THE EFFECTS OF PROFITABILITY RATIOS ON DEBT RATIO: THE SAMPLE OF THE BIST MANUFACTURING INDUSTRY

Özge KORKMAZ, PhD*

Abstract

The factors affecting debt levels of firms are related to the course of economy as well as the profitability of companies. But it is quite difficult to make a prediction about the course of economy. In this study, it is aimed to reveal how profitability indicators of companies affect debt levels.

The purpose of this study is to examine the relation between the debt and profitability ratios of the companies that operate on the BIST (Istanbul Stock Exchange Market) manufacturing industry by using Panel Regression Analysis. The data of the 86 companies within manufacturing industry on the BIST between the years 1994 and 2015 were used. Furthermore, the variables such as asset growth ratio, return on asset, current ratio, leverage ratio, cash rate, new borrowing rates, total financial liability/total liability ratio, return on equity, investment and earnings have been studied. It has been observed in the study that the active growth and the return on equity ratios affect the new borrowing variables positively while investment, current earnings per share ratios affect the new borrowing variables-negatively. In addition, it has been determined in the study that the return on investment, the return on assets and the current ratios affect the leverage ratio negatively while the active growth, the return on equity, the earnings and the cash ratios per share affect the leverage ratios positively. It has also seen that the active return on assets and the earnings per share ratios affect the total financial liabilities/total liability ratios negatively while the asset growth ratios affect the total financial liabilities/total liabilities ratios positively.

Keywords: Manufacturing Industry, Capital Structure, Turkish Stock Market, Panel Regression

JEL Classification: G3, L6, C23

* *Assistant Prof. Bayburt University, Faculty of Economics and Administrative Sciences, Department of Economics, ozgekorkmaz@gmail.com*

1. Introduction

The studies in the literature are based on two major points: those investigating the factors which affect the profitability of companies and those investigating debt ratios. In other words, it is possible to state that the majority of the studies in the literature focus on the factors affecting profitability or investigate the factors affecting the debt ratios based on capital structures. Moreover, the fact that there are no studies in the literature examining the effects of profitability on debt ratios draws attention. Therefore, it is considered that this study is going to fill this gap in the field and to contribute to the literature in this respect.

The profitability and debt ratios of companies affect each other. To illustrate, it is known that some companies make investments by borrowing, while some use their equities for investments. It is possible to say that in the case that companies receive profits from their investments, they will continue to grow or at least to maintain their continuity. Therefore, it is a fact that the factor determining the debt levels of companies which prefer borrowing is economic conditions. In other words, it is an undeniable fact that the profitability ratios of companies affect their debt levels. In this context, this study aims to research the relation between the borrowing and the profitability ratios of the 86 companies within the Istanbul Stock Exchange Market (BIST) for the period between 1994 and 2010. The variable elimination method has been employed in order to determine the variables indicating the financial structure and profitability of the companies. When determining the variables showing the financial and profitability structure of the companies, the Forward Stepwise-Wald method, which is a variable elimination method, has been used. Accordingly, active growth rate, return on asset, current rate, leverage ratio, cash rate, new borrowing and total financial liability/total liability ratios, return on equity, investment and earnings per share and leverage ratio variables as well as Panel Regression Analysis have been used in the study.

2. Literature review

Profitability and debt ratios, which give information about the financial statuses of companies, are important indicators. It has been observed that there are a great number of studies in the literature researching the profitability and debt ratios of companies.

Nissim and Penman (2003) conducted a study in which they researched the difference between the leverage effect that appeared in the transactions performed between the years 1963 and 2001. Also, they examined the effects of these leverages on profitability and equity capital values. The return on equity rates of all the companies within COMPUSTAT, net transaction return on assets, financial leverage rates, financial spread rates, net debt ratios, risk-free short-term interest rates after tax and the market borrowing rate variables were used in this study. Also regression analyses were employed. As a result of the study, it was found that the financial leverage and the transaction liability leverage affected the profitability positively. It was also seen that the price book value rates depended on the expected profitability. In addition, this study pointed out that these two leverage ratios affected the price book value rates, as well.

