METHOD FOR MEASURING THE EFFECTS OF FIRMS' RESTRUCTURING PROGRAM

Tadeusz Wascinski,

prof. Economics, Faculty of Management, Warsaw University of Technology, Warsaw, Poland
e-mail: twascinski@wp.pl

Katarzyna Anna Wojcik

dr. Economics, Faculty of Management, Warsaw University of Technology, Warsaw, Poland
e-mail: katarzyna.anna.wojcik@googlemail.com

Abstract
The application of statistical methods in connection with the systematized knowledge of the restructuring program in a significant way reinforces the efficiency of the implemented restructuring processes. The objective of this paper is to compare several statistical methods and to reveal the possibilities of their application in measuring the effects of the implemented restructuring programs in firms. The examples shown refer to a very thorough analysis of the case study of Volkswagen, where quarterly results covering the period of 10 years were examined. Statistical method of multiple regression was applied in the calculations and additionally there were performed calculations with the use of the SPSS 20 feature for ten models, for three time intervals on a quarterly basis (48 periods). The obtained results confirmed the results that were acquired when studying regression.

Keywords: statistical methods, firm's value, concern reports, effects of the restructuring program

JEL classification: C13, C22, G32, G30, G34, O31

1. INTRODUCTION

In the contemporary concepts in the area of planning, organizing and settling the restructuring processes, we are looking for new ideas and solutions for the way of managing changes in a firm. A comprehensive approach to seek new ideas is embraced by the methods of multidimensional statistics when measuring the effects of the restructuring program. Monitoring and analysis including the process of forming conclusions are of crucial importance for the rise in a firm's competitiveness, its development and market value.
Also "the life cycle of a company, firm specific characteristics and type of business environment will have impact on capital structure" (Wood, 2004; Boateng, 2003 in Marimuthu,M., 2009, p.127).
The application of new ideas and solutions in the process of measuring the effects of the restructuring program is a fundamental question for survival and aspiration for the maximisation of business profit. There are many methods for measuring the effects of the restructuring program. Hence, the question arises: whether the application of statistical methods for measuring the effects of the restructuring program, in reality, has an impact on the efficiency assessment of this measurement and will it have a pragmatic result? This question seems very significant because each instrument that helps in a real way generate new solutions, contributes at the same time to the increase in the firm's performance and by means of the above, also to the optimization of the implemented processes as well as to the development and functioning of a firm in a competitive environment.
It is crucial whether the existing statistical methods may support effectively the measurement of the restructuring processes and whether their application may prove useful in practice when employed by a firm. The use of statistical instruments that in fact support the measurement of

the restructuring effects accounts for a new trend of measuring the restructuring effects. The application of statistical instruments that rationally support the measurement of the restructuring effects accounts for a separate tendency when taking these measurements.

The presented method for measuring the effects of the restructuring is a proposal for an approach to the research issue, which is the economic success of the restructuring. On the basis of the management theory, the developed method provides a tool to support decision-making processes by contributing to the function of controlling the economic and financial effects of the restructuring processes carried out in large transnational automobile corporations. Therefore, the issue on the restructuring programs was presented and analyzed in the context of new solutions for the analysis and evaluation of the restructuring processes implemented by large automobile corporations, which occupy a key position in the market.

Volkswagen is an example of a global corporation in the automotive branch and in its restructuring actions it manages to achieve great success, which has been confirmed by good results gained recently. Volkswagen is one of the leading in the world and largest in Europe car manufacturers (Wojcik K., 2014, p. 7).

2.   EMPIRICAL METHODOLOGY / EMPIRICAL SPECIFICATION

Empirical research on the firm's value (both before and after the implementation of the restructuring processes) by using statistical methods ought to include a firm's complete organizational and financial performance. With this end in view it is significant to use such statistical methods that may be applied on the basis of generally available financial results of concerns (annual, quarterly reports). It will allow long-term observation of a firm's performance over a freely chosen period of time. Such a function may be performed by profitability ratios, financial (standing) liquidity as well as methods of business valuation, which will be presented selectively in this paper.

