

Investigating the factors affecting the profitability of Saudi Industrial Companies by using DuPont Model

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Abstract: The study aimed to investigate the factors affecting the profitability of Saudi industrial companies for the period from 2011 to 2015. The DuPont model was used to measure the factors that affect both return on assets (ROA) and return on equity (ROE), using both simple and multiple linear regression tests. The results of the study showed a statistically significant effect of profit margin on (ROA), and no effect of assets turnover rate on (ROA). The results of the study showed a decrease in the explanatory power of the variables of the (ROA) model as there are other variables that explain the change in the (ROA). The results also showed a statistically significant effect of (ROA) and financial leverage on (ROE), and these variables explain 87.6% of the changes in the ROE model.

Key Words : Profitability, Return on assets, Return on equity, Dupont Model.

Introduction:

Analyzing companies' profitability is considered one of the important issues in financial management. Making profits is considered an important target for companies as well as maximizing market value. A lot of researchers in the financial management field agree that the most important goal is shareholders' wealth maximization. This goal takes in consideration most of the points that the profit maximization goal ignore, such as the time of returns .The researchers also agree that shareholders take in consideration available cash flows .However , profit maximization is not ignored for it is considered one of the basic goals for all companies to stay and continue (Haddad, 2009).

To achieve the goal of profit maximization, the financial manager takes only those actions that are expected to contribute to the firm's overall profits. For each alternative being considered, the financial manager would select the one that is expected to result in the highest monetary return (Gitman,2009).

Profitability is considered a result of the policies and decisions that can be measured by a lot of measurements known as financial ratios such as earning per share (EPS), return on equity (ROE), return on assets (ROA) and profit margins (PM). DuPont Model is considered one of the important models in the

financial studies which added a lot of comprehension to the financial analysis and to the recognition of important and indispensable details which are necessary to have a comprehensive look at two important indicators of companies' measures of profitability: return on assets (ROA) and return on equity (ROE).

The DuPont model, which has been developed by DuPont Company in 1920 in the United States, has given a lot of explanations to measure the profitability of companies as a measure of corporate performance. This model has achieved wide fame in various business fields in America for providing a holistic view of profitability analysis and knowledge of the main factors affecting the profitability of assets and equity.

The model tells us that the company's profitability measured by return on assets (ROA) is affected by two factors: profit margin and asset turnover rate which are the two elements that determine the possibility of achieving a high rate of return on the company's assets.

$$\text{ROA} = \text{Profit Margin} \times \text{Total Assets Turnover}$$

$$\text{ROA} = (\text{Net profit after tax} \div \text{Sales}) \times (\text{Sales} \div \text{Total assets})$$

Profit margin is an important measure of sales profitability, the efficiency of the operating company in managing its sales, and the reflection of that efficiency on the net profits of the company; the more that percentage increased the more efficient is that company in managing its sales which reflects on profits and increases them. Asset turnover ratio on the other hand is a measure of the company's activity which is considered a reflection of the efficiency of the company in managing their assets and the ability of those assets to achieve profits, achieving higher asset turnover ratio by the company indicates its efficiency in the management of their assets.

The model also indicates that return on equity (ROE) is affected by two factors which are both returns on assets (ROA) and financial leverage.

$$\text{ROE} = \text{ROA} \times \text{Financial Leverage Multiplier (FLM)}$$

$$\text{ROE} = (\text{Net profit after tax} \div \text{Total assets}) \times (\text{Total assets} \div \text{Owners' equity})$$

$$\text{Or ROE} = \text{Profit Margin} \times \text{Total Assets Turnover} \times \text{Financial Leverage Multiplier}$$

The return on assets (ROA) is an important measure of the profitability of the company's investments and its efficiency in exploiting their investments to generate profits; it is considered one of the operational performance indicators thus it monitors the company's extent of exploitation of its assets to generate profits.

