Using Beneish Model in Identifying Accounting Manipulation: An Empirical Study in BIST Manufacturing Industry Sector

(Muhasebe Manipülasyonun Tespitinde Beneish Modelinin Kullanımı: BIST İmalat Sanayii Sektöründe Bir Ampirik Çalışma)

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Abstract
Falsifications made on financial tables which are the outputs of accounting decreases the confidence relied on the financial statements. Falsified financial reports emerged as a result of manipulation misguide or misdirect the financial statements' users. In this study, it was researched whether 132 firms continuously operating in Manufacturing Industry sector at Istanbul Stock Exchange (BIST) between the years of 2010-2012 are drawn to manipulation in accounting. Beneish model is the most preferred model in literature as manipulation identifying model. In the study, logistic regression method was used and it was concluded that the rates as Working Capital/Total Assets(WC/TA), Working Capital/Sales(WC/Sales), Net Working Capital/Sales(NWC/Sales) and Natural Logarithm of Total Debts(NLTD) are effective in identifying the manipulation in accounting.

Anahtar Kelimeler
Muhasebe Manipülasyonu, İmalat Sanayii, Lojistik Regresyon.

Jel Sınıflandırması
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Özet
Muhasebenin çıktısı olan finansal tablolar üzerinde yapılan çarpıtmalar mali tablolara olan güveni azaltmaktadır. Manipülasyonlar sonucu ortaya çıkan hileli finansal raporlar, mali tablo kullanıcılarını yanıltmakta veya yanlış yönlendirmektedir. Bu çalışmada Borsa İstanbul'da (BIST) İmalat Sanayii sektöründe işlem gören 2010-2012 yılları arasında faaliyeti süreklilik gösteren 132 firmanın muhasebe manipülasyonu yapıp yapmadıkları araştırılmıştır. Manipülasyon tespit modeli olarak literatürde en fazla kullanılan Beneish modeli esas alınmıştır. Çalışmada lojistik regresyon yöntemi kullanılmış ve muhasebe manipülasyonunun tespitinde Çalışma Sermayesi/Toplam Aktif, Çalışma Sermayesi/Satışlar, Net Çalışma Sermayesi/Satışlar oranlarının ve Toplam Borçların Doğal Logaritmasının etkili olduğu sonucuna ulaşılmıştır.

1.   Introduction

Financial statements are the outputs of accounting process used by investors, shareholders, enterprise management and third parties in order to take various decisions. Financial statements prepared should present continuous, accurate and direct information to the ones requesting information about the enterprise. However, financial statement editors spread on effort to present the situation as they should be instead presenting as they are. Scandals witnessed in the companies as Enron, WorldCom, Qwest, Tyco, Global Crossing etc and falsifications made on financial statements are shown as the reasons of decreasing confidence about financial statements.

A common language was tried to create on accounting and financial statements as the outputs of accounting and standards prepared in globalized world. Flexibility included by financial reports in order to comply with different situations arises from accounting standards (Bekçi and Avşarlıgil,2011:133-135). In case this flexibility brought in order to comply with innovations is misused, manipulation in financial information (fraudulent financial reporting) was emerged Levitt, (1998). Fraudulent financial reporting is defined as preparing inaccurate deceptive financial statements by the companies intentionally in order to misguide or misdirect the users of financial statements (Needles et.al., 1999:223).

Methods of accounting manipulation may be aligned as Earnings Management, Income Smoothing, Big Bath Accounting, Aggressive Accounting and Fraud (Demir and Bahadır, 2007:111-115).

There have been different models having the purpose of identifying manipulation in financial information by using financial rates and indexes. Accruals accounting models is started with Healy (1985) and Industry model being developed in parallel with De Angelo (1986), Jones (1991), Jones (1991) models have been used as a measuring tool. Beneish stating probit and logit models using a set of different variables in addition to the accruals can be used in identifying enterprises applying manipulation in financial information, together with linear regressions used for identifying changes in accrual, was added a new dimension to the literature of manipulation in financial information in his studies conducted

between the years of 1997 and 1999. As different from the indexes used in probit model (1999) of Beneish (1997), Spathis who gave place financial rates in his studies applied logistic regression analysis instead of probit while identifying manipulation in financial information (Küçükkocaoğlu et.al.,1997:4-8).