The following ratios, among others, are included in the analysis of a firm's financial standing (Brigham E.F., Houston J.F., 2004, p.78-88): ROA (*Return on Total Assets*) represents return on total assets and determines the ratio of net income to total assets.

ROE *(Return on Equity)* stands for the rate of return on equity capital. The higher the level of this ratio, the greater the efficiency of the capital employed. EPS (*Earnings per Share)* represents the earnings per share. The growing value of this ratio means the higher the market price of equity. Also Gross profit margin *(gross profit margin)* and Net profit margin *(net profit margin)*. Receivables turnover ratio allows determining the average time of making payment by deliverers. QR (*Current Ratio*) illustrates the ratio of current assets to current liabilities.

Other profitability coefficients encompass also the following: ROI the return on investment and ROCE the return on capital employed.

Great importance when calculating the restructuring effects is attached to statistical methods and among others, first of all to the regression modelling, which serve as the basis for such calculations. The choice of the form of the model may rely on earlier results (Everitt B.S., 1998, p. 281).

In this paper there will be employed an estimated linear regression model with one explanatory variable, which is also used for statistical calculations. Form of the model (Schlittgen R., 1997. p. 420):

$$y_t = \beta_0 + \beta_1 x_t + \varepsilon_t, \qquad t = 1,2,...,n, n > 2 \ [\ 1 \ ]$$

Residual standard deviation is calculated in the following way:

$$S_e = \sqrt{\frac{1}{n-k-1} \cdot \sum_{i=1}^{n} e_i^2} \quad [\,2\,]$$

Residual standard deviation represents by how much the observed response variable values differ on the average from the theoretical values of the variable specified in the model.

Coefficient of determination R^2 :

$$R^2 = \frac{SSR}{SST} = \frac{\sum_{i=1}^{n}(\hat{y}_i - \bar{y})^2}{\sum_{i=1}^{n}(y_i - \bar{y})^2} \quad [\,3\,]$$

Provides information of what part of the entire variability of the response variable has been explained by the model. Coefficient of indetermination φ^2 :

$$\varphi^2 = \frac{SSE}{SST} = \frac{\sum_{i=1}^{n} e_i^2}{\sum_{i=1}^{n}(y_i - \bar{y})^2} = 1 - R^2 \quad [\,4\,]$$

Provides information of what part of the entire variability of the response variable has not been explained by the model. $R = \sqrt{R^2} \quad [\,5\,]$

Since $R = r_{y\hat{y}}$ that is why the coefficient of multiple correlation specifies to what degree the empirical and theoretical values of the response variable are correlated with each other.
Studies of the significance of the model parameters by determining a confidence interval for a structural parameter $(1-\alpha)\cdot 100$-percent confidence interval for the parameter β_j is as follows:

$$(b_j - t_{\alpha,n-k-1} \cdot S_{b_j}, b_j + t_{\alpha,n-k-1} \cdot S_{b_j}), \qquad j = 0,1,...,k. \;[\,6\,]$$

In practice, the important thing is whether the constructed confidence interval contains zero. If 0 belongs to the confidence interval, then a given structural parameter of the model is statistically insignificant. The last element of the statistical research is the interpretation of the standing parameter evaluation with the explanatory variable (Bielecka A., 2005, p. 262-278).
As J.M. Wooldridge (Wooldridge J.M., 2011, p. 12-15) states as regards panel data models, where there are few time periods, that one may apply cross section. With different time intervals per unit and „fixed effects" - where unobserved heterogeneity is estimated with the population parameters - the results are common. (Example - Jones and Schurer 2011).
Cobb-Douglas innovative approach to the production function is emphasized by C. Tronconi and G.V. Marzetti after Lev and Radhakrishnan (2005) as well as De and Dutta (2007) who estimate this function together with the organization capital as an additional function sustaining the division of the common capital of the organization specifically to each firm. The formula of calculating the organization capital is made up of general and administrative sales costs. It includes some expenses that may increase the organization

capital such as: employee training costs, brand activities promotion costs, payments to systems and strategy consultants and IT expenses.

