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Investigation of Financial Performance and Market Value of Technology Firms With Dupont-Regression Analysis*

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ABSTRACT

The aim of this study is to investigate the determinants of financial performance and market value of technology sector companies in Turkey. We used DuPont Analysis with Multiple Linear Regression method to evaluate which components of DuPont Analysis; Profitability, Asset Efficiency, Leverage, determine financial performance of technology companies at which level. Afterwards, with the aid of DuPont Analysis and Multiple Linear Regression method, market values of technology sector firms are investigated to understand which components of financial performance is related with market value in the sector. This study reveals that main determinants of financial performance of technology firms are profitability and asset efficiency respectively. This study also shows that asset efficiency and equity multiplier have positive impact on market value of technology firms but explanatory power of these variables are very low (R2=0,075). According to the results of this study, profitability does not explain market valuation of technology firms. The most important contribution of this study to the current literature is that components of financial performance are not sufficient to explain market value of technology firms in Turkey. There are different determinants of market value of technology firms rather than financial performance components such as profitability, asset utilization efficiency and capital structure.

Keywords: *DuPont Analysis, Market Value, Technology Sector, Firm Performance*

Jel Classification*: M40, M21, G32*

Teknoloji Firmalarının Finansal Performansının Ve Piyasa Değerinin Dupont Analizi İle İncelenmesi

ÖZET

Bu çalışmanın amacı, Türkiye'deki teknoloji sektörü şirketlerinin finansal performansının ve piyasa değerinin belirleyicilerini incelemektir. Bu bağlamda öncelikle DuPont Analizi ve Çoklu Doğrusal Regresyon modeli kullanılarak DuPont Analizinin; Karlılık, Varlık Verimliliği ve Kaldıraç bileşenlerinden hangilerinin teknoloji sektörü şirketlerinin finansal performansı üzerinde ne düzeyde etkisi olduğu incelenmiştir. Daha sonrasında DuPont Analizi ve Çoklu Doğrusal Regresyon yöntemleri ile teknoloji sektörü firmalarının piyasa değerini açıklamada finansal performansın hangi bileşenlerinin sektördeki piyasa değeri ile ilişkili olduğu analiz edilmiştir. Bu çalışma, teknoloji şirketlerinin finansal performansının temel belirleyicilerinin sırasıyla karlılık ve varlık verimliliği olduğunu ortaya koymaktadır. Bu çalışma aynı zamanda varlık verimliliği ve öz sermaye çarpanının teknoloji firmalarının piyasa değeri üzerinde olumlu etkisi olduğunu, ancak bu değişkenlerin açıklama gücünün çok düşük olduğunu (R2 = 0,075) göstermektedir. Bu çalışmanın sonuçlarına göre karlılık, teknoloji firmalarının piyasa değerlemesini açıklamamaktadır. Bu çalışmanın güncel literatüre en önemli katkısı, finansal performans bileşenlerinin Türkiye'deki teknoloji firmalarının piyasa değerini açıklamakta yeterli olmadığının ortaya konulmasıdır. Kârlılık, varlık kullanım etkinliği ve sermaye yapısı gibi finansal performans bileşenlerinden ziyade teknoloji şirketlerinin piyasa değerinin farklı belirleyicilerinin olduğu çalışma sonucunda ulaşılan en önemli sonuçlardan bir tanesidir.

Anahtar Kelimeler: *DuPont Analizi, Piyasa Değeri, Teknoloji Sektörü, Firma Performansı*

