DuPont Analysis of Luxury Industry and Market Portfolio : A Comparative Study

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Abstract

The measurement of financial performance is primarily based on return on equity (ROE) ratio. The DuPont model analyzes the sources of financial performance (ROE) of a firm. The luxury industry tends to drive high profitability in the market vis-a-vis the market counterparts. Is this an enough evidence to believe that the ROE is majorly contributed by profitability of the luxury firms ? The study intended to test the impact of firms' profitability, asset efficiency, and financial leverage on ROE in the luxury industry (LI) and the non-luxury industry (NLI). The paper conducted the DuPont analysis, and a comparison between luxury industry and non-luxury industry was drawn. The empirical findings claimed that the maximum beta-coefficient was contributed by efficiency of a firm, which was measured by ATR for dependent variable ROE. On establishing a comparison, the results were found to be similar even in the luxury industry.

Keywords : **financial performance, luxury industry, DuPont model, ROE**

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The measurement of financial performance is primarily based on the ROE ratio. The DuPont model analyzes the sources of financial performance (ROE) of a firm. The DuPont analysis is a form of financial statement analysis, which is used to decompose (in its initial phase) the return on asset (ROA) into two multiplicative components : Profit margin and asset turnover. Further, these two components are not enough to explain the financial leverage of a firm. So, the third component has also been included in subsequent studies of DuPont models. All these three accounting ratios together measure diverse constructs of a firm's financial performance, ROE.

The objective is to decompose ROE as three components (firms' profitability, asset efficiency, and financial leverage).This can be detailed as firstly, to test the impact of firms' profitability, asset efficiency, and financial leverage on ROE in the non-luxury industry (market performance) and luxury industry portfolio. Secondly, the study aims to conduct a comparison of DuPont analysis between luxury industry and non-luxury industry. The analysis is used to examine the effect of profitability, efficiency, and leverage on the ROE. A firm's profitability is considered as the net profitability ratio formulated as a proportion of net income to sales. The efficiency is analyzed from the asset turnover ratio, which is denoted as a ratio of sales to average total assets. The leverage of a

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firm is that component of ROE, which is measured as equity multiplier, which is a proportion of total assets to shareholder's equity. This is first examined in the non-luxury industry, and then the study is extended to the luxury industry.

Review of Literature

In 1918, an engineer, F. Donaldson Brown in E. I. Du Pont Corporation of Wilmington, Delaware was allotted to elaborate on the finances of a company, General Motors of which Du Pont had just purchased 23% of stocks. The engineer deciphered a mathematical logic that prevailed between two crucial ratios, that is, net profit ratio (which is a profitability measure of firm performance) and total asset turnover ratio (that is an efficiency measure) which explains return on asset. The return on asset was investigated as a multiple of firm's profitability and efficiency of a firm and this was the primary DuPont model. This model was initially equated as :

$$\text{Return on Asset} = \left(\frac{\text{Net income}}{\text{Total asset}}\right) \quad (1)$$

The concept of return on asset was initially disintegrated into profitability and efficiency ratio, which was denoted as :

$$\left(\frac{\text{Net income}}{\text{Total asset}}\right) = \left(\frac{\text{Net income}}{\text{Sales}}\right) \times \left(\frac{\text{Sales}}{\text{Total asset}}\right) \quad (2)$$

Those were the times when maximizing the return on asset used to be on top of a firm's list of objectives to be attained. So, the corporate goal focused on ROA, which could be directly impacted by the two common ratios, that is, profitability as well as efficiency ratio. This traditional approach contributed to the upliftment and improvement in decision-making pertaining to planning and control for all operating managers at the firm level. The concepts of DuPont analysis were taken this way till 1970s for financial apprehensions. In 1970s, the generally accepted goal of financial management became "maximizing the wealth of the firm's owners" (Gitman, 2000) and the focus shifted from return on asset (ROA) to ROE. This contribution majorly modified the interpretation of the preliminary model, the DuPont model. Here, the sources of finance were given due importance. By the sources of finance, it generally means the leverage of a firm or the proportion capital funded by debt. The concept of leverage in the DuPont model was given an equal attention as the other two ratios, profitability and efficiency. This emerging framework of including leverage in the model to capture the true picture of ROE is recognized as equity multiplier. The equity multiplier is defined as a proportion of total assets to equity. Simplifying it further, it is now equated as :

$$\text{Return on Equity} = \left(\frac{\text{Total asset}}{\text{Equity}}\right) \times \text{ROA} \quad (3)$$

$$\text{ROE} = \left(\frac{\text{Net income}}{\text{Sales}}\right) \times \left(\frac{\text{Sales}}{\text{Total asset}}\right) \times \left(\frac{\text{Total asset}}{\text{Equity}}\right) \quad (4)$$

The basic reason to have included leverage as a factor in the model was to consider the contribution of source of funds for respective companies. This is the modified version of the model to examine the sources of return to owners of the firm created by three dimensions. This formulation has also assisted managers to look forward for

the perfections and progressions in decision making from profitability, efficiency, and the newly associated leverage perspective. The modified DuPont model (also commonly known as the "DuPont identity") became a standard in all financial literature (Liesz & Maranville, 2008). Nissim and Penman (2001) analyzed the approach to equity valuation that gives a simple direct mapping of financial equity valuation. The DuPont analysis was followed in the study which decomposed a firm on net operating assets (RNOA) into profit margin (PM) and asset turnover (denoted as $RNOA = PM \times ATO$). *PM* and *ATO* were accounting signals that measured different aspects about a firm's operations. Based upon the literature of this model, the present study analyzes the comparison of DuPont analysis between luxury industry and non-luxury industry.

