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Factors determining the profitability of equity in small and medium-sized enterprises in Poland

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1. Introduction

Small and medium-sized enterprises (SMEs) play an important role in the development of modern economies. According to many authors, SMEs are an important source of employment growth, characterized by a high degree of flexibility in adapting to market demands, they play an important role in the creation of competition, filling the market niches, introducing new technologies, products and services, etc. (Jędrzejczak-Gas 2003). Therefore, they have many important social, political and economic functions. In the Polish economy, the SMEs played a particularly important role in the early 90-ies of XX century. The dynamic development of the SMEs served an important role in reducing high costs of the transformation process. Currently, the importance of the role of SMEs in the Polish economy and the economies of other countries, indicates among others a high share of SMEs in the total number of enterprises, the share in GDP, the total number of employees, etc. Therefore, it is important to develop proper conditions for their functioning and development.

SMEs activities are affected by many different factors such as: economic, political, social, psychological, etc., which can be both a stimulant or a brake in their development. Therefore, it is necessary to identify and diagnose the factors of the development of SMEs, to on the one hand, reduce or minimize barriers to their development, on the other hand strengthen the positive factors.

One of the most important financial parameters of SMEs, determining their proper and safe functioning is the equity capital. The observation of changes which are taking place within the equity capitals can constitute a very important part of controlling the efficiency of SMEs. One of the tools for such control may be the examination of equity capital profitability. The equity capital profitability indicator is one of the basic measures of the financial position of the company. It is considered to be one of the most synthetic evaluation metrics of the companies activity. It's level is influenced by the overall economic phenomenons taking place in the company. This indicator is a proportion of the financial result to capital. However, in a synthetic approach, the indicator does not present a wide range of interpretation possibilities. It allows only to conclude whether the achieved level of profitability is the result of a high net profit, or a low level of equity capital. Much greater interpretation possibilities and opportunities for the determination of cause and effect relations creates a structural system, called „pyramid of indicators" which also allows to (Jerzemowska 2004, p. 127):

• explain the trends and opportunities of reaching the objective determined in the system by an appropriate synthetic index,
• show the location of individual indicators in the system, and thus, indirectly, in the economic reality.

An example of the „system of indicators", which includes the pyramid of financial parameters ranked according to cause and effect is the Du Pont System of Financial Control, also known as tri-factor model of changes in return on equity. Du Pont model in a practical way indicates the causes of changes which take place within the company's profitability.

The purpose of this article is to identify factors influencing the return on equity of small and medium-sized enterprises and to examine the strength and direction of the impact of these factors on the level of ROE based on Du Pont model. To accomplish this objective were used three different methods: correlation analysis, deterministic (differentiation) method and the method of linear regression.

186

Factors determining the profitability of equity
in small and medium-sized enterprises
in Poland

2. Identification of factors influencing ROE based on Du Pont model

Du Pont model is one of the most popular forms of pyramidal extension of return on equity indicator (ROE). The original version of the model presented in the form of the equation:

(net income / sales) x (sales / total assets) = (net income / total assets)

This version of the model was formulated by Donaldson Brown, an employee of Du Pont company, who in 1918 received the task of bringing the improvement of finances of General Motors company (Du Pont company purchased in that time 23% of shares in General Motors). This model was the basic tool of financial analysis till 1970 The first modification of the original version of the model appeared in the 70s of the twentieth century, when the model was extended to a new area of interest of managers, that is, the way of financing activities, expressed as a capital multiplier (Liesz 2002). The modified model presents as follows:

ROA x (total assets / equity capital) = ROE, that is,
(net income / sales) x (sales / total assets) x (total assets / equity capital) = ROE

The presented equation shows that the return on equity is influenced by three factors:
- return on sales (ROS = net profit / sales),
- asset turnover (TAT = sales / total assets),
- capital structure (ER = total assets / equity capitals).

