The strong employee nature of a company using a state-owned enterprise against payment is a result of the need to meet capital-ownership statutory conditions (see Błaszczuk, 2002, p. 193) which create a possibility to establish a joint stock company, even with a full participation of employees of the privatised state-owned enterprise, but with dispersed ownership of the share capital.

Empirical studies on the influence of employee ownership on the efficiency of a company carried out so far show that the entities in which the share of employee ownership exceeded 5% of the share capital — in relation to those in which it did not exceed 5% — revealed relatively poor performance. Those companies usually had lower Tobin's Q, invested less in long-term assets, took fewer risks, grew more slowly, created fewer new jobs as well as exhibited lower labour and total productivity factors (see Faleye *et al.*, 2006, p. 509; Kruse & Freeman, 2012, pp. 23). However, it seems that the increase in ownership concentration in the hands of outside or inside shareholders raising the effectiveness of corporate governance (compare Fazlzadeh *et al.*, 2011, pp. 255–256; Kapopoulos & Lazaretou, 2006, p. 18; Sanchez-Ballesta & Garcia-Meca, 2007, pp. 885–886) and the implementation of managerial equity ownership reducing the principal-agent conflict (compare Daraghma & Alsinawi, 2010, p. 124; Jelinek & Stuerke, 2009, p. 173) may improve performance of this type of entities.

The main aim of this article is to identify the impact of the degree of ownership concentration in employee-owned companies on sales revenues.

In order to realise the objective of this paper, the formulated research hypothesis stated that in investigated employee-owned companies an increase in the degree of ownership concentration leads to an increase in sales revenues. The verification of this research hypothesis was conducted among fifteen employee-owned companies from Mazowieckie Province, which concluded the agreement of giving a state-owned enterprise for use against payment in between years 2000–2004. To identify the influence of the degree of ownership, concentration of employee-owned companies on their sales revenues a Cobb–Douglas production function, whose parameters were estimated by Ordinary Least Squares method was used. While estimating parameters of the adopted production function, independently collected and processed data from the financial statements, which had been submitted by the analysed employee-owned companies to the National Court Register for ten years following the year of privatization, was used.

The remainder of this paper is structured as follows. The next section explains the essence of employee-owned companies. Section 3 contains a description of the sample and research design. Section 4 offers the results of an empirical analysis of the relation between ownership concentration and productivity of employee-owned companies. Finally, section 5 presents concluding remarks.

The essence of employee-owned companies

Giving a directly privatised state-owned enterprise for use against payment as a rule, takes place to a joint stock company that meets the following conditions (see Act of August 30, 1996, Article 51 (1, 2)):

- more than half of employees of the privatised state-owned enterprise joined the company,
- shareholders are only natural persons unless the Minister of the State Treasury allows for the participation of legal persons in the company,
- paid-up share capital of the company shall not be lower than 20% of the founding capital and the enterprise capital at the date on which balance sheet for the financial year, preceding the year of issuing the direct privatisation order, was drawn up and
- at least 20% of shares have been acquired by persons not employed in the privatised state-owned enterprise¹.

¹ The Minister of the State Treasury may consent to give the state-owned enterprise for use against payment to a company which does not fulfil the requirement of the acquisition of 20% of shares by persons not employed in the privatised state-owned enterprise.

The fulfilment of these conditions, with limited financial resources of employees (see Bojar & Sosińska-Wit, 1999, p. 426) and negligible interest of outside investors in joining the company with their capital participation (compare Goszka, 2001, p. 55; Krajewski, 2001, p. 93–103) makes that the ownership of relatively low value share capital of the company established to take a state-owned enterprise in the use against payment is usually significantly dispersed (see Jarosz & Kozak, 1995, pp. 115–125). However, due to the disposal of shares belonging to ordinary employees to managers, the ownership that was initially dispersed among employees of a state-owned enterprise given for use against payment is gradually concentrated in the hands of managerial elites (compare Błaszczuk & Woodward, 2001, p. 17; Goszka & Popławski, 2001, pp. 48–52). The reason for the transfer of shares by the rank and file employees is mostly a weak economic and financial standing of the employee-owned company, resulting from the need to meet not only capital-ownership statutory conditions of its creation, but also the obligations under the agreement on giving a state-owned enterprise for use against payment. This agreement is concluded for a fixed period with the State Treasury and includes a lot of different types of obligations (compare Act of December 5, 2002, Article 2 (15), Article 25).

