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The Relevance of the Tax Effect Compared with Other Dupont Model Factors in Order to Explain the "Return on Equity" (Listed Companies – France, Germany, Portugal and Spain)

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Abstract

Financial statements provide information that could explain the return on equity. The DuPont extended model identifies five key ratios/indicators that might explain the performance of a company – tax effect, interest burden, earnings before interest and taxes (EBIT) margin, assets turnover and financial leverage. This study aims to analyze the relevance of the tax effect on the "return on equity" (ROE) when compared with the other DuPont model factors. For the purpose of the study, we selected a sample based on listed companies from the stock markets of France, Germany, Portugal and Spain. The number of companies of the sample is 516. The Ordinary Least Square (OLS) method was used to determine the individual impact of each factor on the "return on equity". According to our findings, the tax effect and the interest burden play the most important role in order to explain the return on equity.

Keywords: tax effect, return on equity, DuPont model, stock markets.

Introduction

The assessment of the performance of a company is always a relevant issue in the management field. The tax burden (or tax effect) is a component that significantly affect the financial performance of any company. Consequently, all companies do tax planning, tax avoidance, or even tax evasion, in order to decrease the tax burden. Thus, analyzing the tax effect on the "return on equity" (ROE) is necessary if the managers intend to present better results to shareholders. The performance assessment can be done using book and market data. Financial Statements provide the raw material for financial statements analysis. DuPont method is a well-known model which uses financial accounting information to analyze companies' performance. Return on equity (ROE) in the simplest computing way is obtained dividing the net income by the total equity. In order to obtain a deeply information about the factors that have influence in ROE, DuPont method states that ROE depends on three factors: "net profit margin", "assets turnover" and "leverage". A modified version suggested by Hawawini & Viallet (1999) extends the model to five factors: tax effect, interest burden, earnings before interest and taxes (EBIT) margin, assets turnover and financial leverage. Thus, in this study, taking into consideration that we are focused on the relevance of the tax effect, using a sample of 516 companies, listed in the French, German, Portuguese and Spanish Stock Markets, we computed all the DuPont components that affect the ROE in year 2017 (which consist on a cross-section analysis). Next, we used the OLS method to find out evidence about the relevance of each component, particularly the tax effect, to explain ROE, according to the main objective. This study is structured as

follows: firstly, we present a brief background about the topic; secondly, we expose the data, sample, variables and method; Thirdly, we present and discuss the results. Finally, we expose the main conclusions.

Background / brief Literature Review

In the point of view of shareholders, corporate taxation is an important factor that influence the performance of any company, decreasing the net income and consequently the earnings per share. Therefore, managers attempt to reduce the tax burden. Thus, as previously mentioned, tax planning is a strategy that is followed to improve the net income for shareholders.

The use of ratios in research studies has been a way to find out evidence about the impact of taxation over the companies' performance. Ratios can be used to measure several types of performances, namely the financial performance. Therefore, in many studies firm performance is measured as a financial ratio (Lazar, 2016). For example, ratio analysis can be defined as the use of ratios to interpret the financial statements in order to analyze the historical performance and current financial position of an entity (Sahu & Charan, 2013). Table 1 identifies and describes the main categories of financial ratios.

Table 1: Categories of financial ratios

Category	Description
Activity	Activity ratios measure the efficiency of a company on using its resources (assets)
Liquidity	Liquidity ratios measure the ability of a company to meet its short-term debts obligations
Solvency	Solvency ratios measure the company's ability company to meet its long-term debts obligations
Profitability	Profitability ratios measure the company's ability to generate earnings from its assets
Valuation	Valuation ratios measure whether a particular security is cheap or expensive when compared to a certain measure.