A characteristic feature of the Du Pont model is the fact that ie. negative change in the value of one of the indicators included in the model does not have to automatically cause the deterioration of the final indicator. The impact of individual financial indicators on the return on equity can compensate for each other, which means that the deterioration in the profitability of sales can be successfully compensated by a higher asset turnover (and vice versa). However, a significant increase in the profitability of such sales may be offset by less favorable capital structure (inefficient increase in the share of foreign capital).

3. Practical use of the Du Pont model

In the subject literature, little attention has been paid to the analysis of the factors influencing ROE in small and medium-sized enterprises. Therefore, in the later part of the study, based on data from Central Statistical Office, is shown the formation of return on equity - using the Du Pont model - in small and medium-sized enterprises. A set of companies subjected to the analysis, is composed of business entities performing accounting services or keeping revenue and expense ledgers, in which the number of employees varies between 10-49 people (small businesses), and 50-249 (medium-sized enterprises). The study included the last 10 years, more specifically the years 2002-2011[1]. Table 1 shows the evolution of the return on equity ratio and its components forming the Du Pont model for small and medium-sized enterprises.

As results from the data presented in table 1, in the years 2002-2011, it was both in small as well as in medium companies that indicators of profitability (ROS, ROE) assumed diversified values without any clear trend. In 2002 companies have developed a small loss, which had a visible impact on the profitability indicator - ROS and ROE were negative. In the years 2003-2010, it was in these companies that ROS assumed values in the range of from 3,24 to 5,81 and ROE in the range of from 4,16 to 7,59. In 2011 in small businesses was reported a distinct deterioration of the financial situation, which resulted in a significant reduction of all profitability ratios. In the medium companies, ROS and ROE were also strongly diversified in the analysed period. In 2011, the medium-sized enterprises develop a profit, but it was so small that the indicators of profitability in that year were the lowest in the entire analyzed period. In the subsequent years, ROS ranged from 1.60 to 4.96 and ROE within 4.34 and 11.65.

**Table 1. Du Pont model parameters
for small and medium-sized enterprises in the years 2002-2011**

Year	Small enterprises				Medium enterprises			
	ROS	**TAT**	**ER**	**ROE**	**ROS**	**TAT**	**ER**	**ROE**
2002	-0,86	1,23	2,42	-2,57	0,52	1,22	2,02	1,29
2003	3,24	1,28	2,59	10,78	1,60	1,30	2,08	4,34
2004	3,96	1,42	2,26	12,70	3,90	1,38	1,96	10,59

1   The latest figures published by the CSO concern 2011.

188

Factors determining the profitability of equity
in small and medium-sized enterprises
in Poland

2005	4,06	1,38	2,03	11,34	3,23	1,36	1,96	8,61
2006	3,88	1,34	2,07	10,78	4,30	1,35	1,94	11,29
2007	5,81	1,31	1,97	14,99	4,96	1,26	1,87	11,65
2008	4,38	1,34	2,07	12,16	3,28	1,36	2,02	9,01
2009	4,88	1,28	2,13	13,29	3,76	1,25	1,95	9,17
2010	4,34	1,28	2,15	11,97	3,71	1,27	2,05	9,65
2011	1,74	1,32	2,31	5,32	3,08	1,31	2,13	8,57

ROS = net profit/sales   TAT = sales/total assets   ER = total assets/equity capitals
ROE = ROS x TAT x ER

Source: self calculations based on: Financial results
(2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012)

Throughout the analyzed period, with the exception of 2002 and 2011, both in small and medium enterprises the value of ROE was highly dependent form the return on assets (ROA)[2], and the influence of capital structure (ER) was relatively lower. Throughout the analyzed period ER both in small and medium-sized enterprises remained at a similar relatively low level, although in small enterprises it was slightly higher. This indicates that the analyzed companies, in particular the medium-sized companies, did not make a full use of the financial leverage, as the share of foreign capital in the financing of their activities reached a level of approximately 50%.

