

Profit persistence at the industry level: evidence from Polish companies

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Abstract:

Aim: Within the neoclassical microeconomics framework the long-term goal of the enterprise is to generate economic profit (above average profit). In case of competitive markets, the preservation of economic profit is impossible in the long run due to increasing competition. It is therefore important, both from the scientific and antitrust law perspective, to verify empirically whether companies' abnormal profits are characterized by a tendency to persist (persistence). The main objective of the study is to examine the level of profit persistence of Polish enterprises both at the aggregate level and at the level of industries.

Design / Research methods: The abnormal profit persistence analysis was carried out on the basis of unbalanced panel data for 38253 Polish companies in 2006-2014 using the system GMM estimator.

Conclusions / findings: The results obtained show that the abnormal profit of Polish companies in the analyzed period was characterized by low persistence both at the aggregate level and at the industry level, which indicates a high level of competition in the industries under investigation.

Originality / value of the article: This paper contributes to the existing profit persistence literature in three ways. First, the analysis was conducted for a developing country. Second, the analysis was carried out both at aggregate and industry levels. Third, the analysis was conducted mainly for the period following the global financial crisis. Implications of the research: The results of the study are not only interesting from the scientific point of view, as they verify empirically the notions about long-run profitability of companies stemming from the theory of industrial organization, but equally important is that the results may be useful for antitrust policy and the assessment of the competitiveness of industries.

Limitations of the research: Among the most important suggestions coming from the research conducted is that the future analyses need to focus on more narrowly defined markets, because further disaggregation can reveal significant differences in the abnormal profit persistence.

Keywords: panel data; firm profitability; abnormal returns; profit persistence.

JEL: C23, D22, L13, L60

1. Introduction

Classic microeconomics assumes that the free flow of resources (factors of productions) between markets or entire industries has the effect that any differences in terms of the level of profits between companies and industries should disappear over time. Owing to the development of financial reporting, today we have access to a great number of empirical data on whose basis it is possible to verify whether the theories hold true. The analysis of data included in financial statements allows for making an assertion that at any time substantial differences in the profitability level exist across various industries, as well as across companies within one particular industry. Some of the companies analyzed have abnormal profit, to be understood as a profit deviating positively from the average for a particular sector, which is an approximation for the concept of a normal profit (in other words, profit equilibrium). Companies with higher than average earnings in the industry are characterized by abnormal returns. The above observations entitle one to raise the question as to the observable differences in profitability. Are these differences merely temporary with a tendency to disappear, or perhaps they are enduring? If so, empirical observations would demand that the existing theory be tested.

In the scholarly literature, one defines two lines of research touching upon the aforementioned issue (Bou, Satorra 2007). The first focuses on the level at which the differences in profits are identified. The question is whether the differentials observed are at the level of companies within one sector or across sectors of industry. Within this area, the research is exemplified by works of Schmalensee (1985); Wernerfelt and Montgomery (1988); Powell (1996); Brush et al. (1999); Spanos et al. (2004). Their findings show that with respect to profitability, the sectorial effect and individual effect are important, with the company effect being more significant. Moreover, there is a strong correlation between the effects and time (McGahan, Porter 1997; Chang, Singh 2000).

The second line of research concentrates on the correlation between profit and time. Consequently, the research focuses on the convergence of firms' return levels to the long-run equilibrium level. Classical works in this field include those by Mueller (1986; 1990) and later works from the turn of the 80' and 90' of the last century: Odagiri and Yamawaki (1986); Jacobson (1988), as well as Ghemawat (1991). The research findings suggest that the convergence process unfolds up to the average rate of return, although this process is not

complete, for it does not lead to making the levels of the companies' rates of return equal to a single equilibrium level, and so we can only observe the process as it approaches the equilibrium, yet finally arriving at it cannot be observed.