JEL Sınıflandırması: M40, M21, G32

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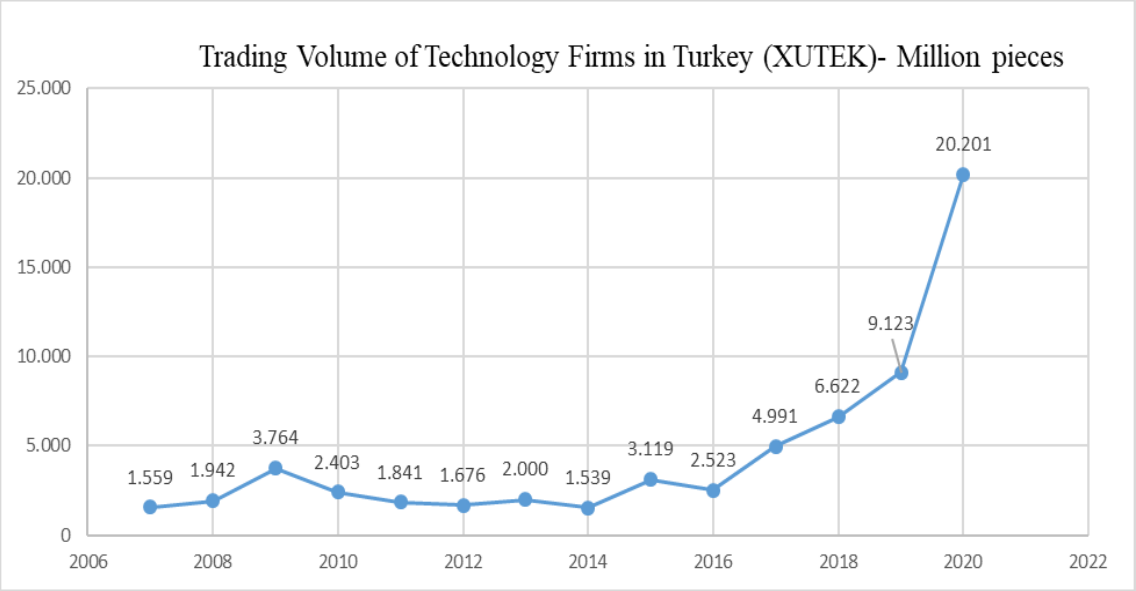
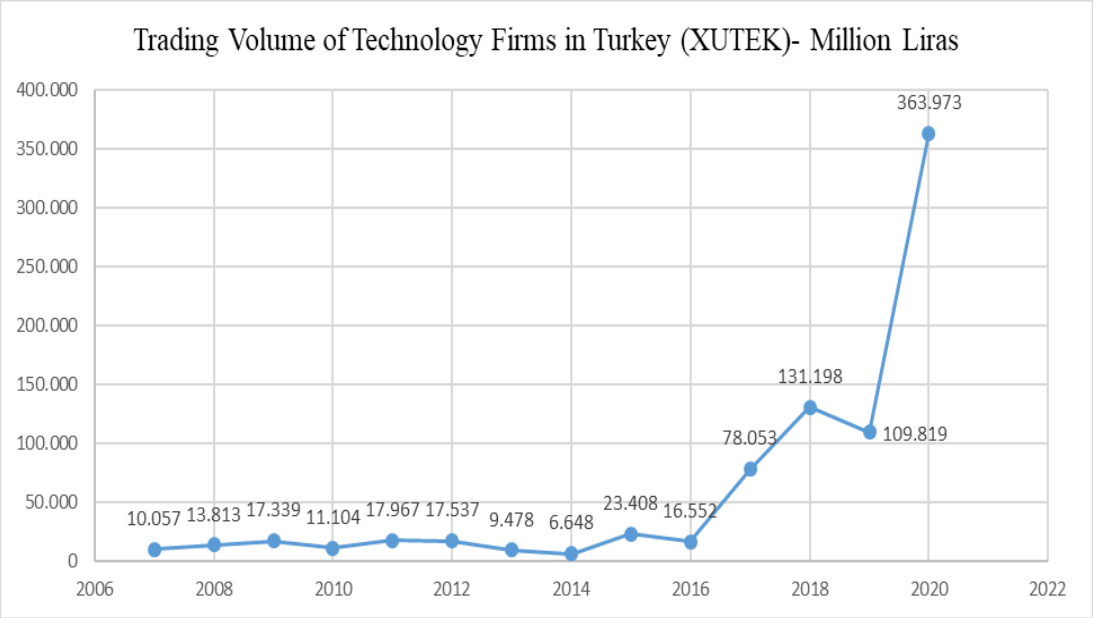
1. INTRODUCTION

Many investors use the information in the financial statements when making economic decisions about a business. Investors make predictions and analyzes for the future based on financial statements. Financial performance indicators such as Return on Assets (ROA), Return on Equity (ROE) and Return on Sales (ROS) ratios used in DuPont analysis are provided in these statements. With the sub-items of ROE in DuPont Analysis, many models that are used to make predictions of the future value of ROE have been presented. As a result of these analysis, investors are informed about financial performance of businesses. However, when these ratios are used in enterprises operating in technology sector, obtained results do not seem very pleasant compared to other sectors. Despite the fact that the demand for stocks of technology companies is quite high.

Graph 1 shows annual trading volume of technology sectors (XUTEK) firm in Turkey as number of shares between 2007-2020. Also graph 2 demonstrate annual trading volume of the firms in Turkish Liras for the same period. Graph 1 and 2 indicates that the demand for technology sector firms have been increased steeply between the last 10 years, especially between the period of 2016 to 2020. Not only the number of traded shares increased, but also the trading volume as Turkish Liras increased incredibly as well. As graph 1 and 2 shows, we believe that this incredible increase in trading volume of technology firms in Turkey will continue in the future according to the trend in the market. Therefore, investigating and understanding the determinants of financial performance and market value of technology firms have been becoming an important research topic in modern finance theory.