In turn, the level of return on assets (ROA) indicator in both small and medium companies was mainly influenced by the return on sales (ROS), on the other hand, the impact of assets turnover ratio (TAT) was relatively lower.

4. The correlation coefficient in the analysis of profitability

The most well-known and used indicator of the relation between two measurable variables is a classic Pearson correlation coefficient (Zeliaś 2000, p. 80). It should be borne in mind that a simple linear correlation coefficient may be considered as an indicator of the strength of the relation between the studied variables only if:

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2   ROA = ROS x TAT.

1. independent variable is the only factor affecting the dependent variable,
2. the studied relation between variables is linear.

However, if one of these two conditions is not met, the interpretation of the correlation coefficient as a measure of the strength of the dependency of the dependent and independent variable is not justified (Guzik 2008, pp. 55-56).

In the analysis presented in a lesser article, the first condition is not satisfied, because the return on equity depends on more than one variable. Therefore, the correlation coefficient can only be used to measure the similarity between the direction of changes in the two studied variables and the degree of harmonization of their course.

Correlation coefficients between indicators of Du Pont mode shown in table 1l was shown in table 2. This ratio assumes the values within the range of <-1, +1>. The sign informs on the correlation direction and its value on the strength of the relation. It is assumed that if the ratio is (Zeliaś 2000, s. 82):
- less than 0,2 - there is no linear relation between the variables,
- from 0,2 to 0,4 - there is a distinct but small linear relation,
- from 0,4 to 0,7 - a relation is moderate,
- from 0,7 to 0,9 - a relation is significant,
- above 0,9 - a relation is very strong.

Table 2. Pearson correlation coefficients between indicators of Du Pont model

Small enterprises				
	ROS	TAT	ER	ROE
ROS	1,000	0,388	**-0,650**	**0,985**
TAT	0,388	1,000	-0,364	**0,459**
ER	**-0,650**	-0,364	1,000	**-0,540**
ROE	**0,985**	**0,459**	**-0,540**	1,000
Medium enterprises				
	ROS	TAT	ER	ROE
ROS	1,000	0,327	**-0,599**	**0,987**
TAT	0,327	1,000	-0,028	**0,451**
ER	**-0,599**	-0,028	1,000	**-0,510**
ROE	**0,987**	**0,451**	**-0,510**	1,000

Source: Self calculations based on: Financial results (2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012).

Factors determining the profitability of equity
in small and medium-sized enterprises
in Poland

Analysis of the correlation coefficients indicates, that during the studied period, both in small and medium-sized enterprises:

- changed the trends in the return on equity and return on sales which were strongly similar (harmonized). Increasing (decreasing) return on equity was accompanied by very strong increasing (decreasing) return on sales,
- the directions of changes in return on equity, profitability and rotation (the turnover) of the assets were moderately similar (harmonized). Increasing (decreasing) return on equity was accompanied by moderate increases (decreases) in the rotation of assets,
- directions of changes in return equity and profitability and the capital structure (ER) were moderately unsimilar (non-harmonized). The increasing profitability of capital was accompanied by moderately decreasing ER (and declining return on equity was accompanied by moderately increasing ER).

The calculated Pearson correlation coefficient, however, can not be regarded as estimating the relation force between ROS and ROE (ROE and TAT, ROE and ER), because the basic condition is not satisfied, condition which claims that ROE depends only from ROS or only from TAT or just from ER.

5. Differentiation method for the analysis of profitability

On the basis of earlier analysis were determined ROE indicators affecting small and medium-sized enterprises, which include the return on sales, asset turnover and capital structure. The conducted analysis of correlation coefficients allowed only to examine the similarities of direction of changes between ROE, ROE determinants and the degree of their harmonization. To examine the strength and direction of the influence of profitability of sales, asset turnover and capital structure on ROE level, was used one of the deterministic methods, the differentiation method.

The literature indicates certain disadvantages method for the differentiation of certain disadvantages, including the fact that the measurement accuracy depends on different factors influence on the adopted order in the analysis. This method, however, is characterized by a simplicity, easiness, low laborious and is often used in research practice (Grzenkowicz, Kowalczyk, Kusak, Podgórski 2007, pp. 35-38).