They indicate the Cobb-Douglas production function as an important example, first of all, to American firms, however, depending on the firm with or without R&D. To recapitulate: according to Lev and Radhakrishnan (2005) and De and Dutta (2007) it is worth referring to their research because it reveals that specific solutions have a positive influence on performance and, depending on the firm, the organization capital has the highest elasticity (Tronconi C., Marzetti G.V., 2011, p. 141-143).

Also, it is worth applying Altman's Z-score method which is the most commonly used measure of the financial likelihood of organization survival on the market. Altman was the first to use multiple discriminate analyses in order to anticipate bankruptcy. The function of Altman's Z-score model:

$$Z = 1,2X_1 + 1,4X_2 + 3,3X_3 + 0,6X_4 + 1,0X_4 \ [\,7\,]$$

where:
X1 - working capital / total assets
X2 - retained earnings / total assets
X3 - earnings before interest and taxes / total assets
X4 - market value of equity / book value of total liabilities and
X5 - sales / total assets.

Altman claims that firms whose Z-score is higher than 2.99 are clearly included in the non-bankruptcy category, whereas firms whose *Z-score* is lower than 1.81 clearly show the bankruptcy tendency. Firms whose Z-score is between these two values are considered to be in danger of going bankrupt although they are not yet bankrupt (Carton R.B., 2006. p. 94).

Market-based measures are the following:
- return to shareholders,
- market value added,
- holding period returns,
- Jensen's alpha,
- Tobins's Q.

To calculate these values a firm's market valuation is required and it is available only for publicly-traded companies. It has already been mentioned at the beginning of this paper. Return to Shareholders - RTS represents the return on total financial value of the share owned in a given period. RTS includes both common equity appreciation and the distribution to the shareholders in the form of dividends. The formula is as below (Carton R.B., 2006. p. 95):

Total shareholder return = Rate of return over the period of investment + Dividend rate
where:
Rate of return over the period of investment = share market price at the beginning of a given year - share market price at the end of a given year / share market price at the beginning of a given year.

Robinson (1995) found that RTS assured the highest research effects when measuring the efficiency of new undertaking among 10 researched variables. He did not measure, however,

RTS over the same time period for every firm. As a result, RTS values embrace both specific performance effects as well as general outcomes of the market operation. General conclusion resulting from his research on RTS remains an open question (Carton R.B., 2006. p. 96).

Market Value Added is a measure of the long-term economic profit creation of a firm (Barney, 2002). It is calculated as the firm enterprise value (market value of equity plus the market value of debt) less the economic book value of the organization (book value of equity and the book value of debt). The *MVA* formula (Carton R.B., 2006. p. 97):

Market value added = Market current value of equity - Book value of equity invested
where:
Market value of equity = Market value of common stock
+ Market value of preferred stock
+ Market value of a firm's short-term debt
+ Market value of a firm's long-term debt
and
Economic book value = Book value of equity + Book value of debt.

Another measure, Jensen's Alpha, is adjusted to the risk of performance measure, which is calculated as the return to shareholders in excess of the cost of equity capital, as the use of the capital asset pricing model (*CAPM*). The formula (Carton R.B., 2006. p. 98):

$$\alpha_p = \bar{r}_p - [r_f + \beta_p(\bar{r}_m - r_f)], \quad [\,8\,]$$

where:
rp = expected rate of return
rf = risk-free rate
ßp = Beta coefficient
rm = expected rate of return on changes

Tobin's Q method is defined as the ratio of a firm's market value (capital value on the stock market) to the replacement value of the book equity. The formula is given below:
Tobin's Q = firm's market value / replacement value of the book equity
Chung and Pruitt (1994) have implied that when calculating a firm's actual values - the book value of short-term and long-term debt and the value market of the debt, is not often available (Carton R.B., 2006. p. 99).