Source: Kharatyan, Lopes, Nunes, & Aghababyan (2016, p. 5)

One of the most used and well-known ratio (in the category of profitability ratios) is ROE. Profitability ratios, as ROE, are likely to confirm that a company is able to efficiently use resources available to increase sales or/and net profit (Ciurariu, 2015). This ratio uses the net income as a benchmark to measure profitability (Kijewska, 2016). However, we can get deeply information reformulating this formula. Which is the DuPont model purposes – learn how other factors/ratios could affect the ROE. 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 (Kharatyan, Lopes & Nunes, 2016). The three-factors formula is: ROE = (net income/sales) × (sales/total assets) × (total assets/shareholder′s equity). A modification was introduced by Hawawini and Viallet (1999). More two factor were added, consisting in a total of five ratios combined to form the ROE. The equation suggested by the previous authors has been stated as follows:

$$ROE = \frac{net\ income}{EBIT} \times \frac{EBT}{EBIT} \times \frac{EBIT}{revenue} \times \frac{revenue}{total\ assets} \times \frac{total\ assets}{shareholder's\ equity} \qquad (1)$$

Where, EBIT are the earnings before interest and taxes, the EBT are the earnings before taxes and the ROE is given by the following formula: $ROE = Tax\ burden \times Interest\ burden \times EBIT\ margin \times Total\ asset\ turnover \times Leverage$. In this ROE's formula, the tax burden measures the effect of taxes on ROE, the interest burden measures the interest burden on ROE, the EBIT margin measures the operating profitability on ROE, the assets turnover measures how effectively the entity uses the assets to generate revenue, and the financial leverage measures the relationship between the equity and total assets.

The DuPont model analysis requires just few simple calculations as stressed by Liesz and Maranville (2011) and gives managers the possibility to conduct strategic and financial planning. In the literature, we can find several studies that used the DuPont model to explain profitability. However, some authors (e.g. Kharatyan, Lopes, Nunes, & Aghababyan (2016) argue that, individually, financial ratios indicate incomplete information of a firm. Therefore, in many studies, other ratios were also considered (e.g. current ratio or price-to-book). For example, Batchimeg (2017) examined what ratios can determine financial performance of Mongolian companies. He used growth in sales, growth in profit, growth in assets, earnings per share, gross profit margin, cost to revenue ratio, return on costs, short-term debt to assets ratio, current assets to total assets ratio, long-term debt to total assets, quick ratio, current ratio, and cash ratio as explanatory variables. Return on Assets (ROA), Return on Equity (ROE), and Return on Sales (ROS) were chosen as performance indicators.

The DuPont model does not take into account the relationship between return and risk, as the Capital Asset Pricing Model and its modified versions. Nonetheless, it is always an important tool to analyze the profitability of a company and to understand what are the factors that have a contribution to a better performance.

We can find in the literature many studies addressing the performance issue. Lazar (2016) analyzed the firm-specific determinants of firm profitability for Romanian listed companies over the 2000-2011 period. He found that tangibles, leverage, size and labour intensity have negative effect on firm performance.

In addition to the previous factors, we believe that the "tax effect" will be always an important factor to be considered to improve the returns for shareholders. Sometimes "tax effect", "interest burden" and, consequently the "capital structure" are linked in order to explain the performance. In 1963, Modigliani and Miller, based on two different entities, one financed by external sources and the other financed by internal sources, found that the use of external sources seems to have advantages due to the interest expenses deductions. However, taking into consideration the taxation of corporate income, the weighted average cost of capital is not only influenced by the tax rate but also by the capital structure (Modigliani & Miller,1963).

In terms of leverage, according to Ribeiro (2015, p.8) «it is expected that more leveraged firms exhibit lower effective tax rates» mentioning that Richardson and Lanis (2007) and Kraft (2014) found a significant negative relationship between leverage, used as a proxy for capital structure, and effective tax rates (ETR). Therefore, if the cost of debt is lower than the return on investment, due to tax deduction of interest, the return on equity will increase.

Using a sample that comprises of 20 companies listed on the Bucharest Stock Exchange, and net profit and return on assets (ROA) as a measure of performance, and effective tax rate, firm size, asset structure, long-term debt and financial leverage, Pitulice et al (2016) analyzed the possible influence of corporate tax on the financial performance of a company; they found that the effective tax rate negatively influencing the dependent variable (ROA); net profit lower 5,63% compared to 0,32% in ROA.