Table 3 shows the results of the analysis of the impact of sales profitability, asset turnover and capital structure on ROE in small and medium-sized enterprises.

Table 3. Impact of sales profitability, asset turnover and capital structure on return on equity in small and medium-sized enterprises

Year	Absolute deviation				The impact of changes on the factors for ROE deviation			Impact force (%)		
	ΔROS	ΔTAT	ΔER	ΔROE	ROS ↓ ΔROE	TAT ↓ ΔROE	ER ↓ ΔROE	ROS ↓ ROE	TAT ↓ ROE	ER ↓ ROE
Small enterprises										
2003	4,10	0,05	0,18	13,35	12,24	0,37	0,73	91,70	2,80	5,49
2004	0,72	0,13	-0,33	1,91	2,41	1,38	-1,88	125,81	72,33	-98,14
2005	0,09	-0,04	-0,23	-1,35	0,30	-0,38	-1,27	-22,06	28,15	93,91
2006	-0,18	-0,03	0,04	-0,56	-0,49	-0,26	0,19	87,68	45,93	-33,60
2007	1,93	-0,04	-0,09	4,21	5,36	-0,44	-0,72	127,51	-10,48	-17,03
2008	-1,43	0,03	0,10	-2,82	-3,70	0,29	0,58	130,93	-10,43	-20,50
2009	0,51	-0,06	0,06	1,13	1,41	-0,65	0,38	124,60	-57,81	33,21
2010	-0,54	0,00	0,02	-1,32	-1,47	0,04	0,11	111,04	-2,81	-8,23
2011	-2,60	0,04	0,15	-6,65	-7,17	0,17	0,35	107,79	-2,50	-5,29
Medium enterprises										
2003	1,08	0,08	0,06	3,06	2,67	0,27	0,12	87,29	8,70	4,01
2004	2,30	0,08	-0,12	6,24	6,24	0,64	-0,65	100,03	10,31	-10,34
2005	-0,68	-0,02	0,00	-1,97	-1,84	-0,14	0,01	93,20	7,33	-0,53
2006	1,08	-0,01	-0,02	2,68	2,87	-0,08	-0,12	107,33	-2,85	-4,47
2007	0,66	-0,09	-0,08	0,36	1,72	-0,89	-0,47	478,27	-246,41	-131,85
2008	-1,68	0,10	0,15	-2,64	-3,94	0,64	0,66	149,11	-24,12	-24,99
2009	0,48	-0,11	-0,07	0,16	1,32	-0,83	-0,32	811,11	-512,96	-198,15
2010	-0,06	0,02	0,10	0,48	-0,14	0,15	0,47	-28,98	31,22	97,76
2011	-0,62	0,03	0,08	-1,08	-1,62	0,20	0,34	149,90	-18,80	-31,11

Source: self calculations based on: Financial results
(2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012)

Factors determining the profitability of equity
in small and medium-sized enterprises
in Poland

From the data presented in table 3 results that in the majority of years in the analyzed period, both in small and medium-sized enterprises, the strongest factor affecting the change in return on equity was the return on sales. In the case of small businesses it does not apply only to 2005, and in the case of medium-sized companies - 2010. In small enterprises in 2005 on the decrease of ROE by 1,35 percentage point the greatest impact and the decrease of capital structure (94%) and slow down the rotation of assets (28%), on the other hand the 0,09 percentage point increase in return on sales was less influential and decreased slightly the drop of ROE. In turn, in medium enterprises in 2010 the increase of ROE by 0,48 percentage point was mostly influenced by the growth of the capital structure, while the negative change in return on sales by 0,06 percentage point was less influential and decreased slightly the growth of ROE. In addition, the direction of changes of ROE and ROS was generally the same (except of 2005 for the small companies, and average companies with the exception of 2010), which indicates a growth correlation of ROS on ROE, and vice versa.

