Industry and Firm Influences on Performance: Evidence from Polish Public Firms

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This study examines the influence of industry and firm effects on performance of Polish listed companies. The study is based on the data on 387 companies listed on the Warsaw Stock Exchange in the period 2007-2010. Each of them has also been classified into a specific industry according to the Polish PKD classification (similar to NACE Rev.2). The results of this research show that industry effects have non-significant influence on companies' performance while one of the used models (with ROA as a dependent variable) showed significant influence of company effects.

INTRODUCTION

Strategic management has been based on some basic assumptions that in a smart way explain the scale and complexity of the problems affecting today's companies. However, for some of these assumptions there are some difficulties with finding empirical confirmation. One of such assumptions is the importance of the industry factors for strategic decisions making, as well as companies performance. Strategy textbooks usually do not devote attention to this subject, occasionally you can see the importance of this issue in the extensions of the chapters (Grant, 2005).

Meanwhile, there has been a major discussion on the empirical confirmation of the industry impact for the last 30 years. Many research articles addressed this issue but the results are usually significantly differentiated. Most of the research was based on the results of U.S. companies, some related to the example of other mature economies (e.g. the UK, Japan). There is, in principle, lack of research confirming the importance of industrial factors on the performance of companies on the example of the emerging economies, particularly in Central and Eastern Europe.

Hence, the purpose of this study is to examine the impact of the firm and industry effects on the performance of Polish companies (listed on the Warsaw Stock Exchange). Given the significant differences in the development of the Polish capital market, you can also expect differences in the results of the proposed research. To the indicated differences between the markets (and companies) we can include, for example: a much greater level of concentration of ownership in the case of Polish companies in comparison to mature markets (Jeżak, 2010b), a two-tier board model as the only one in Poland to the dominant one-tier board model (Jeżak, 2010a), or the gender differences in the composition of management and supervisory boards (Bohdanowicz, 2012).

LITERATURE REVIEW

The first study to analyze the impact of firm- and industry factors on companies performance was conducted by Schmalensee (1985). The sample was the population of U.S. industrial companies, the reference year was 1975. The results strongly influenced future debate within this issue – it turned out that industry effects explained over 20% of the performance of examined companies compared to just less than 1% of firm effects. In Schmalensee's opinion "the apparent nonexistence of firm effects is somewhat surprising. […] The absence of firm effects […] means that knowing a firm's profitability in market A tells nothing about its likely profitability in *randomly selected* market B. This is consistent with the conglomerate bust of the past decade […]: wise firms do not diversify beyond their demonstrated spheres of competence" (Schmalensee, 1985, p.349).

Schmalensee's research caused a major impact in industrial organization and strategic management research. The first response was prepared by Rumelt (1991). In his research the time frame was a bit longer (4 years), with the same sample. The results showed by Rumelt were almost completely inverse – this time firm effects were extremely important (explained almost 44% of the total performance of examined companies), with industrial effects responsible for just 4% of it.

Such a large discrepancy between these two articles caused an ongoing debate among researchers within industrial organization and strategic management areas. Rumelt's research took into account a longer time horizon, which allowed to average the results - any deviation from the long-term annual average was much less important for the final result. But the question how much industry-level effects are influencing firms' performance remained open. These early years of research were in fact summarized by McGahan and Porter (1997) – on the basis of their research they stated that both firm (32%) and industry (19%) effects are important for companies' performance. This time the time period was much longer (covered the years 1981-1994), the sample was much larger (covered all but financial industries).

The above results of early studies were just a prelude to a huge body of research within this area for the next 15 years. For over a decade there has been conducted many research articles which results are summarized in table 1.

Based on the data contained in the table we can see significantly increased interest in the problem of the industry (and firm) effects on companies performance. The samples were larger, time horizons longer than in the previous research, moreover some samples took into consideration data from SME's (small and medium-sized companies) beside public companies. The key research results allow to draw some general conclusions:

- generally the initially assumed (both in strategic management and industrial organization) impact of industry effects on performance of companies can be confirmed in research, although it's not as large as it was assumed;
- as in the early studies, the results of the recent ones indicate a large spread of the results. Industry effects range from 0.14% (almost complete lack of effect) to 40.6% (a very large effect). This implies the need for further research in this area;
- it should be noted that in general more important factors are firm effects – usually two to three times larger influence. However, it is also possible for most of the research to overlook the impact of intra industrial level – the level of strategic groups. The inclusion of this level in the studies could reduce the role of firm effects.

