FINANCE (ACCOUNTING)

DETERMINANTS OF RETURN OF EQUITY: EVIDENCE FROM NASDAQ 100

Davit Kharatyan
Instituto Politécnico de Bragança; National Polytechnic University of Armenia.
e-mail: davidkharatyan94@yahoo.com
Tel. 00.374.55.775.543

José Carlos Lopes
Instituto Politécnico de Bragança
Campus de Santa Apolonia - Apartado 1134; Código Postal: 5301 854 Bragança
e-mail: jlopes@ipb.pt
Tel. 00.351.273.303.108

Alcina Nunes
Instituto Politécnico de Bragança
Campus de Santa Apolonia - Apartado 1134; Código Postal: 5301 854 Bragança
e-mail: alcina@ipb.pt
Tel. 00.351.273.303.108

ABSTRACT
This study aims to investigate factors that may affect return on equity (ROE). Firms with higher ROE typically have competitive advantages over their competitors which translates into superior returns for investors. Therefore, it is imperative to study the drivers of ROE, particularly ratios and indicators that may have considerable impact. The analysis is done on a sample of 90 largest non-financial companies which are components of NASDAQ-100 index and also on industry sector samples. The ordinary least squares method is used to find the most impactful drivers of ROE. The extended DuPont model's components are considered as the primary factors affecting ROE. In addition, other ratios and indicators such as price to earnings, price to book and current are also incorporated. According to our findings, the most relevant ratios that determine ROE are tax burden, interest burden, operating margin, asset turnover and financial leverage (extended DuPont components) regardless of industry sectors.
KEYWORDS: return on equity, ratio analysis, DuPont model, return on equity ratios/indicators

1. INTRODUCTION

The aim of this study is to analyze and explain factors (ratios and indicators) which are believed to have a significant impact on return on equity (ROE). The main goal of a company is the generation of profit and maximization of shareholders' equity. Glancing at corporate finance textbooks and literature ample information is found on shareholder wealth maximization being the primary goal of corporations. (Brealey & Myers, 2000), Brigham & Ehrhardt, 2011 and many others argue that maximizing the market value of a firm offers the most essential objective function which is necessary for the efficient management of a firm. Thus, the importance of return on equity as a profitability indicator becomes evident taking into account the fact that it measures how effectively the management generates wealth for shareholders. However, thorough analysis of profitability (return on equity) is a demanding and complicated process. Padake & Soni, 2015 and Herciu, Ogrean, & Belascu, 2011 along with other studies have identified that an absolute profitability measure doesn't provide reliable results and only by grouping several profitability ratios it is possible to achieve meaningful outcomes.

DuPont model clarifies this issue as it presents ROE as a profitability measure and gives information about the drivers of ROE. With DuPont model the main issue of absolute profitability is resolved as the latter simply reflects capital not how well company's assets are utilized. DuPont model is a widely used gauge of profitability which links several factors to ROE. Liesz & Maranville, 2011 have found that extended DuPont formula adds more to ratio analysis and through decomposition links ROE to many ratios. Therefore, to gain a deeper understanding of the drivers of ROE "Really" modified DuPont model's components are used in this study.

In addition to DuPont components other indicators of market and financial profitability such as price-to-earnings, current and book-to-market ratios are incorporated into the analysis. These ratios are believed to have relevant impact on return on equity. Therefore, is it important to find out what ratios/indicators determine the return on equity. To achieve this objective, the OLS (ordinary least squares regression) analysis is not only applied to the components (90 companies) of Nasdaq-100 index but also its industry sectors to find out which ratios/indicators have greater explanatory power regarding return on equity. Two models are used for the empirical analysis. The first model uses original units of measure. Whereas, the second model uses logarithmic values. The OLS regression analysis is firstly applied on all companies (global sample). Then, the OLS regression analysis is also conducted on industry sectors, namely technology sector, consumer sector and other sector (residual sector) to find evidence on how different industry characteristics influence the ROE.

2. **FINANCIAL RATIO ANALYSIS**

A ratio expresses a mathematical relationship between two quantities Babalola & Abiola (2013). Financial ratios are used to compare various figures from financial statements in order to gain information about company's overall performance. While computation of a ratio is a simple arithmetic operation, its interpretation is more complex Babalola et al., (2013). In this respect, it is the interpretation rather than the calculation that makes financial ratios a useful tool for market participants. Ratio analysis is defined as systematic use of ratios to interpret the financial statements so that the strengths and weaknesses of a firm as well as its historical performance and current financial position can be determined Sahu & Charan (2013). Information required for ratio analysis is derived from financial statements and some ratios often link accounts from different financial statements such as balance sheet and income statement. Financial ratios can be interpreted as hints, indicators or red flags concerning notable associations between variables used to assess the company's performance. Some of the most important questions to be answered are whether all resources were used effectively, whether the profitability of the business met or even exceeded expectations, and whether financing choices were made prudently. Shareholder value creation ultimately requires positive results in all these areas which will bring about favorable cash flow patterns exceeding the company's cost of capital Helfert (2001). Financial ratio analysis can be used in two different but equally useful ways. It can be used to explore current state of the company in comparison to its past performance, in other words, it tracks financial performance over time. Comparing current performance to past performance is very useful as it enables a manager to identify issues that need fixing. Moreover, a manager can discover potential problems that can be avoided. By making trend-analysis which compares a specific ratio over years it is possible to evaluate how is company performing over time and whether it has improved its financial performance or not. In trend-analysis a ratio serves as a red flag for worrying problems or a benchmark for performance measurement. Firm performance can be also measured by making comparative analysis. A ratio can be compared with industry average to find out whether a firm is lagging in performance or doing well. Financial ratio analysis can be used both by internal and external parties. External users can be creditors, security analysts, potential investors, competitors and others. Internal users such as managers use ratio analysis to monitor company's performance and to assess its strengths and weaknesses.

Before undertaking any task, it is critical to define following elements:

- The viewpoint taken;
- The objectives of the analysis;
- The potential standards of comparison. Helfert (2001)

Ratio analysis is meaningful when the viewpoint taken and objectives of the analysis are clearly defined. Obviously, there should be consensus between the viewpoint taken and the objective of the analysis. While conducting ratio analysis a market participant should find out if there are similar companies in the same industry or if the industry average is available. Ratio analysis is only meaningful when it is compared to some benchmark. Different industries have various characteristics and a ratio may vary from industry to industry to a significant degree. Therefore, it is crucial to have a benchmark of comparison. Along with apparent benefits of ratio analysis there are some major precautions that every market participant should exercise when making ratio analysis.

- Ratios should be used in appointed combinations
- Ratio analysis should be used in industry context as different industries have different characteristics.
- Ratios need to be compared to industry norms to gain an understanding if a specific company is doing well in the industry or falling behind compared to its peers.
- Huge companies may have different lines of businesses which can cause bias in aggregate financial ratios.
- Due to different accounting standards some ratios could be contorted as a result of differences in financial statements.

