CORPORATE AND SECTOR INFLUENCES ON FIRM PERFORMANCE: EVIDENCE FROM POLAND

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Abstract

The study examines the impact of firm- and industry-level variables on performance of Polish listed companies. The study is based on the data of companies (all but financial and commercial ones) listed on the Warsaw Stock Exchange in the period of 2007-2012. Each of the companies has also been classified into a specific industry according to the Polish PKD classification (similar to NACE Rev.2). The study employed panel data analysis with fixed effects. The results indicate that the firm-level effects have a slightly stronger impact on companies' performance than industry-level effects, though the differences largely depend on the model applied to research. In the 1st panel (dependent variable ROA) the results indicate around three times higher impact of firm- in comparison to industry-level effects. In the 2nd panel (dependent variable ROS) the difference between these two types of variables is approximately 15%.

Key words: *industry-level effects, company-level effects, panel data analysis*

1. INTRODUCTION

The problem of the importance of industrial factors has been heavily discussed for the last 30 years in the literature of strategic management. It is in fact one of the major assumptions of the so called strategic management process in the strategy textbooks (Grant 2005), the empirical evidence is however mainly dedicated to confirm the importance of industrial factors to companies' performance (understood usually only in financial terms).

The importance of industrial- versus firm-level effects can be also understood as a discussion between two main approaches (schools) in strategic management thinking: positional versus resource-based view. This issue has been addressed in many different research papers, though the results were at least mixed. Most of papers were based on the U.S. examples, some related to other mature economies (like the UK or Japan). First papers were published in the mid 1980s, the research within this area was developed continuously until present (Karniouchina et al. 2013). There is however a significant lack of research papers based on the example of emerging economies, particularly in Central and Eastern Europe, with the exception of just a few studies (Matyjas 2014).

Hence, the purpose of the study is to examine the impact of the firm- and industry-level effects on the performance (financial) of Polish public companies (listed on the Warsaw Stock Exchange in years 2007-2012).

2. LITERATURE REVIEW

The first research within this area was published by Schmalensee (1985) on the sample of the U.S. industrial companies (data were obtained for the year 1975). The results of the study showed as significant influence of industrial factors, as it turned out that they explained around 20% of the performance of examined companies (in comparison to only 1% of firm-level effects). The results strongly supported the positional view of strategic thinking, and they also led to an entirely new stream of research within strategic management.

In response to Schmalensee's research Rumelt (1991) developed a somewhat analogous study. The main difference was the time horizon (four years span) in the research, the other factors were unchanged. In this study the results were surprisingly reverse. Changes in time horizon of the study (year 1975 was included) resulted in strongly support to the resource-based view of strategic

management. It was due to the fact that 44% of the total performance of examined companies' performance was explained by firm-level effects, while industrial-level explained merely 4%.

So large a discrepancy between those two initial papers resulted in an ongoing discussion among researchers within industrial organization as well as strategic management areas. Rumelt's research was based on a longer time horizon, which allowed averaging results - any deviation from the long-term annual average was much less important for the final result. But the question of the importance of industry-level effects remained open. One can assume that these early years of research were summarized by McGahan and Porter (1997). They observed that both levels were important in explaining firm performance, though firm-level effects (32%) had a bit higher impact than industry-level effects (19%). The time period of this study was much longer (covered the years 1981-1994), the sample was much larger (covered all but financial industries).

The above first studies in this area can be viewed as a merely prelude to a substantial number of research papers published in subsequent years (the results of the most important ones were summarized in table 1). In general, there is a lack of an unambiguous confirmation of the importance of firm- versus industry-level effects on companies' performance. On one hand some studies indicated that the level of importance of industrial factors was almost negligible (minimum 0.14%), on the other hand the industry-level effects impact was significantly higher (maximum 40.6%). Analogously, the spread of importance of firm-level effects was almost equal, though at significantly higher level (minimum 8.8%, maximum 71.8%).

Summing up the results of the most important research in this area it should be explicitly stated that the industry-level effects turned out to be about three times less important in comparison to the firm-level effects. This may be viewed as an important support of the resource-based view of strategic management.

In the previous results based on Polish sample (Matyjas 2014), firm-level effects were even more important. Around 15% of the companies' performance was explained by firm-level effects, while just 0.5% by industrial factors.