In another study carried out by Chen and Zhao (2005) for the period between 1972 and 2002, it was examined the inclination of the companies which had more profits for lower leverage ratios and the leverage ratios average rates of returns. Equity returns, changes in current debts, long-term debt emissions, equity share sales and purchase variables were used in this study. Moreover, they made use of OLS Method. In order to measure the leverage ratio, four variables were employed: total debts on the market value of the assets, long-term debts on the market value of the assets, total debts on the book value of the assets and long-term debts on the book value of assets. As a result of the study, it was found out that there was a negative relation between profitability and leverage ratios, and that the capital structure theory was valid.

Mansor, Mahmood and Zaprofitia (2007) conducted another study on the period between 1996 and 2003 in Malaysia. They examined the factors that affected the profitability and capital structure of the 25real estate companies and the 20 construction companies. The capital gearing, the rate of debts to equities, profit margin before tax, the value of the fixed assets, net profit margins, equity share profit rate variables were used in this study. Also, OLS Method was applied. As a result of the study, it was determined that the capital gearing had a negative effect on net profit margin and on price earnings ratios.

In another study conducted by Nobonee (2009), a comprehensive and integrative optimal cash conversion cycle model for business capital management were suggested. Accordingly, the

data belonging to the 5802 companies which were non-financial and which were listed on the NYSE, American Stock Exchange and on Nasdaq for the period between 1990 and 2004 were employed. The transaction returns to sales ratio, the receivables to sales ratio, the lists of goods to the cost of the sold commodities ratio, the receivables to the cost of sold commodities, the cash conversion cycle, the debts to equity capital ratio and the liquidity rates variables were used. In addition, GMM Dynamic Panel Data Analysis was carried out. As a result, it was seen that the recomended optimal cash cycle model increased the market values and the profitability of companies and maximized their sales.

Albayrak and Akbulut (2008) conducted a study and tried to reveal the factors that affected the profitability levels of the 55 companies that were active in the BIST industry and service sectors by evaluating the annual data belonging to the years between 2004 and 2006. In the study, return on assets, return on equity, profit margins, earnings per share were regarded as the dependent variables, while the liquidity rates, the efficiency of asset usage, the capital structure leverage rates, the market values and the company sizes were considered as the independent variables. Besides, variable elimination and Panel Regression Analysis methods were used. According to the results of Panel Regression Analysis Method, it was determined that the equity turnover and liquidity rate affected the profitability of the active assets negatively. It was also concluded that the financial structure variable, which was among the factors that affected the return on equity, caused a significantly positive effect, which was contrary to the expectations. In the model, the factors affecting the net profit margin were examined. It was determined that the liquidity rate, the stock turnover rate as well as the equity turnover rate affected the net profit margin negatively, which was contrary to the expectations. It was also observed that a similar situation was valid for the relation between the gross profit margin and short-term liability turnover rate, as in the relation between the activity profit margin and current rate.

As to Demirhan's study (2009), she examined the factors the capital structure of the companies that were active in the Istanbul Stock Exchange service sector. The data belonging to the 20 companies for the period between 2003 and 2006 were analyzed. Total debt/total active assets, short-term debt/total active assets, long-term debt/total active assets, total debt/equity, short-term

debt/equity and long-term debt/equity capital rates were used as the dependent variables, while profitability, company size, R&D expenses/sales, material fixed assets/total active assets, company risk rate, paid tax/profit before tax, finance expenses/total liabilities, current active assets/current passive assets and depreciation/total active assets rates were used as the independent variables. Moreover, the regression analysis was carried out. As a result of the study, it was determined that the most significant variables affecting debt levels of companies were the profitability, the company size, the structure of assets and the liquidity level.

Ata and Ağ (2010) conducted a study about the effects of company characteristics on capital structures of the companies that are active in the main metal industry and metal goods sector, machinery and tool manufacturing sector within Istanbul Stock Exchange. For this purpose, the annual data of the 42 companies listed on the Istanbul Stock Exchange between the years 2003 and 2007. In this study, Panel Data Analysis was applied. Furthermore, the debt level was used as the dependent variable, while the company size, the liquidity rate, the interest coverage ratio and the growth rate were used as the independent variables. As a result of the study, it was determined that only the company size affected the capital structure positively, and all the other variables affected it negatively. It was also concluded that the results of the study showed parallelism with the trade-off theory.