The most important obligation of the employee-owned company arising from the agreement concluded with the State Treasury, while taking into account the volume of related charges (compare Bukowska-Piestrzyńska, 2002, pp. 45–46; Karpińska-Mizielińska & Smuga, 1997, pp. 117–118), is the necessity to repay the debt for the use of a state-owned enterprise. The volume of this commitment cannot be lower than the sum of (compare Ordinance of the Council of Ministers of October 16, 1997, §3):

- the value of the state-owned enterprise paid in capital instalments – the quotient of the value of the state-owned enterprise and the numbers of quarters, for which the agreement was concluded and
- the sum of additional fees for the entire duration of the agreement debited in financial costs (see Kozarzewski, 1998, p. 25) – the product of the value of the state-owned enterprise reduced by paid capital instalments and an interest rate of the unpaid part i.e. 0.5 of the current Lombard rate.

Beside price liabilities, i.e. related to the value of a state-owned enterprise constituting the subject of the agreement with the State Treasury, the employee-owned company is obliged to comply with the so-called, non-price commitments. Non-price commitments primarily consist of investment commitments, which in accordance with the accepted practice by the State Treasury to prevent the depreciation of assets of a state-owned enterprise given for use against payment (compare Bojar *et al.*, 2003, s. 110–

111; Wrońska, 2004, pp. 125–127) require from the employee-owned company to pay in the prescribed period a set amount of capital expenditure on tangible fixed assets (compare Matuszewska-Pierzynka, 2014, pp. 45–47). In addition, in the scope of non-price commitments the employee-owned company, as under the law it becomes the party to the existing employment relationships (compare Act of August 30, 1996, Article 44, Labour Code of June 26, 1974, Article 23¹) may be obliged to fulfil social guarantees protecting interests of employees of a state-owned enterprise taken in the use against payment, which include a need to keep agreed employment within the specified period and quite frequently, even to increase wages paid to date in each year (see Matuszewska-Pierzynka, 2016a, pp. 101–103; Matuszewska-Pierzynka, 2016b, pp. 114–115).

The small share capital with slight prospects for its increase in the future, difficulties in gaining a positive financial result, being the effect of significant financial costs and operating costs, especially in the field of salaries, as well as the lack of property rights of a state-owned enterprise taken for use against payment in the duration of the agreement with the State Treasury (compare Pawłowski, 1999, p. 430; Act of August 30, 1996, Article 5 (2)) negatively affect the credit capacity of the employee-owned company. Limited possibility of obtaining funds from a bank loan for the implementation of obligatory investments means that a primary source of their financing becomes the net profit earned in the employee-owned company (compare Matuszewska-Pierzynka, 2015a, pp. 388–389; Matuszewska-Pierzynka, 2015b, p. 103). Therefore, due to retaining the whole of a minuscule net profit for investment purposes, workers-shareholders seeking to maximize total current incomes (compare Faleye *et al.*, 2006, p. 509; Harbaugh, 2005, p. 566; Kim & Ouimet, 2010, pp. 9, 36), which mainly consist of salaries and dividends, are likely not only to exert some wage pressure, but also to sell shares of the employee-owned company (compare Błaszczuk, 2002, p. 197; Kozarzewski & Woodward, 2001, p. 22).

Research methodology

The empirical research on productivity effects of the ownership concentration in employee-owned companies was carried out among entities, which concluded the agreement of giving a state-owned enterprise for use against payment in years 2000–2004. Defining this period was connected with the following reasons:

- previously conducted empirical studies on the efficiency of employee-owned companies in most cases did not cover the period beyond 2000

(see Bojar *et al.*, 2003; Matuszewska–Pierzynka, 2015c; Wrońska, 2004),

- significant changes in the law relating to the method of repayment and interest obligations for using a state-owned enterprise were implemented at the end of 2004 (compare Ordinance of the Council of Ministers of October 16, 1997; Ordinance of the Council of Ministers of December 14, 2004),
- empirical studies should cover a ten-year research period to consider the entire duration of the agreement with the State Treasury².