Graph 1. Trading volume of Technology Firms as number of shares (XUTEK Index)



Graph 2. Trading volume of Technology Firms as Turkish Liras (XUTEK Index)

Our study aims to investigate financial performances and market values of technology companies in Turkey whose shares are traded in Istanbul Stock Exchange from financial management and accounting points of view via using DuPont Analysis. The main motivation behind this study is that there are not many studies which use Dupont Analysis to explain technology sector firms' financial performance and market value. Generally, researchers tried to investigate technology firms' financial performance with other factors that have been thought to have relationship with performance of technology firms. But in this study, we tried to explain technology firms' financial performance and market value with DuPont Analysis. The reason of choosing DuPont Analysis as the main method of this study is that DuPont Analysis allows one to understand and analyze the sources of financial performance by decomposing the performance output of a firm as profitability, efficiency and capital structure.

2. LITERATURE REVIEW

In many studies in the literature, DuPont Analysis elements are mainly related to furniture and health industries. We decided to use DuPont Analysis on technology sector. Because this method was not used on technology sector, and this method has been demonstrated to have a significant effect on estimating the ROE ratio in industries. There are some studies to explain relations between technology-based firms and these firms' financial performance (Soriano (2010), Wu and Wang (2007), Rojas et al. (2011), Reuber and Fisher (1994), Mason and Harrison (2004), Im and Workman (2004), Poutziouris et al. (2000)). Our main motivation is to investigate how the components of DuPont Analysis affect technology sector firm's performance and market value. There are some studies in the current literature using DuPont Analysis to explain firms' financial performance. Some of these studies are mentioned below.

In the study of Akyüz et al. (2019), DuPont Profitability Analysis, one of the financial analysis techniques was examined. In the study, 178 enterprises operating in the manufacturing sector were considered, and the financial performances of the enterprises between 2015-2017 were analyzed with the DuPont financial analysis technique from a sectoral perspective, considering their profitability. As a result of the research, they revealed that the enterprises used their assets more efficiently in 2016-2017. They also emphasized the use of financial leverage.

Karadeniz et al. (2019) investigated the profitability of hotel businesses traded in European capital markets using DuPont Analysis technique. In addition, in the context of the variables used in the DuPont Analysis Technique, they tried to identify the variables that affect the return on assets and return on equity of hotel businesses. They analyzed the return on assets and return on equity of 76 hotel businesses, whose shares are traded on the stock exchange, for the period 2007-2016, using panel data method. As a result of the study, it has been determined that while the effect of net profit margin on the asset profitability of public hotel enterprises in Europe is positive and significant, the asset turnover rate does not have a significant effect. It has been determined that the asset turnover ratio does not have a significant effect on profitability as well as in return on assets.

Pudake and Soni (2015) investigated the financial performance of the best 12 Banks operating in India over a six-year period using DuPont Analysis. As a result of their studies, they revealed that the performance of banks cannot be evaluated only with profitability.

In their study, Praveena and Mahendran (2013) stated DuPont Analysis as the best method to analyze the performance of enterprises. They used the data of sugar businesses between 2007 and 2012 in their research and implied DuPont Analysis. As a result of their analysis, they revealed that sugar businesses have good profitability and that they can increase their financial performance by improving their asset turnover ratio.

Raza et al. (2013) argued that investors do not always choose the most profitable companies when making stock purchasing decisions. The scope of the research was the insurance companies operating in the Asia region. As a result of their studies, they claimed that investors should prefer the effort method rather than the effect method when making their decisions.

Almazari (2012) aimed to measure the financial performance of Jordanian Arab Bank by using the DuPont Analysis method with the data between 2000-2009. As a result of the study, it has been revealed with the DuPont Analysis Method that Jordanian Arab Bank benefited less from financial leverage and the economic crisis negatively affected the financial performance of the bank.

In his study, Doorasamy (2016) aimed to measure the financial performance of companies by using the data of 2013-2014 of the best 3 businesses in the food sector, included in the JSE list. DuPont Analysis was used to measure financial performance. In the study, the data from Tiger Brands, Pionner Foods and RCI businesses were examined. As a result of DuPont Analysis, it was revealed that Tiger Brands business is more profitable than other businesses.

In her study, Botika (2012) investigated abnormal returns of stocks in Romanian Capital Market for a period of 2007-2010. In the study, components of the DuPont Analysis: Profitability Ratio, Leverage and Asset Turnover Ratio were used to explore to identify which components is most likely to influence the abnormal returns in Romanian Capital Market As research method Ordinary Least Squares is exercised. The results of the study indicated that components of DuPont Analysis are important factors that explain the abnormal stock returns in the market.