This paper is part of the second line of research, as its objective was to investigate whether Polish companies were characterized by persistent abnormal return in the period analyzed (from 2006 to 2014). This work contributes to the existing literature on profit persistence in three ways. Firstly, the analysis was carried out for a developing country, which Poland certainly is. In their vast majority, the previous works have concentrated on enterprises from developed economies. This is understandable considering that clearly there is greater access to financial data of such companies and these studies have a longer history. Secondly, this paper is not only concerned with profit persistence at the aggregate level but also at the level of individual sectors. In the study, companies were divided into six sectors, which allowed potential differences to be revealed in terms of the levels of return, and profit persistency, of which the latter has greater significance. Thirdly, the availability of data had the effect that the beginning of the period under study overlapped with that marking the beginning of the global financial crisis of 2007. This with no doubt negative market shock had an impact on the behavior of companies in Poland and their profitability. Such shock always knocks entire economies and companies themselves off their balance. This coincidence allowed the companies' behaviors in terms of their profits to be observed while they were adapting to the new conditions in the wake of the crisis. A clear majority of the referenced titles within the scope of profit persistence is concerned with the companies' behavior before the world's financial crisis, in other words, a potentially less turbulent environment.

The rest of the paper is structured as follows: the research method and the data set used in the research are outlined in the second section. The third section presents data on profitability of companies used in the research, with this section containing descriptive statistics of the sample. The fourth section presents the results of the estimation of the short-run persistency coefficient for five sectors employing ROA as a measure of profitability based on the data from the period of 2006-2014. The findings are included in the last section of the paper.

2. Research method and data set

In this study the approach proposed by Muller in his classic work (1986) was used. ROA_{it} denotes firm i 's profit defined as profit before taxes in relation to its total assets in period t . In order to remove the variations in ROA_{it} caused by factors related to economic fluctuations, the measure of profit is standardized as a deviation from the average profit level in the entire sample calculated for year t :

$$\pi_{it} = \frac{ROA_{it} - \overline{ROA}_t}{\sigma} \quad (1)$$

where:

\overline{ROA}_t - average ROA level calculated for the entire sample in year t

σ - a standard deviation calculated for the sample in year t

A firm's profitability (π_{it}) in year t is assumed to consist of three components:

1. a competitive rate of return (c), which is common to all companies;
2. a permanent rate of return (r_i), which is specific to every firm;
3. a short-run rate of return s_{it} , which is specific for every firm i and is assumed to erode over time. It can thus be written that:

$$\pi_{it} = c + r_i + s_{it} \quad (2)$$

If one were to assume that the firm operates on a perfectly competitive market, then it is not possible for the return on capital invested to be above the competitive rate of return (c), which implies that the permanent rate of return $r_i = 0$ and the expected short-run rate of return $E(s_{it}) = 0$ if $t \rightarrow \infty$. It is assumed that every short-run profit above the average rate of return erodes over time; however, the erosion rate may vary, so a correlation can exist between short-run rates of return over time. This process of short-run rate of return eroding can be given as follows:

$$s_{it} = \lambda_i \cdot s_{it-1} + \mu_{it} \quad (3)$$

where:

μ_{it} - a random error with constant variation and zero expected value

λ_i - a so called short-run persistence coefficient which for a stationary process takes on the values from -1 to 1, while the probable value of this coefficient falls in the range from, 0 to 1 (Yurtoglu 2004).

Assuming that for every period equation (3) holds true, it can be transformed and put into

equation (2), being given as follows:

$$\pi_{it} = (1 - \lambda_i) \cdot (c + r_i) + \lambda_i \cdot \pi_{it-1} + \mu_{it} \quad (4)$$

The above equation can be estimated assuming that $\hat{\alpha}$ and $\hat{\lambda}$ are the estimates of the autoregressive equation:

$$\pi_{it} = \hat{\alpha} + \hat{\lambda}_i \cdot \pi_{it-1} + \mu_{it} \quad (5)$$

The unconditional mean rate of return (π_{it}) can be interpreted as firm i 's projected long-run rate of return:

$$\widehat{\pi}_{ip} = \frac{\hat{\alpha}}{1 - \hat{\lambda}_i} \quad (6)$$

Equation (5) is a one-order autoregressive model which describes the pattern of variations in the level of abnormal profit for firm i in time. The long-term projected rate of return ($\widehat{\pi}_{ip}$) and parameter ($\hat{\lambda}_i$) can be estimated using annual data on the profit level determined as a deviation in the profit level of a particular firm from the average annual value determined based on all the firms included in the study. The parameters estimated are important from two standpoints. First, the level of profitability observed in a particular moment reflects the competitive level on a particular market, while competition in the neoclassical view is when it leads to leveling the projected long-run rate of return with the level of the competitive rate of return (thus $\widehat{\pi}_{ip} = c$) for all firms, setting aside the risk involved in a particular industry. Secondly, companies are drawn by high rates generated by an industry which make competition grow and profitability fall. From the neoclassical standpoint, competition is a manifestation of the market forces operating when an industry is entered by rivals strong enough to deprive competing firms of their abnormal profits, which has the effect that $\hat{\lambda}_i$ must equal 0 or be very close to 0. The expression $(1 - \hat{\lambda}_i)$ is the estimation of the speed with which the short-run abnormal profit erodes, while informing on how fast abnormal profits converge to the level of the long-run equilibrium ($\widehat{\pi}_{ip}$). The higher the value of parameter $\hat{\lambda}_i$, the slower the rate of return gets back to the level of the long-run equilibrium, being interpreted as profit persistence. This implies that abnormal returns generated by the firm earlier affect significantly the firm's current profits.

In the paper, parameter $\hat{\lambda}_i$ is determined on the basis of the systematic GMM estimator (Arellano, Bover 1995). This estimator was devised especially for panel data and autoregressive models. For this estimator, it is assumed that it is consistent and effective if there is no second-

order autocorrelation of a random component (first-order autocorrelation must exist because of formal considerations) and if the instruments used in the estimation are exogenous. The significance of instruments is tested based on Hansen's J-test (1982), which is resistant to heteroskedasticity in the random component, implying that the test takes into account Windmeijer's correction (2000). In order to test the second-order autocorrelation of random component, the test proposed by Arellano and Bond (Roodman 2006) was used.

In order to estimate the short-run persistence coefficient ($\hat{\lambda}_l$) for Polish companies, Amadeus data base was used (Bureau van Dijk 2017). The base has over 1.3 million indexed firms for Poland, however, it does not have financial information on all companies. Partially, it is due to the fact that the data base contains information on small firms, which, according to Polish law, are not required to keep full accounting. Second, a lack of data arises from the fact that some firms suspend their activity, others cease operating entirely while still others are just about to begin. It is thus not possible for every firm to have data available for each and every year.

According to the official statistics of the European Commission (2017, at the end of 2014 in Poland there were 1 528 629 million economic entities in the so called business economy. According to the nomenclature of the Polish Classification of Business Activities (PKD), which since 2007 has been adjusted to NACE Rev 2 classification, the business economy, in line with Eurostat, includes businesses operating in sections B-D, which is industry in its broad sense, section F, that is, construction and services broadly defined, excluding section K, encompassing financial and insurance activity. The business economy does not include section A – agriculture and fishery, as well as public sector activities and non-business activities (sections from O to U). Considering that the paper focuses on profitability as the crucial objective of companies, the Eurostat definition was adopted, and as such the companies subject to analysis were economic operators within the business economy.

In the work the period adopted in the study spanned the years between 2006 and 2014. This timeframe was dictated by the availability of data on the day they were accessed. The information thus obtained about companies operating in the business economy was then selected so as to ensure a high quality of the sample. First, only those companies were selected which were considered to be operating, that is, such which had information published on their assets value at least once in the course of the last three years.¹ Second, companies whose data on sales

¹ This is the definition of an active firm according to the publisher of Amadeus Database (Bureau van Dijk 2017).

revenues for 2014 were not included in the data base were excluded. Adopting this criterion was dictated by the need to evaluate the sample representativeness. With no information on the revenues from sales one cannot determine in what portion the companies examined covered the sales revenues generated within the entire economy. Third, companies were removed from the sample whose report had come up only once and those which had published their reports only at the beginning of the period in question. In this way those companies were removed which had no impact on the real economy (they only operated during one financial period) and those which did not exert much influence on the current economic situation. Ultimately, the sample was made up of an unbalanced panel comprising 214 234 annual observations of profitability measured by the rate of return on assets (ROA) for 38 253 of entities.

In scholarly literature there are usually two approaches to the sample selection. In the majority of cases, the panel of companies under study is balanced, that is, there are only firms for which data exist in every period analyzed. This approach allows for using any econometric tools in a study, ensuring the group stability, and yet its opponents tend to emphasize that results may be affected by survivorship bias. This bias is linked to the fact that only companies which have been operating (survived) over the period studied have impact on final results, although other companies may actually have just started their business while others have just ceased their activity because of, e.g. poor management, which may have led to bad financial performance and ultimately to bankruptcy. However, including all firms in the study has the effect that the panel is unbalanced, which, on the one hand, shows the real picture, and yet, on the other, limits the possibility in terms of using the available econometric methods. The decision on the sample selection in this paper is an attempt to strike a balance between the advantages and disadvantages of the two approaches outlined above.