The empirical research on the relation between ownership concentration and productivity was carried out in employee-owned companies from Mazowieckie Province, where most such entities were established during the period given for the conclusion of the agreement with the State Treasury (see *Privatisation...*, 2000, p. 48; *Privatisation...*, 2005, p. 39).

According to the data from the Ministry of the Treasury, 24 agreements of giving a state-owned enterprise for use against payment were concluded in Mazowieckie Province between 2000–2004. Having analysed 24 employee-owned companies initially qualified for the research sample, the entities which operated in a form other than a limited liability company, as well as those which transformed their organisational-legal form or went into the liquidation/bankruptcy during ten-year research period were excluded. Eventually, empirical studies on productivity results of the ownership concentration were conducted on a sample of 15 employee-owned companies from Mazowieckie Province, which concluded the agreement of giving a state-owned enterprise for use against payment from 2000 to 2004 (see Table 1).

The empirical research on the relation between ownership concentration and productivity was carried out using the data from financial statements handed in by employee-owned companies to the National Court Register for ten-year period after the privatisation year, wherein the privatization year is the year of concluding the agreement with the State Treasury.

Bearing in mind previous empirical research that analysed productivity effects of the employee participation (see Conte & Svejnar, 1988, pp. 144–145; Estrin *et al.*, 1987; pp. 51–52), empirical studies on the relation between ownership concentration and productivity of employee-owned companies are based on the augmented production function in its general form. This general form looks as follows:

² To 15 January 2003 the agreement of giving a state-owned enterprise for the use against payment could be concluded for the period not exceeding 10 years.

$$V = V(K, L, X, Z) \quad (1)$$

where V denotes value added as the output, K and L represent the capital and labour inputs, respectively, X is a vector of enterprise-specific variables and Z is a vector of institutional variables. The operationalisation of the general form of an augmented production function is conducted with the use of a Cobb–Douglas production function (compare Jones, 1993, pp. 478–479; Kozarzewski & Woodward, 2001, p. 31) that looks as follows:

$$V = AK^{\alpha_1}L^{\alpha_2}e^{(\beta X + \gamma Z)} \quad (2)$$

and in a logarithm form becomes:

$$\ln V = \ln A + \alpha_1 \ln K + \alpha_2 \ln L + \beta X + \gamma Z \quad (3)$$

From collected data, three operating variables are constructed³:

- V (output) – sales revenues instead of value added, which was impossible to calculate because of the lack of data measuring capital cost (compare Christev & FitzRoy, 2002, p. 261; Grosfeld & Nivet, 1999, p. 1141; Kozarzewski & Woodward, 2001, p. 31; Mickiewicz, 2002, p. 233),
- K (capital input) – tangible fixed assets being the object of obligatory investments⁴ and
- L (labour input) – salaries covering employment and wages commitments.

In addition to V , K , and L to assess the productivity impact of other important factors, particular institutional factors, two following vectors are considered. The X vector contains dummies for the number of years after privatisation year treated as 0 period (AGE), the year of production (YEAR) and the location of company headquarters (CITY) as well as the construction (CONST) and transportation and storage (TRANS) sectors. The vector Z comprises three proxies for the ownership concentration: DOC (degree of ownership concentration) measured by the value of Herfindahl–Hirschman Index (compare Sosnowski, 2015, p. 351; Fazlzadeh *et*

³ The operating variables are expressed in real values because one of them is one period lagged variable.

⁴ The variable of capital input is one period lagged because in contrast to output variable and variable of labour input, expressed by sales revenues and salaries, respectively, tangible fixed assets are not the value created during the particular period but the value on the particular day.

al., 2011, p. 254) that forms the basis for the construction of two other dummy variables, namely SOC (strong ownership concentration) and WOC (weak ownership concentration) (see Table 2).