The DuPont analysis has an objective to test the impact of firms' profitability, asset efficiency, and financial leverage on ROE. Scholars have defended the various ratios in past studies with a justification of industry – specific behavior or market factors as underlying causes.

Almajali, Alamro, and Al - Soub (2012) believed that there are various methodologies of measuring financial performance. A company's performance can be evaluated on three magnitudes : company's productivity (processing inputs into outputs efficiently), profitability (the level of company's earnings are bigger than its costs), and market premium (the level at which a company's market value is exceeding its book value) (Walker, 1997).

Cohen, Chang, and Ledford Jr. (1997) interpreted accounting returns from return on assets (ROA). They proved that ROA is widely used by market analysts as a measure of financial performance as it measures the efficiency of assets in producing income. The most often studied and followed accounting measures of financial performance are either ROE (Bowman & Haire, 1975), ROA (Clarkson, Overell, & Chapple, 2011 ; McGuire, Sundgren, & Schneeweis, 1988 ; Russo & Fouts, 1997 ; Stanwick & Stanwick, 2000), and return on sales (ROS) (Stanwick & Stanwick, 2000). The variable ROE captures the three component variables, two of them (profitability and efficiency of a firm) are already considered by the ROA studies and the third factor is leverage of a firm.

Sharma and Gupta (2019) found that IFRS had a significant impact on profitability of the concerns, but there was no significant difference in the profits of IFRS adopted companies of developed countries and developing countries.

Since ROA captures the efficiency of a firm ; whereas, the prime focus of ROE is on the three dimensions : efficiency, leverage, and profitability ; so, ROE is inferred to be a better measure of financial performance.

Besides the two components of primary DuPont analysis (ROA model), impact of leverage is examined on financial performance. Leverage as a determinant of ROE is often supported by the trade-off theory. Ghosh, Nag, and Sirmans (2000) and Berger and Di Patti (2006) reported a positive relationship between leverage and financial performance, while Gleason, Mathur, and Mathur (2000) and Simerly and Li (2000) showed a negative relationship between financial performance and leverage levels. Similarly, Zeitun and Tian (2007) found that debt level was negatively related with financial performance.

Upneja and Dalbor (2001) concluded that there have been several firms studied by researchers to shed light about the debt undertaken. They stated that research studies have given recommendation as the determinants of financial leverage by reporting that a firm's debt-equity decision is generally based on a trade-off between interest tax shields and the costs of financial stress. According to the trade-off theory of capital structure, it is believed that optimal debt level balances the benefits of debt against the costs of debt (Gu, 1993). Hence, the use of debt to a certain debt ratio results in higher ROE, however, the benefit of debt would be lower than the cost beyond this level of capital structure. In other words, the more a company uses debt, the less income tax the company pays, but the greater is its financial risk. Based on the trade-off theory for capital structure, firms can take advantage of debt to make a better ROE.

Conceptual Framework

Luxury is defined as anything that is more than necessary. Conventionally, in economics, a luxury good is a Veblen good for which demand increases more than proportionately as income rises, and is distinct from a necessity good, for which demand is related to income. When people turn to be more affluent, they purchase more of luxury goods. Appadurai listed five characteristics of luxury (Appadurai, 1986) :

(i) Restriction to elites by law or price.

(ii) Complexity of acquisition – which may or may not reflect real "scarcity".

(iii) Semiotic virtuosity.

(iv) Codes for "appropriate" consumption demanding specialized knowledge.

(v) High degree of linkage of their consumption to person and personality.

The luxury industry tends to drive high profitability in the market than the market counterparts. Is this a sufficient evidence to believe that the ROE is majorly contributed by profitability of the luxury firms ? Gupta (2018) concluded that the FV measurement does away with window dressing, makes the financial statements more transparent, closer to real market value, less volatile, and more predictable in accordance with the principle of substance over form, which is becoming all pervasive now.

Data and Methodology

To study the comparative analysis of non-luxury industry (NLI) and luxury industry (LI) based on DuPont identity, two portfolios' financial variables were collected : S&P 500 Index (505 NLI companies) and S&P Global Luxury Index (76 luxury companies) from Bloomberg Financial Database for the calendar year 2006 –2017 (Q4 : 2006 to Q2 : 2017). The study is based on quarterly secondary data (gathered on the last day of every quarter). Banking companies, missing values, and extreme values were eliminated. In total, 427 companies were taken as a sample to study the NLI. The software used for data processing and running the statistical tests is Stata.

Initially, the ordinary least square was run to test the significance of the independent variables on the dependent variable. Whenever the fixed effect model is used, the prime interest is towards analyzing the impact of variables that vary over time (time variant factors). The fixed effect model (FEM) eliminates the effect of time invariant characteristics so that the net effect of predictor on outcome variable can be analyzed. If the error terms are correlated, then the FEM is not an appropriate model as the inferences may not be efficient. Then, the Hausman test (1978) is run to select among FEM or REM of individual specific effects. The null hypothesis of the Hausman test is "REM is an appropriate model." The models are based on two assumptions :

(i) The impact of general market factors influences all the listed sample data companies.