3.   ECONOMIC VALUE MEASURES

Residual Income RI is a measure that adjusts net income subtracting a charge for the cost of capital employed in the organization. The cost of capital is equal to the beginning book value of the capital *(BV)* times the cost of capital *(k)*. RI is defined by the following formula:

$$RI = NI_t - (k_t \times BV_{t-1}) \qquad\qquad\qquad [\,9\,]$$

The calculation provides the economic profit generated by the organization. Another way to determine residual income or economic profit is the difference between the return on invested

capital and its WACC-times the amount of capital invested by the organization (Carton R.B., 2006. p. 100).

Economic profit = invested capital x (ROIC - WACC)   [10]
where:
ROIC = return on invested capital
WACC = weighted average cost of capital

As regards traditional indicators of performance measurement: "the most of Lithuanian companies use absolute values (such as revenue, net profit, profit before taxes) in order to evaluate performance results of a company. Besides them, efficiency of activity is measured using return on investment (ROI), return on capital and other financial ratios. Ratios are more informative than absolute values, since they outline performance efficiency more precisely. Foreign, as well as Lithuanian scientists also apply financial ratios to evaluate performance of a company or the effect of different decisions (including restructuring) on performance results" (Christauskas and Kazlauskiene, 2009, Sakiene and Puleikiene, 2009, Charitonovas, 2004; Leepsa and Mishra 2012; Lukason 2012, Fedier 2011 in Stankeviciene J., 2012, p. 1290).

4.   ESTIMATION RESULTS / DATA

As an example of development one may provide such concerns whose actions help to generate innovative ideas in the field of, among others, the restructuring program. Seeking innovative solutions for measuring the restructuring processes, to some extent, serves as the foundation of innovative development of each firm. New possibilities are searched for in many spheres of life, and in particular in respect of the following (Tidd, Bessant, Pavitt, 2005, p. 349 - 362):
- the observation of the tendency of changes and market expectations,
- present and predicted technological possibilities in a given scope,
- conducted research,
- constant learning from others,
- the observation and anticipation of the competition actions,
- enabling cooperation among employees inside the firm.

Financial statements supply information on a firm's financial standing at present as well as contain data on the results of its performance over a particular and past period of time. However, the actual value of the financial statements is that they may contribute to the prediction of future earnings and dividends as well as to the anticipation of future conditions as the basis for planning operations that will foster the improvement of the firm's future results. The use of financial ratios will help to assess the financial statements (Brigham E.F., Houston J.F., 2004, p.77).
To achieve the research objectives of this paper, we had to choose financial figures, which were used to evaluate the effects of the restructuring processes. The foundations of the methods to measure the effects of restructuring are as follows (Wojcik K., 2014, p. 102):
• basic premise is the principle: "You cannot manage something you cannot measure" (Davila T., Epstein M., Shelton R., 2006. p. 19; Kaplan R., Norton D. 2006, p. 13),
• primary purpose of the Volkswagen Group as type-profit organization is to generate a profit,

• for constructing the method of measuring the effects of restructuring choose the measurable data that characterizes the effects of the restructuring processes implemented in Volkswagen,

• when selecting financial figures seek those that allow you to build linear econometric models and which represent the data which values are obtained exclusively by aggregating the value of the same kind, without using other mathematical operations, methods, techniques and computational tools (Wojcik K., 2014, p. 105).

In addition to these foundations the literature recommends the use of other principles which are designed to achieve the effective measurement system. These principles have been applied as the rules to build such method (Davila T., Epstein M., Shelton R., p. 177-178),

• measurement system should be flexible, adapted to the appropriate organizational level, which is being researched,

• measure only necessary quantities which are measurable. Multiplying the number of the projection ranges used in the measurement system increases the difficulty in formulating clear conclusions arising from the results of calculations (Wojcik K., 2014, p. 106).