Akbulut (2011) conducted a research on the relation between company capital management and profitability. It was carried out among the 127 companies which were active in manufacturing sector within the Istanbul Stock Exchange. The return on assets was considered as the dependent variable, while the average collection duration of the receivables, the stock keeping process, the cash cycle, the active size, the growth rate and the leverage ratio were regarded as the independent variables. One-Way variance and regression analyses were employed in the study. As a result, a one-way relation was determined between profitability and company capital management.

In another study, Gülhan and Uzunlar (2011) analyzed the sample of Turkey in the period from 1990 and 2008 in order to determine the factors affecting active return on assets of local and foreign banks. In the study, in which Panel Data Analysis was applied, capital, activity expenses, liquidity, securities, non-performing

loans and growth variables were regarded as the specific variables for banks. Also, inflation and GNP growth rates were regarded as the macroeconomic variables, and sector share and intensifying rate were regarded as the sector variables. 18 local banks and 11 foreign banks were examined for the period between 1990 and 2000, and 11 local and foreign banks were examined for the period 2002 and 2008. It was concluded in the study that capital, personnel expenses, size, securities, inflation and sector share affected the active return on assets in the period between 1990 and 2000. On the other hand, in the regression models that were handled for the period between 2002 and 2008, the variables that affected active return on assets significantly were capital, personnel expenses, non-performing loans, GNP growth rate and sector share. It was also seen that all these results were valid for each of these three models: the local banks, foreign banks, and all the banks together.

Najjar and Petrov (2011) reseached the relation between the capital structure and the factors particular to the companies in insurance sector in Bahrain taking the period between 2005 and 2009. It was determined in the study that there was a positive relation among the leverage ratio of the insurance companies, their material fixed assets and total active assets. Also, there was a negative relation between the liquid assets and the leverage ratios.

Almajali and Alamro (2012) examined the performance of the 25 insurance companies listed on the Jordan Stock Exchange. The effects of liquidity, leverage and size variables on the performance of companies in the period between 2002 and 2007 were investigated in the study. As a result, it was found that there was a positive relation between the company performance and the relevant variables.

Saldanlı (2012) conducted a study and researched the effects of working capital management of manufacturing companies within 'Istanbul Stock Exchange 100' on profitability for the period between 2001 and 2011. In the study, return on assets was taken as the dependent variable, while receivables turnover rate, debt turnover rate, stock turnover rate, current rate, acid test rate, cash rate and net trade duration were taken as the independent variables. Besides, the linear regression analysis was applied. It was concluded that current rate, acid test rate and cash rate affected active return on assets negatively. Moreover, it was determined that the other variables did not have any significant effects on active profitability.

Sarıoğlu et al. (2013) conducted a study which the data of the companies publicly-traded on the BIST within cement, automotive and automotive subordinate industry and informatics sectors were taken as samples. The factors affecting the decisions of companies on capital structures were examined in the study. In addition, panel regression analysis was applied. Debt ratio was regarded as the dependent variable, while active profitability, return on equity, active growth, acid-test rate, period depreciation expenses/total active assets, material fixed assets/total active assets and annual renewal growth rates of sales were regarded as the independent variables. As a result, it was concluded that the active size and profitability rates were effective on debt ratios in the cement sector. The growth rate of the sales was effective on the debt ratios in automotive sector, while the size, the asset structure and the sales had effects on debt ratios in the informatics sector.

In another study, Elitaş and Doğan (2013) aimed to investigate the factors determining the capital structures of the insurance companies functioning within the Istanbul Stock Exchange in the scope of trade-off theory. In this context, they made use of the data of insurance companies pertaining to the period between 2005 and 2011. Also, they used leverage ratio as the dependent variable, while fixed asset rates, return on assets, total assets rates, premium rates and current rates were used as the independent variables. As a result of the regression analysis, it was determined that the fixed assets ratio in the assets of the insurance companies, the current ratio, active return on assets rates and premium increase percentage and active size rates were effective on the capital structure.