(ii) The general market factors have some impact on the accounting variables, which may vary from industry to industry.

In the study, the market performance and the LI are comparatively examined for the maximum sourcing of returns for potential betterment of future returns. Here, the impact of profitability, asset turnover, and financial leverage is tested as a predictor variable on the predicted variable of ROE. The behavior of the LI is discussed with the counterpart NLI in Table 1 as Models 1 – 4.

Table 1. ***Methodology for DuPont Identity Analysis***

Model	Independent Variable	Dependent Variable	Hypothesized Impact on ROE
Model 1	$Profitability_{it}$	ROE_{it}	+
Model 2	$Efficiency_{it}$	ROE_{it}	+
Model 3	$Leverage_{it}$	ROE_{it}	+
Model 4	$Profitability_{it,}$	ROE_{it}	+
	$Efficiency_{it,}$		+
	$Leverage_{it}$		+

The regression test and Hausman test are interpreted from the *p*-value. The *p*-value is the probability of observing a sample outcome even more extreme than the observed value when the null hypothesis is true.

In this study, the DuPont model has been considered to examine the effect of these three ratio variables on the performance measure, ROE. The objective to test the impact of the firms' profitability, asset efficiency, and financial leverage on ROE is statistically analyzed in LI. These four variables have been described in Table 2.

The model was developed to analyze the pragmatic source of creating the current ROE. It also highlights the variable that needs a room for improvement which can, in turn, enhance the financial performance of a firm.

Figure 1 shows the quarter-wise average ROE in the NLI and the LI portfolios. The sample data as well as Figure 1 both demonstrate that returns in LI are steep to rise and fall in the times when the NLI is rising and falling, respectively. Table 3 and Table 4 summarize the correlation between the dependent and independent variables as well as between the independent variables.

Also, to check the model specification link test, Hausman test has been performed. The following regressions are run to test the three decomposed variables individually. The variables are tested one after the other in first,

Table 2. ***Variables and Formulas***

Ratios	Descriptions
LEVERAGE	Examines the proportion of debt used to finance a firm.
Asset Equity Ratio	Asset Equity Ratio = Total Assets*/Average Shareholder's Fund.
EFFICIENCY	Activity ratios/ operating efficiency ratio indicate the ongoing operational performance of the firm.
Asset Turnover Ratio *Sales/Average Total Asset**	Assets = The total of all short and long-term assets as reported on the Balance Sheet.
PROFITABILITY	Explains the efficiency with which the economic activity is performed.
Net Profit Ratio *Net Income /Sales*	NPR, in percentage, is an indicator of how profitable a company is relative to its sales.
RETURN ON EQUITY	ROE in proportion to the shareholding.
PAT/ Average Shareholder Equity Fund	ROE, in percentage, shows the return earned on every share by the shareholders.

Assets = Tangible fixed assets only as reported on the Balance Sheet.*

Source : US GAAP and IAS IFRS

Figure 1. ***Quarter - Wise Average ROE in the Non-Luxury Industry and the Luxury Industry***

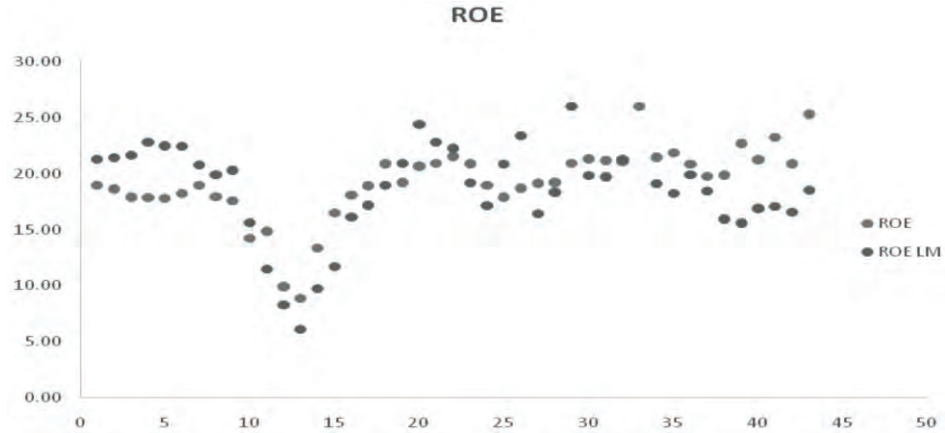


Table 3. ***Correlation Matrix of Variables (NLI)***

	ROE	Profitability	Leverage	Efficiency
ROE	1.0000			
Profitability	0.1942	1.0000		
Leverage	0.2652	0.0858	1.0000	
Efficiency	0.3143	–0.4993	–0.3214	1.0000