Constantin (2012), regarding correlations between financial indicators and effective tax rate (ETR) found a negative relationship between assets ratio and ETR: an increase of 1% of the ratio between fixed assets and total assets, the effective rate of taxation on company level decreases with 0,3251%; relationship between ETR and ROE is negative; sales margin and ETR show an indirect relationship;

Xianyu (2011) found that that the tax burden on the macro and micro operating performance have a significant negative impact on the performance of listed companies in China.

The link between the effective tax rate and leverage, calculated as the ratio between debt and equity, occurs in some studies as being negative (Md Noor et al., 2010; Richardson and Lanis, 2007; Gupta and Newberry, 1997). The authors found that there is an insignificant negative relationship between corporate tax and financial performance using return on assets as a measuring variable.

A study conducted by Rotimi and Henry (2016) confirmed existence of significant relationship between corporate tax and performance of manufacturing companies in Nigeria. The results showed a negative relationship between corporate income tax and "earnings per share", «indicating is that a unit increase in tax expenditure reduces earnings per share by approximately 38.3percent, during the period under review» (p. 22).

Regarding the component "assets turnover", Soliman (2008) studied the decomposition of earnings which is asset turnover, profit margin and market's association with the DuPont components both in long and

short-window tests. He found that asset turnover has an explanatory power for future changes in "return on net operating assets".

Methodology

Objectives

The tax burden is always an important factor that reduces the profits available to shareholders. The impact could be higher or lower considering the tax rates, the tax benefits, tax incentives, and the tax adjustments to the "profits before taxes" in order to compute the "taxable profit". Therefore, depends on the tax law and, consequently, is dependent of the country in analysis. Thus, the main objectives of this study are: (i) to analyze the tax effect on the ROE, and (ii) compare it with the other DuPont factor effects.

Data and sample

The data was collected from the financial statements of listed companies in the French, German, Portuguese and Spanish stock markets available in Amadeus database (https://amadeus.bvdinfo.com). The accounting information needed for the study is the data about pre-tax income, net income, EBIT, sales, total asset turnover and equity. After getting the information from the database (2019, March), the data was analyzed and treated in order to avoid biased results. The data was obtained from the financial statements of 2017, therefore, the analysis is cross-sectional. In the process of preparing the data several companies were dropped according to the following guidelines:

   a) Financial Institutions entities were removed from the database because they use a different accounting system with specific accounting standards, consequently, the financial information is not comparable for the purposes of this study;
   b) Companies with values considered outliers, that could bias the results (e.g. ROE values greater than 100% and negatives values);
   c) Companies were values for the variables were missing, not allowing the ratios calculation.
   d) Companies without activity in 2017;
   e) Companies which did not paid corporate income tax in 2017:
   f) Companies without interest burden ("positive" interest burden; i.e. interest income higher than interest expenses)

As a consequence of our approach, the database includes 516 listed companies from the following Stock Markets: France - 233, Germany – 199, Portugal – 18 and Spain – 66. Next, after identifying the extended DuPont model variables has been computed the values for those variables according to their formulas (see Table 2).

Variables

The variables used are the following: ROE, tax effect, interest burden, EBIT margin, asset turnover and financial leverage. Table 2 identifies the variables, its descriptions and formulas, and the expected association between each variable and ROE.

ROE is the dependent variable (the one which we intend to explain) and all the others are the independent variables (the ones that we expect to have some association/effect on the ROE). Regarding the type of association with ROE, all independent variables are expected to present a positive association. For example, the higher the tax effect ratio value, the lower the tax to be paid. In other words, if the ratio increases, the tax burden decreases. The same happens with the interest burden. Regarding the EBIT margin, the higher the ratio, the better. Concerning the financial leverage, the higher the ratio value, the greater the leverage level.