Having selected enterprises to be finally included in the study, the question which usually arises at this point is about the representativeness of the sample. To this end, the number of firms included in the study was compared with the total number of firms, according to official statistics from the Eurostat base (European Commission 2017) and further, the value of sales revenues generated by the firms analyzed was compared to the total revenues generated by firms in the business economy in Poland. For the evaluation of representativeness, the data from 2014, as the last year covered by the analysis, were used. The relevant data are included in Table 1.

Table 1. The value of sales revenues and number of enterprises included in the study in relation to the population of enterprises in Poland, according to Eurostat – as in 2014

Section EKD	Sector	Total number of firms	Number of firms under study	Total revenues (mln euro)	Revenues of firms under study (mln euro)
B	Mining	1 852	180	12 450.5	11 677.8
C	Processing industry	180 639	6 672	281 252.9	211 145.7
D - E	EGW	9 643	997	52 291.2	45 125.9
F	Construction	230 497	4 438	59 925.2	21 367.1
G	Trade	497 562	9 515	339 562.2	183 052.8
I - N*	Other services	608 436	16 451	134 139.8	77 391.7
B - N*	Poland	1 528 629	38 253	879 621.8	549 761.1

Source: self-reported data based on Eurostat (European Commission 2017) [10.01.2017] and Amadeus Database (Bureau van Dijk 2017) [10.01.2017].

*excluding section K – Financial and insurance activity

In comparing the number of firms, which was the final sample, to all firms officially in business, one could maintain that it was small, since it made up about 2.5% of the population, and yet looking at the value of sales revenues it generated, the sample proved to be around 62.5%. This observation allows one to assert that the results obtained referred to almost 2/3 of the business economy value in Poland.

The objective set in the work which was the analysis of profit persistence at the sector level made it necessary to divide and allocate firms to specific sectors. Five sectors were defined in the study: mining (section B), processing industry (section C), supply sector (EGW – energy, gas and water supply, that is, sections D and E), construction (section F), trade (section G) and other market services (sections from I to N, excluding section K – financial and insurance activity). The breakdown of firms into sectors was done based on a two-digit code denoting a division (second level of PKD). In comparing the number of enterprises investigated in relation to the total number of enterprises, the largest percentage was for supply sector (19.3%) and mining (9.7%). For processing industry, it was 3.7%, for other services 2.7%, with construction and trade accounting for 1.9% each. A completely different coverage emerged when the revenues generated by sales were taken into account. For mining that was 93.8%, supply sector (86.3%), processing industry 75.1%, other services 57.7%, trade 53.9% and construction 35.7%. In the vast majority, the firms generated most of their revenues on the markets they operated. Only for

construction the value of revenues generated by the firms in question was smaller than half of this market. Despite the fact that the sample selection should be seen as purposeful, the results obtained reflected the situation of the larger portion of the sectors analyzed measured by the business economy value, which implies that although the results could not be considered formally to be valid for the entire business economy, they should be viewed as very suggestive.

3. Profitability characteristics of the companies under study

As in the research by Bou and Satorra (2007) or Schmalensee's classical paper (1985), ROA rate, that is, net return on total assets, was adopted as a profitability measure. The decision to take into consideration net return was made because enterprises choosing to enter the business economy analyze what advantages they can get in terms of tax burden. The literature does not clearly state which profit measure is considered the best. Each of the classical measures such as return on assets, return on equity (ROE), return on sales (ROS) or return on invested capital (ROIC/ROCE) has its pros and cons. Calculating such measures as ROCE or ROIC is extremely difficult and possible only if there is a full financial statement and additional information, which, in turn, further limits the sample, since there is no such information. ROE, on the other hand, takes into account only the equity employed from which net return is generated and insofar these are commensurate components, then the real picture of the company's profits is blurred by the use of financial leverage. Aware of the shortcomings of the ROA measure, manifested even by the fact that net return is on total assets, while net profit is already reduced by remuneration received by providers of borrowed capital, whose capital is included in the total assets, it was decided that the measure ROA allows for obtaining information for a larger group of enterprises (especially the small ones) and, in addition, it is comparable between sectors, for it is not influenced by financial leverage. An additional advantage of this measure is that it is easy to obtain.