TABLE 1
SUMMARY OF THE RESULTS OF PREVIOUS RESEARCH

Authors	Method	Sample/ country	Time horizon	Industry Effect	Firm Effect
Mauri and Michaels (1998)	VCA (1988-92) VCA (1978-92)	264 (USA)	1978-1992	6,2% 5,8%	36,9% 25,4%
Chang and 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 and 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 and 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%

DATA AND METHODS

The primary objective of the study is to verify the impact of industry and firm effects on performance of listed Polish companies. Data for this study were gathered from all Polish public companies whose values were listed at the end of the years 2007- 2010 on the Warsaw Stock Exchange. Each company selected for the study was also classified into a specific industry according to Polish PKD classification (analogous to NACE Rev. 2). Financial and commercial companies were excluded from the data due to preliminary assumptions of the study. Data were collected from the Amadeus database (companies listed on the Stock Exchange), a PONT-info database (industrial data), as well as the consolidated annual reports or reports of individual companies, if the company did not prepare consolidated reports (both of them were hand-collected).

Given the above assumptions the sample comprises 387 companies and 1208 observations. The composition of the companies changed from year to year depending on the availability of data. Hence the individual company may be subjected to from one to four observations. The industrial data and assignment of companies into selected industries are presented in Table 2.

TABLE 2
COMPANIES ACCORDING TO INDUSTRIES

PKD No.	Industry	No. of companies
10	Manufacture of food products	22
11	Manufacture of beverages	2
13	Manufacture of textiles	5
15	Manufacture of leather and related products	2
16	Manufacture of wood and of products of wood and cork, except furniture	8
17	Manufacture of paper and paper products	5
18	Printing and reproduction of recorded media	5
19	Manufacture of coke and refined petroleum products	3
20	Manufacture of chemicals and chemical products	10
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	5
22	Manufacture of rubber and plastic products	15
23	Manufacture of other non-metallic mineral products	13
24	Manufacture of basic metals	6
25	Manufacture of fabricated metal products, except machinery and equipment	21
26	Manufacture of computer, electronic and optical products	9
27	Manufacture of electrical equipment	6
28	Manufacture of machinery and equipment n.e.c.	17
29	Manufacture of motor vehicles, trailers and semi-trailers	4
31	Manufacture of furniture	3
32	Other manufacturing	3
33	Repair and installation of machinery and equipment	5
35	Electricity, gas, steam and air conditioning supply	12
36	Water collection, treatment and supply	2
38	Waste collection, treatment and disposal activities; materials recovery	4
41	Construction of buildings	35
42	Civil engineering	15
43	Specialized construction activities	16
52	Warehousing and support activities for transportation	7
55	Accommodation	2
56	Food and beverage service activities	8
58	Publishing activities	10
59	Motion picture, video and television programme production, sound recording and music publishing activities	6
60	Programming and broadcasting activities	3
61	Telecommunications	20
62	Computer programming, consultancy and related activities	44
63	Information service activities	12
68	Real estate activities	22
TOTAL		387

Variables

The analyzed variables were divided into three basic groups: characterizing the profitability of individual companies (thus representing firm effects), the profitability of the industry (industry effects),

and the control variables describing the size of the companies. List of all analyzed variables can be found in table 3.

TABLE 3
VARIABLES USED IN RESEARCH

Acronym	Description of the variable
ROA – firm level	Return on assets – firm level
ROS – firm level	Return on sales – firm level
ROA – industry level	Return on assets – industry level
ROS – industry level	Return on sales – industry level
Revenues (log)	Overall revenues – firm level (natural logarithm)
Total assets (log)	Total assets – firm level (natural logarithm)

The list of the variables is similar to that used in previous studies (Bamiatzi and Hall, 2009). The decision on the use of certain variables in the study was dictated by the availability of these variables within the research project.

Methods

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

$$\pi_{it} = \propto + \rho\pi_{i,t-1}\beta \mathrm{X_{it}} + \varepsilon_{it} \quad (1)$$

for $i = 1,\ldots,N$; $t = 1, \ldots, T$

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.