Table 4. ***Correlation Matrix of Variables (Luxury Industry)***

	ROE	Profitability	Leverage	Efficiency
ROE	1.0000			
Profitability	0.1219	1.0000		
Leverage	0.1484	–0.0170	1.0000	
Efficiency	0.5600	–0.3934	–0.2773	1.0000

second, and third models. All the three variables are examined in the fourth model. The tests are run on the gathered data and a linear univariate regression model has been established in Model 1, Model 2, and Model 3. Unlike the initial three models, the final model is a linear multivariate regression model. The final model has examined the beta coefficient (variable-wise) for the three sources of creating financial returns to equity shareholders. The contribution by these three variables is elaborated in the initial three models to interpret the factor wise significance. All the models are compared after analyzing the results tested on both the indices of NLI and LI portfolio. The four models are as follows :

$$ROE_{it} = \alpha + \beta_1 Profitability_{it} + \epsilon_{it} \quad (5)$$

$$ROE_{it} = \alpha + \beta_1 Efficiency_{it} + \epsilon_{it} \quad (6)$$

$$ROE_{it} = \alpha + \beta_1 Leverage_{it} + \epsilon_{it} \quad (7)$$

$$ROE_{it} = \alpha + \beta_1 Profitability_{it} + \beta_2 Efficiency_{it} + \beta_3 Leverage_{it} + \epsilon_{it} \quad (8)$$

where,

ROE_{it} = Return on equity of i^{th} firm in the quarter t,

α = Intercept,

β_j = Beta coefficient or slope of the variable,

$Profitability_{it}$ = Profitability of i^{th} firm in the quarter t,

$Efficiency_{it}$ = Efficiency of i^{th} firm in the quarter t,

$Leverage_{it}$ = Leverage of i^{th} firm in the quarter t,

ϵ_{it} = Error term.

The models are intended to test the beta coefficients of independent variables. The null hypothesis is the $\beta_i = 0$ as against the alternative hypothesis $\beta_i \neq 0$. If the null hypothesis is true, X_i has no effect on Y_i. The acceptance (or rejection) of null hypothesis (or alternative hypothesis) is determined by the *p*-value or *p*-statistics. The model-wise null hypotheses are detailed in the following section.

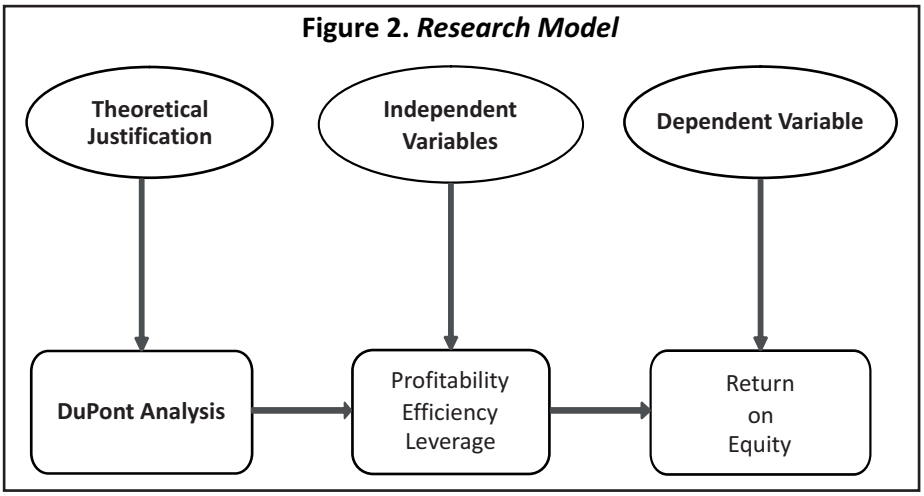
Model

The Models test the impact of profitability, efficiency, and leverage on ROE for NLI and LI portfolios. So, three-null hypothesis are tested in the fourth model. The hypotheses of the models are :

↳ **H_{01} :** There is no significant linear relationship between independent variable profitability and the dependent variable ROE.

↳ **H_{02} :** There is no significant linear relationship between the independent variable efficiency and the dependent variable ROE.

Figure 2. *Research Model*



↳ **H_{03} :** There is no significant linear relationship between the independent variable leverage and the dependent variable ROE.

This tells us that the beta coefficients of profitability, efficiency, and leverage are equal to zero in the regression equation. The alternative hypothesis is that the beta coefficients are not equal to zero (see Figure 2).

Statistical Models on DuPont Analysis

Non-Luxury Industry (S&P 500 Index)

In this section of the study, overall, the three DuPont models have been estimated to determine which of these business performance components is most responsible for changes in ROE.

Model 1 : Testing the Model for Profitability on ROE in NLI

In this model, the first component variable of DuPont identity is tested using regression model to measure the effect of profitability (net profit ratio) on the variable ROE for all the companies listed under S&P 500 Index to capture the accounting and financial information about NLI.

Table 5. ***Effect of Profitability on ROE in the Non-Luxury Industry (NLI)***

ROE	Coefficient (Std. Err.)	*p*-value
Profitability	.1719805(.0084484)	0.0000*
Constant	3.270241 (.0218504)	0.0000*
Adjusted *R*-square		0.0457
Hausman Test		0.0634**
	Fixed Effect Model	
Profitability	.1330773 (.0056953)	0.0000*
Constant	3.170604 (.0151409)	0.0000*

Note. * Significant at the 5% level ; **Significant at the 10% level.

Based on Table 5, it can be lucidly inferred that profitability is significantly impacting the dependent variable ROE. Here, even though the adjusted *R*-square is quite small to explain the dependent variable, the table shows that profitability is responsible for the current ROE with the total optimistic impact of a beta = .1720 at *p*-value being below 0.05, where the beta value shows that with a positive change of every unit in profitability, the ROE upsurges by .1720 unit.