Table 2 contains basic information on the enterprises under study over the period of 2007-2014 in Poland by sectors. For the group analyzed, 38 253 enterprises were taken into account, while the average number of observations per one firm was almost 6 in the nine-year period. The first column presents which sections make up a particular sector, the second column shows the

sector's name, with columns 3 and 4 showing the number of firms and observations for a given sector, respectively. The last three columns present the average level of profitability (measured using ROA), as well as standard deviation and coefficient of variation.

Table 2. Characteristics of enterprises under study in Poland over the years 2007-2014 by sectors

Section EKD	Sector	Number of firms	Number of observations	\overline{ROA}	SD	CV
B	Mining	180	1 007	0.004	0.223	57.88
C	Processing industry	6 672	42 660	0.041	0.197	4.85
D - E	EGW	997	5 279	0.013	0.189	14.77
F	Construction	4 438	24 510	0.028	0.217	7.79
G	Trade	9 515	56 971	0.037	0.206	5.63
I - N*	Other services	16 451	83 807	0.042	0.247	5.93
B - N*	Poland	38 253	214 234	0.038	0.222	5.91

Source: self-reported data based on Amadeus Database (Bureau van Dijk 2017) [10.01.2017].

*excluding section K – Financial and insurance activity

Over the period under study, the observation made was that the average annual level of profits of the firms involved in the business economy analyzed over 2006-2014 was at 3.8%, at an average deviation at 22.2%, which makes the coefficient of variance at 5.91. From Table 2 it can be gleaned that there were considerable differences across sectors in the very level of profitability and its differentiation. The highest profits measured through ROA showed the firms from the sector of other services (without trade) and the processing industry. Moreover, the lowest profitability was characteristic for enterprises involved in the mining sector. The firms from the trade sector had their profits at the level average for the entire group examined. In terms of differentiation of the profit levels over time and across the firms, the firms from the service and mining sectors were characterized by the highest standard deviation. What makes this interesting is that these were the sectors with firms showing the highest and lowest levels of profits. It can then be concluded that these were the most heterogeneous sectors in which the profitability level was the most differentiated. The profit of enterprises from the supply sector was characterized by the lowest standard deviation.

Table 3 presents data on the average annual level of profits of the firms (column 2), standard deviations (column 3) and correlation coefficients for the ROA annual levels (columns

4-12) over the period of 2006-2014². The observation based on the data included in Table 3 made it possible to answer three basic questions. First, how profits of the firms varied over the time in question. Second, how the differentiation of the profit levels changed over time. Thirdly, and most crucially, whether there was a significant correlation between the profit levels in time. In other words, whether there was repetitiveness of good/bad results.

Table 3. The average annual ROA level, standard deviations and correlation coefficients for ROA levels of firms in Poland over the period of 2006-2014

Year	\overline{ROA}	SD	2006	2007	2008	2009	2010	2011	2012	2013	2014
			Correlation coefficients (r)								
2006	0.078	0.188	1.000								
2007	0.086	0.197	0.442	1.000							
2008	0.062	0.212	0.346	0.449	1.000						
2009	0.039	0.212	0.294	0.327	0.396	1.000					
2010	0.033	0.215	0.227	0.243	0.303	0.426	1.000				
2011	0.031	0.220	0.242	0.241	0.269	0.304	0.396	1.000			
2012	0.023	0.229	0.186	0.176	0.200	0.232	0.277	0.363	1.000		
2013	0.024	0.239	0.164	0.170	0.210	0.226	0.237	0.272	0.353	1.000	
2014	0.024	0.230	0.140	0.160	0.170	0.197	0.184	0.210	0.239	0.343	1.000

Source: self-reported data based on Amadeus Database (Bureau van Dijk 2017) [10.01.2017].

In observing the average annual ROA level, one could detect a general downward trend, in particular since 2007, the time when the firms attained the highest profits at 8.6%. In the subsequent years, the rate of return kept falling until 2012 when it was at a level of 2.3%. In the last two years covered by the analysis profits grew slightly and were stable. Based on the observation, it was not possible to assert with certainty that this marked the end of the downward trend. In interpreting the data on profitability one should keep in mind the macro-environment which could have affected the profits of the Polish enterprises. The global financial crisis, whose full force was revealed at the end of 2007, had surely a crucial role in terms of the fall of the Polish companies' profits. The next seven years following this event saw the profits some three times lower, which certainly found its reflection in the entire economy.