Benjamin et al. (2018) investigated the informative level of the DuPont Analysis Method in explaining the dividend distribution policy. In the analysis, they used the data of Malaysian companies between 2004-2009. As a result of the study, they found that the profit margin and asset turnover ratio are strong explanatory variables to explain dividend payout decisions.

In their study, Herciu et al. (2011) showed with DuPont Analysis that the companies which make the most profit are not the ones who attract the most attention from investors. In doing so, (twenty of the world's most profitable companies are chosen in this study as a sample), it has revealed that investors who take ROA, ROE and ROS ratios into account do pay attention to the ranking of the most profitable companies.

In his study, Rogova (2011) used DuPont Analysis to reveal the factors of effectiveness by using financial data of the oil extraction enterprises included in The Energy Intelligence TOP 100 between the years 2008-2012. In his study, he examined the factors affecting ROE on the basis of regression analysis. As a result of the study, ROE values of all three firms were found to be similar to market indicators. In addition, the asset turnover ratio for these three companies was also below the average.

Sheela and Karthikayan (2012) analyzed the ROE and ROA ratios of the financial performances of 3 big pharmaceutical companies between 2003 and 2012 by using DuPont Analysis method. As a result of their analysis, they ranked pharmaceutical companies according to their performances and concluded that the best firm increased its profitability by reducing its costs and expenses.

Burja and Marginean (2014) revealed the factors affecting the performance of 5 major companies operating in the furniture sector with DuPont Analysis. In order to observe the effect of indicators in the profitability model, they have provided indicators and ROE calculation in a 13-year period. Using the Pearson Correlation Coefficient calculation method, they revealed the positive correlations between ROE and asset turnover ratio with other indicators of the model.

Bauman (2013) studied the relationship between ROA and Profit Margin changes. He found that profitability with DuPont Analysis and then created a model to estimate the ROA of the next year using regression analysis. He concluded that asset turnover is effective in predicting future ROA, but profit margin is not.

Turner et al. (2015) analyzed the profitability of hospitals using DuPont Analysis. As a result of their studies, they revealed that public companies have higher profitability and work with higher efficiency. When the Multiple Linear Regression model is applied, ownership,

size, critical access designation, location, and system affiliation have a significant relationship with ROE. All of the models for the ROE, profit margin, asset utilization efficiency, and equity multiplier have large F statistics that are significant at the <.0001 level.

In their study, Büyükarıkan and Eryılmaz (2020) analyzed the financial performances of 4 agricultural companies operating in the BIST with the DuPont Analysis method by using the data of 2012 and 2013. They applied regression analysis and ANOVA test to analyze the relationship between active capital and DuPont components. According to their results, it has been determined that the low net profit margin in agricultural enterprises also negatively affects the percentage of investment profitability. It is thought to be due to low profitability of sales and high costs.

Soliman (2008) stated that DuPont Analysis is very useful in understanding financial performance. In his study, he found that the change in asset turnover ratio produces consistent results in predicting the future ROE.

In the third part of the article, DuPont Analysis is briefly explained. In the fourth part, the methodology used in the research is explained in detail. In the fifth part the obtained findings were analyzed and discussed. Last part of this article consists a general evaluation and conclusion of the study.

3. DUPONT ANALYSIS TECHNIQUE

DuPont Analysis Technique is a financial analysis technique that evaluate the sources of a firm's earnings to shareholders, or in other words return on equity. Return on Equity (ROE) measures the rate of return of a firm on shareholders' investment to the company (Brigham et al., 1999).

$$\text{ROE} = \frac{\text{Net Income Available to Common Stockholders}}{\text{Shareholders'Equity}} \qquad (1)$$

To understand the ability of a firm's creating profit, or return to shareholders, DuPont analysis can be expanded by decomposing the formula given in Equation 1.

$$\text{ROE} = \frac{\text{Net Profit}}{\text{Shareholders'Equity}} = \frac{\text{Net Profit}}{\text{Revenue}} \text{x} \frac{\text{Revenue}}{\text{Total Assets}} \text{x} \frac{\text{Total Assets}}{\text{Shareholders'Equity}} \quad (2)$$

Equation 2 shows the components of a firm's profitability to shareholders. This analysis shows how the return on equity of a firm is affected by its asset turnover, profit margin and leverage. We can basically visualize this approach in Equation 3.

$$\text{ROE} = \text{Profit Margin x Asset Turnover Ratio x Equity Multiplier} \quad (3)$$

With DuPont Analysis, earning power of equity can be analyzed based on profit margin, turnover ratio of assets and equity multiplier (Ercan and Ban, 2018).