The data given below comes from the calculations on the basis of annual reports of the Volkswagen concern. The calculations were made on the basis of the data from 2004-2008. This is a period of an intensive restructuring program of the concern. (Table 1).

Table 1

Firm's financial standing

No.	Ratio	Value	2000	2001	2002	2003	2004	2005	2006	2007	2008
1.	ROA	unit	2,824	2,802	2,385	0,946	0,524	0,820	2,013	2,836	2,792
2.	ROE	unit	12940,594	12242,678	9874,525	4677,824	2868,313	3624,595	5445,545	3998,060	3434,432
3.	EPS	unit	0,835	0,916	0,811	0,349	0,218	0,348	0,958	1,415	1,590
4.	gross profit margin	unit	4,474	4,980	4,584	1,803	1,223	1,808	1,710	6,008	5,806
5.	net profit margin	unit	3,145	3,305	2,987	1,318	0,783	1,176	2,622	3,785	4,119
6.	receivables turnover ratio	unit	115,045	199,163	109,620	206,628	199,775	204,243	186,146	187,928	207,830
7.	QR	unit	1,150	0,567	1,015	0,556	0,350	0,329	0,346	0,360	0,326

Source: Own study on the basis of annual reports of the VW concern.

In the table there have been presented the analysis ratios of the firm's financial standing. ROA represents the ratio of net income to total assets from the lowest value 0.524 of the unit in 2004 to the highest value 2.836 of the unit in 2007. ROE the return on equity simmered down considerably in 2003 but in 2004 this ratio increased distinctly and one may notice certain stability between 3624 and 5445 of the unit. In turn, very noticeable improvement of EPS (earnings per share) followed in the years 2006-2008 (between 0.958-0.159 of the unit), while during 2003-2004 the ratio value reached only 0.218-0.348. The growing value of this ratio means the higher market price of equity. Gross and net profit margin developed in a similar way. Receivables turnover ratio determines average time of making payment by deliverers and at this point it is easy to perceive the prolongation of time in the course of years from the minimum value 115 of the unit in 2000 to the maximum value 207 of the unit in 2008. Current ratio QR illustrates the ratio of current assets to current liabilities and one may observe a considerable drop in this ratio from 2004 (0.35 of the unit) to 2008 (0.33 of the unit), in 2000 the ratio equalled 1.15 of the unit and in 2002, 1.015 of the unit.

In turn, estimated linear regression models with one explanatory variable served as the method of measuring the restructuring effects. The results of estimates of regression models are revealed in table 2.

Table 2

The results of estimates of regression models

The whole period - Division into quarters	Estimation of models	R^2	n quarters included in the research	independent variable [x]	dependent variable [y]
2000-2011	$\hat{y}_t = 219,8567 + \mathbf{0,0482x_t}$ [58,4136] **[0,0022]**	0,9127	48	revenues from sales	vehicles production
2000-2011	$\hat{y}_t = -44,8703 + \mathbf{1,0303x_t}$ [34,8247] **[0,0232]**	0,9770	48	sales	vehicles production
2000-2011	$\hat{y}_t = -712,2007 + \mathbf{6,2244x_t}$ [201,3312] **[0,5700]**	0,7216	48	employment	vehicles production
2000-2011	$\hat{y}_t = -1888,82 + \mathbf{18,8990x_t}$ [1291,8651] **[0,8616]**	0,9127	48	vehicles production	revenues from sales
2000-2011	$\hat{y}_t = -3294,6607 + \mathbf{19,8506x_t}$ [1231,4805] **[0,8224]**	0,9268	48	sales	revenues from sales
2000-2011	$\hat{y}_t = -19611,8349 + \mathbf{129,7742x_t}$ [3362,4688] **[9,5199]**	0,8015	48	employment	revenues from sales
2000-2011	$\hat{y}_t = 5,2922 + 2,7881x_t$ [191,7949] [1,111]	0,1203	48	employment in the country	production in the country
2000-2011	$\hat{y}_t = -242,5466 + 6,9006x_t$ [103,3961] [0,5801]	0,7546	48	employment in the foreign country	production in the foreign country

Own study on the basis of annual reports of the VW concern.