Korkmaz and Karaca (2014) conducted a study which aimed to determine the elements affecting profitability for manufacturing companies. They made use of the data belonging to the 78 companies that were active within Manufacturing Industry Index on the Istanbul Stock Exchange between the years 2000 and 2011. They also made use of panel regression analysis. Earnings per share, net profit/equity capital, net profit/total active assets, total active assets growth, net sales/total active assets, sold product cost/stocks, net sales/commercial receivables, current rate, fixed asset/total active assets, material fixed assets/long-term foreign resources, net sales/fixed assets and total liabilities/total active assets variables were used in the study. As a result, it was found that the fixed assets were financed through the long term foreign resources and that the

companies preferred financing their fixed assets with equity capitals rather than the long term foreign resources. It was also concluded that in the case that the share of the fixed assets increased in the active assets, the active return on asset rates decreased.

Erdoğan (2015) carried out a research to determine the relation among growth possibility, leverage ratio, matured liability, and total investments by using the data of the 290 companies that were active on the BIST between the years 1996 and 2012. Besides, the regression analysis was applied. Leverage rate, debt maturity rate and total investment rates were taken as the dependent variables; market value/book value (PP/DD) rate, material fixed assets rate, non-debt tax shield rate, return on equity, company size, asset maturity structure rate and cash flow rate were taken as the independent variables. As a result of the regression analysis, it was found that there were no relations between the debt maturity and leverage ratio; however, there was a negative relation between the PP/DD rate and debt maturity rate. In addition, it was also determined that the long-run loans had a decreasing effect on investments.

When the literature is examined, it is possible to state that the studies that have been conducted so far have focused on the factors affecting the profitability and the debt ratios based on the capital structures. In addition, it points out that there are no studies examining the effects of profitability ratios on debt ratios. Therefore, this study can be considered to be original from this aspect.

3. Dataset and Methodology

The data belonging to the companies in manufacturing industry within the Istanbul Stock Exchange (BIST) between the years 1994 and 2010 have been examined in this study. The variables that indicate the financial structures and the profitability of the companies have been used in the study. These variables are given in Table 1.

Table 1

Variables

Abbreviation	Variables	Formula
AGR	Active Growth Rate	((Total Assets$_t$ / Total Assets$_{t-1}$)-1)*100
ROA	Return on Assets	(Net Profit / Average Total Assets)*100
CR	Current Rate	Current Asset/ Short Term Loans

EPS	Earnings per share	Net Profit / Total Number of Shares
ROI	Return on Investment	(Gain from Investment-Cost of Investment)/Cost of Investment
LR	Leverage Ratio	Total liabilities/ Total Assets
CAR	Cash Ratio	(Ready Liquid Assets + Stocks and Bonds) / Short Term Liabilities
ROE	Return on equity	Net Profit / Equities
TFTD	Financial Liabilities	Total Financial Debt/Total Debts
NB	New Borrowing	(Current Period Long Term Liabilities -Previous Period Long Term Liabilities)

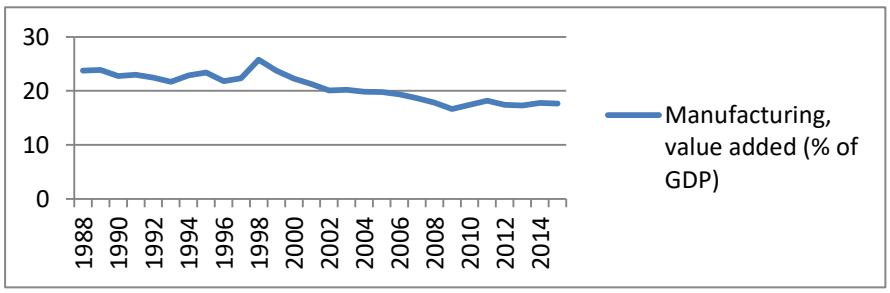
Source: Akgüç, 2011: 450-459; Karaca, 2014:193-208.; Botchkarev and Andru, 2011: 246.

The years from 1994 to 2015 constitute the time dimension of the dataset and the cross-sectional part consists of the 86 companies in the BIST Manufacturing Industry. The annual data have been used in this study.