EMPIRICAL FINDINGS

Descriptive statistics

Table 4 gives the mean, standard deviation, minimum and maximum values of the variables across all firm-years in the sample. There is a significant standard deviation within variables ROA and ROS at the firm level (it is particularly the case with ROS variable) – it is due to a financial performance of two small firms. All results are depicted in graph 1.

TABLE 4
DESCRIPTIVE STATISTICS

Variable	Mean	Std. Dev.	Minimum	Maximum	Observations
ROA – firm level	4.35369	26.59072	-388.5294	150.6329	1208
ROS – firm level	5.19941	1619.051	-55220.00	3918.239	1208
ROA – industry level	6.118493	3.595412	-9.590000	32.34000	1208
ROS – industry level	5.783212	3.523021	-12.03000	24.13000	1208
Revenues (log)	3.997107	2.257319	0.000000	11.34236	1208
Total assets (log)	4.116757	2.288549	0.000000	10.90500	1208

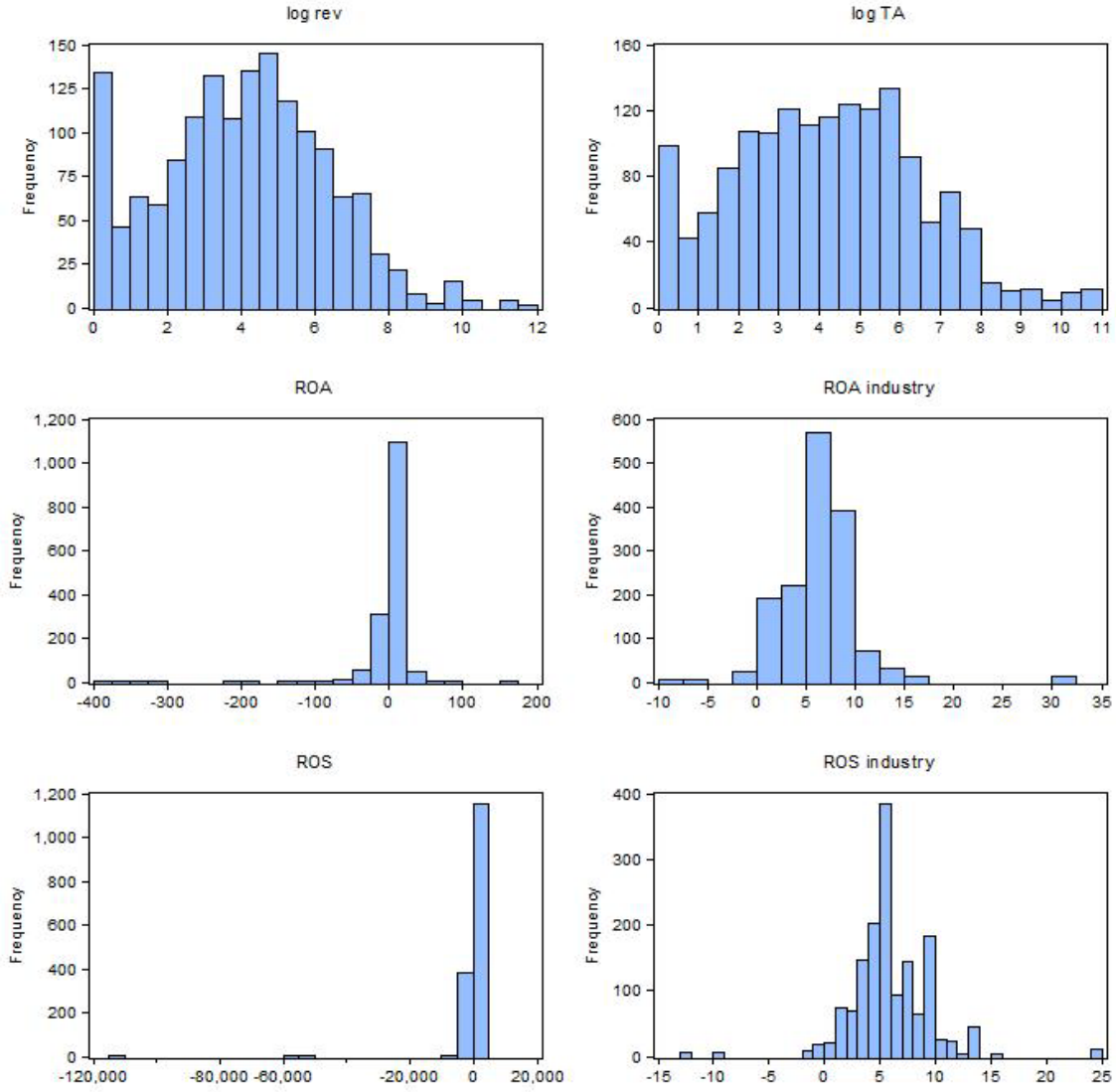
Table 5 gives the correlation matrix between the variables. As you can observe there is a significant correlation between relative types of variables: ROA and ROS at firm level, ROA and ROS at industry level, and control variables (revenues and total assets).