Ratios are not absolute criteria. They serve best when appointed in combinations to identify changes in financial conditions or overall performance over several years and compared to similar firms or industry average. Assessing a business performance always provides answers that are relative as business and operating conditions are very different from firm to firm and industry to industry. For this reason, industry average serves as an important point of comparison for firms operating in a same industry. Results of trend analysis is particularly difficult to interpret for huge multi-business companies and conglomerates, where information about individual business line is negligible or not available. Accounting adjustments is another complex issue. Companies reporting under different accounting standards have differences in accounts of financial statements. In this respect, comparison of financial ratios becomes very complex when companies report under different accounting standards.

3. THE DUPONT METHOD

The DuPont model was first introduced by F. Donaldson Brown, an electrical engineer by education who joined the giant chemical company's Treasury department in 1914. After few years, DuPont bought 23 percent of the stock of General Motors Corp. and Brown was given the task of cleaning up the car maker's tangled finances. The DuPont model is credited to Brown as he attempted to find a mathematical relationship between two commonly computed ratios, namely net profit margin and total asset turnover. Original DuPont model was firstly used in internal efficiency report in 1912 which was the product of profit margin (a measure of profitability) and asset turnover (a measure of efficiency). The formula of original DuPont model is illustrated below in equation 1.

$$\text{Return on Assets (ROA)} = \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total assets}} = \frac{\text{Net Income}}{\text{Total assets}} \qquad (1)$$

The maximization of ROA was considered a major corporate goal and the realization that ROA was impacted by both profitability and efficiency led to the development of a system of planning and control for all operating decision in a firm, Liesz (2002). In this respect, DuPont analysis was incorporated in many companies as a strong measure of company’s efficiency until 1970s. After 1970s the common corporate goal of ROA maximization shifted to ROE maximization and it led to a major modification of the original DuPont model. Debt financing (leverage) became the third area of interest for financial managers which was added to the original DuPont model as equity multiplier. The modified DuPont model is shown below in equation 2 and 3.

$$\text{Return on Equity (ROE)} = \text{ROA} \times \frac{\text{Total assets}}{\text{shareholder}'\text{equity}} \qquad (2)$$

$$\text{ROE} = \frac{\text{Net profit}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total assets}} \times \frac{\text{Total assets}}{\text{Shareholder}'\text{s equity}} \qquad (3)$$

DuPont analysis not only measures profitability but also explores how the company can yield return even with debt and how it can generate cash and produce more sales with each asset. DuPont analysis links balance sheet to income statement. It helps to spot areas within a company that are stronger or weaker. A top-profit business exists to generate wealth for its owners. ROE is, therefore, arguably the most important of the key ratios, since it indicates the rate at which owner wealth is increasing. It is obvious that DuPont analysis is not an adequate substitute for detailed financial analysis as it has certain drawbacks. However, it is an excellent tool to get a quick overview of company’s strengths and weaknesses. DuPont model covers the following areas: profitability, operating efficiency and leverage.

i. *Profitability: Net Profit Margin*

Profitability ratios compute the degree at which either sales or capital is transformed into profits at different levels of the operation. Gross, operating and net profitability are the most broadly used measures, which describe performance at different activity levels. Net profitability is the most comprehensive since it uses the bottom line net income in its measure. Essentially, NPM (net profit margin) is the percentage of revenue remaining after all operating, interest, taxes and preferred stock dividends have been deducted from a company's total revenue. It is the best measure of profitability since it shows how good a company is at converting revenue into profits available for shareholders.

ii. Asset Utilization: Total Asset Turnover

Turnover or efficiency ratios are of significant important as they indicate how well the assets of a firm are employed to generate sales and/or cash. Although, profitability is important it doesn't always provide the complete picture of how well a company provides a product or service. A company is profitable very often, but not too efficient. Profitability is derived from accounting measures of sales revenue and costs. Matching principle of accounting enables such measures to be generated, which registers revenue when earned and expenses when incurred. In this respect, a disparity may occur between the goods sold and the goods produced during that same period. In fact, goods produced but not sold will appear in financial statements as inventory assets at the end of the year. It is obvious that a firm with unusually large inventory balances is not performing effectively. The main purpose of efficiency ratios is to reveal problems like this that need fixing. The total asset turnover ratio measures the efficiency of asset deployment in generating revenue. The most comprehensive measure of performance in activity category is being employed in the DuPont system (other measures being fixed asset turnover, working capital turnover, inventory and receivables turnover) which clearly are not as informative as net profitability.

iii. Leverage: The Leverage Multiplier

Leverage ratio is the degree to which a company uses debt. Debt financing is both beneficial and costly for a firm. In fact, the cost of raising debt is less than the cost of raising equity. This effect is augmented by the tax deductibility of interest expenses contrary to taxable dividend payments and stock repurchases. In this respect, if earnings of debt are invested in projects which have substantial returns (more than the cost of debt), owners are able to retain the residual and hence, the return on equity is "leveraged up." However, accumulation of debt forms a fixed payment to be made periodically by the firm whether or not it is generating an operating profit. Therefore, if the company is doing poorly those payments may cut into the equity base. Furthermore, the risk of the equity position is enhanced by the presence of debt holders having a greater claim to the assets of the firm. The leverage multiplier employed in the DuPont ratio is explicitly related to the proportion of debt in the firm's capital structure.
Yet another modification was introduced by Hawawini & Viallet (1999) to the DuPont model. The "really" modified DuPont model consists of five ratios that combine to form the ROE.

The "really" modified DuPont model is shown below in equation 4 and 5

$$\frac{Net\ Income}{Avg.\ shareholders'\ equity} = \frac{\text{Net income}}{\text{EBIT}} \times \frac{EBT}{\text{EBIT}} \times \frac{EBIT}{Revenue} \times \frac{Revenue}{Avg.\ total\ assets} \times \frac{Avg.\ total\ assets}{Avg.\ shareholders'\ equity} \qquad (4)$$

Where:
EBIT- earnings before interest and taxes
EBT- earnings before taxes

$$ROE = Tax\ burden \times Interest\ burden \times EBIT\ margin \times Total\ asset\ turnover \times Leverage \qquad (5)$$

This "really" modified model still maintains the importance of the impact of operating decisions (i.e. profitability and efficiency) and financing decisions (leverage) upon ROE, but uses a total of five ratios to uncover what drives ROE and give insight to how to improve this important ratio Liesz (2002).
The first item on the right-hand side of equation 5 is called Tax burden which measures the effect of taxes on ROE. It measures how much of company's pretax profit is kept. The second item is called interest burden

which measures the effect of interest on ROE. Higher borrowing costs result in lower ROE. The third item measures the impact of operating profitability on ROE. The fourth item is the asset turnover which measures how effectively the company utilizes its assets to generate revenue. The fifth item is financial leverage which is the total amount of company's assets relative to its equity capital. The decomposition is a useful tool for market participants as it expresses a company's ROE as a function of its tax rate, interest burden, operating profitability, efficiency and leverage. Modified DuPont model can be used by market participants to determine what factors are driving company's ROE.