Symbols:

$\hat{y}_t$ value of the response variable determined on the basis of the model

x_t value of the explanatory variable

R^2 coefficient of determination
n quarters included in the research
numbers in brackets standard errors in the parameters estimate

In table 2 one can trace the forming of the dependency of the vehicles production upon the revenues from sales over the following time period 2000-2011 quarterly. On the basis of the amount of the coefficients of determination it has been claimed that over the analyzed years within the range of 9% in 2000-2011 of the variability of the vehicles production was explained by the average value of the revenues from sales. On the basis of the determined parameters evaluation one may state that the growth in the average production value by one unit was accompanied by the growth in the revenues from sales to the highest degree by 0.048

of the unit. Since 2004 an increasing tendency of the influence of the production upon the revenues from sales has been observed. One can see it clearly in 2005 (0.031 of the unit) as well as in 2006-2008 (0.049) and in 2009-2010 (0.061). Therefore, a positive influence of the implemented restructuring processes over 2004-2008 has been confirmed. Similar growing tendencies over 2004-2008 reveal other dependencies.

Dependent variables [y] were estimated in accordance with different modes of dependency. In the research, the focus was put, in particular, on the statistical significance of the parameter with the explanatory variable. The quality of these models was estimated in terms of the statistical significance of model structural parameters for the researched phenomenon. The obtained results of the entire variability of the response variable have been explained by the model. They are statistically essential and present important results. This proves that the calculations by means of statistical methods on the basis of a firm's financial results are a valuable source of economic information.

Table 2 indicates statistically significant models which provide crucial results for this research process. On the basis of the determined parameter estimates there were specified the most important relationships of the studied variables. These include statements that the growth in vehicles production was accompanied by the increase in sales, unequivocal growth in the revenues from sales, increase in employment (mainly abroad) as well as increase in material expenditures. The increase in costs of sales was accompanied by the growth in vehicles production, sale of cars, growth in the revenues from sales and gross income. Increase in sale of cars was accompanied by the increase in employment, vehicles production and manufacturing costs. The growth in the revenues from sales contributed to the increase in employment, vehicles production and sales. The increase in gross profit was accompanied by the increase in employment, sales, revenues from sales and assets. The growth in the revenue from shares contributed to the increase in receivables arising from the financial activity, vehicles production, sale of cars, total liabilities and increase in the financial result.

Statistical method of multiple regressions was applied in the calculations and additionally there were performed calculations with the use of the SPSS 20 feature for ten models, for three time intervals on a quarterly basis:

A. 2000 - 2011 (48 periods),
B. 2000 - 2008 (36 periods),
C. 2004 - 2008 (20 periods).

Table 3

Variables in the calculations with the SPSS 20 feature

number	dependent variable [y]	independent variable [x]	variables	division into quarters / time period 2000-2011
1	**2**	**3**	**4**	**5**
1	employment in the country	production in the country	production in the country - employment in the country	close
2	total employment / in the foreign country	production in the foreign country	total employment - production in the foreign country	very close
3	sales costs	total vehicles production	total vehicles production - sales costs	close
4	sales costs	employment in the country	employment in the country - sales costs	close
5	total vehicles production	employment in the foreign country	Employment in the foreign country - total vehicles production	very close
6	total vehicles production	revenues from sales	revenues from sales - total vehicles production	very close
7	sales	production in the foreign country	production in the foreign country - sales in the country	close
8	sales	employment in the country	employment in the country - sales in the foreign country	close
9	after tax profit margin	sales in the country	sales in the country - after tax profit margin	poor
10	after tax profit margin	production in the foreign country	production in the foreign country - after tax profit margin	very close

Source: Own study on the basis of annual reports of the VW concern.