Taking into account constructed variables as well as denoting enterprises by i , the time period in years by t ($t = 1, 2, \dots$) and residual by μ , the estimated Cobb–Douglas production function is:

$$\ln V_{it} = \alpha_0 + \alpha_1 \ln K_{it-1} + \alpha_2 \ln L_{it} + \beta X_{it} + \gamma Z_{it} \quad (4)$$

The estimation of a Cobb–Douglas production function is carried out with the use of Ordinary Least Squares method for two variants — main and additional — that differ in terms of the vector Z structure. The estimated Cobb–Douglas production function in discussed variants is as follows, respectively:

$$\begin{aligned} \ln V_{it} = \alpha_0 + \alpha_1 \ln K_{it-1} + \alpha_2 \ln L_{it} + \beta_1 AGE_{it} + \beta_2 YEAR_{it} \\ + \beta_3 CITY_{it} + \beta_4 CONST_{it} + \beta_5 TRANS_{it} + \gamma DOC_{it} \end{aligned} \quad (5)$$

and

$$\begin{aligned} \ln V_{it} = \alpha_0 + \alpha_1 \ln K_{it-1} + \alpha_2 \ln L_{it} + \beta_1 AGE_{it} + \beta_2 YEAR_{it} \\ + \beta_3 CITY_{it} + \beta_4 CONST_{it} + \beta_5 TRANS_{it} + \gamma_1 SOC_{it} + \gamma_2 WOC_{it} \end{aligned} \quad (6)$$

For the main variant of the estimation, the Z vector is limited to one variable that is the degree of ownership concentration (DOC), and in the additional one it includes dummies for the strong (SOC) and weak (WOC) ownership concentration.

Results of empirical research

In employee-owned companies qualified for the research sample, sales revenues — output — ranged from 150,761 to 70,004,068 PLN, and their average value measured by the arithmetic mean was equal to 16,479,639 PLN. The average value of tangible fixed assets — labour input — amounted to 4,481,526 PLN, while the lowest value was equal to 0⁵. Salaries — capital input — fell within the range from 164,205 to 10,823,741 PLN.

⁵ In one of the studied employee-owned companies (*BSiPB MSW in Warsaw*), the value of tangible assets in the four-year period was equal to 0, which resulted in the exclusion of these observations from the estimation of a Cobb–Douglas production function.

The adopted research period covered ten years after the privatisation year so the variable AGE took values from 1 to 10, and the variable YEAR from 0 for 2001 to 13 for 2014. Four employee-owned companies qualified for the research sample had their headquarters in Warsaw. Five employee-owned companies ran business activities in the construction sector and four in the transportation and storage sector (compare Table 1 and 2).

The average degree of ownership concentration in surveyed employee-owned companies was 0.2525. The lowest degree of ownership concentration equal to 0 occurred for 10 years in *PRD in Zwoleń*, in which more than seventy shareholders had the highest shareholding, but not exceeding 5%. The highest degree of ownership concentration equal to 1 was in two employee-owned companies: *PRI-D in Grójec* and *Tarczyn* (see Table 3).

In the employee-owned company *PRI-D in Grójec*, the increase in the degree of ownership concentration in the period $t = 8$ resulted from the accession of ELMO plc, which last year of adopted research period became the sole shareholder to this company. In the employee-owned company *Tarczyn* in the period $t = 5$, shares in the increased share capital were acquired by JUWENT partnership, which in the period $t = 7$ sold its shares to one of its partners. Additionally, in the period $t = 7$ shares in the increased share capital of the company were taken by its existing shareholders, who are also relatives of this partner, which caused that all shares were concentrated in the hands of one family. In the tenth period after the privatisation year this family sold all shares to one individual person.

Moreover, the strong degree of ownership concentration (value of the Herfindahl-Hirschman Index above the third quartile from a set of index values equal to 0.5103) was observed in *PRD in Przysucha*, *WCMB*, *BSiPB MSW* and *Polspport in Gróza Kalarii*. The weak degree of ownership concentration (value of the Herfindahl-Hirschman Index below the first quartile from a set of index values equal to 0.0638), occurred in *PRD-M in Płońsk* and *ZTiSZE in Warsaw* (compare Table 2 and 3).

The correlation analysis of explanatory variables showed that there are significant correlations among some of these variables but none of them — beyond AGE and YEAR — do not exceed the critical threshold of 0.8 (see Fooladi, 2012, pp. 691-692). The endogenous relation between AGE and YEAR caused that YEAR variable, which expresses the impact of technological changes on company's performance, was excluded from the estimation of a Cobb–Douglas production function (see Jones, 1993, pp. 479–481).