From the data obtained follows, that the two other factors, namely the assets turnover and capital structure, explained the change of ROE to a lesser degree.

Only in small businesses in 2004 and 2005 the influence of the capital structure was greater. However, the direction of changes of this factor was generally opposite to the direction of changes in ROE. It does not apply only to years 2003 and 2009, in which a positive change in the structure of capital was accompanied by a positive change in ROE. In small enterprises in the slightest extend the turnover of assets influenced ROE changes.

In medium enterprises only in 2007 and 2009 the influence of the assets turnover and capital structure was greater.

6. Econometric model (regression) of several variables in the analysis of profitability

To examine the strength and direction influence of the profitability of sales, asset turnover, and capital structure on ROE can also be used the multivariate regression (Borkowski, Dudek, Szczesny 2003).

Table 4 shows the coefficients of the linear regression between the return on equity amount and the statistically significant explanatory variables (with $\alpha = 0,05$) and the additional regression statistics, ie. standard error values for the coefficients and constant, coefficient of determination (R^2), standard error of ROE assessment, F statistics, degrees of freedom and the value of t-Student test. Additionally, in the analysis was used the beta coefficient, which indicates

the relative importance of independent variables on the dependent variables (Goldberger 1964). The data presented in Table 4 are the basis for synthetic evaluation of the strength and direction of the impact of the sales profitability, asset turnover and capital structure on the return on equity in small and medium-sized enterprises.

Table 4. Linear regression coefficients between ROE (Y) and a statistically significant independent variables X$_i$

independent variables X$_i$	Small enterprises				Medium enterprises			
	Coefficients	Standard Error	β	t-student test	Coefficients	Standard Error	β	t-student test
X$_1$	2,909	0,050	1,0671	57,906	2,492	0,063	1,0026	39,748
X$_2$	10,997	1,432	0,1155	7,680	7,328	1,181	0,1253	6,204
X$_3$	5,146	0,481	0,1951	10,699	3,979	1,005	0,0945	3,961
Constant	-26,056	2,332		-11,173	-17,168	2,312		-7,425

Determination coefficient - R^2 (%)	99,89	99,79
F Statistics	1778,80	960,21
The standard error of the independent variable evaluation (Y)	0,2094	0,1798
Degrees of freedom	6	6

X1 - ROS   X2 - TAT   X3 - ER   Y - ROE

Source: self calculations based on: Financial results
(2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012)

From the data presented in Table 4, result following conclusions:
1. All independent variables adopted in the models (ROS, TAT, ER) were statistically significant.

194

Factors determining the profitability of equity
in small and medium-sized enterprises
in Poland

2. In small businesses, the increase of profitability, assets turnover growth and an increase of total assets in relation to equity by 1 percentage point on average translated into an increase in return on equity, respectively: 2,9; 11; 5,1 percentage point.

3. In medium-sized companies the increase of sales profitability, assets turnover and increase of the relation of total assets to equity ratio by 1 percentage point on average translated into an increase in return on equity, respectively: 2,5; 7,3; 3,98 percentage point.

4. In the view of β, both in small and medium-sized enterprises the sales profitability has the key meaning. In view of β the relative influence of ROS on ROE in small businesses was approximately 5 times stronger than the effect of capital structure and approximately 9 times stronger than the effect of the assets rotation. In turn, in the medium-sized enterprises the influence of ROS on ROE was approximately 8 times stronger than the effect of the assets rotation and 11 times stronger than the capital structure impact.

7. Conclusion

The presented return on equity condition analysis in small and medium-sized enterprises allows for the following conclusions:

1. The equity capital profitability indicator is one of the basic measures of the financial position of the company. It is a relation of earnings to capital. However, in a synthetic approach it does not present a wide range of possibilities of interpretation. Much greater possibilities for interpretation and determine of cause-and-effect dependences pose pyramidal models. An example of such a model is the model of Du Pont.