In conjunction with extended DuPont components additional ratios which are outside of the scope of DuPont model are incorporated in this study. P/E ratio is included in this study as a measure of share value. P/E ratio shows whether company's stock is properly valued. Next ratio we wanted to add in this study is the current ratio. Essentially, current ratio measures a company's ability to pay its short-term liabilities. It expresses current assets in relation to current liabilities. Higher ratio indicates a greater ability to meet short-term obligations. It is useful in terms of providing information about company's liquidity. Finally, the book-to-market ratio is included in the analysis as a measure of a company's value. B/M ratio is the ratio of the market value of equity to the book value of equity.

3. **Literature review**

There is significant and expanding literature on the use of ratios/indicators and the DuPont model. The literature mainly focuses on the viability and effectiveness of DuPont model as a gauge of overall firm profitability. However, there is very little research and evidence concerning to the factors affecting ROE. According to Liesz et al., (2011) to perform DuPont analysis few simple calculations are required. They justified that these calculations lead to meaningful results for small businesses. The authors stress the idea that even with the original model it is possible to get valuable insights in return, however, extended modified DuPont analysis clarifies relatively complex financial analysis and gives managers the ability to effectively conduct strategic and financial planning. Liesz (2002) examines the extended modified DuPont model as a simple tool which can be used by managers, small business owners and other market participants. The author claims that the model simplifies complicated financial analysis and is an effective tool to identify how the DuPont components affect ROE. Saleem & Rehman (2011) examine the relationship between liquidity and profitability of oil and gas companies of Pakistan. Their results show that there is a significant impact of only liquid ratio on return on assets (ROA) while insignificant on ROE and return on investment (ROI). The authors also find that ROE is not significantly affected by three ratios current ratio, quick ratio and liquid ratio, whereas, ROI is greatly affected by current ratio, quick ratio and liquid ratio. Taani & Banykhaled (2011) examine the relationship between profitability and cash flows. Regression analysis is applied to find out how different factors affect earnings per share (EPS) for 40 companies listed on the Amman stock market. The authors conclude that return on equity, debt to equity, price to book value, cash flow from operating activities and leverage ratios have a significant impact on EPS. Roaston P & Roaston A (2012) analyze the impact of five financial and seven market indicator on financial and market performances of eighty-six companies. The authors conclude that according to root mean square error (RMSE) criteria price-to-earnings ratio is a better indicator of financial performance of companies than other indicators. Herciu et al., (2011) perform DuPont analysis on twenty most profitable companies in the world. The authors stress that company's profitability as an absolute measure is not an effective measure for investors as it provides an overview of company's activity without giving details about the company's management of dividend, debt, liabilities and other indicators. With the help of profitability ratios like return on sale, return on assets and return on equity the authors demonstrate that those absolute measurements are not reliable most of the time and only by relating them to other indicators that clarify the relationship between effect and effort it is possible to achieve meaningful results. Padake et al., (2015) analyze the efficiency of top twelve banks in India through DuPont analysis. The authors claim that DuPont analysis provides a much deeper understanding of a firm's efficiency. They conclude that judging a performance of a bank solely by profit or one ratio is not accurate as the banks which made more profit were not more efficient than the others. Thus, profit is reflection of a capital, but not how well a firm utilizes its assets. Burja & Marginean (2014) analyze the impact of DuPont components on ROE and asset turnover. The analysis is conducted on five largest Romanian companies of furniture industry for a 13-year horizon. The authors conclude that ROE is positively correlated with return on sales, return on assets and negatively correlated with equity multiplier. Katchova & Enlow (2013) use DuPont model to compare ROE components of agribusiness companies. They conclude that asset turnover has the most impact on ROE indicating higher operating efficiency of agribusinesses. Delen, Kuzey & Uyar (2013) use factor analysis to find out the underlying dimensions of financial ratios followed by predictive modeling methods to discover associations between financial ratios and firm performance. The authors conclude that ROE is largely affected by earnings before tax-to-equity, net profit margin, leverage and sales growth ratios. Penman (1991) tries to evaluate the role of accounting rate of return (ROE) in assessing cross sectional differences in prices and returns. Their findings assert that ROE is better interpreted as a profitability measure rather than a risk measure. Furthermore, they conclude that ROE is not sufficient for distinguishing future profitability, therefore, it's not a satisfactory summary measure for financial statement analysis.

The literature on DuPont model stresses the idea that financial ratios individually indicate incomplete information of a firm. Incorporating the DuPont model to some extent solves this problem as it links ROE to important areas of firm operations. Therefore, ROE as a measure of profitability is decomposed providing information about the factors that affect ROE. Thus, by observing changes in those factors it is possible to find out which of them affect the ROE most. However, as shown above some studies have also identified other ratios that are not covered by DuPont model and have a strong link to profitability (ROE). In this respect, this study incorporates not only the components of extended DuPont model but also additional ratios and indicators which are deemed important by previous research.

4. Data and sample

In order to achieve the main goal of this study, data was collected for the firms that compose the Nasdaq-100 index. The Nasdaq-100 index includes 106 of the largest domestic and international non-financial companies listed on the Nasdaq Stock Market based on market capitalization[1]. All the data concerning financial ratios and indicators used in this research study were obtained from Bloomberg database on the 23th of February, 2016. The data refers to the business year of 2015, and therefore is a cross sectional database (all the variables are measured at the same moment in time).

The data consists of nine variables, namely: return on equity, tax burden, interest burden, operating margin, asset turnover, financial leverage, price-to-earnings, book-to-market and current ratios. However, some ratios for some companies were not available at the date of information retrieval. Additionally, some outlier values which may bias the results were observed in the database. Therefore, to avoid problems associated with the missing values, 16 observations were excluded from the original research sample. Thus, the final sample available for this study consists of 90 companies.

Table 1. Description of dependent and independent variables and the expected relation between them

Variable	Abbrevation	Description	Ratio	Unit of measure	Type of association
Return on equity	ROE	Amount of income returned as a percentage of shareholders equity	$ROE = \frac{Net\ income\ available\ for\ common\ shareholders}{average\ total\ common\ equity} \times 100\%$	%	n/a
Tax burden	TB	The proportion of the company's profits retained after paying income taxes	$TB = \frac{Net\ income\ available\ for\ common\ shareholders}{Pre-tax\ income} \times 100\%$	%	+
Interest burden	IB	Measures the effect on interest on ROE	$IB = \frac{Pre-tax\ income}{Operating\ income\ (loss)} \times 100\%$	%	+
Operating margin	OM	Measures how much is lefot of revenue cosidering cost of goods sold and operating expenses	$OM = \frac{Operating\ income}{Net\ sales} \times 100\%$	%	+
Asset turnover	AT	Measures the efficiency of a company's use of its assets in generating sales revenue	$AT = \frac{Net\ sales}{Average\ total\ assets}$	€	+
Financial leverage	FL	Is the use of borroewed capital to increase potential return of an investment	$FL = \frac{Average\ total\ assets}{Averahe\ total\ common\ equity}$	€	(+) / (-)
Price-to-earnings	PE	Measures a company's current share price relative to its per-share earnings	$\mathrm{PE} = \frac{Last\ price}{Earnings\ per\ share}$	€	-
Price-to-book	PB	Compares a stock's market value to its book value	$\mathrm{PB} = \frac{Last\ price}{Book\ value\ per\ share}$	€	+
Current ratio	CUR	Measures a company's ability to cover its short-terrm liabilities with its current assets	$CUR = \frac{Current\ assets}{Current\ liabilities}$	€	+