Profitability: It is calculated by dividing net profit to net sales. Profit margin shows a firm's ability to create net profit based on its total revenue. Profit margin represent operating efficiency in DuPont Analysis.

Efficiency: It is calculated by dividing total revenue to total assets of a firm. Asset turnover indicates that how efficiently a firm uses its assets to create revenue. With this ratio, a firm's efficiency to use its assets is evaluated in DuPont Analysis.

Capital Structure: Capital structure is represented by Equity Multiplier. Equity Multiplier is calculated by dividing total assets to shareholders' equity. It represents the efficiency of financial leverage of a company.

4. RESEARCH METHODOLOGY

4.1. Data Set

This study consists of two analysis. Firstly, we have investigated financial performance of technology sector in Turkey by using DuPont Analysis Technique. We used three components of DuPont Analysis; Profitability, Efficiency and Capital Structure ratios and analyzed with regression model to reveal the explanatory power of these components on firm performance. Secondly, the relationship between market value and DuPont Analysis components, Profitability, Efficiency and Capital Structure, is investigated.

Data set consists of 10 years periods on a quarterly basis. (2010-Q1 to 2019-Q4). The reason for selecting a period of 10 years is that number of technology firms whose shares are traded in Istanbul Stock Exchange are very low for longer than a 10 years period. Because of this reason the biggest and the most optimal data set for this research could only be constructed with a period of 10 years that cover years between 2010 to 2019.

Data is collected from quarterly financial statements of technology firms whose shares are traded publicly. Currently (2020) there are 19 firms in the market. But due to the lack of available information, we were able to analyze financial statements of only 10 firms. The names and firm size of the firms analyzed in this study are given in Table 1.

Table 1. Technology Firms in Turkey

Abbreviation	Firm Name	Total Assets TL (2019)	Total Assets USD (2019)
ALCTL	ALCATEL LUCENT TELETAS Telecommunication Inc.	812.107.073	136.815.100
ARENA	ARENA Computer Industry Trade Inc.	1.192.234.994	200.854.981
ARMDA	ARMADA Computer Systems Industry and Trade Inc.	1.102.475.147	185.733.203
DGATE	DATAGATE Computer Materials Trade Inc.	274.544.796	46.252.366
INDES	INDEKS Computer Systems Engineering Industry and Trade Inc.	2.267.675.276	382.033.639
KAREL	KAREL Electronic Industry and Trade Inc.	1.113.943.568	187.665.280
LINK	LINK Computer Systems Software and Hardware Industry and Trade Inc.	40.421.992	6.809.864
LOGO	LOGO Software Industry and Trade Inc.	775.732.272	130.687.064
NETAS	NETAS Telecommunication Inc.	2.006.190.715	337.981.521
PKART	PLASTIKKART Smart Cards Communication Systems Industry and Trade Inc.	102.316.285	17.237.152

Originally this study was supposed to consist of 400 observations. But our analysis showed that there are some outliers in data set that make the results irrational. To make the analysis better, outliers are cleared in data set. In order to achieve this goal, make the analysis purer and more robust, following statistical procedure is applied to all variables in this study. Thus, dataset is cleared from outliers (Bluman, 2018);

Step 1: Data is arranged in order from lowest to highest to find Q1 and Q3 values,

Step 2: Interquartile Range (IQR) is calculated by taking differences of Q3 and Q1 values,

Step 3: Interquartile Range is multiplied by 1,5,

Step 4: The value which is calculated in Step 3 is subtracted from Q1 and added to Q3.

Step 5: Observed values that are lower than Q1-(1,5 IQR) and higher than Q3+(1,5 IQR) are cleared from data set.

4.2. Research Models

In the scope of this study, we applied two regression models for two purposes. Multiple Linear Regression (MLR) method is used by using financial data of technology firms in Turkey. For analysis in this study, SPSS (Statistical Package for Social Science) program is used. All analyzes are made at a 95% confidence level and the results are interpreted. Abbreviations of variables of models are given in Table 2.

Table 2. Variables Abbreviation

Variable Abbreviation	Name
ROE	Return on Equity
NPM	Net Profit Margin
ATR	Asset Turnover Ratio
EM	Equity Multiplier
MV/BV	Market Value to Book Value

Model 1

$$ROE_{i,t} = \beta_0 + \beta_1 NPM_{i,t} + \beta_2 ATR_{i,t} + \beta_3 EM_{i,t} + \varepsilon_{i,t} \qquad (4)$$

First model is a classical DuPont Analysis model that measures how a firm's performance is affected by three main variables; Profitability, Asset Usage Efficiency and Capital Structure. With this model, it is aimed to show which variable is the most dominantly determinant on a firm's financial performance in technology sector in Turkey.