Table 1. Summary of the results of major research papers

Authors	Method	Sample/ country	Time horizon	Industry Effects	Firm Effects
Mauri & Michaels (1998)	VCA (1988-92) VCA (1978-92)	264 (USA)	1978-1992	6,2% 5,8%	36,9% 25,4%
Chang & Singh (2000)	VCA (entire sample) VCA (small firms) VCA (medium firms) VCA (large firms)	709 (USA)	1981-1989	7,3% 4,0% 40,6% 19,3%	47,2% 44,2% 8,8% 47,6%
Sakakibara (2002)	Cox maximum-likelihood proportional hazard	312 (Japan)	1969-1992	-	-
Ruefli & Wiggins (2003)	OLS	1797 (USA)	1984-1996	0,14%	12,33%
Hawawini et al. (2003)	VCA ANOVA	562 (USA)	1987-1996	8,1% 16,0%	35,8% 16,7%
McNamara et al. (2005)	VCA	2686 (USA)	1987-1996	9,1%	43,8%
Short et al. (2007)	VCA ANOVA HLM	1165	1991-1997	19,3% 16,9% 19,2%	65,8% 71,8% 65,8%

Lee (2009)	OLS	7158 (USA)	1987-2006	10,0%	10,0%
Bamiatzi & Hall (2009)	Entire sample (SIC4) Micro firms (SIC4) SMEs (SIC4) Large firms (SIC4)	71 750 (UK)	2002-2004	9,2% 10,2% 1,8% 1,8%	28,3% 28,2% 10,3% 21,2%

Source: Matyjas, Z 2013, *Wzorce konkurowania przedsiębiorstw w sektorach – podejście dynamiczne*, Wydawnictwo Uniwersytetu Łódzkiego, Łódź, pp. 108-109.

3. RESEARCH ASSUMPTIONS

3.1. Sample

The primary objective of the current study is to verify the influence of industry and firm effects on the financial results of Polish public companies. Data for the study were gathered from all Polish public companies whose values were listed on the Warsaw Stock Exchange at the end of the years 2007-2012. Each company has also been classified into a specific industry according to Polish PKD classification (analogous to NACE Rev. 2, the classification were made on the second digit). Due to the preliminary assumption of the study, financial and commercial companies were excluded from research. Data were collected from databases: Amadeus, Datastream and Notoria company (WSE) and PONT-info (industrial data). Missing data was collected on the basis of consolidated (if possible) annual reports of individual companies (manually entered into the database).

Considering the above the sample comprises 221 companies and 1326 observations. Given the availability of the data the number of companies in the study varied in each period, hence a single company may occur in one to five observations. In terms of industrial allocation the companies were assigned to 37 various sectors (details in table 2). The largest groups account for: 27 companies from the industry "Construction of buildings" (PKD 41), 17 companies from the industry "Food products producing" (PKD 10) and 13 companies from the industry "Activity related to software and IT" (PKD 62).

Table 2. Companies according to industries

No.	PKD No.	No. of firms	No.	PKD No.	No. of firms	No.	PKD No.	No. of firms
1	10	**17**	13	24	**6**	25	41	**27**
2	11	**2**	14	25	**12**	26	42	**10**
3	13	**3**	15	26	**8**	27	43	**10**
4	15	**2**	16	27	**5**	28	52	**3**
5	16	**7**	17	28	**12**	29	55	**2**
6	17	**4**	18	29	**3**	30	56	**1**
7	18	**1**	19	31	**2**	31	58	**4**
8	19	**3**	20	32	**2**	32	59	**1**
9	20	**8**	21	33	**2**	33	60	**2**
10	21	**2**	22	35	**7**	34	61	**9**
11	22	**11**	23	36	**1**	35	62	**13**
12	23	**6**	24	38	**3**	36	68	**10**
TOTAL						**221**		

3.2. Variables

The variables used in the study were divided into three basic groups (details in Table 3), characterized by: the results of companies (variables at the firm level), the profitability of the industry (industrial variables) and control variables (describing size of the companies). The variables are analogous to many previous research studies (Bamiatzi & Hall 2009), the primary criterion of selection of variable was its availability in terms of access to data.

Table 3. Variables

Acronym	Description of the variable
ROA	Return on assets – firm level
ROS	Return on sales – firm level
ROA_IND	Return on assets – industry level
ROS_IND	Return on sales – industry level
REV_LN	Overall revenues – firm level (natural logarithm)
TA_LN	Total assets – firm level (natural logarithm)

3.3. Method

Research was conducted with the use of panel data analysis. The general panel data model was specified as:

$$\pi_{it} = \alpha + p\pi_{i,t-1}\ \beta\ X_{it} + \varepsilon_{it}$$

for i = 1,…,N; t = 1, … , T

where π_{it} is the dependent variable for firm i's profit rate in period t (ROA and ROS in two different panels), vector X_{it} includes independent and control variables such as: ROA and ROS of industry and scale of firm. The error term ε_{it} may vary across the N individual firms (individual effects) as well as across the T time periods (time effects).