In order to increase the adjusted R^2 in Model 4, the model has included two new variables. The Hausman test gives the *p* -value of 0.0634, which suggests to accept the null hypothesis H_{01} at a significance level of 0.10. Hence, it is interpreted that the fixed effect model is an appropriate model. This test suggests that profitability does not have much significant influence on financial performance of the companies listed under S&P 500 Index as the adjusted *R*-square is not explanatory enough in the fixed effect model.

Model 2 : Testing the Model for Efficiency on ROE in the Non-Luxury Industry

The Model 2 examines the next component for DuPont analysis. Here, the impact of efficiency (as asset turnover ratio) on ROE is estimated for all the companies to study the NLI.

As can be inferred from Table 6, the asset turnover ratio has a significant impact on the dependent variable ROE. The table shows that efficiency is one of the reasons for current levels of ROE with the total positive impact of $\beta = 0.2128002$ at p - value less than 0.05, where the β value shows that with a positive change of every unit in asset turnover ratio, the ROE moves up by 0.2128002 unit.

Table 6. ***Effect of Efficiency on ROE in the Non-Luxury Industry***

ROE	Coefficient (Std. Err.)	*p*-value
Efficiency	0.2128002 (0.0078328)	0.0000*
Constant	3.139723 (.0137763)	0.0000*
Adjusted *R*-square		0.0683
Hausman Test		0.8840
	Random Effect Model	
Efficiency	.2320042 (.0082801)	0.0000*
Constant	3.17551 (.0344816)	0.0000*

Note. * Significant at the 5% level ; **Significant at the 10% level.

The model has been extended by including two more variables as an endeavor for eliminating the model specification error in Model 4. However, the Hausman test with *p*-value of 0.8840 suggests that the null hypothesis H_{02} should be accepted (the random model), while rejecting the fixed model. This beta coefficient suggests that the asset turnover ratio has a substantially significant influence on ROE of the companies listed under S&P 500 Index. In the accepted model of random effect, the beta coefficient is ascertained to be .2320, and efficiency has a major importance in calculating the ROE. However, the adjusted *R* - square is not found to be high enough as it claims that 6.83% of the variance is explained by efficiency as a factor.

Model 3 : Testing the Model for Leverage on ROE in the Non-Luxury Industry

The impact of the last component variable of DuPont Model is examined here. In Model 3, the significance of equity multiplier (asset equity ratio) is tested on ROE. This analysis is based on the sample data from the NLI.

As inferred from Table 7, the equity multiplier does have a significant impact on ROE with a *p*-value = 0.00. The table shows that the equity multiplier is a determinant factor for a firm's current ROE, with the total positive impact of beta = .1165 at *p*-value 0.00 (that is below 0.05). This statistical result also means that with a positive change of every unit in equity multiplier, the ROE shifts in the same direction by .1165 unit.

The Hausman test is highly significant, which suggests that the null hypothesis H_{03} should be accepted and FEM is the selected model.

This test shows that leverage denoted by asset equity ratio does have a significant influence on ROE of the companies listed under S&P 500 index. With beta coefficient of .0833575, the equity multiplier is found to have an important role as a determinant variable of ROE here.

Table 7. ***Effect of Leverage on ROE in the Non-Luxury Industry***

ROE	Coefficient (Std. Err.)	*p*-value
Leverage	.1164592 (.0073511)	0.0000*
Constant	2.858836 (.0092115)	0.0000*
Adjusted *R*-square		0.0255
Hausman Test		0.0017*
	Fixed Effect Model	
Leverage	.0833575 (.0077702)	0.5950
Constant	2.83694 (.0068735)	0.0000*

Note. * Significant at the 5% level ; **Significant at the 10% level.

Model 4 : Testing the Model for Profitability, Efficiency, and Leverage on ROE in the Non-Luxury Industry

In all the initial three previous models, univariate models have been estimated. So, all the three components of the DuPont analysis are put together in the fourth model. In the final model, all three factors impacting the ROE are put to test. Table 8 depicts the results of the test run to analyze the effect of profitability, efficiency, and leverage on ROE in NLI.

From the set of three independent variables, it has been observed that all the three factors have shown a significant impact on the financial performance of the firms. The beta coefficient of efficiency, the second variable, is .6622, which also has the maximum contribution for explaining the dependent variable ROE when all the independent variables are put together in Table 8. It is also interesting to find that after running the test for all three factors, efficiency seems to have the utmost significant impact on the dependent variable ROE in the NLI.

However, the Hausman test shows that the fixed effect model is more appropriate than the random effect

Table 8. ***Effect of Profitability, Efficiency, and Leverage on ROE in the Non-Luxury Industry***

ROE	Coefficient (Std. Err.)	*p*-value
Profitability	.5215445 (.0128677)	0.0000*
Efficiency	.662174 (.0116563)	0.0000*
Leverage	.2870311 (.0071252)	0.0000*
Constant	5.446594 (.0484764)	0.0000*
Adjusted *R*-square		0.4229
Hausman Test		0.0000*
	Fixed Effect Model	
Profitability	.3094569 (.0064519)	0.0000*
Efficiency	.5013912 (.009482)	0.0000*
Leverage	.1658623 (.0070048)	0.0000*
Constant	4.559873 (.0296653)	0.0000*

Note. * Significant at the 5% level ; **Significant at the 10% level.

model. The fixed effect regression table (Table 8) shows that efficiency is again the factor that has a maximum significant influence on the dependent variable. In the NLI, the other two variables, profitability and leverage (asset equity ratio) have also shown a statistically significant impact as ROE determinants.