The falling profits were accompanied by an increase in standard deviation, which implied

² For example, the figures in the column marked as 2010 and line marked 2011 should be interpreted as the correlation of the profitability level of the companies between 2010 and 2011.

that the enterprises would become more and more differentiated in their earnings. This difficult situation was, however, not so for all operating entities. After the crisis, some enterprises would fare better while others clearly worse. The highest differentiation level was observed in 2013, falling slightly the following year. This could suggest that the enterprises started to look more like their old selves in terms of profits, which, in line with the theory, means that the conditions in which they operated were becoming stable. The models in neoclassical microeconomics foresee that profits should return to the level of equilibrium unless the market is exposed to further shocks.

The last and most crucial observation to be conducted based on the information from Table 3 refers to the correlation between the results attained by the enterprises examined over the subsequent years. The coefficient of correlation between the observations of the profit levels in the individual years was lower with the increase in the length of time between the individual observations. Thus, one cannot talk that there exists a long-term correlation between profits obtained currently and those to be attained in the future. Although the correlation cannot be considered strong, since it did not exceed 0.5 for any of the pairs, it should be emphasized that in each case it was positive and statistically significant (at a 5% -significance level for t-Student test that was carried out). What is more, there is a certain regularity, for the correlation coefficients were at their highest for the observations a year apart, while with the increase in the period between the observations the values for the correlation coefficients were increasingly lower. This implies that there could be a short-run correlation in that profit/loss is retained in the enterprise. In other words, the profit level attained in the year before (year $t-1$) may impact substantially the result from the current year (year t). Observing the variations in the correlation coefficients it is worth pointing out that they were higher for the observations a year apart at the beginning of the period under study. As stated earlier, in time the average profitability would fall and differentiation would grow. This means that initially most of the firms were characterized by, on average, high level of profits, and in such a situation owners and managers are more willing to take actions aimed at “protecting” the profits and to repeat the good results in the upcoming period. A different situation occurs when enterprises are more differentiated in terms of their profits. While some enterprises generate good results and seek to maintain this performance, other enterprises seeing unsatisfactory results try to do everything to overcome this situation and to improve them. In such a situation, the coefficient of correlation is lower because only the

portion of enterprises making profits is interested in repeating their performance from the previous year, while enterprises failing to make profits are keen on changing this situation.

4. Abnormal profit persistence by sectors

Table 4 presents the estimation results for short-run persistence coefficient ($\hat{\lambda}_t$) determined from equation (5) determined for profitability measured using ROA for Polish enterprises by sectors.

Table 4. Estimation results for short-run persistence in Poland by sectors

Section EKD	Sector	$\hat{\lambda}_t$	Independent part	Number of observations.	Number of firms	Number of instruments	stat. F	AR(2)	Hansen's J
B	Mining	0.253*	-0.050*	781	175	29	9.4*	1.64	27.02
C	Processing industry	0.181*	0.019*	34428	6547	29	92.1*	0.54	37.20
D - E	EGW	0.143*	-0.040*	4022	970	29	4.6*	-1.04	30.53
F	Construction	0.130*	-0.040*	18807	4320	29	33.7*	1.18	29.88
G	Trade	0.172*	0.012*	45118	9311	29	72.3*	2.16**	53.97*
I - N	Other services	0.142*	0.034*	62433	16000	29	120.3*	1.43	31.87
B - N	Poland	0.154*	0.013*	165589	37323	29	319.6	2.63*	68.42*

* 1-percent- significance level, ** a 5-percent-significance level

Before results could be interpreted, certain hypotheses should be tested statistically so as to be sure that the results obtained were reliable. The errors in the estimates of the variables in the model were estimated using Windmeijer correction (2000) and were resistant to heteroskedasticity in the random component. Using Hansen's J test, it was tested whether the number of instruments employed in the estimation was correct. In addition, the second-order autocorrelation of a random component was tested using Arrelano-Bond test.