Analysing the results of the estimation of a Cobb–Douglas production function for employee-owned companies qualified for the research sample, the positive relationship between sales revenues and tangible fixed assets as

well as salaries, whose coefficients are statistically significant at the significance level $\alpha = 0.01$ can be noticed. The positive coefficient of AGE variable in both considered variants of the estimation, although not statistically significant may be treated as a slight support for assertions advocating the existence of a positive relationship between the company's performance and its life cycle. According to the conducted empirical research, the location of company headquarters in Warsaw negatively influenced the sales revenues of studied employee-owned companies — the coefficient for CITY variable is statistically significant in the main variant of the estimation at the significance level $\alpha = 0.05$ and in the additional one with the probability close to 90%. What is more, sales revenues are on average lower for employee-owned company operating in the transportation and storage sector, and higher for those operating in the construction sector. It is worth noting that the coefficient of CONST variable may be considered statistically significant with the probability higher than 90% in the main variant of the estimation and at the significance level $\alpha = 0.05$ in the additional one. The coefficient of TRANS variable is statistically significant in both of estimation variants at the significance level $\alpha = 0.01$.

The conducted empirical research in relation to variables associated with the ownership concentration revealed in the main variant of the estimation the existence of the negative relation between the degree of ownership concentration and sales revenues that is statistically significant with the probability close to 99%. The occurrence of the negative influence of ownership concentration on sales revenues of the investigated employee-owned companies seems to confirm the results of the estimation of a Cobb–Douglas production function in the additional variant, in which the coefficient of SOC variable is negative and of WOC variable is positive. However, it should be noted that both of these coefficients are not statistically significant, even at the significance level $\alpha = 0.1$ (see Table 4).

All findings of estimation received in carried out empirical studies were analysed because insignificant coefficients of some dependent variables do not mean that these variables do not have any influence on the independent variable – the influence of these variables can be too small to be detected in the research with the particular number of observations (see Asselain & Mould, 2010, p. 407).

Conclusions

The carried out empirical studies on the effects of the degree of ownership concentration on sales revenues of employee-owned companies showed

that the increase in the degree of ownership concentration leads to the decline in sales revenues, which means that the formulated research hypothesis was verified negatively. =The obtained about the existence negative and statistically significant relation between the degree of ownership concentration and sales revenues are opposite to the findings of Fazlzadeh *et al.* (2011, p. 255) as well as Sanchez-Ballesta and Garcia-Meca (2007, p. 890), according to which ownership concentration does not have any significant effect on the firm's performance.

In addition, sales revenues within the strong ownership concentration are on average lower and within the weak ownership concentration are on average higher than in other cases, which suggests that to some extent the increase in the degree of ownership concentration in examined employee-owned companies causes the increase in their sales revenues, and to some extent it causes the decrease. Lee (2008, p. 3–4) explains that such a situation may arise when the positive impact of the increase in the effectiveness of corporate governance at the initial stage of ownership concentration is outweighed in the process of its proceeding by the negative impact of the conflict between majority and minority shareholders. These findings are partly in the line with the results received by Kozarzewski and Woodward (2001, p. 32), who discovered that not only a high degree of concentration but also relative equality of shareholding has negative and statistically significant relationship with productivity of employee-owned companies.

The conducted empirical research has not confirmed the view of Jarosz and Kozak (1995, pp. 115–125) that the gradual concentration of ownership in employee-owned companies improves their performance. However, the obtained findings cannot be generalized, because the empirical studies were carried out on a sample of 15 employee-owned companies, which should be treated as their major limitation. Future empirical research should, first of all, examine the possible existence of non-linearities in the ownership concentration — productivity relation and then investigate a different effect on productivity when the ownership is concentrated in insiders, outsiders or institutional shareholders as it was done for instance in empirical studies of Akimova and Schwödiauer (2004, p. 41).