2. In the analysis of ROE, correlation coefficient can be used. Although it should be noted, that it can only be used to measure the similarities of the direction of changes similarity between ROE and ROS (ROE and TAT, ROE and ER) and the degree of their harmonization.

3. The correlation coefficient analysis shows that trends in changes of return on equity and return on sales were strongly related. Trends of changes in return on equity and asset rotation (the turnover) were moderately similar. Trends of changes of return on equity and the capital structure were moderately dissimilar.

4. To study the strength and direction of the impact of the profitability of sales, asset turnover and capital structure on the level of return on equity, can be used the method of differentiation or multivariate regression.

5. The method differentiation method allowed to determine that, in most years of the period, both in small and medium-sized enterprises, the strongest factor affecting the change in return on equity was the return on sales.
6. In the consideration of β, both small and medium-sized enterprises the key importance has the profitability of sales.

Summary

Factors determining the profitability of equity in small and medium-sized enterprises in Poland

The equity capital profitability indicator is one of the basic measures of the financial position of the company. It is considered to be one of the most synthetic evaluation metrics of the companies activity. It's level is influenced by the overall economic phenomenons taking place in the company. The purpose of this article is to identify factors influencing the return on equity of small and medium-sized enterprises and to examine the strength and direction of the impact of these factors on the level of ROE based on Du Pont model. To accomplish this objective were used three different methods: correlation analysis, deterministic (differentiation) method and the method of linear regression. The correlation coefficient analysis shows that trends in changes of return on equity and return on sales were strongly related. Trends of changes in return on equity and asset rotation (the turnover) were moderately similar. Trends of changes of return on equity and the capital structure were moderately dissimilar. The method differentiation method allowed to determine that, in most years of the period, both in small and medium-sized enterprises, the strongest factor affecting the change in return on equity was the return on sales. In the consideration of β, both small and medium-sized enterprises the key importance has the profitability of sales.

Keywords: *small and medium-sized enterprises, Return on Equity, Du Pont model.*

Streszczenie

Czynniki determinujące rentowność kapitału własnego w małych i średnich przedsiębiorstwach w Polsce

Wskaźnik   rentowności   kapitału   własnego   jest   jedną

196

Factors determining the profitability of equity
in small and medium-sized enterprises
in Poland

z podstawowych miar oceny sytuacji finansowej przedsiębiorstwa. Jest uważany za jeden z najbardziej syntetycznych mierników ewaluacji działalności firmy. Na jego poziom wpływa całokształt zjawisk gospodarczych zachodzących w firmie. Celem niniejszego artykułu jest wskazanie czynników kształtujących rentowność kapitału własnego małych i średnich przedsiębiorstw oraz zbadanie siły i kierunku wpływu tych czynników na poziom ROE na podstawie modelu Du Ponta. Do realizacji tak postawionego celu wykorzystano trzy różne metody: analizę korelacji, metodę deterministyczną (różnicowania) oraz metodę regresji liniowej. Z analizy współczynnika korelacji wynika, że kierunki zmian rentowności kapitału własnego i rentowność sprzedaży były bardzo silnie podobne. Kierunki zmian rentowności kapitału własnego i rotacji aktywów były umiarkowanie podobne. Natomiast kierunki zmian rentowności kapitału własnego i struktury kapitału były umiarkowanie niepodobne. Metoda różnicowania pozwoliła ustalić iż, w zdecydowanej większości lat badanego okresu, zarówno w małych jak i średnich przedsiębiorstwach, czynnikiem najsilniej oddziałującym na zmianę rentowności kapitału własnego była rentowność sprzedaży. Z punktu widzenia miary β zarówno w małych jak i średnich przedsiębiorstwach zasadnicze znaczenie ma rentowność sprzedaży.

Słowa kluczowe: *małe i średnie przedsiębiorstwa, rentowność kapitału własnego, model Du Ponta.*

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198

Factors determining the profitability of equity
in small and medium-sized enterprises
in Poland