Table 2: Identification and description of the variables included in the extended model

Abbreviation	Variable	Description	Formula	Expected Association
ROE	Return on equity	Amount of income returned as a percentage of shareholders' equity	$\dfrac{net\ income}{total\ equity}$	n/a
tax_effect	Tax effect / tax burden	The proportion of the company's profits retained after paying income taxes%	$\dfrac{net\ income}{pré-tax\ income}$	+
interest_burden	Interest burden	Measures the effect on interest on ROE	$\dfrac{pré-tax\ income}{EBIT}$	+
EBIT_margin	EBIT margin	Measures how much is left of revenue considering cost of goods sold and operating expenses	$\dfrac{EBIT}{sales}$	+
asset_turnover	Assets turnover	Measures the efficiency of a company's use of its assets in generating sales revenue	$\dfrac{sales}{total\ assets}$	+
leverage	Financial leverage	Is the use of borrowed capital to increase potential return of an investment	$\dfrac{total\ assets}{equity}$	+/-

Source: Author's own elaboration

Method

Regarding the method of analysis, the traditional Ordinary Least Squares (OLS) regression method is used in this study to identify the most relevant indicators that explain the changes on ROE and to quantify the relation between each indicator and the return on equity. Therefore, the OLS regression method is applied to determine which variables have the most explanatory/association power on the ROE's variations.

The complete linear regression model would be presented in equation (2). The application of the OLS method to the equation (1) requires the use of logarithms, so the equation that will be estimated is the following one:

$$l\_ROE_i = \alpha + \beta_1 l\_tax\_effect_i + \beta_2 l\_interest\_burden_i + \beta_3 l\_EBIT\ margin_i \\ + \beta_4 l\_assets\_turnover_i + \beta_5 l\_leverage_i + e_i \tag{2}$$

To analyze the factors individually, the simple linear regression models are the following:

$$l\_ROE_i = \alpha + \beta_1 l\_tax\_effect_i + e_i \tag{3}$$

$$l\_ROE_i = \alpha + \beta_1 l\_interest_i + e_i \tag{4}$$

$$l\_ROE_i = \alpha + \beta_1 l\_EBIT\_margin_i + e_i \tag{5}$$

$$l\_ROE_i = \alpha + \beta_1 l\_assets\_turnover_i + e_i \tag{6}$$

$$l\_ROE_i = \alpha + \beta_1 l\_leverage_i + e_i \tag{7}$$

Results and Discussion

According to the sample used, the statutory income tax rate and ETR might also help to understand the statistical results. The effective tax rate (ETR) should be computed using the adjusted tax base for each country. In other words, we have to adjust the accounting profit to reach the taxable profit. Thus, the tax adjustments depend on the corporate tax law for each country. Due to tax privacy rules, the data is available

but not released by tax authorities. Therefore, the ETR shown in the next table (Table 3) are based on the accounting profit (income before tax). The statutory tax rates in the mentioned countries were the ones presented in Table 4, for the year in analysis (2017), according with the KPMG[1]

Table 3: Effective tax rate by country

Country	ETR
Portugal	18,76%
Spain	22,54%
France	25,39%
Germany	23,66%

Source: Authors' own elaboration

Table 4: Statutory tax rate

Country	Statutory tax rate
Portugal	21,00%
Spain	25,00%
France	33,33%
Germany	29,79%

Source: KPMG

At first sight, we can see that the effective tax rate is lower than the statutory tax rate. This could mean that in all countries the tax adjustments (it might include tax planning) lead to a lower taxable profit and, consequently to decrease the tax burden.

The next table shows the descriptive statistics in relation to all variables. Regarding the interest burden, the standard deviation is considerably higher than for the other ratios/indicators.