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Annex

Table 1. Employee-owned companies qualified for the research sample

Employee-owned company	Type of economic activity	Privatisation year
<i>PRD in Przysusze</i>	Construction	2000
<i>PRD in Zwolen</i>	Construction	2000
<i>PRI-D in Grójec</i>	Construction	2000
<i>WCMB</i>	Wholesale and retail trade	2000
<i>PKS in Grójec</i>	Transportation and storage	2001
<i>PRD-M Sp. z o.o. in Plońsk</i>	Construction	2001
<i>ZTE RADOM</i>	Transportation and storage	2001
<i>BSiPB MSW in Warsaw</i>	Professional, scientific and technical activities	2001
<i>PKS in Grodzisk Maz.</i>	Transportation and storage	2001
<i>Tarczyn</i>	Manufacturing	2001
<i>Ostrada in Ostrołęka</i>	Construction	2001
<i>Elmet Sp. z o.o. in Warsaw</i>	Wholesale and retail trade	2001
<i>ZTiSZE in Warsaw</i>	Transportation and storage	2001
<i>Geokart in Warsaw</i>	Professional, scientific and technical activities	2002
<i>Polsport in Góra Kalwarii</i>	Manufacturing	2004

Source: own work based on the data of the National Court Register and the Ministry of the Treasury.

Table 2. Description of variables used in the estimation of a Cobb–Douglas production function

Variable	Measure
V – output	value of sales revenues deflated by $CPI_{2000=100}$
K – capital input	value of tangible fixed assets deflated by $CPI_{2000=100}$ – one period lagged variable
L – labour input	value of salaries deflated by $CPI_{2000=100}$
AGE – number of years after privatisation year ($t = 0$)	dummy variable coded as follows: 1 year = 1, 2 years = 2, ...
YEAR – year of production	dummy variable coded as follows: 2001 = 0, 2002 = 1, ...
CITY – location of company headquarters	dummy variable which takes value of 1 if the headquarters of a company is located in Warsaw and 0 otherwise
CONST – construction sector	dummy variable which takes value of 1 when an enterprise operates in the construction sector and 0 otherwise
TRANS – transportation and storage sector	dummy variable which takes value of 1 when an enterprise operates in the transportation and storage sector and 0 otherwise
DOC – degree of ownership concentration	value of Herfindahl–Hirschman Index calculated as the sum of squares of the share of each substantial shareholder, i.e. a shareholder owning at least 5-percent of share capital

Table 2. Continued

Variable	Measure
SOC – strong ownership concentration	dummy variable which takes value of 1 if the value of Herfindahl–Hirschman Index is above the third quartile from a set of index values and 0 otherwise
WOC – weak ownership concentration	dummy variable which takes value of 1 if the value of Herfindahl–Hirschman Index is below the first quartile from a set of index values and 0 otherwise
CPI ₂₀₀₀₌₁₀₀ – Consumer Price Index (basic year = 2000)	

Source: own work based on Conte and Svejnar (1988, p. 144), Estrin *et al.* (1987, pp. 58-59), Jones (1993, p. 484), Kozarzewski and Woodward (2001, p. 42).

Table 3. Summary statistics of the main variables used in the analysis

Variable*	V	K	L	DOC
Mean	16,479,639	4,481,526	3,097,889	0.2525
Standard deviation	14,988,331	7,229,754	2,969,335	0.2467
Minimum value	150,761	0	164,205	0.0000
Maximum value	70,004,068	39,144,455	10,823,741	1.0000
First quartile	4,493,224	798,849	701,508	0.0638
Median	11,719,910	2,075,549	2,206,927	0.1268
Third quartile	24,907,178	4,795,815	4,531,427	0.5103

*All variables except the ownership concentration are expressed in PLN and constant prices (2000).

Source: own calculations based on the data of the National Court Register.

Table 4. Production function estimates of productivity effects

Variable	Main variant		Additional variant	
	Parameter estimate	p-value	Parameter estimate	p-value
LnA	2,4650	0,0023	2,4228	0,0060
LnK	0,2535	0,0000	0,2531	0,0000
LnL	0,7077	0,0000	0,7047	0,0000
AGE	0,0080	0,5143	0,0041	0,7411
YEAR	-	-	-	-

Table 4. Continued

Variable	Main variant		Additional variant	
	Parameter estimate	<i>p</i> -value	Parameter estimate	<i>p</i> -value
CITY	-0,2020	0,0407	-0,1617	0,1027
CONST	0,1932	0,0908	0,2402	0,0490
TRANS	-0,5502	0,0003	-0,4888	0,0021
DOC	-0,3967	0,0225	-	-
SOC	-	-	-0,1479	0,1596
WOC	-	-	0,0303	0,7426
N	146		146	
Adj R ²	0,8995		0,8968	
F statistics	186,38		158,56	

Source: own calculations based on the data of the National Court Register.