What comes first when evaluating the development process of a country is the share of manufacturing industry in economics. "Manufacturing industry exhibits – the engine of development- features with rapid productivity growth, returns according to dynamically increasing scales, rapid technological change and with many dynamic externalities." (Doğruel and Doğruel, 2008:7). In other words, manufacturing industry is considered to be the locomotive of economics. Thus, the sample of this study has been chosen as the manufacturing industry sector.

Figure 1

Manufacturing Industry %of GDP



Resource : The World Data Base.

Panel data includes the units and the time dimension. Panel data analysis consists of the combination of the cross-sectional area and the time series analyses. Sometimes, the data about some units related to some periods may be missing or lost in analyses and in such a situation, unbalanced panel data are used. Therefore, due to the missing data belonging to some years, the unbalanced panel data method has been employed in the study. The models examined are as follow:

Model 1: $\boldsymbol{LR_{it} = \alpha_0 + \alpha_1 AGR_{it} + \alpha_2 ROA_{it} + \alpha_3 EPS_{it} + \alpha_4 CR_{it} + \alpha_5 CAR_{it} + \alpha_6 ROE_{it} + \alpha_7 ROI_{it}}$

Model 2: $\boldsymbol{TFTD_{it} = \beta_0 + \beta_1 AGR_{it} + \beta_2 ROA_{it} + \beta_3 EPS_{it} + \beta_4 CR_{it} + \beta_5 CAR_{it} + \beta_6 ROE_{it} + \beta_7 ROI_{it}}$

Model 3: $\boldsymbol{NB_{it} = \delta_0 + \delta_1 AGR_{it} + \delta_2 ROA_{it} + \delta_3 EPS_{it} + \delta_4 CR_{it} + \delta_5 CAR_{it} + \delta_6 ROE_{it} + \delta_7 ROI_{it}}$

When determining the variables used in the models, Forward Stepwise-Wald method, which is a variable elimination method. has been used.

As in time series, the variables' being stable in panel data analysis is quite important to avoid spurious regression problems. The levels or differences at which each series is stable must be determined so that the models mentioned above can give accurate and reliable results. This is possible with unit root analysis. In order to determine the Unit Root test to be used in a study, first of all, it must be researched that whether there is a correlation between the units or not. Since panel regression models depend on cross-sectional independence hypotheses between units.

Cross-sectional independence tests are used in order to determine whether the models dealt include unit and time effects. The Pesaran CD test is used to research the existence of cross-sectional independence between units, and it is used only when N>T. In this context, the Pesaran CD test is as follows (Hoyos and Sarafidis, 2006: 487):

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{p}_{ij}\right) \quad (1)$$

Here, T stands for the time period, N stands for the number of the cross-sections and $\hat{p}_{ij}$indicates the correlation between the i.[st]

and j.st error terms. Also, it has zero average for the fixed values of T and N. In this equation,

$$\hat{p}_{ij} = \sum_{t=1}^{T} \frac{e_{it} e_{jt}}{\left(\sum_{t=1}^{T} e_{it}^2\right)^{\frac{1}{2}} \left(\sum_{t=1}^{T} e_{jt}^2\right)^{\frac{1}{2}}} \quad (2)$$

e_{it} shows the OLS error terms based on T observation for each i=1,…,N (Baltagi, 2005: 247).

In the case that there is a cross-sectional independence between the models, the First Generation unit root tests are *not* used for the stability analyses of the series. The Pesaran unit root test, which is one of the Second Generation unit root tests, resolves this problem. In other words, the Pesaran (2007) unit root test focuses on the cross-sectional independence. Pesaran dealt with the ADF regression, which included the delayed levels of individual series and the cross-section averages of the first differences in the unit root test he suggested. In this test, the standard panel unit root tests are based on the averages of the ADF statistics (CADF) with the individual cross-section (Pesaran, 2007:266). The Pesaran CIPS statistics is as shown in the equation below (3):

$$CIPS = \frac{1}{N} \sum_{i=1}^{N} CADF_i \quad (3)$$

In the wake of determining the stability, the specifications of the models that will be estimated in panel data analysis must be determined. The Breusch-Pagan Lagrange Multipliers (LM) Test is used to decide whether the models to be estimated include unit and time effects. Breusch-Pagan LM test Statistics is as follows (Breusch-Pagan, 1980):

$$LM = \frac{NT}{2(T-1)} \left[\frac{\sum_{i=1}^{n} (\sum_{t=1}^{T} u_{it})^2}{\sum_{i=1}^{n} \sum_{t=1}^{T} u_{it}^2} - 1 \right]^2 \quad (4)$$

Another test used to research the specifications of the models to be estimated is the F test. It is used in order to determine whether there is a unit effect.