Calculations were made for a single response and explanatory variable (simple linear regression) for quarterly periods. Intervals were specified, correlations were calculated and scatter plots were drawn up (the so-called adjustment graphs).

For the analysis the following scale of correlation (relationship) - value $|r|$ - *Pearson* was adopted in this paper:

lack of correlational relationship	0,000
poor	0,001- 0,250
average	0,251 - 0,500
close	0,501 - 0,750
very close	0,751 - 0,999
complete	1,000

Calculations with the use of the SPSS 20 feature. (scatter plots, statistical method of multiple regression, Pearson correlation, statistics Durbin-Watson) feature confirmed the correlation between the dependent variables.

Production in the country and employment in the country showed a close correlational relationship.

The results of the selected variables demonstrate the success of the restructuring process in the concern and prove that the above mentioned restructuring process has had both a short- and long-term impact.

CONCLUSIONS

The restructuring program conducted in the Volkswagen Group in 2004-2008, was unarguably multidimensional. The program brought greater results than expected. The restructuring processes allowed us to identify strategic objectives oriented to survival, development, maximizing profits and gaining the competitive advantage. In terms of the survival associated with the crisis, nowadays the concern is one of the leading and largest European manufacturer of the passenger cars and vans.

Carried out- it is worth mentioning that the restructuring programs helped to improve performance mainly in the area of total vehicles production, production in the foreign country and revenues from sales.

The goals of this paper have been achieved, and they were to demonstrate that Volkswagen carried out many restructuring processes at the same simultaneously and achieved the objectives of these processes.

Measurement, analysis and assessment of the dynamics of changes on the level of effectiveness should be carry out in a systematic manner, as a permanent element of controlling performance in companies remaining subject to restructuring. The method of measuring the effectiveness of restructuring should be applied in the measurement, analysis and evaluation of complex restructuring processes carried out in enterprises, the organizational structure of the group. The versatility of the method manifests in the fact that to construct it we can apply financial figures available in every enterprise. Furthermore, there is possibility to analyze and evaluate at any time interval the data and that can be minute-long, hourly, daily, weekly, monthly, quarterly or yearly. On the basis of management theory, the developed method provides a tool to assist decision-making and helps to control the economical effects of restructuring processes carried out in large transnational car corporations (Wojcik K., 2014, p. 97-98, 136-137).

The aim of this paper is to indicate on the basis of available data (annual, quarterly reports and other documents) the significance and grounds for the application of statistical methods in measuring the restructuring effects. The obtained results show that the main determinant for the efficiency of the data analysis is the selection of an appropriate research method and correct interpretation of the data. These methods may serve as an innovative approach to measuring the restructuring effects both in big concerns as well as in small firms.

REFERENCES
1. Bielecka A., Statystyka w biznesie i ekonomii. Teoria i praktyka. [Statistics in business and economy. Theory and practice] Wydawnictwo Wyzszej Szkoly Przedsiebiorczosci i Zarzadzania im. Leona Kozminskiego, Warszawa 2005. p. 262-278.
2. Boateng, A., Determinants of capital structure: Evidence from international joint ventures in Ghana, International Journal of Social Economics, 31 (1/2), 2003, p. 56-66.
3. Brigham E.F., Houston J.F., Fundamentals of Financial Management, Thomson, South-Western 2004. p. 77-88.
4. Carton R.B., Measuring Organizational Performance. Metrics for Entrepreneurship and Strategic Management Research. Edward Elgar Publishing, Inc. MA, USA, 2006. p. 94-100.
5. Charitonovas, V., Imoniu bankroto prevencija. Metodologinis aspektas, Organizaciju vadyba: sisteminiaityrimai. Nr. 30, 2004.
6. Christauskas, C., Kazlauskiene, V., Moderniu veiklos vertinimo sistemu itaka imones valdymui globalizacijos laikotarpiu, Ekonomika ir vadyba. Nr. 14., 2009.