Note: The ratios are acquired from Bloomberg database and were used to calculate the variables in study. The notation n.a. means that is an expected relation is not applicable. ROE is the dependent variable

Source: Author's calculations using Bloomberg data retrieved on 23.02.2016

[1] http://www.nasdaq.com/markets/indices/nasdaq-100.aspx

Table 1 depicts the variables used in the study, the abbreviation of their full name, their complete definitions as well as their units of measure and ratios that were used to calculate the variables. The expected relation between each independent variable and the dependent variable (ROE) is also depicted in the table. The (+) and (-) notations are used to explain the type of relationship between each independent variable and the dependent one. The (+) notation indicates a positive relationship with the independent variable, or in other words, a variation in the dependent variable in question influences positively the return on equity. In contrast, the (-) notation indicates the existence of a negative relationship between the selected independent variable and the variable that is being explained, this is, if the dependent variable varies the return on equity will vary in the opposite direction. The (+) notation means that variations in the dependent variable are expected to change the return on equity in the same direction. Whereas, the (-) notation implies that variations in the independent variable are expected to alter the return on equity in an opposite direction. The unit of measure of the variables is either euro amounts or percentages. Formulas depicted in Table 1can differ from other sources as different databases use different formulas to calculate indicators. The ratios from table 1 are acquired from the Bloomberg database and were used to calculate the independent variables/indicators.

5. Methodology and data treatment

With respect to methodology of inferential data analysis, the Ordinary Least Squares (OLS) regression method is used in this study to both identify the most relevant indicators that explain the changes on return on equity and to quantify the relation between each indicator and the return on equity. In other words, the OLS regression method is applied to find out which variables have the most explanatory power or variations occurring in return on equity quantifying that explanatory power.

The OLS procedure is the simplest type of estimation procedure used in statistical empirical analyses and therefore is one of the most frequently used methods concerning analysis of economic nature. (Wooldridge, 2012). Under certain assumptions (some that are important to guarantee the possibility of model estimation and the unbiased and trustworthy results and others that guarantee the quality of such results), the method of ordinary least squares has some very attractive statistical properties that have made it one of the most powerful and popular methods of regression analysis (Gujarati, 2010).

The assumptions that are important to guarantee the model estimation and to achieve unbiased results in this particular empirical cross sectional study are the following ones: (1) the model must be linear in the parameters; (2) the data are a random sample of the population, i.e., residuals are statistically independent/uncorrelated from each other; (3) the independent variables are not too strongly collinear; and, (4) the independent variables are measured precisely such that measurement error is negligible. Assumption (1) is verified, the estimations which results will be presented in the next section are linear in the parameters. Assumption (2) is called homoscedasticity and is difficult to guarantee in cross sectional databases. The violation of such assumption makes the results of the OLS estimator biased and inconsistent. Consequently, the estimates will be inefficient and the OLS will give incorrect estimates of the parameter standard errors (Verbeek, 2008). To avoid this situation, the OLS is estimated using robust standard errors that ensure the residuals are independent of each other. Assumption (3) requires that the independent variables are not too strongly collinear. This is important because the problem of multicollinearity is an issue often raised in multiple regressions (regressions with more than one independent variable), since it prohibits accurate statistical inference. This condition occurs when there are near-linear relationships between the independent variables. To verify the validity of the hypothesis the Variance Inflation Factor (VIF) is calculated and presented – this indicator shows whether the variables are strongly collinear. If a VIF value is bigger than 10 there is strong collinearity between the variables.

Another problem that may arise when a multiple regression model is estimated is the existence of a misspecification of the model (a wrong specification of the model that may not properly represents the relationship between dependent and independent variables or the existence of omitted variables. Both may be causes for the occurrence of this problem). The Regression Specification Error Test or RESET test of Ramsey (1969), that became a standard test in applied research, tests the null hypothesis of the that the model is correctly specified. The test follows an F distribution - when the F-statistics is bigger than the critical value at a given significance level the null hypothesis of correct specification is rejected and, therefore, there is a functional form misspecification or omitted variables (Godfrey, 1991).

6. EMPIRICAL RESULTS OF GLOBAL SAMPLE

To have a clear understanding about the indicators' distributions of values the descriptive statistics are presented and discussed. Indicators of central tendency, variability and shape are presented in Table 2. Arithmetic mean is the indicator of central tendency, whereas the indicators of variability or dispersion around the mean are the minimum and maximum values in the sample, the range[2] (the difference between the minimum and maximum values of the distribution), the standard deviation and coefficient of variation[3] (that gives the standard deviation in percentage values). The shape indicators are the skewness and kurtosis. Skewness is a measure of asymmetry around the variable's mean. Whereas, kurtosis measures how tall and sharp the central peak is relative to normal distribution.

The variables return on equity, interest burden, operating margin and price to earnings ratios are characterized by large deviations around their respective means. Due to this, the coefficient of variation, as well as range, present high values for these variables indicating a high degree of dispersion around their respective means. Moreover, those variables have also high skewness values meaning that their respective distributions are asymmetric. Return on equity and price to earnings are skewed to right as skewness values are positive meaning that most of the companies in the sample present values nearest to the minimum. Whereas, interest burden and operating margin are skewed to left as skewness values are negative meaning that most of the companies in the sample present values nearest to the maximum.

The second group of variables tax burden, asset turnover, financial leverage, price to book and current ratios have relatively low dispersion around their respective means indicated by lower values of their respective coefficient of variations and ranges compared with the first group. Kurtosis values of the second group are relatively lower compared to the first group of variables meaning that the distribution of variables of the former are less peaked (more dispersed) than the distributions of variables of the latter.
To sum up, return on equity, interest burden, operating margin and price to earnings variables are characterized by a significant degree of dispersion around their respective means compared to tax burden, asset turnover, financial leverage, price to book and current ratios as shown above by coefficient of variation, skewness and kurtosis values.