4. Results

When applying Panel Data Analysis, the first thing to do is to determine whether there is a cross-sectional dependence among the

series. The existence of cross-sectional dependence for the models dealt with in this context has been examined through the Pesaran CD cross-sectional independence test. The relevant findings are shown in Table 2.

Table 2

Pesaran Cross-sectional Dependence Test

MODEL 1		MODEL 2		MODEL 3	
CD	Probability	CD	Probability	CD	Probability
29.096	0.0000***	8.207	0.0000***	16.414	0.0000***

*, **and ***show statistical significance at 0.10, 0.05 and 0.01 levels, respectively.

According to the results of the Pesaran CD test, it is possible to state that there is a cross-sectional independence in the variables. Accordingly, in this study, the stability of the variables has been examined through the Pesaran unit root test, which takes cross-sectional dependence into consideration. The results are shown in Table 3.

Table 3

The Results of Pesaran Unit Root Tests Regarding Variables

	I(0) Constant and Trend		I(1) Constant and Trend	
Variables	**Statistics**	**Probability**	**Statistics**	**Probability**
AGR	-1.613(3)	0.053*	-9.704(2)	0.000***
CAR	-3.400(3)	0.000***	-14.385(1)	0.000***
CR	-5.588(2)	0.000***	-9.119 (2)	0.000***
EPS	1.455 (3)	0.926	-8.062(2)	0.000***
LR	0.163(1)	0.565	-2.672(2)	0.004***
NB	-0.182(1)	0.428	-2.724 (2)	0.003***
ROA	2.287(3)	0.989	-8.028(2)	0.000***
ROE	1.824(2)	0.966	-4.564 (2)	0.000***
ROI	-6.106(1)	0.000***	-13.105(1)	0.000***
TFTD	2.829(3)	0.998	-6.301(2)	0.000***

*The lag lengths are determined according to Akaike (AIC) and Schwarz (SC) data criterion. The lag length numbers are shown in brackets ( ),and the Maximum lags number of Schwert (1989)[5] has been taken as 8. *, ** and *** show statistical significance at 0.10, 0.05 and 0.01 levels, respectively.*

[5] $Maximum\ lags = \left(12 * \left(\frac{T}{100}\right)^{0.25}\right)$

Another issue in panel regression analyses, which is as important as stability, is the determination of the unit effects in the model to be estimated.

The models in the study have been established by considering the levels or differences at which the variables are stable. For these models, whether the individual effects are random, has been examined by using the Breusch Pagan Lagrange Multiplier (LM) test, as well. The findings are given in Table 4.

Table 4

LM Test Results

MODEL 1				
Test	**χ^2 Statistics**	**Probability**	**Ho Hypothesis**	**Decision**
LM_1	-1.680	0.953	Unit Effects are not Random.	Rejected
MODEL 2				
Test	**χ^2 Statistics**	**Probability**	**Ho Hypothesis**	**Decision**
LM_1	-3.100	0.999	Unit Effects are not Random.	Rejected
MODEL 3				
Test	**χ^2 Statistics**	**Probability**	**Ho Hypothesis**	**Decision**
LM_1	-2.560	0.994	Unit Effects are not Random.	Rejected

*, ** and *** show statistical significance at 0.10, 0.05 and 0.01 levels, respectively.

According to the LM test results, it has been concluded that the unit effects are not random in Model 1, Model 2 and Model 3. At this stage of the study, whether there are unit effects has been examined with the F Test. The results are given in Table 5.