7. Davila T., Epstein M., Shelton R., Making Innovation Work: How to Manage It, Measure It, and Profit from It, Wharton School Publishing, Upper Saddle River, NJ, USA, 2006. 19, p. 177-178.
8. Everitt B.S., The Cambridge Dictionary of Statistics. Cambridge University Press 1998, p. 281.
9. Fieder, J., The art of restructuring debt under pressure. Financial restructuring of Oerlikon, 4th CFO, 2012, Summit Emerging Europe & CIS. Internet Access: http://www.cfo., insight.com/fileadmin/Events/CFO_Summit/Review/4th/p_p/CEE2011-Fedier-Keynote.pdf. [Access on 06.06.2012].
10. Kaplan R. S., Norton D. P., Strategy Maps, Converting intangible assets into tangible outcomes, Harvard Business School Press, Boston, Massachusetts 2004, p. 13.
11. Leepsa, N. M., Mishra, Ch. S., Post merger financial performance: a study with reference to select manufacturing companies in India, International Research Journal of Finance and Economics. Issue 83. 2012, Internet access: http://www.internationalresearchjournaloffinanceandeconomics.com/ISSUES/IRJFE_83_01.pdf. [Access on 11.06.2012].
12. Lukason, O., Pre-Bankruptcy Financial Performance of Firms: Do Size and Industry Matter?, 2nd International Conference on Economics, Trade and Development IPEDR. Vol. 36., 2012, Internet access: http://www.ipedr.com/vol36/015-ICETD2012-D10004.pdf. [Access on 12.06.2012.]
13. Marimuthu M., Corporate Restructuring, Firm Characteristics and Implications on Capital Structure: an Academic View, International Journal of Business and Management, Vol. 4, No. 1, Jan. 2009, Internet access: http://www.ccsenet.org/journal.html. [Access on 25.06.2014], 2009, p. 127.
14. Sakiene, H., Puleikiene, K., Finansiniu santykiniu rodikliu taikymas lr akciniu bendroviu finansines – ukines veiklos analizeje, Vadyba – Journal of Management. Nr. 14 (2), 2009. Internet access: http://www.vlvk.lt/private/Vadybos%20turiniai/Vadyba_2(14).pdf. [Access on 26.05.2012].
15. Schlittgen R., Einfuhrung in die Statistik. Analyse und Modellierung von Daten. 7 Auflage, R. Oldenburger Verlag Munchen Wien, 1997, p. 420.
16. Stankeviciene J., Methods for valuation of restructuring impact on financial results of a company, Economics and Management, 17 (4) ISSN 2029-9338 (ONLINE) ISSN 1822-6515 (CD-ROM), 2012, p. 1290.
17. Tidd J., Bessant J., Pavitt K., Managing Innovation: Integrating, Market and Organizational Change. 2005, p. 349 - 362.
18. Tronconi C., Marzetti G.V., Organization capital and firm performance. Empirical evidence for European firms. Economics Letters 112 (2011). p. 141-143.
19. Wood, J. S., Interactions of corporate financing and investment decisions: The financing present value (FPV) approach to evaluating investment projects that change capital structure, Managerial Finance, 30 (2), 2004, p. 16-37.
20. Wooldridge J.M., A simple method for estimating unconditional heterogeneity distributions in correlated random effects models. Economics Letters 113 (2011). p. 12-15.
21. Wojcik K., Method of evaluation of restructuring processes in an automobile corporation, Warsaw University of Technology, Warsaw 2014, p. 7, 97-98, 102-106, 136-137.