Table 2. Statistical distribution of variables' values for the complete set of firms in the global sample

Variable	Obs	Mean	Minimum	Maximum	Range	Standard Deviation	Coeficient of variation	Skewness	Kurtosis
ROE	90	22,29	-35,84	198,80	234,64	24,96	1,12	4,33	30,50
TB	90	74,99	13,97	164,90	150,92	19,22	0,26	0,58	8,24
IB	90	73,16	-1932,57	324,78	2257,35	216,24	2,96	-8,99	84,13
OM	90	18,65	-95,58	68,00	163,57	17,67	0,95	-2,84	21,54
AT	90	0,79	0,09	3,55	3,46	0,61	0,78	2,23	8,38
FL	90	2,57	1,11	11,97	10,86	1,59	0,62	3,44	18,48
PE	90	37,21	4,58	453,04	448,46	59,84	1,61	5,44	34,60
PB	90	5,61	1,03	40,30	39,28	5,18	0,92	3,91	24,35
CUR	90	2,41	0,14	11,25	11,10	1,77	0,74	2,20	10,02

Note: All the values are presented in the same unit of measurment of the variables with the exception of the coefficient of variation that is presented in %

Source: Author's calculations using Bloomberg data retrieved on 23.02.2016

The OLS method is applied to identify and quantify which of the selected variables determine changes in the return on equity of the 90 companies of Nasdaq-100 NDX index selected for analysis. It allows also to verify the possible relation between each independent variable and the dependent variable – ROE.
Some variables are presented in percentage terms while others are presented in monetary units (€) which makes the comparison of each variable's impact on ROE difficult. For an obvious reason it is necessary to present them in a same unit of measure to simplify the comparison of results. Additionally, the descriptive statistical analysis showed that some variables exhibit high values of range (the distance between their minimum and maximum values were big). Therefore, the linear functional form of the model is transformed into a logarithmic functional form – all the variables will be used in their logarithmic format. Logarithmic values are known to decrease the degree of dispersion of a variable's values. Second, the transformation

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[2] $Range = Maximum\ value - Minimum\ value$
[3] $Coefficient\ of\ variation = Mean/\ Standard\ deviation * 100$

allows to analyze all the coefficients in percentage values. Thus, a second model using the same variables is estimated – the only difference between the first and the second model is that the former uses the values with original units of measure, whereas, the latter uses logarithmic values.

Table 3 presents the results of OLS regression analysis of global sample. As shown in Table 3, logarithmic values present better results as indicated by, for example, a higher R-squared value. Moreover, the regression analysis with original values presents a Ramsey values statistically significant which indicates the existence of omitted variables, that is, more variables should be added to the model to make the analysis more accurate. The model presents a R-squared equal to 0,6786 for original values which means that almost 68% of the variation in the return on equity are explained by the variations that happen in the eight variables presented in the model. However, the results of regression analysis for logarithmic values indicate a much higher R-squared value - 93% of the variation in the return on equity is explained by changes in independent variables. For variables presented with their original measures and in logarithmic values, the remaining 38% and 7%, respectively, of the ROE variations are explained by the error term, that is, by factors like omitted variables, measurement errors or others that could not be included in the model.

Table 3. Results of the OLS regression analysis of global sample, using original measurement units and logarithmic values.

	Model 1: Normal values					Model 2: Logarithmic values				
Variables	Estimated coefficient	Standard Robust Error	p-value		VIF	Estimated coefficient	Standard Robust Error	p-value		VIF
TB	0.44	0.154	0.005	***	1.24	0.94	0.034	0.000	***	1.47
IB	0.00	0.004	0.659		1.04	0.95	0.044	0.000	***	1.54
OM	0.59	0.273	0.033	**	1.32	0.89	0.047	0.000	***	4.32
AT	11.23	3.585	0.002	***	1.17	0.90	0.056	0.000	***	4.13
FL	9.02	3.047	0.004	***	1.41	0.89	0.064	0.000	***	3.59
PE	-0.06	0.030	0.040	**	1.55	-0.10	0.047	0.037	**	4.35
PB	0.63	0.207	0.003	***	1.37	0.14	0.066	0.042	**	4.24
CUR	1.83	1.249	0.147		1.31	-0.03	0.019	0.132		1.92
Constant	-59.43	19.489	0.003	***		-8.24	0.484	0.000	***	
	N=90					N=87				
	R-squared= 0.6786					R-squared= 0.9930				
	F-test (8, 81) = 5.55 ***					F-test (8, 78) = 4364.82 ***				
	Root MSE = 14.831					Root MSE = 0.06895				
	Ramsey test: F (3, 75) = 51.19 ***					Ramsey test: F (3, 75) = 0.44				

Notes: * means that the coefficient presents a 10% level of significance; ** means that the coefficient presents a 5% level of significance; *** means that the coefficient presents a 1% level of significance

Source: Author's calculations using Bloomberg data retrieve on 23.02.2016

The F-test results for both normal and logarithmic values are statistical significant for a significance level of 1% which indicates that the independent variables jointly justify the variation on the return to equity. However, as explained before the Ramsey test indicates the existence of omitted variables if the original values are used. The R-squared and Root MSE values indicate that the results of logarithmic model (model 2) are better.

According to the results of regression analysis with normal values only CUR and IB (current, interest burden) are not statistically significant. The results of regression analysis with logarithmic values indicate that only CUR is not statistically significant. Therefore, a conclusion cannot be withdrawn regarding the influence of these variables on return on equity. All the other six variables for the first model and seven for the second model are statistically significant and present the expected sign between them and the return on equity.
The results of first model point out that asset turnover has a coefficient of 11.23 which means that 1€ change in asset turnover translates into 11.23% change in return on equity. Financial leverage has a value of 9.02 which signifies that 1€ change in financial leverage translates into 9% change return on equity. Nevertheless, the second model presents different results.

According to the results, tax burden, interest burden, operating margin, asset turnover, financial leverage ratios (extended DuPont components) describe changes occurring in return on equity. The coefficients of the second model for TB, IB, OM, AT and FL are 0.94, 0.95, 0.89, 0.90 and 0.89 respectively, which means that 1% change in TB, IB, OM, AT and FL translates into 0.94 %, 0.95 %, 0.89 %, 0.90 % and 0.89 % change in return on equity, respectively. The model asserts that TB, IB, OM, AT and FL (extended DuPont components) are the most powerful drivers of ROE.

7. EMPIRICAL RESULTS OF TECHNOLOGY SAMPLE

Table 4 presents the same indicators of statistical distribution of table 2 for the technology sector sample. The variables can be divided into two groups.

The first group of variables is characterized by high degree of dispersion which consists of return on equity, operating margin, price to earnings, price to book and current indicators given that there are large deviations around their respective means. This can be seen by the high values of coefficient of variations. Moreover, those variables have also high skewness values especially price to book and current ratios meaning that the distribution is asymmetric and skewed to the right. This means that most of the companies in the sample present values nearest to the minimum value. Kurtosis values are positive and high especially price to book indicating more peaked distribution relative to normal distribution.

The second group of variables includes tax burden, interest burden, asset turnover and financial leverage. In contrast to the first group, the second group is characterized by relatively low degree of dispersion given that there are relatively small deviations around their respective means. This is backed by low values of coefficient of variations. Compared to the first group, the second group exhibits lower values of skewness. Tax burden, asset turnover and financial leverage have positive skewness values indicating that most of the companies again present values near to the minimum value.