The return on assets (ROA) is considered an indicator of the company profitability with reference to the total assets, and referred to as the return on investment (ROI) (Aowad Allah & Alshreef, 2016); high rates of return on assets indicate the company's good management of its investments. Financial leverage multiplier measures the financing policy of the company and its dependence on funding from external sources and the impact of that policy on the company's profits.

Objectives of the Study:

This study aims to test the DuPont model by applying it to Saudi industrial companies so as to learn the following:

- 1- The impact of operational efficiency which is reflected in the profitability of sales on its financial performance.
- 2- The impact of the efficiency of the use of Saudi industrial companies of its assets on its financial performance.
- 3- The impact of financing policy on the financial performance of Saudi industrial companies.

Importance of the Study:

This study is important for being the first study (according to researchers) to look at the impact of the components of the DuPont model on the financial performance of Saudi industrial companies. Moreover, this study is significant due to the importance of the DuPont model in giving details in financial analysis, of which we can know the strengths and weaknesses which affect the financial performance of the companies.

The study problem

We can formulate the study problem through the following questions:

- 1- Does the components of Dupont model affect the financial performance which is measured by ROE?
- 2- Does the components of Dupont model affect the financial performance which is measured by ROA?

Literature Review:

Here we review some of the previous studies which look at the relationship between the variables of the study either through the DuPont model or by another proposition.

The study of (Ghadome, 2008), this study aimed to test the impact of the financing decision on the performance of a sample of companies listed on Amman Stock Change which has reached 53 companies between 1999 and 2008. The researcher focused on studying the relationship between the company's debt and its impact on both return on assets (ROA) and return on equity (ROE). The study concluded that there is no statistically significant relationship between the ratio of debt, long- term loans and short-term loans and the study variables except for a statistically significant relationship between debt ratio and return on investment (ROI).

(Noufal et al., 2012) worked on studying the impact of financial and operational leverage and asset turnover rate on return on assets (ROA), return on equity (ROE) and earnings per share by applying to a sample of Jordanian industrial companies, from 1997 to 2007. Researchers reached to an inverse relationship between debt ratio and returns, and a positive correlation between assets turnover rate and returns.

In (Addae, etc.all., 2013) study, the researchers studied the possible impact of debt on the profitability of companies in Ghana, from 2005 to 2009. The researchers found a positive relationship between short-term debt (STD) and return on equity (ROE), and a negative relationship between long-term debt (LTD) and return on equity (ROE).

The purpose of (AlNajjar, 2013) study was to examine the impact of the financial leverage on the performance standards of the Palestinian companies from 2004 to 2011. The researcher concluded that there is a negative impact for the financial leverage on the standards of the accounting performance of return on assets (ROA) and return on equity (ROE).

In (Abdel-Jalil, 2014) study, the researcher studied the impact of capital structure on the performance of the Jordanian industrial companies between 2008 and 2012. The researcher used many ratios to measure indebtedness as well as to know the effect of the rate of growth in assets and asset turnover ratio on return on investment (ROI) and return on equity (ROE). The study found a negative relationship between debt ratio and return of investment (ROI) and a negative relationship between debt-to-equity ratio and return on equity (ROE). Additionally, the study also found a positive effect of both the growth rate and asset turnover ratio on returns.

In the study of (AL- Shubiri, 2014), the researcher tried to find out the factors which affect return on equity (ROE) by applying to a sample of Jordanian industrial companies between 2003 and 2011. The researcher found a positive effect for each of the size of the assets, the industrial index and multiplier industry and the equity multiplier on return of equity (ROE).

In (Hatem, 2014) study the researcher worked on finding the factors that affect the profitability of companies in Italy, Switzerland and Sweden from 2003 to 2011. Moreover, the researcher used both measures of return on assets (ROA) and return on equity (ROE) to measure the profitability in addition to return on sales (ROS) and earnings per share. The study concluded that each of growth, monetary rate and the size and age of the company have an impact on the profitability of these companies.

In their study (Berzkalne & Zelgalve, 2014) tried to find the relationship between return on equity (ROE) and several factors: return on assets (ROA), return on sales (ROS), trading ratio and capital structure ratios through applying to a sample of companies of Latvia from 2004 to 2012 . The researchers found a connection between each of return on assets (ROA) and return on equity (ROE), and a negative relationship between the ratios of capital structure and return on equity (ROE).