Table 5

F Test Results

MODEL 1				
Test	**F Statistics**	**Probability**	**Ho Hypothesis**	**Decision**
F	0.280	0.991	There are not unit effects.	Accepted
MODEL 2				
Test	**F Statistics**	**Probability**	**Ho Hypothesis**	**Decision**
F	0.170	0.998	There are not unit effects.	Accepted

MODEL 3				
Test	**F Statistics**	**Probability**	**Ho Hypothesis**	**Decision**
F	0.110	0.993	There are not unit effects.	Accepted
, ** and * show statistical significance at 0.10, 0.05 and 0.01 levels, respectively.*				

As Table 5 is examined, it is seen that "There are not unit effects." statement is not rejected for all the models. It has been observed in the study that the results of the F and the LM tests support each other. Based on these results, it is possible to state that all the models must be estimated as Pooled Models.

After it had been decided that the three models were to be estimated as Pooled Models, whether there were autocorrelation and heteroscedasticity problems in the relevant models was dealt with in this section of the study.

First of all, the existence of autocorrelation for Pooled Models were examined with the Wooldridge Autocorrelation Test. And then, the analysis continued with heteroscedasticity test. The heteroscedasticity problem for all the models was examined by using the White Heteroscedasticity Test. All results are given in Table 6.

Table 6

Diagnostic Test Results

	White Heteroscedasticity Test		**Wooldridge Autocorrelation Test**	
Models	**χ^2 Statistics**	**Probability**	**χ^2 Statistics**	**Probability**
MODEL 1	284.663	0.000***	4.946	0.028**
MODEL 2	104.249	0.000***	10.257	0.001**
MODEL 3	50.545	0.043**	5.220	0.002**
, ** and * indicate statistical significance at 0.10, 0.05 and 0.01 levels, respectively.*				

Based on the findings in Table 6, it is possible to state that all models have heteroscedasticity and autocorrelation problems. Since there are both autocorrelation and heteroscedasticity problems in all the models, standard errors were corrected without altering the parameter estimations in order to solve these problems. To ensure

the robust standard errors in the study, the Huber, Eicker and White estimators were used. The model results estimated for Model 1, Model 2 and Model 3 are given in Table 7, Table 8 and Table 9, respectively.

Table 7

Pooled Model for Model 1

Dependent Variable: ΔLR			
Independent Variables	**Coefficient**	**Robust Std. Error**	**Probability**
AGR	0.022	0.009	0.019**
CAR	1.131	0.394	0.004***
CR	1.046	0.298	0.000***
ΔEPS	0.002	0.001	0.000***
ΔROA	-0.452	0.035	0.000***
ΔROE	-0.001	0.001	0.240
ROI	-1.725	1.091	0.114
Constant	1.187	0.634	0.061*
R^2= 0.2317		Wald $_{statistics}$=51.99 (0.000)***	
, **and*show statistical significance at 0.10, 0.05 and 0.01 levels, respectively. Δ represents first difference.*			

The explanatory power of Model 1 is 23.17%, and the coefficients are statistically significant both one by one and as a whole. It can be seen in Model 1 that the return on assets affect the leverage ratio variable negatively, while the active growth, earnings per share and cash ratios affect them positively. In other words, the increase in active growth rate points out that companies use debts more than the finance of their assets. It also indicates that the increase in the earnings per share increase the debt ratios of the companies. The relation between the leverage ratio and the return on assets shows that the increase in return on assets decreases borrowing to finance the assets of a company.

Table 8

Pooled Model for Model 2

Dependent Variable: ΔTFTD			
Independent Variables	**Coefficient**	**Robust Std. Error**	**Probability**
AGR	0.047	0.012	0.000***
CAR	0.177	0.727	0.807
CR	0.848	0.483	0.861

ΔEPS	-0.004	0.002	0.000***
ΔROA	-0.404	0.043	0.000***
ΔROE	0.008	0.006	0.205
ROI	-3.593	1.710	0.036**
Constant	-0.709	0.943	0.452
R^2= 0.0841		Wald $_{statistics}$= 87.32(0.000)***	
*, **and*** *show statistical significance at 0.10, 0.05 and 0.01 levels, respectively. Δ represents first difference.*			

It is seen in Model 2 that the coefficients are statistically significant both one by one and as a whole (except for CO, CAR, ROE and I). In addition, it can be said that the explanatory power of the model is 8.41%. It has been determined in the study that the return on investment, the return on assets and the earnings per share ratios affect the total financial liabilities/total liabilities rate negatively; but, the active growth rate affect the total financial liabilities/total liabilities ratio positively.