Table 4. Statistical distribution of variables' values for the Technology sector sample

Variable	Obs	Mean	Minimum	Maximum	Range	Standard Deviation	Coefficient of variation	Skewness	Kurtosis
ROE	32	19.74	6.23	42.71	36.48	9.28	0.47	0.82	2.86
TB	32	81.64	65.50	116.84	51.34	11.86	0.15	0.98	3.77
IB	32	95.29	73.75	109.32	35.57	8.50	0.09	-0.86	3.19
OM	32	22.41	7.10	51.52	44.42	10.63	0.47	0.80	3.40
AT	32	0.64	0.31	1.24	0.93	0.22	0.34	0.69	3.17
FL	32	1.97	1.18	3.61	2.43	0.62	0.31	1.05	3.36
PE	32	24.08	6.53	71.64	65.11	12.30	0.51	1.92	8.31
PB	32	5.44	1.03	40.30	39.28	6.69	1.23	4.60	24.55
CUR	32	2.68	1.00	8.66	7.66	1.55	0.58	2.04	8.35

Note: All the values are presented in the same unit of measurment of the variables with the exception of the coefficient of variation that is presented in %

Source: Author's calculations using Bloomberg data retrieved on 23.02.2016

On the other hand, interest burden has a negative skewness meaning most of the companies present values near to the maximum value. Kurtosis values of the second group are relatively lower compared to the first group of variables meaning that the distribution of variables of the former are less peaked (more dispersed) than the distributions of variables of the latter.

Since Nasdaq-100 NDX includes largest companies in the world, companies operating in the same sector (Technology) have similar size and characteristics. It can be observed that variables are characterized by significantly less dispersion compared to the values of table 3. As the results of descriptive statistics in table 2 are for all companies from various industries, the variables exhibit notable dispersion around their respective means. This can be seen by comparing the coefficient of variations of table 4 and table 2.
The results of OLS regression analysis for technology sample are presented in Table 5.

As shown in Table 5, both models show high R-squared values indicating that variations occurring in the independent variables effectively explain variations occurring in the dependent variable. The first model presents a R-squared equal to 0,8621 for original values and the second model presents higher R-squared value of 0.9847. The results with logarithmic values are better due to higher R-squared value. The F-test results for both normal and logarithmic values are statistically significant for a significance level of 1%. The Root MSE is much lower for regression model using logarithmic values, indicating much higher accuracy compared to the model with normal values.

According to the results of regression analysis with normal values only PE and CUR (price to earnings, current ratio) are not statistically significant. The results of regression analysis with logarithmic values indicate that only CUR is not statistically significant. Therefore, a conclusion cannot be withdrawn regarding the influence of these variables on return on equity. All the other six variables for the first model and seven for the second model are statistically significant and present the expected sign between them and the return on equity.

Table 5. Results of the OLS regression analysis for the technology sector sample, using original measurement units and logarithmic values

	Model 1: Normal values					Model 2: Logarithmic values				
Variables	Estimated coefficient	Standard Robust Error	p-value		VIF	Estimated coefficient	Standard Robust Error	p-value		VIF
TB	0.13	0.066	0.066	*	2	0.98	0.149	0.000	***	2.25
IB	0.21	0.106	0.065	*	2.2	0.54	0.248	0.041	***	2.5
OM	0.67	0.126	0.000	***	1.46	0.87	0.056	0.000	***	2.2
AT	22.22	5.403	0.000	***	1.68	0.87	0.058	0.000	***	3.04
FL	6.95	1.456	0.000	***	1.79	0.71	0.128	0.000	***	3.26
PE	-0.01	0.034	0.723		1.94	-0.13	0.071	0.090	**	4.03
PB	0.39	0.081	0.000	***	1.56	0.20	0.079	0.020	**	4.28
CUR	-0.13	0.680	0.845		1.41	-0.05	0.033	0.180		1.72
Constant	-54.72	13.621	0.001	***		-6.33	1.577	0.001	***	
	n = 32					n=32				
	R-squared = 0.8621					R-squared= 0.9847				
	F-Test (8, 23) = 126.97 ***					F-test (8, 23) = 1009.39 ***				
	Root MSE = 3.9997					Root MSE = 0.06749				
	Ramsey test: F (3, 20) = 0.28					Ramsey test: F (3, 20) = 0.19				

Notes: * means that the coefficient presents a 10% level of significance; ** means that the coefficient presents a 5% level of significance; *** means that the coefficient presents a 1% level of significance

Source: Author's calculations using Bloomberg data retrieved on 23.02.2016

The results of first model point out that asset turnover has a coefficient of 22.22 which means that 1€ change in asset turnover translates into 22.22% change in return on equity. Whereas, financial leverage has a value of 6.95 which signifies that 1€ change in financial leverage translates into 6.95% change in return on equity. Nevertheless, the second model presents different results.

According to the results, tax burden, interest burden, operating margin, asset turnover, financial leverage ratios (extended DuPont components) have the most impact on return on equity. The coefficients of the second model for TB, IB, OM, AT and FL are 0.98, 0.54, 0.87, 0.87 and 0.71 respectively, which means that 1% change in TB, IB, OM, AT and FL translates into 0.98 %, 0.54 %, 0.87 %, 0.87 % and 0.71 % change in return on equity, respectively. The model asserts that TB, IB, OM, AT and FL (extended DuPont components) are the most powerful drivers of ROE.

7. EMPIRICAL RESULTS OF CONSUMER SAMPLE

The indicators of statistical distribution for Consumer sector are presented in table 6. The variables can be divided into two groups.

The first group of variables is characterized by high degree of dispersion which consists of return on equity, operating margin, asset turnover, financial leverage and current ratios given that there are large deviations around their respective means. This can be seen by the high values of coefficient of variations. Moreover, those variables have also high skewness values especially return on equity and financial leverage meaning that most of the companies in the sample present values nearest to the minimum. Kurtosis values are positive and high especially return on equity and financial leverage indicating more peaked distribution relative to normal distribution.

The second group of variables includes tax burden, interest burden, price to earnings and price to book.
In contrast to the first group, the second group is characterized by relatively low degree of dispersion given that there are relatively small deviations around their respective means. This is based on low values of coefficient of variations. Tax burden, price to earnings and price to book have positive skewness values indicating that most of the companies in the sample present values nearest to the minimum. On the other hand, interest burden has a negative skewness meaning that most of the companies in the sample present values nearest to the maximum. Kurtosis values of the second group are relatively lower compared to the first group of variables meaning that the distribution of variables of the former are less peaked (more dispersed) than the distributions of variables of the latter.

Since all the companies operate in Consumer sector, it can be observed that variables are characterized by significantly less dispersion compared to the values of table 2 as was the case for Technology sector. This can be seen by comparing the coefficient of variations of table 6 and table 2.