Model 2

$$MV/BV_{i,t} = \beta_0 + \beta_1 NPM_{i,t-1} + \beta_2 ATR_{i,t-1} + \beta_3 EM_{i,t-1} + \varepsilon_{i,t} \quad (5)$$

In second model, technology firms' market value is evaluated by using financial performance components. As financial performance variables, components of DuPont Analysis are selected. In short, this study integrates DuPont Analysis and Multiple Regression Analysis to investigate market value of technology companies in Turkey. To represent market value, Market-to-Book Ratio is selected as dependent variable rather than share prices because this ratio eliminates possible mistakes due to firm specific price fluctuations such as stock repurchase, stock split or reverse split etc.

In model 2, the values of independent variables in the t-1 period are used while dependent variable is selected from period t. The reason for this is that independent variables are considered as lagged explanatory variables. In Turkey, financial reports are declared to the public after some time passes (after a certain period of time). These reports are usually delayed one or two months. Therefore, investors' reaction, so the fluctuation on stock prices to firms' financial performance occurs after accounting period ends. For these reasons, one period (Quarter) delay is placed between dependent and independent variables in the second model.

5. FINDINGS AND DISCUSSION

5.1. DuPont Analysis of Technology Sector (Model 1)

In this first analysis, we examined the financial performance of technology firms with DuPont Analysis by using Multiple Linear Regression method. Descriptive statistics for the first model used in this study is given in Table 3. As it can be seen in Table 3., ROE is approximately 5,6% with a moderate level of standard deviation of 6,33%. Average profit margin of technology sector is 2,25%. Despite ROE, standard deviation of NPM is relatively low, 2,95%.

Table 3. Descriptive Statistics for Model 1.

Descriptive Statistics			
	Mean	**Std. Deviation**	**N**
ROE_t	0,05722	0,063327	289
NPM_t	0,02204	0,029563	289
ATR_t	1,14723	0,757134	289
EM_t	2,88754	1,285523	289

In Table 4., Pearson Correlations of variables are given. As Table 4. shows, there are negative and low degree of correlation between efficiency and profitability variables. Profitability variable also shows an adverse and low degree of correlation with capital structure. Lastly, it is observed that correlation between efficiency and equity multiplier is positive and the degree of relationship is low for technology industry.

Table 4. Correlation Coefficients for Model 1

Correlation Coefficients			
	NPM_t	**ATR_t**	**EM_t**
NPM_t	1,000		
ATR_t	-0,199	1,000	
EM_t	-0,286	0,283	1,000

Regression analysis results are given in Table 5. This model reveals the explanatory power of three components of DuPont Analysis on financial performance. Model results shows that independent variables used in this study have high degree of explanatory power on dependent variable (Adj. R2=0,679; p<0,05). The components of DuPont Analysis explain 67,9% of the variance of the financial performance.

Table 5. Regression Model Summary

Model Summary								
R	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Change Statistics**				
				R Square Change	**F Change**	**df1**	**df2**	**Sig. F Change**
,826	0,682	0,679	0,035884	0,682	203,992	3	285	0,000

To test whether the regression model is statistically significant or not, ANOVA test is done. Table 6 shows ANOVA test results of regression model. As it can be seen in Table 6, regression model is statistically significant at 95% confidence level (F=203,992; p<0,05)

Table 6. ANOVA Test Results

ANOVA					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Regression	0,788	3	0,263	203,992	,000
Residual	0,367	285	0,001		
Total	1,155	288			

Multicollinearity problem is a situation which occurs when independent variables correlate highly each other in a multiple regression model. This is an unwished situation for the significancy of regression model. To test multicollinearity problem in the regression model, VIF and Tolerance test are carried out. VIF and Tolerance test results are given in Table 7. All VIF values are below 10 (Dagnaw, 2020) and Tolerance values are above 0,10 (Merard, 1955). There is no multicollinearity problem in the regression model.