(Mubin, etc.all., 2014) study aimed at learning the components of return on equity (ROE) within the DuPont model through applying it to companies from various sectors in Pakistan, from 2004 to 2012. The study concluded that the rate of asset turnover was one of the most influential elements on return on equity (ROE), whereas both the profit margin and the equity multiplier have no effects on it.

In (Vatavu, 2015) study, the researcher tried to knowledge the most important factors affecting return on assets (ROA) through applying to a sample of Romanian companies from 2003 to 2013. The researcher used several factors: debt, fixed assets, the company's size, liquidity, risk, tax and inflation. The research reached to the presence of a statistically significant effect of all the elements on return on assets (ROA).

The Study of (Aowad Allah & Alshreef, 2016) aimed at testing the effect of return on assets (ROA) and the financial leverage on return on equity (ROE) of Jordan Steel Company from year 2003 to 2013. The study found a positive effect of return on assets (ROA) on return on equity (ROE) and a negative impact of financial leverage on return of equity (ROE).

Research Methodology:

1- Population and Sampling

The study population consists of Saudi industrial companies belonging to the petrochemical industries, energy and utilities, cement and industrial investment.

A sample of 40 companies was selected using their financial statements from 2011-2015, provided that the data of these companies are available for years studying. The sample of the study was divided according to the selected sectors as follows:

1. Petrochemical industries 13 companies.
2. Energy and utilities 2 companies.
3. Cement 13 companies.
4. Industrial Investment 12 companies.

2- Hypotheses of the study

The hypotheses are formulated based on the objectives of the study and its significance in order to test the relations between the variables of the study.

- **H01:** There is no statistically significant effect of profit margin on return on assets (ROA).
- **H02:** There is no statistically significant effect of asset turnover rate on return on assets (ROA).
- **H03:** There is no statistically significant effect of profit margin and asset turnover on return on assets (ROA).
- **H04:** There is no statistically significant effect of return on assets (ROA) on return on equity (ROE).
- **H05:** There is no statistically significant effect of financial leverage on return on equity (ROE).

- **H06:** There is no statistically significant effect of return on assets (ROA) and financial leverage on return on equity (ROE).

3- Variables of the study:

The following variables were assigned in order to serve the objectives of the study:

- **Independent Variables**

1. **Profit margin:** It is one of the standards of profitability and which calculates the remaining percentage of each dollar of sales, after deducting all costs or measures net profit after interest and taxes generated by each dollar of net sales (Gitman, 2009). Moreover, the profit margin was calculated by the following equation:

Net profit/ revenue

2. **Asset turnover rate:**

Turnover or efficiency ratios are important because they indicate how well the assets of a firm are used to generate sales and/or cash. While profitability is important, it doesn't always provide the complete picture of how well a company provides a product or service. A company can be very profitable, but not too efficient (Isberg, 1998).

To calculate the rate of asset turnover the following equation was used:

Net sales/ total assets

3. **Financial leverage:** the degree of financial leverage (DFL) is given to any borrowing or use of financial instruments that result in the inflation of the impact of gains or losses on the investor. Sometimes financial leverage is used to describe the indebtedness ratios; when debt ratios increase the impact of financial leverage on the company's earnings also increases. Furthermore, the degree of financial leverage (DFL) also measures the company's exposure to financial risks (AlNajjar, 2013).

Financial leverage is considered a scale for measuring the extent to which companies used third parties funds to finance their assets (Haddad, 2009). Debt indicators measure to what extent a company uses funding through debt, i.e. comparing funds provided by the owners of the company with funds provided by third parties (Abdul Hadi, 2008).

Financial leverage multiplier is used to convert return on assets (ROA) to return of equity (ROE) and finding the impact of the use of debt to the angel fund returns (Gitman, 2009).