Table 6. Statistical distribution of variables' values for the Consumer sector sample

Variable	Obs	Mean	Minimum	Maximum	Range	Stdandard Deviation	Coefficient of variation	Skewness	Kurtosis
ROE	34	29.00	-35.84	198.80	234.64	37.12	1.28	3.04	14.62
TB	34	73.41	28.98	164.90	135.91	22.66	0.31	1.68	9.43
IB	34	93.90	42.70	154.03	111.33	18.45	0.20	-0.11	6.47
OM	34	18.39	-28.56	68.00	96.55	15.90	0.86	0.34	5.89
AT	34	1.11	0.22	3.55	3.34	0.85	0.76	1.10	3.48
FL	34	2.79	1.15	11.97	10.82	1.91	0.68	3.49	17.12
PE	34	28.69	4.58	72.15	67.58	14.69	0.51	0.89	3.83
PB	34	6.01	1.61	14.31	12.70	3.74	0.62	0.88	2.61
CUR	34	2.15	0.14	6.97	6.82	1.54	0.71	1.21	4.10

Note: All the values are presented in the same unit of measurment of the variables with the exception of the coefficient of variation that is presented in %

Source: Author's calculations using Bloomberg data retrieved on 23.02.2016

The results of OLS regression analysis for consumer sector sample are presented in Table 7. As shown in Table 7, both models show high R-squared values indicating that variations occurring in the independent variables effectively explain variations occurring in the dependent variable. The first model presents a R-squared equal to 0,9022 for original values and the second model presents higher R-squared value of 0.9934. Obviously, second model with logarithmic values is better due to higher R-squared value. The F-test results for both normal and logarithmic values are statistically significant for a significance level of 1%. The Root MSE is much lower for regression model using logarithmic values, indicating much higher accuracy compared to the model with normal values.

It is noteworthy that the regression analysis with original values presents a Ramsey values statistically significant which indicates the existence of omitted variables, that is, that more variables should be added to the model to make the analysis more accurate.

According to the results of regression analysis with normal values TB, IB, PE, PB, CUR (tax burden, interest burden, price to earnings, price to book and current) are not statistically significant. The results of regression analysis with logarithmic values indicate that PE, PB, CUR are not statistically significant. Therefore, a conclusion cannot be withdrawn regarding the influence of these variables on return on equity. OM, AT and FL (DuPont components) variables for the first model and TB, IB, OM, AT, FL (extended DuPont components) for the second model are statistically significant and present the expected sign between them and the return on equity.

The results of first model point out that operating margin has a coefficient of 1.47 which means that 1% change in operating margin results in 1.47% change in return on equity. Asset turnover has a coefficient of 18.48 which means that 1€ change in asset turnover translates into 18.48% change in return on equity. Financial leverage has a value of 14.96 which signifies that 1€ change in financial leverage translates into 14.96% change in return on equity. Nevertheless, the second model presents different results.

According to the results, tax burden, interest burden, operating margin, asset turnover, financial leverage ratios (extended DuPont components) significantly affect return on equity. The coefficients of the second model for TB, IB, OM, AT and FL are 0.91, 1.05, 0.87, 0.88 and 0.93 respectively, which means that 1% change in TB, IB, OM and 1€ change in AT and FL translates into 0.91 %, 1.05 %, 0.87 %, 0.88 % and 0.93 % change in return on equity, respectively. The model asserts that TB, IB, OM, AT and FL (extended DuPont components) are the most powerful drivers of ROE which was the case both in global and technology samples.

Table 7. Results of the OLS regression analysis for the consumer sector sample, using original measurement units and logarithmic values.

	Model 1: Normal values					Model 2: Logarithmic values				
Variables	Estimated coefficient	Standard Robust Error	p-value		VIF	Estimated coefficient	Standard Robust Error	p-value		VIF
TB	0.25	0.185	0.193		2.71	0.91	0.079	0.000	***	1.89
IB	0.07	0.124	0.555		1.28	1.05	0.064	0.000	***	1.63
OM	1.47	0.221	0.000	***	2.28	0.87	0.079	0.000	***	7.3
AT	18.48	6.268	0.007	***	1.91	0.88	0.094	0.000	***	9.01
FL	14.96	2.876	0.000	***	2.77	0.93	0.057	0.000	***	6.28
PE	0.00	0.284	0.990		2.75	-0.12	0.081	0.149		6.25
PB	0.09	1.086	0.936		2.05	0.12	0.092	0.196		6.78
CUR	0.54	1.863	0.775		1.79	-0.01	0.015	0.538		1.87
Constant	-86.91	25.759	0.002	***		-8.45	0.749	0.000	***	
	n = 34					n=33				
	R-squared = 0.9022					R-squared= 0.9934				
	F-Test (8, 25) = 25.48 ***					F-test (8, 24) = 1082.18 ***				
	Root MSE = 13.339					Root MSE = 0.0805				
	Ramsey test: F (3, 22) = 98.97***					Ramsey test: F (3, 21) = 1.82				

Notes: * means that the coefficient presents a 10% level of significance; ** means that the coefficient presents a 5% level of significance; *** means that the coefficient presents a 1% level of significance

Source: Author's calculations using Bloomberg data retrieved on 23.02.2016

7. EMPIRICAL RESULTS OF OTHER (RESIDUAL) SAMPLE

The indicators of statistical distribution for other sector are presented in table 8. Table 8 consists of 24 observations regarding companies from different sectors, excluding technology and consumer sectors which are gathered in a residual sector named "other sectors". Since the observations are from different sectors, it can be observed that there are some major differences between the values of table 6 and table 4, table 2. The degree of dispersion is similar to Technology and Consumer sector. However, tax burden, interest burden and operating margin have negative values indicating that most of the companies in the sample present values nearest to the minimum which was not the case in Technology and Consumer sectors as only interest burden had a negative skewness value. Kurtosis values are much higher in other sectors compared to consumer and technology sectors except return on equity and tax burden meaning that the distribution of variables of the former are less peaked (more dispersed) than the distributions of variables of the latter. These differences are obvious as grouping of companies from different sectors results in scattered values due to different characteristics present in different industries.

Table 8. Statistical distribution of variables' values for the other sector sample.

Variable	Obs	Mean	Minimum	Maximum	Range	Standard Deviation	Coefficient of variation	Skewness	Kurtosis
ROE	24	16.18	-12.86	53.08	65.94	14.25	0.88	1.01	4.68
TB	24	68.38	13.97	97.63	83.66	19.81	0.29	-0.85	3.52
IB	24	14.29	-1932.57	324.78	2257.35	418.83	29.30	-4.43	21.20
OM	24	14.00	-95.58	35.33	130.91	25.51	1.82	-3.43	15.51
AT	24	0.53	0.09	1.78	1.69	0.31	0.59	2.72	12.43
FL	24	3.08	1.11	9.44	8.32	1.79	0.58	2.08	7.85
PE	24	66.77	7.50	453.04	445.54	109.92	1.65	2.61	8.80
PB	24	5.28	1.11	19.82	18.71	4.79	0.91	2.11	6.79
CUR	24	2.40	0.25	11.25	11.00	2.31	0.96	2.57	10.20

Note: All the values are presented in the same unit of measurment of the variables with the exception of the coefficient of variation that is presented in %

Source: Author's calculations using Bloomberg data retrieved on 23.02.2016

The results of OLS regression analysis for other sample are presented in Table 9. As shown in Table 9, both models show high R-squared values indicating that variations occurring in the independent variables effectively explain variations occurring in the dependent variable.