Table 7. Regression Coefficients

Regression Coefficients										
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
(Constant)	-0,073	0,006		-11,316	0,000					
NPM_t	1,323	0,075	0,618	17,580	0,000	0,411	0,721	0,587	0,903	1,107
ATR_t	0,050	0,003	0,597	16,993	0,000	0,562	0,709	0,567	0,905	1,105
EM_t	0,015	0,002	0,310	8,631	0,000	0,302	0,455	0,288	0,865	1,156

Regression coefficients of the model is given in Table 7. It is found that all components of DuPont Analysis, Profitability, Efficiency and Leverage variables are statistically significant to explain ROE in this model. When profitability ratio is investigated, there is a positive and significant relationship between profitability and financial performance of technology firms. 1 Unit increase in profit margin also increases return on equity by 1,323 unit. Profit margin is the most powerful determinant of financial performance between all independent variables performed in the model ($t=17,580$, $p<0,05$, Adj. $\beta=0,618$). Efficiency which is measured by ATR (Asset Turnover Ratio), has also a positive and statistically significant relationship with ROE ($t=16,993$, $p<0,05$, Adj $\beta=0,597$). For Turkish technology firms, it can be said that 1 Unit increase in asset utilization efficiency also increases financial performance by 0,050. Lastly, regression model results show that debt usage positively affect financial performance in technology firms. The relationship between debt usage and financial performance of technology firms is statistically significant ($p<0,05$).

5.2. Market Value and DuPont Analysis in Technology Sector (Model 2)

In this second analysis, market value of technology firms is investigated with using the components of DuPont Analysis. Descriptive statistics of variables are given in Table 8. In technology industry, the mean of market value to book value ratio is 1,43. When MV/BV variable is investigated by firm level, it can be said that number of firms with abnormal valuations is low. There are not many firms with undervalued or overvalued market values in the industry.

Table 8. Descriptive Statistics for Model 2

Descriptive Statistics			
	Mean	Std. Deviation	N
MV/BV_t	1,43337	0,707342	288
NPM_{t-1}	0,02308	0,031261	288
ATR_{t-1}	1,13237	0,741172	288
EM_{t-1}	2,89590	1,284104	288

Correlation coefficients between independent variables are given in Table 9. Correlation coefficients table shows that NPM and ATR move reverse and power of the relationship between them are low. There is also a negative and low degree relationship between profitability margin and equity multiplier. For the relationship between asset utilization efficiency and equity multiplier, it can be said that there is a positive and low degree relationship between these variables. Table 9 results are almost the same with Model 1's correlation coefficients values.

Table 9. Correlation Coefficient of Variables

Correlations			
	NPM_{t-1}	**ATR_{t-1}**	**EM_{t-1}**
NPM_{t-1}	1,000		
ATR_{t-1}	-0,229	1,000	
EM_{t-1}	-0,282	0,336	1,000

Table 10. gives regression model summary for Model 2 which is developed to establish the relationship between market value of technology firms and financial performance components via using DuPont Analysis. This model shows that explanatory power of independent variables, DuPont Analysis Components (Profitability, Asset Utilization Efficiency, Capital Structure), on the market value of technology firms in Turkey is 7,5% (Adj. R2=0,075).

Table 10. Regression Model Summary

Model Summary								
R	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Change Statistics**				
				R Square Change	**F Change**	**df1**	**df2**	**Sig. F Change**
,274	0,075	0,066	0,683771	0,075	7,709	3	284	0,000

ANOVA test result of the regression model is given in Table 11. ANOVA results indicate that regression model is statistically significant at 95% confidence level (F=7,709; p<0,05). At least one of the independent variables has explanatory adequacy on market value of technology sector companies.

Table 11. ANOVA Test Results

ANOVA					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Regression	10,813	3	3,604	7,709	,000
Residual	132,782	284	0,468		
Total	143,596	287			

To test multicollinearity problem between independent variables in the model, VIF and Tolerance test are conducted. VIF and Tolerance tests results are given in Table 12. As the test results indicate, all VIF values are below 10 and Tolerance values are above 0,10. This means that there is no multicollinearity between independent variables used in this model (respectively; Dagnaw, 2020, Merard, 1955).

Regression coefficients of the model is given in Table 12. Three independent variables are used in the model to explain the market value of technology firms in Turkey. These variables are respectively; Net Profit Margin, Asset Turnover Ratio and Equity Multiplier. The regression model that is composed in this study reveals that only two independent variables have explanatory power on market value of technology firms which are Asset Turnover Ratio (t=-2,089; p<0,05; Adj β=-0,128) and Equity Multiplier (t=4,604; p<0,05; Adj β=0,286).