Financial leverage multiplier is measured by the following scale:

Total assets/ equity

• **Dependent Variables:**

1. **Return on assets (ROA):**

It is the most popular method within the rates of economic return and measures the profitability of the entire capital invested in the entity. This ratio measures the return on capital invested in business assets (Hada.T, 2014).

Return on assets is measured by the following formula:

Net profit after tax/ total assets

2. **Return on equity (ROE)**

Return on equity (ROE) is considered a significant profitability indicator for investors in a company, as it shows the proportion of profits generated as a result of their investment in it. It gives a vision of choice for equity investors between companies, as they prefer, of course, the companies that have high investors' return on equity (ROE), because that what will really return to them (Aowad allah, Alshreef, 2016).

It reflects the efficiency of using the capital of the contributed shares or of net profit at the enterprise's disposal for self-financing and company's equity (Hada.T, 2014).

Return on equity (ROE) is measured by the following formula

Net profit after tax / Total Equity

The hypotheses testing:

Two main statistical techniques will be used to test the hypotheses of the study:

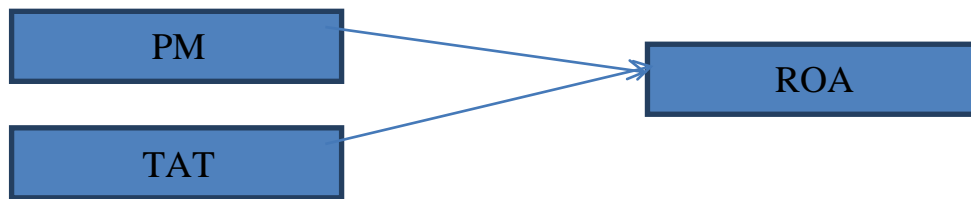
1. Simple linear regression (SLR) test using the ordinary least squares (OLS) method.
2. Multiple linear regression (MLR) test using the ordinary least squares (OLS) method.

These tests will demonstrate the impact of the independent variables on the dependent variables by using the T test and the F test and the relationship between the study's variables using Pearson correlation coefficient (r).

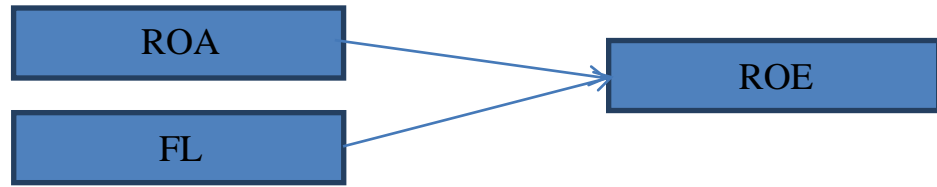
Models of the study:

The following models demonstrate the relationship between the variables of the study:

Figure(1): The DuPont system of analysis ROA



Figure(2):The DuPont system of analysis ROE



$$ROA = a + b_1 PM + b_2 TAT + e_i$$

$$ROA = a + b_1 PM + e_i$$

$$ROA = a + b_1 TAT + e_i$$

Where is :

ROA: Return on assets

PM: Profit margin

TAT: Total assets turnover

$$ROE = a + b_1 ROA + b_2 FL + e_i$$

$$ROE = a + b_1 ROA + e_i$$

$$ROE = a + b_1 FL + e_i$$

Where is:

ROE: Return on equity

FL: Financial leverage

Results of the study tests:

1- The Descriptive Statistics Results

Table (1) refers to the results of the descriptive analysis of the study data from 2011 to 2015; Hail Cement Company has achieved the lowest rate of profit margin (PM) which amounted to -19.63, while Saudi Arabian Fertilizer Company (SAFCO) has achieved the highest profit margin (PM) which reached 0.81, the results also indicate that the average of profit margin (PM) for the sample companies amounted to 0.0304, this means that there are companies achieving low profit margin (PM) due to either poor sales management or an increase in costs.