The first model presents a R-squared equal to 0,6204 for original values and the second model presents higher R-squared value of 0.9998. Obviously, the second model with logarithmic values is better due to higher R-squared value.

Table 9. Results of the OLS regression analysis for the other sector sample, using original measurement units and logarithmic values

	Model 1: Normal values				Model 2: Logarithmic values				
Variables	Estimated coefficient	Standard Robust Error	p-value	VIF	Estimated coefficient	Standard Robust Error	p-value		VIF
TB	0.23	0.193	0.261	2.52	1.00	0.009	0.000	***	2.84
IB	0.00	0.007	0.691	1.7	1.01	0.008	0.000	***	2.51
OM	0.12	0.206	0.584	4.81	1.02	0.015	0.000	***	11.1
AT	7.00	10.615	0.520	3.93	1.00	0.015	0.000	***	6.90
FL	2.28	3.103	0.475	2.48	1.02	0.020	0.000	***	8.32
PE	-0.10	0.095	0.302	14.91	0.01	0.009	0.267		13.66
PB	1.26	2.308	0.592	14.6	0.00	0.013	0.922		9.90
CUR	-0.24	0.929	0.803	1.67	0.00	0.007	0.985		4.72
Constant	-10.92	20.171	0.596		-9.39	0.121	0.000	***	
	n = 24				n=22				
	R-squared = 0.6204				R-squared= 0.9998				
	F-Test (8, 15) = 11.64 ***				F-test (8, 13) = 49663.91 ***				
	Root MSE = 10.868				Root MSE = 0.0165				
	Ramsey test: F (3, 12) = 5.32**				Ramsey test: F (3, 21) = 2.13				

Source: Author's calculations using Bloomberg data retrieved on 23.02.2016

The F-test results for both normal and logarithmic values are statistically significant for a significance level of 1%. The Root MSE is much lower for regression model using logarithmic values, indicating much higher accuracy compared to the model with normal values. However, there is a problem regarding the VIF values in some variables. Therefore, the results of other sector should be considered with caution.
Moreover, the regression analysis with original values presents a Ramsey values statistically significant which indicates the existence of omitted variables, that is, that more variables should be added to the model to make the analysis more accurate.

According to the results of regression analysis with normal values none of the variables are statistically significant. A conclusion cannot be withdrawn regarding the influence of these variables on return on equity. TB, IB, OM, AT, FL (extended DuPont components) for the second model are statistically significant and present the expected sign between them and the return on equity. According to the results, tax burden, interest burden, operating margin, asset turnover and financial leverage ratios (extended DuPont components) significantly affect return on equity.

The coefficients of the second model for TB, IB, OM, AT and FL are 1, 1.01, 1.02, 1 and 1.02 respectively, which means that 1% change in TB, IB, OM and 1% change in AT and FL translates into 1 %, 1.01 %, 1.02 %, 1 % and 1.02 % change in return on equity, respectively. The model asserts that TB, IB, OM, AT and FL (extended DuPont components) are the most powerful drivers of ROE.
As shown in table 3, 5, 7 and 9 TB, IM, OM, AT and FL are statistically significant in every sample which is one of the most important findings of this study. The coefficients of these variables are relatively similar in each sample which highlights the importance of extended DuPont model components as determinants of return on equity.

8. CONCLUSIONS, LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

This study incorporates a set of financial ratios/indicators that may have impact on return on equity. As mentioned throughout the thesis, profitability analysis plays a crucial role in financial statement analysis and return on equity (profitability measure) is an important metric for a company manager who attempts to understand company's strengths and weaknesses or an investor who seeks a profitable investment. Any market participant practically uses profitability measures no matter the underlying reason of financial analysis in question. In this respect, return on equity assumes a greater relevance as it measures how effectively capital is utilized to generate profit for company's shareholders. Therefore, it is imperative to identify the determinants of return on equity, in other words, ratios and indicators that have the most explanatory power regarding return on equity. Considering the literature review, the study incorporates eight ratios/indicators that may have impact on return on equity.

To carry out the empirical analysis, OLS regression analysis was used on Nasdaq-100 NDX components and three industry sectors. Two models are used for the empirical analysis. The first model uses original units of measure. Whereas, the second model uses logarithmic values. The results of the second model are better as it shows higher value of R-squared compared to the first model. Furthermore, the first model presented Ramsey test value statistically significant which renders the results of the model inaccurate. Therefore, only the results of the second model are considered.

The most important finding of this study is that extended DuPont components are the most powerful drivers of return on equity. The extended DuPont components have enough explanatory power to describe the variations occurring in return on equity. Therefore, extended DuPont analysis can be considered as a very sophisticated tool for ratio analysis. By solely making extended DuPont analysis a market participant is equipped to observe the changes in the components, which in turn change return on equity. According to the findings, extended DuPont analysis provides important insights into the changes in return on equity. This finding is unique on its own and this is one of the newest empirical studies trying to identify return on equity drivers by incorporating extended DuPont components.

The price to earnings ratio and price to book ratios were only statistically significant in global and technology samples. However, they were not statistically significant in consumer and other sample. The underlying reason could be intra-sector wide dispersion of ROE and other indicators in consumer sector. Even though Consumer sector companies operate in the same sector their nature of operations and business model varies. In contrast, Technology sector is more homogeneous and low dispersion can be observed in values of variables. Current ratio is statistically insignificant in all samples. Therefore, conclusions cannot be withdrawn regarding its impact on return on equity. Saleem et al., (2011) have also found that current ratio does not affect return on equity.

The main limitation of this study is that the research sample is limited to Nasdaq-100 NDX components. Another limitation is that the empirical analysis was carried out only for two industry sectors. Based on the results of this study, it has been concluded that extended DuPont components are the most powerful drivers of return on equity. This finding can be further studied by making research:

- on larger samples extending the analysis from Nasdaq-100 NDX to larger indexes,
- by extending the scope to more industry sectors,
- based on time series and cross sectional data to find out which ratios/indicators have the most explanatory power on return on equity over time. This would allow to identify predictive power of those indicators to forecast changes in return on equity.

Extensive research based on time series with DuPont components is found in literature. According to Penman (1991) "a further research question is whether (and how) a decomposition of ROE might improve the assessment of future profitability." Such research using three-step DuPont components is ample in literature, however there is lack of research decomposing DuPont components into five-step DuPont model to assess. Thus, extended DuPont model could be used in time series to continue previous research as it allows to more deeply dive into the components affecting return on equity.

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