Luxury Industry (S&P Global Luxury Index)

After testing the DuPont identity in the NLI, the model is now tested in the LI as well, considering the NLI as a benchmark. This section has four models using regression model with the same dependent variable ROE as a measure of financial performance for the companies that fall under the S&P Luxury Index. The similarities and the deviations of this market from the NLI are discussed in the latter section of this study.

Model 1 : Testing the Model for Profitability on ROE in the Luxury Industry

In the initial model of LI, the significance of profitability is tested on the dependent variable, although all the three components of DuPont analysis are together verified in the subsequent model. Table 9 shows that profitability significantly impacts the dependent variable ROE. Hence, the hypothesis H_{01} is rejected. The tests have also proved that profitability of the industry is responsible for the current ROE with a positive impact of beta coefficient =.1079 at *p*-value below 0.05. This depicts that with every unit increase in profitability, the ROE also increases with .1079 unit.

The statistical results of the first model in the LI are detailed in Table 9.

Table 9. ***Effect of Profitability on ROE in the Luxury Industry***

ROE	Coefficient (Std. Err.)	*p*-value
Profitability	.1078859 (.0216858)	0.0000*
Constant	3.151397 (.05831)	0.0000*
Adjusted *R*-square		0.0210
Hausman Test		0.2966
	Random Effect Model	
Profitability	.0898554 (.0149978)	0.0000*
Constant	3.025706 (.1089314)	0.0000*

Note. * Significant at the 5% level ; **Significant at the 10% level.

The Hausman test suggests accepting the random effect model with the *p*-value = 0.2966. This test shows that the profitability ratio has quite a significant influence on ROE of the companies listed under the S&P Luxury Index with *p*-value less than 0.05, and the profitability ratio is observed to be statistically vital in estimating the current ROE of the companies.

Model 2 : Testing the Model for Efficiency on ROE in the Luxury Industry

The null hypothesis of Model 2 is that there is no significant linear relationship between the independent variable efficiency and the dependent variable ROE (H_{02}). Here, the second component of DuPont identity, asset turnover ratio (efficiency), is tested to check the impact on the ROE.

In Table 10, the estimation test shows that the effect of efficiency on ROE is quite significant with *p*-value less

Table 10. ***Effect of Efficiency on ROE in the Luxury Industry***

ROE	Coefficient (Std. Err.)	*p*-value
Efficiency	.3537382 (.0293444)	0.0000*
Constant	3.213142 (.0406894)	0.0000*
Adjusted *R*-square		0.1591
Hausman Test		0.0786**
	Fixed Effect Model	
Efficiency	.1763627 (.0253547)	0.0000*
Constant	2.990762 (.0353817)	0.0000*

Note. * Significant at the 5% level ; **Significant at the 10% level.

than 0.05, and there is a statistically significant positive impact of efficiency with beta coefficient of .3537 on ROE. Interpreting the statistical test results, it implies that with every unit increase in efficiency, there will be an upward shift of some .3537 unit in ROE. Hence, the hypothesis H_{02} is rejected.

The Hausman test is applied, which has suggested the fixed effect model with the *p*-value of .0786. According to Table 10, efficiency has a statistically significant influence on ROE as drawn from the *p*-value, that is, below 0.05. This table depicts that efficiency is important in estimating the ROE for the companies under S&P Luxury index as well.

Model 3 : Testing the Model for Leverage on ROE in the Luxury Industry

In this model, the third crucial source of creating financial performance is measured as leverage. The asset equity ratio is tested for analyzing the impact of leverage on the dependent variable of financial performance ROE. The statistical results of the third model in the LI are detailed in Table 11.

Table 11 shows that leverage, also known as equity multiplier in DuPont analysis, significant impacts the dependent variable ROE with *p*-value 0.0520. Hence, the hypothesis H_{03} is rejected. It is observed that the asset equity ratio is a contributing variable for the current ROE with a positive impact of beta coefficient of .0456. With every unit increase in equity multiplier, approximately .0456 unit of ROE increase has been observed. To reduce

Table 11. ***Effect of Leverage on ROE in the Luxury Industry***

ROE	Coefficient (Std. Err.)	*p*-value
Leverage	.0455165 (.0234391)	0.0520**
Constant	2.766572 (.0381588)	0.0000*
Adjusted *R*-square		0.0046
Hausman Test		0.3935
	Random Effect Model	
Leverage	.0006728 (.0247016)	0.9780
Constant	2.647823 (.1117217)	0.0000*

Note. * Significant at the 5% level ; **Significant at the 10% level.

the specification error, the panel data analysis Hausman test has been tested from where the random effect model has been found to be more effective. The table shows that the equity multiplier has a significant impact on ROE with *p*-value significant at 0.10 levels and it is one of the important components used to calculate the ROE for all the companies in LI.