Hail Cement Company has also achieved the least asset turnover ratio which reached 0.00, while the Saudi Industrial Export Company (SIEC) has achieved the highest asset turnover ratio which amounted to 4.47, whereas the asset turnover ratio reached 0.5220. On the other hand, the National Metal Manufacturing & Casting Co. has attained the lowest financial Leverage rate which amounted to 0.15. Moreover, the Rabigh Refining and Petrochemical Company (Petro Rabigh) has achieved the highest financial leverage rate which reached 6.17; the average of financial leverage reached 1.8477. Additionally, Nama Chemicals Co. has achieved the lowest return on assets (ROA), which amounted to -0.10, while SAFCO has achieved the highest

return on assets (ROA) which reached 0.44; the average of return on assets reached 0.0882. The Saudi Paper Manufacturing Company (SPMC) has attained the lowest return on equity (ROE) which reached -0.24, whereas SAFCO has achieved the highest return on equity (ROE) which reached 0.50; the average of return on equity (ROE) amounted to 0.1252.

Table (1)

| | Minimum | Maximum | Mean | Std. Deviation |
|-----|---------|---------|--------|----------------|
| PM | -19.63 | .81 | .0304 | 1.92359 |
| AT | .00 | 4.47 | .5220 | .52900 |
| FL | .15 | 6.17 | 1.8477 | .98623 |
| ROA | -.10 | .44 | .0882 | .08797 |
| ROE | -.24 | .50 | .1252 | .11535 |

2- The Results of the Regression Analysis and Hypotheses Testing:

The Results of the simple linear regression (SLR) and multiple linear regression (MLR) analyses for the model of ROA:

Table (2) shows the results of the return on assets (ROA) regression on the profit margin (PM) and asset turnover rate; the results show that there is a statistically significant effect of profit margin (PM) on return on assets (ROA). This indicates that the performance of Saudi industrial companies is influenced by the profitability of sales i.e. the sales policy followed by Saudi industrial companies has an impact on the return on investment (ROI). The results also show that the performance of companies is not affected by the asset turnover rate. That result is different from the results of (Abdel-Jalil, 2014) and (Noufal et al., 2012) studies, which means that companies did not manage their assets properly to generate sales and then profits.

Table (3) indicates the results of multiple linear regression (MLR) of the DuPont model of return on assets (ROA) analysis. The results also show a statistically significant effect of the variables of the analysis model of return on assets (ROA). Furthermore, the results show that the model variants explain only 0.042 of changes in the return on assets (ROA), which is considered very low; therefore, there are other variables that explain the changes in the return on assets (ROA) other than those variables in the model.

Table (2)

| Variable | Equation results | | Hypothesis testing |
|----------|------------------|-------|--------------------|
| PM | Coefficient | .010* | H01: Rejected |
| | R | .228 | |
| | R-square | .052 | |

| Variable | Equation results | | Hypothesis testing |
|----------|------------------|------|--------------------|
| TAT | Coefficient | .004 | H02: Accepted |
| | R | .023 | |
| | R-square | .001 | |

* Denotes 1% level of significance

Table (3)

| Variable | Equation results | | Hypothesis testing |
|-------------------|------------------|-------|--------------------|
| PM | Coefficient | .010* | H03:Rejected |
| TAT | Coefficient | .001 | |
| Adjusted R-Square | .042 | | |
| F- test | 5.394 | | |
| P- Value | 0.005 | | |

* Denotes 1% level of significance

2.2 The Results of the simple linear regression (SLR) and multiple linear regression (MLR) analyses for the ROE Model:

We can see in table (4) that there is a statistically significant effect for the return on assets (ROA) on the return of equity (ROE), and this explains the impact of angel investors’ equity on return of investment (ROI) and its reflection on their wealth. This result agrees with the results of (Aowad Allah & Alshreef, 2016) and (Berzkalne & Zelgalve, 2014). We can also see that there is a negative impact with a statistically significant effect of the financial leverage on return on equity (ROE). This explains to what extent the angel investor’s wealth is affected by the increase of the amount of debt used in Saudi companies either to increase the cost of debt or due to some companies’ losses. The studies of (Aowad Allah & Alshreef, 2016), (Abdel-Jalil, 2014) and (AlNajjar, 2013) agree with that result, whereas the studies of (Ghadome, 2008), (Berzkalne & Zelgalve, 2014), (Mubin, et al., 2014) and (AL- Shubiri, 2014) disagree with it.