Table 12. Regression Coefficients

Regression Coefficients										
	Unstandardized Coefficients		**Standardized Coefficients**	**t**	**Sig.**	**Correlations**			**Collinearity Statistics**	
	B	**Std. Error**	**Beta**			**Zero-order**	**Partial**	**Part**	**Tolerance**	**VIF**
(Constant)	1,054	0,123		8,604	0,000					
NPM_{t-1}	2,644	1,361	0,117	1,943	0,053	0,065	0,115	0,111	0,900	1,111
ATR_{t-1}	-0,122	0,058	-0,128	-2,089	0,038	-0,059	-0,123	-0,119	0,868	1,152
EM_{t-1}	0,158	0,034	0,286	4,604	0,000	0,210	0,264	0,263	0,843	1,186

Regression model demonstrates that there is an inverse and statistically significant relationship between market value and a firm's ability to use its assets efficiently. 1 Unit increase in asset turnover ratio decreases firm's market value by 0,122 unit. This result may look illogical at first glance. But when a depth analysis is carried out this negative relationship between asset utilization efficiency and market value may not be surprise. Asset turnover ratio is calculated by dividing net sales by total assets and market value to book value which represent market value of technology firms is calculated by dividing market value of a firm to book value of its equity. If asset utilization efficiency has negative relationship with market value, there could be two reason for this.

Firstly, sales may increase at a higher degree than total assets which cause an increase in ATRt-1. At the same time, the effect of sales' increase more than total assets may have an impact on book value. Book value may increase from the effect of increment of net sales more than Market Value and cause a decrease in MV/BV. It may show that net sales' effect on book value (sales turn into net profit after tax which goes to equity directly) is higher than market value. If it is the case in this situation, we can say that market participants' sensitivity and reaction to net sales of technology companies so low that market value increases lower than book value.

Secondly, a firm's total assets might increase at a higher degree than net sales that cause a decrease in ATRt-1 and simultaneously the firm's MV/BV may increase as well. A higher increase in total assets than net sales could be an indicator of corporate growth, capacity increase and more opportunity in the future of that firm. This may be reflected to stock prices in this sector. Investors of technology firms may pay attention to growth of firms more than net sales. At the same time, firms' MV/BV may increase as well due to the increase in total assets. Increase in MV/BV could be caused by an increase in market value which is supposed to be higher than the increase in book value (of course, if a firm finance all of its new assets with debt, book value may stay same). Results of this study may indicate that for investors of technology firms in the Turkish capital markets, firm growth is an important determinant of stock selection. Thus, total assets' increases may directly increase market values of technology companies. It can be important indicator that technology firms are perceived as "Growth Stocks" rather than "Value Stocks" by investors.

According to the model results, we can say that there is a positive and statistically significant relationship between market value of technology firms and Equity Multiplier. As debt usage increase, market value also of technology companies also increases. It can be said that technology firms in Turkey utilize leverage effect of debt usage successfully. This success also reflected to stock prices This study reveals that there is no statistically significant relationship between net profit margin and market value of technology firms (p=0,053). This result shows that current profitability of companies is not a significant determinant of market value of technology firms. It may indicate that profitability of the firms does not reflected to stock prices in this industry. It may also be said that profitability is ignored in this sector when investors determine whether to invest a firm's stock.

6. CONCLUSION

The aim of this study is to investigate the technology sector firms in Turkey with perspectives of financial management and corporate finance with using DuPont Regression Analysis. For this aim, technology firms are analyzed in two ways. Firstly, DuPont Analysis with a Multiple Linear Regression model is performed on technology companies to understand the sources of financial performance. According to DuPont Analysis results, it is observed that all components of DuPont Analysis; Profitability, Asset Utilization Efficiency and Capital Structure, have positive and significant impact on the financial performance among technology firms in Turkey. This analysis exhibits that main sources of successful financial performance in technology industry is derived from the profitability and efficiently using its assets.

Afterwards, market value of technology industry firms is investigated. For this objective, a combination of DuPont Analysis and Multiple Linear Regression is used to examine market value of the firms. The model results indicate that profitability variable is not statistically significant to explain the market value of technology firms. Only two components of DuPont Analysis explain the market value of technology firms. These components are asset utilization efficiency which is measured by asset turnover ratio and capital structure which is represented by equity multiplier. The results of the analysis showed that different variables beyond financial performance are effective in determining the market value of technology firms. According to finance and valuation theories, value of any investment is determined by the sum of the discounted value of total utility that the investment will provide to the investor

during the investment's useful life. In equity market, the investment is represented by stock prices while the utility is represented by dividends. According to the analysis in this study, the valuation of stock prices in technology industry is not related with profitability. Even though asset utilization efficiency and capital structure have statistically significant impact on market value, their effect is too low to consider as substantial determinants of market value of technology firms (R2=0,075). So, there must be some other variables that explain valuation of technology firms' value rather than classical financial performance variables. Valuation of stock prices in this sector could be related to some other factors such as managerial quality, corporate governance, intellectual capital, R&D efforts, Key Employees or some other non-financial variables that has not been revealed. In short, in technology sector there are some other variables rather than financial performance indicators that investors think that the firms will provide more utility to them in the future. This could be an important research area for future studies. This study only consists of Turkish firms. A broader data set could reveal different and more comprehensive results.

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