Table 5: Descriptive statistics

Variable	Unit	Mean	Minimum	Maximum	Standard deviation	Coefficient of variation (CV)
Tax effect	%	71,134	0,519	99,904	16,006	22,501
Interest burden	%	81,494	1,902	100,000	17,351	21,291
EBIT margin	%	19,149	0,305	501,560	45,930	239,850
Assets turnover	€	0,965	0,019	5,895	0,621	64,404
Financial leverage	€	2,733	1,002	14,316	1,493	54,611
ROE	%	12,484	0,036	64,575	9,011	72,181

Source: Authors' own elaboration using data collected from Amadeus database on 11.03.2019

Tax effect on ROE

Based on the data and using the OLS method (equation 3) the results show a strong impact of corporate taxation on the "return equity". The following table shows the results obtained – the OLS estimated coefficient, the standard error and the level of significance. It also presents the results for the coefficient of determination $\left(R^{2}\right)$ and the test for joint statistical significance (in this case the same as the level of significance since the model presents just one single explanatory variable). The same indicators will be presented in Tables 6 to 10.

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[1] https://home.kpmg/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/corporate-tax-rates-table.html

Table 6: Tax effect on ROE

	Estimated coefficient	Standard error	Level of significance
Constant	-1,906	0,047	***
l_tax_effect	1,198	0,083	***
	R²= 0,288		
	F(1,514)= 208,325 Valor P(F)= 0,000		

*Note: *** significance level of 1%.*

Source: Authors' own elaboration using data collected from Amadeus on 11.03.2019

As can be seen, if the tax effect increases (tax paid decreases) by 1% the ROE will increase 1,20%. Considering that we are using only one variable, the explanation power of the model ins not so bad – by itself the variations on the explanatory variable explain approximately 29% of the ROE variations.

Interest burden effect on ROE

Using equation (4) we assess the impact of interest burden on ROE. The results are presented in Table 7.

Table 7: Interest burden effect on ROE.

	Estimated coefficient	Standard error	Level of significance
Constant	-1,976	0,040	***
l_interest_burden	1,635	0,098	***
	R²= 0,350		
	FF(1,514)= 276,454 Valor P(F)= 0,000		

*Note: *** significance level of 1%.*

Source: Authors' own elaboration using data collected from Amadeus on 11.03.2019

According to the results, if the interest burden changes +1%, the ROE will change +1,64%%. Once again we have to be aware that when the interest burden value increases, the interest paid decreases. However, the model only explains about 35% of the ROE variations, a prediction value higher than the one found for the tax effect (Table 6).

EBIT margin effect on ROE

The EBIT margin effect is computed using equation (5). On the next table (Table 8) we can see the impact of this variable over ROE.

As can be seen in the table, the impact of EBIT margin over the ROE is about 0,33%. In other words, considering a significance level of 1% (or in other words a confidence level of 99%), a variation of 1% in the EBIT margin will improve the ROE in 0,33%. The evidence is statistically significant, however, this factor only accounts for 13% to explain the ROE.

Table 8: EBIT margin effect on ROE.

	Estimated coefficient	Standard error	Level of significance
Constant	-1,599	0,096	***
l_ EBIT margin	0,329	0,037	***
	R²= 0,130		
	F(1,514)= 76,900 Valor P(F)= 0,000***		

*Note: *** significance level of 1%.*

Source: Authors' own elaboration using data collected from Amadeus on 11.03.2019

Assets turnover Effect on ROE

The effect of assets turnover is measured using equation (6). The results do not show a higher impact over ROE (see next table – Table 9). They contribute to a better ROE performance; although not so significant as the previous factors. Additionally, the explanation power of the model is very weak – just 0,9%. Nonetheless, the result is statistically significant.

Table 9: Assets turnover effect on ROE

	Estimated coefficient	Standard error	Level of significance
Constant	-2,342	0,042	***
l_assets turnover	0,099	0,046	**
	R^2= 0,009		
	F(1,514)= 4,588 Valor P(F)= 0,033***		

*Note: *** significance level of 1%.*

Source: Authors' own elaboration using data collected from Amadeus on 11.03.2019

Financial Leverage effect on ROE

Finally, the financial leverage effect can have a positive or a negative effect over the ROE. Depends the profits or the losses. In this case, the effect is positive (see Table 10). The leverage shows an impact over ROE of 27,6%; that is, if financial leverage increases 1% the ROE will increase 27,6%. However, the explanation power of the model is very weak, like assets turnover; only 1%. The result is statistically significant.