Panel data analysis enables simultaneous analysis in two dimensions (temporal and spatial), which makes possible to effectively analyze cross-sectional data. As pointed out by Lee (2009) it offers two advantages over traditional least-squares models: allows to control for unobserved factors (constant over time but differ from one firm to another), and allows to control for variables that vary through times, but not across companies.

4. EMPIRICAL FINDINGS

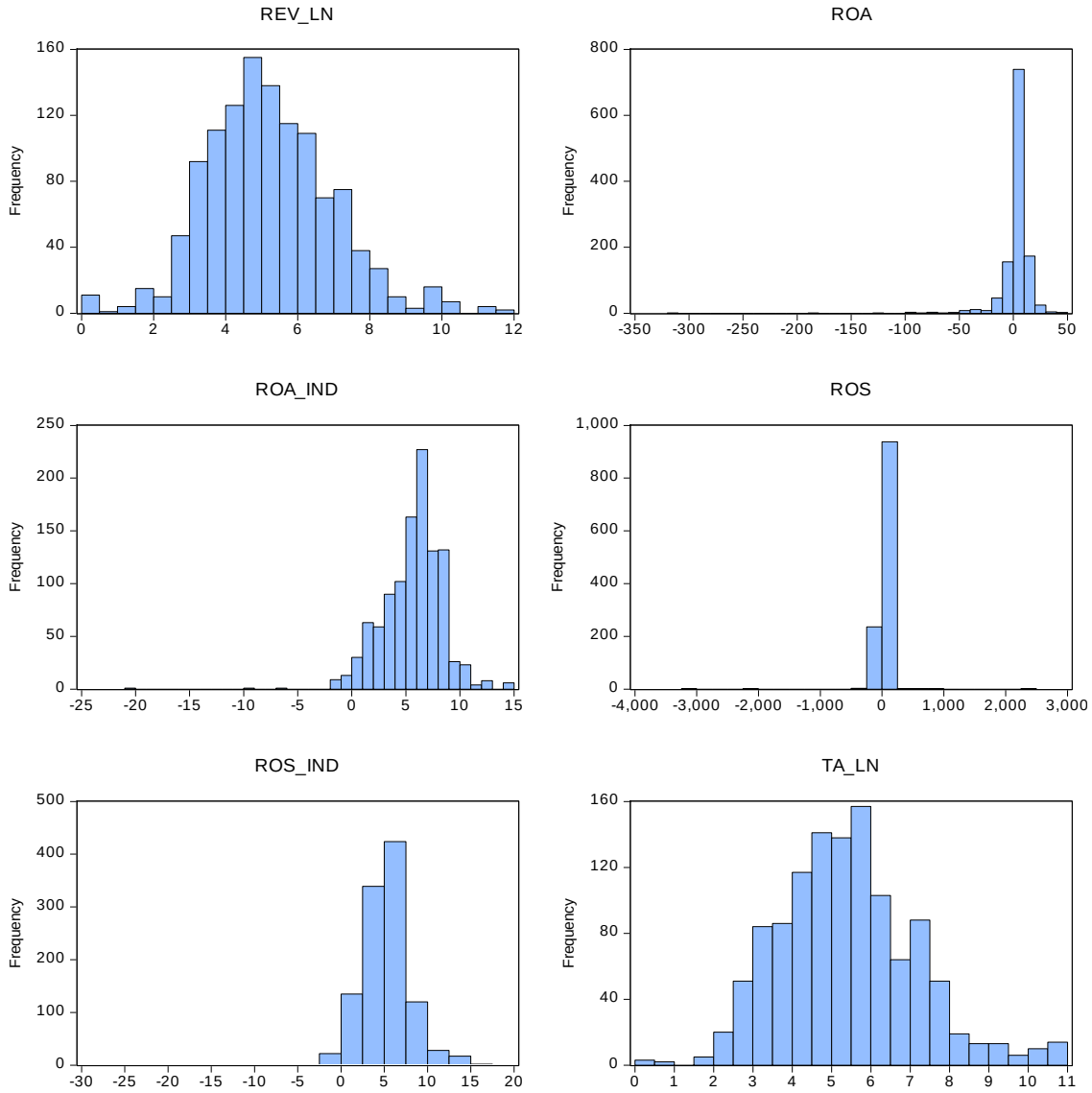
4.1. Descriptive statistics

Descriptive statistics are presented in Table 4 (arithmetic mean, median, minimum and maximum, and standard deviation) for all companies in the sample-periods. In particular, there are differences with the standard deviation for variables ROA and ROS, due to a financial performance of one of the companies listed on the Warsaw Stock Exchange. The distribution of data for each variable is presented in Figure 1.