Table 9

Pooled Model for Model 3

Dependent Variable: ΔNB			
Independent Variables	**Coefficient**	**Robust Std. Error**	**Probability**
AGR	104097.9	64442.67	0.099*
CAR	-8340686	8187696	0.308
CR	10000000	5905439	0.090*
ΔEPS	-918.956	1736.414	0.597
ΔROA	-64048.06	284406.1	0.822
ΔROE	7701.374	1822.479	0.000***
ROI	3652395	193000000	0.850
Constant	-208000000	20000000	0.297
R^2= 0. 0229		Wald $_{statistics}$=6.72 (0.000)***	
*, **and*** *show statistical significance at 0.10, 0.05 and 0.01 levels, respectively. Δ represents first difference.*			

It has been determined in the study that the active growth and return on equity, current rate and the return on equity ratio affect the new borrowing variable positively. As is observed in Table 9, the coefficients (except for CAR, EPS, ROA and ROI) are statistically significant one by one. Likewise, the coefficients are significant as a whole. The explanatory power of Model 3 is 2.29%. With reference to

these models' results, it is thought that the effect of the return on investment on borrowing does not emerge concurrently, since the cash flows of the investment emerge in the following years.

5. Conclusion

The relation between the debt and profitability ratios of the 86 companies quoted in manufacturing sector in the Istanbul Stock Exchange Market (BIST) for the period between 1994 and 2015 has been examined in this study. In order to determine the variables that would show the financial and profitability structures of companies, the variable elimination method has been used. When determining the variables used in the models, Forward Stepwise-Wald method, which is a variable elimination method. has been used. The variables such as active growth rate, return on asset, current rate, leverage rate, cash rate, new borrowing, total financial debt/total liabilities rate, return on equity, return on investment and earnings per share rates, leverage rates and total financial liabilities/total liabilities have been used in the study. The three models in which leverage ratio, total financial liability/total liability ratio and new borrowing rate were used as the dependent variables have been used in the study. Furthermore, Panel Regression Analysis has been used for estimation of the models.

When the models, in which the total financial liabilities/total liabilities ratio and the leverage ratio are taken as the dependent variables are examined together, it is seen that the return on assets decreases both the dependent variables. Similarly, when the models in which the total financial liabilities/total liabilities rate is regarded as the dependent variable, the earnings per share affect it negatively.

The negative relation between the leverage ratios determined in the study and the return on assets show parallelism with the findings reached in the study of Demirhan (2009) and Najjar and Petrov (2011). In the relevant studies, it was found that the relation between the leverage ratio and the profitability variables was negative. Then, it is possible to suggest that these results support the Financial Hierarchy Approach. Because, according to this approach, profitable companies need less external resources. Therefore, the existence of the relation between the leverage ratio and the return on assets rate is an expected situation.

In the study, the current rate and the cash ratio have been found to be the variables which affect the leverage ratio positively

most. Moreover, it has been determined that the variable affecting the leverage ratio negatively most is the return on assets. Likewise, the variable affecting the total financial liability/total liability ratio negatively most has been found as the return on investment. It has been also seen that the total financial liability/total liability ratio is not affected positively and significantly by any variables. Another finding reached in the study is that the current and the growth rates are the variables affecting the new borrowing variable positively most. In addition, it has been concluded that the new borrowing variable is not affected negatively by any variables, either.

Another conclusion drawn from the study is that only active growth rate affects the debt ratios positively in all these three models. It has also been observed that the return on equity and the current ratios affect the new borrowing ratio positively; however, the return on investment affect the total financial liabilities/total liabilities ratio negatively. In addition, it has been concluded that the earnings per share, the cash rates and the current ratios affect the leverage ratio positively. With reference to these findings, it can be suggested that the companies functioning within the manufacturing industry will take the results of this study into consideration when they take decisions about determining their debt policies.

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