The results of Hansen's J test (column 10) indicated that the null hypothesis stating that there was no correlation between the vector of instruments and a random component was rejected only for trade and the entire sample. Although this does not yet mean that the results were

invalid, still they should be viewed with caution. The change in the number of instruments for trade and the entire sample of instruments did not allow the results to be improved, hence they were presented taking into account the same number of instruments, which was considered to be a default number, that is, 29. The results from the test of the second-order autocorrelation of random component (column 9) showed that the null hypothesis on the lack of correlation should once more be rejected for trade and the entire sample, which confirmed that the results obtained for the trade sector and Poland were not binding in this respect. F-statistics test (column 7) showed significance for all the models presented in Table 4, which implies that the estimations obtained could be the subject for economic interpretation. On the basis of the above information, it can be concluded that in general the equations were correctly specified and were significant.

For the entire research sample the coefficient of persistence was at 0,154 and was statistically significant; this result should be viewed as “suggestive”, yet not binding on account of rejecting the null hypothesis on the appropriate number of instruments and because of the second-order autocorrelation of residuals. However, if one were to interpret the value of the persistence coefficient obtained, then, in line with the theory and literature, such level would suggest that abnormal profits erode rather quickly.

Comparing the results at the level of industries, the finding is that the persistence coefficient was at a rather low level in relation to other research, where the most likely results for the sectors examined were within the range of 0.3 to 0.5 (Gozbasi, Aslan 2015: 625). This means that although not eroding immediately, abnormal profits return to the equilibrium level (that is zero). The highest coefficient was obtained for the mining sector (0.253), with this being the only result above 0.2. In other sectors, the persistence coefficient was at the level ranging from 0.13 to slightly exceeding 0.18. The results suggested that in the vast majority of the sectors about 15% of abnormal profits from the previous period was transferred to the present period. Only for the mining sector, it was found that over 20% of abnormal profits from the previous period was transferred to the current period. As said before, this is not a high level compared to other research (in particular with respect to developed markets); yet against other sectors, this result could be considered above average. Such result could imply that in this sector barriers to entry are indeed at a higher level than is the case for the other sectors and hence the abnormal profits were retained by enterprises as long as possible. On the other hand, profits in the construction sector were characterized by the lowest persistence. For this sector, firms were able to transfer

slightly more than 10% of abnormal profits from the period before to the current one.

5. Conclusions

The body of literature concerned with profit persistence is very vast, but only for developed economies. That the research for developing economies is conducted is still very rare. The study carried out in this paper aimed at filling this gap clearly present in the research on persistence in developing countries which Poland certainly is. Further to that, most of the studies focusing on persistence analyze only tens or at most a few hundred companies. These are frequently companies quoted on the stock exchange and the panels created are balanced. This paper considered an unbalanced panel, which is not affected by survivorship bias, and what is crucial, over 30 thousand companies were investigated, in total responsible for over half of revenues generated in the entire business economy in Poland, which although not entitling one to view the results as binding, they may still be seen as suggestive for the country's entire business economy.

The analysis of profit persistence shows the level of competition on the markets, and with this competition lacking, the government may have the reason to intervene so as to bring it to an appropriate level. Intervention in this case is justified as the lack of competition leads to the loss of social advantages arising from the exchange unfolding on the market terms. In antitrust laws, in order to assess the competition level, the measures of market concentration are most frequently used (e.g. C4 or Herfindahl-Hirschman index); however, examining profit persistence has the advantage of being able to indicate a situation where there is no need for a government to intervene together with a high degree of market concentration. This situation would occur if there was only a small number of firms operating on the market with relatively large shares, while at the same time having no abnormal profit persistence. This can happen if despite the small number of firms, there is a threat of other companies entering the market, which is as significant for the competition level as if new companies were actually making their entrance.

The results obtained in the study indicate a low level of profit persistence, which may imply that the level of competition across the specified sectors of the business economy is high. The Polish companies were able to transfer their abnormal profits to upcoming years only to a

very small degree. Abnormal profits erode relatively quickly, with this speed, however, varying depending on the sector. This observation confirms the plausibility of conducting research at lower aggregation levels such as sectors, for the analysis of profit persistence for the entire business economy does not allow for detecting those differences. When at the aggregated level enterprises are characterized by profit persistence, the state intervention is expected; however, it is possible that the overall picture is obscured by, for example, one dominant sector, and if this is so, the intervention should refer only to the problematic sectors and not the entire business economy.

Although the results obtained for Poland suggest that there is a rather high level of competition across the individual sectors, attention should still be directed towards findings obtained from this kind of research, since possible mergers and acquisitions may relatively quickly lead to excessive concentration of industries, which may result in a decreased competition level and loss of social advantages arising from an economy based on market mechanisms.

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