Given table (5) we find the results of the multiple linear regressions (MLR) of the DuPont Model analysis of return of equity (ROE). The model’s elements have a statistically significant effect on the return of equity (ROE). Moreover, the impact of financial leverage on equity has changed to a positive impact due to the interaction between the independent variables in the multiple regression model. The results show that the variable in the model explain 0.876 of changes in the return of equity (ROE), and this enhances the strength of the model to adopt it as an explanatory model for the changes in the return of equity (ROE) of Saudi industrial companies.

Table (4)

| Variable | Factors | | Hypothesis testing |
|----------|-------------|--------|--------------------|
| ROA | Coefficient | 1.225* | H04: Rejected |
| | R | .935 | |
| | R-square | .873 | |
| FL | Coefficient | -.043* | H05: Rejected |
| | R | .372 | |
| | R-square | .138 | |

* Denotes 1% level of significance

Table (5)

| Variable | Factors | | Hypothesis testing |
|-------------------|-------------|--------|--------------------|
| ROA | Coefficient | 1.270* | H06: Rejected |
| FL | Coefficient | .009* | |
| Adjusted R-Square | .876 | | |
| F- test | 707.067 | | |
| P- Value | .000 | | |

* Denotes 1% level of significance

Conclusions:

After reviewing the results of the study, they can be summarized as follows:

1. The DuPont Model for the analysis of return on assets (ROA) is considered a deficient model when applied to Saudi industrial companies. This might be due to the lack of a statistically significant relationship between the asset turnover ratio and the return on assets (ROA), and the weakness of the relationship between the profit margin (PM) and the return on assets (ROA). Some companies have incurred losses which led to a decrease in the average of the profit margin (PM) of the study sample; this means a decline in the operational efficiency of the study sample, which reflected the weakness of correlation; the correlation coefficient was (0.228).
2. The DuPont Model for the analysis of return on equity (ROE) is a strong model in explaining the changes in the return on equity (ROE); it explained the return on assets (ROA) and equity multiplier; the amount of (0.876) of changes in the return of equity (ROE). This due to the fact that the return on assets (ROA) is considered the most correlative and illustrative variable of the return on equity (ROE); the correlation

between the two variables was (0.935), and it explains the sum of (0.873) of the return on equity (ROE) changes. One can rely on this model to predict the return on equity (ROE) of Saudi industrial companies.

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استقصاء العوامل المؤثرة على ربحية الشركات الصناعية السعودية باستخدام نموذج دوبونت

الملخص: هدفت هذه الدراسة الى استقصاء العناصر المؤثرة على الربحية، وذلك للفترة من عام 2011 الى عام 2015. وقد تم استخدام نموذج دوبونت لمعرفة العوامل المؤثرة على كل من العائد على الأصول ROA والعائد على الملكية ROE من خلال نموذج الانحدار البسيط ونموذج الانحدار المتعدد لتحليل بيانات الدراسة. وقد أفضت نتائج الدراسة إلى وجود أثر ذو دلالة إحصائية لمتغير هامش الربحية Profit Margin على العائد على الأصول وعدم وجود أثر لمعدل دوران الأصول Assets turnover rate على العائد على الأصول. وقد بينت النتائج انخفاض القوة التفسيرية للمتغيرات المفسرة للتغير في العائد على الأصول. وقد أفضت أيضاً نتائج الدراسة إلى وجود أثر ذو دلالة إحصائية لكل من العائد على الأصول والرافعة المالية Financial Leverage على العائد على الملكية وبقوة تفسيرية 87.6% من التغير الحاصل في العائد على الملكية.

الكلمات المفتاحية: الربحية، العائد على الأصول، العائد على الملكية، نموذج دوبونت.