Model 4 : Testing the Model for Profitability, Efficiency, and Leverage on ROE in the Luxury Industry

The final model includes all the three factors or performance measures impacting the ROE as also tested in Model 1, Model 2, and Model 3, which have been tested in the LI. All the three components of DuPont analysis are here together verified in the fourth model. The statistical results of the model in LI are detailed in Table 12.

Table 12. ***Effect of Profitability, Efficiency, and Leverage on ROE in the Luxury Industry***

ROE	Coefficient (Std. Err.)	*p*-value
Profitability	.4706253 (.0309542)	0.0000*
Efficiency	.7455265 (.0298824)	0.0000*
Leverage	.1757367 (.0189319)	0.0000*
Constant	5.305366 (.1197018)	0.0000*
Adjusted *R*-square		0.4514
Hausman Test		0.0000*
	Fixed Effect Model	
Profitability	.2201196 (.0202096)	0.0000*
Efficiency	.3825827 (.0297981)	.0000*
Leverage	.0811318 (.0230849)	0.0000*
Constant	4.026702 (.0950639)	0.0000*

Note. * Significant at the 5% level ; **Significant at the 10% level.

The statistical results show that all the financial performance measures are significantly impacting the ROE at significance level *p*-value less than 0.05 for LI. It is clearly observed that all the variables are directly influencing the ROE with a positive impact. The Hausman test in this model is highly significant with a *p*-value below than 0.05, showing that the fixed effect model would be more appropriate for the DuPont model analysis in LI. This fixed effect model results have proved that all three variables play an important role in determining the ROE at a significance level of 0.05. However, the most influencing variable (beta-wise) is efficiency ratio with beta coefficient = .3826. Next follows profitability with the next significant beta of .2201, and last is the variable leverage, whose beta coefficient is .0811.

Discussion and Conclusion

The study analyzes the DuPont identity by initially testing as linear univariate models for the three independent factors. Then, the final model examines and analyzes the impact of the components of ROE (namely, profitability, efficiency, and equity multiplier) on the financial performance variable ROE as a linear multivariate model.

Table 13 shows the comparative analysis of the two portfolios. The research question has been inferred from

Table 13. ***Comparative Analysis of DuPont Analysis of ROE in S&P 500 and Luxury Index***

	Non-Luxury Industry		Luxury Industry	
ROE	**Coefficient (Std. Err.)**	***p*-value**	**Coefficient (Std. Err.)**	***p*-value**
Profitability	.5215445 (.0128677)	0.0000*	.4706253 (.0309542)	0.0000*
Efficiency	.662174 (.0116563)	0.0000*	.7455265 (.0298824)	0.0000*
Leverage	.2870311 (.0071252)	0.0000*	.1757367 (.0189319)	0.0000*
Constant	5.446594 (.0484764)	0.0000*	5.305366 (.1197018)	0.0000*
Adjusted *R*-square		0.4229		0.4514
Hausman Test		0.0000*		0.0000*
FEM/REM	**Fixed Effect Model**		**Fixed Effect**	**Model**
Profitability	.3094569 (.0064519)	0.0000*	.2201196 (.0202096)	0.0000*
Efficiency	.5013912 (.009482)	0.0000*	.3825827 (.0297981)	0.0000*
Leverage	.1658623 (.0070048)	0.0000*	.0811318 (.0230849)	0.0000*
Constant	4.559873 (.0296653)	0.0000*	4.026702 (.0950639)	0.0000*

Note. * Significant at the 5% level ; **Significant at the 10% level.

the study wherein the DuPont (components) model have been analyzed and compared between the two portfolios. The conclusions drawn are as follows :

(i) The maximum beta-coefficient is contributed by *efficiency* of a firm, which is measured by ATR for dependent variable ROE.

(ii) The LI's ROE is majorly contributed by the *asset efficiency* that is also in line with the NLI.

(iii) The contribution of firms' *profitability* on ROE is significant in both the sample portfolios. However, profitability is contributing higher in NLI. On the other hand, LI is slightly relaxed to capture the profitability as an indicator of ROE.

(iv) In DuPont analysis, the beta coefficient is higher for *asset efficiency* of Luxury companies ; whereas, the NLI has observed higher betas for *profitability* and *financial leverage* of firms for determining the financial returns, ROE.

Concluding the output results of all the tests performed under DuPont analysis, Table 14 discusses the beta coefficients with standard errors in the four models of DuPont identity. The comparison is made among the NLI and LI, where the explanatory power of the model is not very much different in the two industries. The final model of S&P 500 Index and S&P Global Luxury Index explains 42.29% and 45.14% of the variation, respectively. The adjusted *R*-squares are not found to be much different in the two markets. However, one more peculiar observation from the final model has been noticed. It has been observed that the variable - 'efficiency' impacts financial performance the most in both the markets.