Table 10: Leverage effect on ROE.

	Estimated coefficient	Standard error	Level of significance
Constant	-2,618	0,093	***
l_financial_leverage	0,273	0,093	***
	R^2= 0,016		
	F(1,514)= 8,531 Valor P(F)= 0,004		

*Note: *** indicates a significance level of 1%.*

Source: Authors' own elaboration using data collected from Amadeus on 11.03.2019

Discussion and comparative analysis between factors

Tax effect. Comparing all the Dupont model factors, for the sample analyzed, we can say that "interest burden" and "tax effect" are the factors with more significant impact on ROE; The tax effect has the second higher negative impact over the return on equity (ROE), after "interest burden". *Per se*, the tax effect explains more than one-quarter of the ROE variations. Furthermore, the explanation power of the model used is the second highest. In regards to the "tax effect", the results are in line with the literature (e.g. Constantin, 2012; Xianyu, 2011; Pitulice et al., 2016), showing a negative (and significant) impact of this factor on companies performance.

Interest burden. "Interest burden" also shows a significant impact on companies' performance

Ebit margin. Ebit margin effect has some impact on ROE; however, per se, the model seems to have a weak explanatory power. Delen, Kuzey & Uyar (2013) conclude that ROE is largely affected by *earnings before tax to-equity*, net profit margin, leverage and sales growth ratios.

Asset turnover. Regarding to "assets turnover", contrary to some literature (e.g. Soliman, 2008) we have not found evidence of a significant impact of this factor on companies' performance; in line with Md Noor et al. (2010), Richardson and Lanis (2007), and Gupta and Newberry (1997).

Leverage effect. Concerning to the "leverage effect", the impact on companies' performance was not considerable and, as previously mentioned the model shows no explanatory power, which is not in line with the evidence obtained by Richardson and Lanis (2007) and Kraft (2014) - found a significant negative relationship between leverage, used as a proxy for capital structure, and ETR.

Conclusion

Using data from companies listed in the French, German, Portuguese and Spanish stock markets, we analyzed the importance of the tax effect simultaneously with other components of the DuPont model. The analysis was done considering the components separately. We also concluded that the effective tax rate is lower than the statutory tax rate for all countries. In terms of statutory tax rates, the differences between countries are significant, from 21% in Portugal to 33,33% in France. However, in terms of effective rates, the gap between countries is not so high – from 21,36% in Portugal to 25,39% in France.

In relation to DuPont model factors, where the tax burden is included, the evidence shows that taxation plays an important role in order to explain the ROE. The tax effect, *per se*, explains about 29% of the ROE. In terms of impact over ROE, if the tax effect increases 1% (i.e. tax paid decreases, according to the model), the ROE increases 1,20%, which shows the importance of this factor in the process of decision-making in relation to investments decisions. Interest burden is the factor that have the strongest impact on ROE and explains approximately 35%.

Limitations

The analysis was done using companies from all countries (global sample), being important in future research to extend the analysis for each country to have in consideration the differences in the ETR. The conclusions of this study should be considered taking into account the context of the DuPont model. From the initial sample, we had to drop-off several companies due to the actual accounting process of deferred tax. When we think on DuPont model we might need to hold the following assumptions: taxes will decrease the profit before tax and interest burden also decreases the profit before interest paid. Nowadays, due to the general adoption of the international accounting standards (IAS, IFRS) from IASB, the accounting context for deferred taxes might not be well understood when using the DuPont model; we expect taxes to decrease the profit after taxes, not the opposite. Therefore, although we have removed from the sample companies showing profits after taxes higher than profits after taxes, the results may be influenced by deferred taxes.

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