TABLE 5
CORRELATION MATRIX

Variable	ROA – firm	ROS – firm	ROA – industry	ROS – industry	Revenues (log)	Total assets (log)
ROA – firm	1.000000					
ROS – firm	0.112221***	1.000000				
ROA – industry	-0.007651	0.044352	1.000000			
ROS – industry	0.003940	0.026215	0.776551***	1.000000		
Revenues (log)	0.153865***	0.064667**	-0.075285***	-0.145312***	1.000000	
Total assets (log)	0.124243***	0.041427	-0.146717***	-0.149876***	0.934934***	1.000000

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

FIGURE 1
THE DISTRIBUTION OF DATA



Regression Analysis

Results of estimation are reported in table 6. Analyses were conducted separately for two dependent variables: ROA and ROS of the firm. These two models gave different results, particularly in terms of the significance of firm-level effects influencing firm performance. In model 1 (ROA) there is a significant influence of the lagged profit rate ($ROA_{i,t-1}$) as an important factor influencing its performance. There is also a significant influence of the second firm-level effect used within this study – ROS at the level of the firm. The results of model 1 strongly support the thesis about the advantage of firm-level effects over industry-level effects.

Results for model 2 don't show any significant influence, both at the company, as well as on the industry level, on firm performance. The only significant variable is a control one (revenues calculated as natural logarithm). But the adjusted R^2 statistics indicate that this model accounts for less than 1% of the overall variance of the dependent variable.

The results of these study are somewhat consistent with an earlier results obtained in the research conducted by Matyjas (2011) on the sample of 85 Polish public companies for the years 2005-2007.

TABLE 6
OLS REGRESSION RESULTS

	Model 1 **ROA – firm level**	**Model 2** **ROS – firm level**
ROA – firm level (t-1)	0.299175***	-
	(11.90120)	-
ROA – firm level	-	5.310779
	-	(1.552311)
ROS – firm level (t-1)	-	-0.007222
	-	(-0.209117)
ROS – firm level	0.000901**	-
	(2.295157)	-
ROA – industry level	-0.212950	45.96916
	(-0.524315)	(1.274500)
ROS – industry level	0.333530	-23.34856
	(0.929721)	(-0.733731)
Firm size – revenues (log)	1.131654	181.4452**
	(1.116383)	(2.055591)
Firm size – total assets (log)	-0.280116	-139.0507
	(-0.281674)	(-1.599789)
Constant	-3.450780	-359.5576*
	(-1.516869)	(-1.787077)
Adjusted R^2	0.170802	0.008046
Observations	842	839
Log likelihood	-3778.579	-7521.904
F-Statistics	29.87216	2.132885

Notes: t-statistics are in parentheses. * significant at 10% ** significant at 5% *** significant at 1%

CONCLUSIONS

To sum up the above studies conducted with regard of the current state of knowledge it should be noted that the great interest of researchers in the world taking up the issue of industry effects on companies' performance is not a coincidence. Theoretically the level of an industry has a strong influence on strategic decision-making in every company – that's one of the key principles of strategic management.

Further research in this area seems to be appropriate, with particular emphasis on Polish (and other Central and Eastern Europe markets) specificity. The development of emerging economies often took place in a completely different way from established routines of many developed economies. And it can also affect the results of similar studies. Further studies in this area should take into account somewhat broader spectrum of the analyzed variables, particularly at the level of individual companies (for example, expenditure on R & D, capital expenditures, or advertising expenditures).

In addition, further studies should benefit from a comparison of the simultaneously conducted quantitative tools (e.g. nonparametric methods or variance components analysis). This would increase the accuracy of the conclusions based on the results of similar studies with simultaneous use of several statistical tools.

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