The observation is consistent with the findings of Fairfield and Yohn (2001) and Penman and Zhang (2004) ; wherein, the asset turnover ratio is more persistent than the other variables. It is the efficiency factor with the coefficients of .6622 and .7455 in the two markets, respectively. The fourth model infers that the other two

Table 14. ***Beta Coefficients with Standard Errors in the Four Models of DuPont Model in the Non-Luxury Industry and the Luxury Industry***

	Model 1	**Model 2**	**Model 3**	**Model 4**
DV : *ROE*	*NPR*	*ATR*	*FL*	*NPR, ATR, FL*
Adj. R^2 of NLI	.0457	.0683	.0255	.4229
Adj. R^2 of LI	.0210	.1591	.0046	.4514
	.1719805*			.5215445*
	(.0084484)			(.0128677)
β_1	.1078859*			.4706253*
(β coef. of *NPR*)	(.0216858)			(.0309542)
		0.2128002*		.662174*
		(0.0078328)		(.0116563)
β_2		.3537382*		.7455265*
(β coef. of *ATR*)		(.0293444)		(.0298824)
			.1164592*	.2870311*
			(.0073511)	(.0071252)
β_3			.0455165**	.1757367*
(β coef. of *FL*)			(.0234391)	(.0189319)
Constant	3.270241*	3.151397*	2.858836*	5.446594*
	(.0218504)	(.0137763)	(.0092115)	(.0484764)
	3.139723*	3.213142*	2.766572*	5.305366*
	(.05831)	(.0406894)	(.0381588)	(.1197018)

Note. * Significant at the 5% level ; **Significant at the 10% level.

components have proven that profitability as well as leverage are the two important variables to have defined the equity shareholders' returns in the markets of luxe. Unlike the NLI, the efficiency variable statistically explains the ROE much more in the LI. The profitability of a firm is often attained from its pricing power. The firm can price a product competitively owing to brand-name recognition, self-generated goodwill, product innovation, first - mover advantage, product positioning, etc. The efficiency of a firm, denoted as ATO, measures asset utilization and efficiency. It generally comes from the efficient use of property, plant, and equipment ; efficient inventory processes ; forms of working capital management ; etc.

According to Table 14, the following interpretations have been drawn. Firstly, it shows that all the three variables, profitability, efficiency, and leverage are proven to be statistically significant factors in NLI. This observation has also been accepted by the market of luxe consistently with the NLI. Secondly, all the significant variables are observed to be positive, which clearly states that with an increase in any of these performance measures, the ROE would also go up. However, efficiency of a firm is found to have a higher beta coefficient than profitability and asset equity ratio in defining the ROE of the companies listed in the NLI as well as LI. Thirdly, the explanatory power of the models is varying for the two portfolios model-wise. All the models have higher explanatory power for the LI than the NLI, with the exceptions of Model 1 and Model 3. It is probably due to the reason that profitability and leverage contribute ROE less in case of LI. Fourthly, the efficiency of a firm has a higher explanation to determine the ROE in the LI than the NLI. Lastly, the ROE is determined by all the three factors, but the maximum weightage is contributed by efficiency, then by profitability, and lastly by the leverage of a firm. This observation is found to be consistent in both the markets.

In a scholarly work contributed by Soliman (2008), the DuPont model was analyzed with respect to health care services. In the study, it was concluded that the DuPont components had less informative accounting signals in the healthcare setting compared to the all-industry sample. The observation of Soliman (2008) is found to be contrary to the conclusions drawn in the LI in this study. Here, the NLI and the luxury portfolio are not statistically much different to be informative for giving accounting signals to the investors about the determinant factors. In another research by Chang, Chichernea, and Hassab Elnaby (2014), it was observed that levels and changes in profitability were generally more important for investors and analysts (market participants) than their counterpart ratio of efficiency. However, this study has arrived at the results stating that change in the efficiency ratio is more persistent in the LI than profitability in explaining the variation of the DuPont model.

A parallel study by Katchova and Enlow (2013) captured agribusiness firms. They tested the DuPont ratios on the financial performance (ROE). The major findings of the study turned up to claim that asset turnover was the most predictive ratio, leading to a stronger financial performance. This study on DuPont analysis in LI has found results in contrast to the findings of Soliman (2008) and Chang et al. (2014). However, these statistical results are found to be identical to the concluding outcomes of Katchova and Enlow (2013).

Research Implications

By analyzing the data points, it has been observed that the DuPont model has three significant parameters : profitability, efficiency, and leverage. The model has been significantly explained in the LI and the NLI. The pivotal observation of the study may be concluded as :

Firstly, the high intangibility ratio in LI failed to influence the impact of profitability and leverage on ROE. The NLI has a statistically significant impact of profitability and leverage on ROE. Secondly, the influence of efficiency on the ROE was greater in the LI than in the NLI. Lastly, the unmeasured/self-generated assets could not prove the DuPont model to be more explanatory in the LI than the counterpart NLI.

The study began with an objective to compare the LI and NLI, but not many results have supported the difference. The LI could not establish a novel relationship in the DuPont analysis in terms of explaining the three parameters vis-à-vis NLI.

Limitations of the Study and Scope for Further Research

Despite putting in our best efforts, the study carries the following limitations. Firstly, the selection of companies was confined only to those companies whose shares were listed on S&P. Secondly, the study is based upon the data collected merely from these handful number of companies listed in the S&P Global Luxury Index. Future research studies can revisit these limitations of the study mentioned above. The researchers may also examine a broader quantum of luxury companies to enhance the body of literature.

Authors' Contribution

Dr. Neha Bothra is the corresponding author. Dr. Saloni Gupta is the second author. Both of them equally conceived, designed, developed, prepared, and wrote the whole paper.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest, or non-financial interest in the subject matter, or materials discussed in this manuscript.

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