Table 4. Descriptive statistics

	ROA	ROS	ROA_IND	ROS_IND	REV_LN	TA_LN
Mean	2.383523	2.354846	5.623104	5.109303	5.211740	5.397058
Median	4.054428	4.210526	6.090000	5.140000	5.095286	5.313206
Maximum	45.91712	2324.324	14.27000	15.05000	11.69610	10.98126
Minimum	-313.3333	-3133.333	-20.27000	-26.77000	0.000000	0.366724
SD	16.63375	136.9070	2.819572	2.972062	1.758171	1.745197
Observations	1185	1185	1089	1090	1186	1185

Figure 1. The distribution of data



4.2. Panel data results

The estimation results are presented in Table 5. The analysis was conducted separately in two panels for two dependent variables: ROA and ROS (both at firm level). After the rejection of the null hypothesis of the presence of random effects with the use of the Hausman test, the basis for further tests was the panel data analysis with fixed effects.

The panels gave slightly different results, especially considering the significance of the impact of various factors on the financial results of companies. In model 1 (ROA) there is a strong relationship between the dependent variable and the lagged variable ROA (t-1). In addition, there are also relationships between variable ROA and the following variables: the lagged variable ROA_IND (weak relationship) and lagged variable ROS_IND (average), as well as with both control variables (REV_LN and TA_LN). Taking into account the level of adjusted R^2 of 0.12 it can be assumed that both industry- and firm-level effects are significant factors in explaining companies' performance.

There is a slightly different situation for panel 2 (ROS). Both firm- and industry-level variables impacted (statistically significantly) companies' performance. However, it should be noted that the adjusted R^2 coefficient (0.05) suggest a rather poor fit for this model.

Table 5. OLS regression results with fixed effects

	Model 1	**Model 2**
	ROA	**ROS**
ROA (t-1)	0.460643***	1.245165***
	(10.18644)	(3.061932)
ROS (t-1)	-0.004540	0.266248***
	(-0.700370)	(4.567888)
ROA_IND (t-1)	-0.560774*	-9.078227***
	(-1.834999)	(-3.303387)
ROS_IND (t-1)	0.615894**	8.304682***
	(2.185578)	(3.277131)
REV_LN	2.344878***	9.114548
	(3.122711)	(1.349762)
TA_LN	-1.490575**	-7.787554
	(-1.971657)	(-1.145484)
C	-3.937559	-1.719901
	(-1.875369)	(-0.091091)
Adj. R^2	0.121567	0.047167
Observations	948	948
Log likelihood	-4000.630	-6082.828
F-Statistics	22.84262	8.812980

Notes: t-statistics are in parentheses.

* significant at 10% ** significant at 5% *** significant at 1%

5. CONCLUSIONS

Summarizing the results of the research it is worth noting that there is a relatively significant difference in the results in comparison to previous studies conducted on the sample of Polish public companies (Matyjas 2014). It is due to the fact that in the current study the performance of companies is influences by both industry- and firm-level variables, though with a slightly stronger impact of firm-level effects. Nonetheless it should be clearly stated that the difference between those two different types of effects is significantly blurred.

In Model 1 (ROA) two firm-level lagged variables (ROA_{t-1} and ROS_{t-1}) explain about 6% of the dependent variable, while the two industrial lagged variables (ROA_IND_{t-1} and ROS_IND_{t-1}) slightly more than 2%. The difference is about three times (analogously to average in major research papers). There is a significantly lower difference in model 2 (ROS), where the firm-level variables influence slightly more than 2% of the dependent variable, while industry-level effects slightly less than 2% (the exact difference is 0.3PP).

To sum up the results carried out in the paper it should be noted that the final results should be viewed with some caution, mainly due to the relatively low level of R^2 coefficient of determination in both models. In addition, similarly to Rumelt's (1991) approach, the extension of the research horizon by just two years (Matyjas 2014) demonstrated a significant shift in the importance of industrial versus firm effects on companies' performance. It may be due to the incremental increase of the effects of global economic crisis resulted in, among others, a significant increase in uncertainty of future business conditions, which usually leads to shortening the time horizon of the strategy formulated by the company.

It seems appropriate to carry out research on similar issues in the future, with further expanding the time horizon of the study, to the period of at least ten years. The current state of the availability of data from Polish public companies allows for moderate optimism in this regard.

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