Beneish analyzed the data set composing by the companies showing incredible performance in 1997 about whether manipulation is made (Küçüksözen, 2004:267). The model of Beneish acquired in 1999 through improving the model made in 1997is as follows:

$$M_i = -4,840 + 0,920*DSRI + 0,528*GMI + 0,404*AQI + 0,892*SGI + 0,115*DEPI - 0,172*SGAI + 4,679*TATA - 0,327*LVGI$$

M_i refers to the value that is acquired as a result of Beneish original equation and determinant about whether any enterprise applies manipulation.

Table 1. Formula Used in Beneish Model

$(DSRI) = \dfrac{(Trd.Rec._t / GrossSales._t)}{(Trd.Rec._{t-1} / GrossSales._{t-1})}$	$(DEPI) = \dfrac{Dep.Exp._{t-1} /(Dep..Exp._{t-1} + RealAsset._{t-1})}{Dep.Exp._t /(Dep..Exp._t + RealAsset._t)}$
$(GMI) = \dfrac{(GrossSales_{t-1} - CGS_{t-1}) / Grosssales_{t-1}}{(GrossSales_t - CGS_t) / Grosssales_t}$	$(SGAI) = \dfrac{(MSDE_t + GME_t) / GrossSales._t}{(MSDE_{t-1} + GME_{t-1}) / GrossSales._{t-1}}$
$(AQI) = \dfrac{(1 - Liq.Asset._t + RealAsset._t) / TotalAsset._t}{(1 - Liq.Asset._{t-1} + RealAsset._{t-1}) / TotalAsset._{t-1}}$	$(TATA) = TotAcc.GrossSales_t / TotalAsset_t$ $(SGI) = GrossSales_t / GrossSales._{t-1}$
$(LVGI) = \dfrac{(LongTermLiabilities_t + ShortTermLiabilities_t) / TotalAsset._t}{(LongTermLiabilities_{t-1} + ShortTermLiabilities_{t-1}) / TotalAsset._{t-1}}$	

(DSRI): Trade receivable index, (GMI); Gross profit margin index, (AQI): Asset quality index, (DEPI): Depreciation index, (SGAI): Changing Debt Structure Index, (TATA): Total accrual/total asset rate, (SGI): Sales growing index, (LVGI): Marketing sales distribution expenses and general management expenses index (Resource: Varıcı and Er, 2013:47).

In the calculation of possibilities related to M_i value in normal distribution, possibilities acquired as a result of converting standardized normal variable are as follows (Bekçi and Avşarlıgil, 2011,:146);

In case the value Z_i corresponding to the value M_i is lower than 0,035, there is no finding showing this company applies manipulation in financial information,

In case the value Z_i corresponding to the value M_i is between 0,035 and 0,06, there

is a possibility showing this company applies manipulation in financial information,

In case the value Z_i corresponding to the value M_i is between 0,06 and 0,14, there are serious findings showing this company applies manipulation in financial information,

In case the value Z_i corresponding to the value M_i is higher than 0,14, there are significant findings showing this company applies manipulation in financial information.

2.   Literature

One of the most comprehensive studies conducted for identifying fraudulent operations and qualifications of the companies subject to these operations was made by COSO (Committee of Sponsoring Organizations). COSO prepared its study by benefitting from the data of approximately 300 companies which SEC (Securities and Exchange Commission) was started proceedings about these companies by virtue of preparing fraudulent financial statements between the years of 1987 and 1997. In this study, it was determined that stocks of 78 % of the companies subject to fraudulent financial reporting are not traded at an exchange and having less size of assets compared to the exchange companies and their loss for the relevant financial year was camouflaged. It was explained that most of fraudulent operations exceed two-year period and the most typical example of fraudulent financial reporting is to present higher amount of assets and incomes (Kula et.al.,2008:66-67).

When financial reporting scandals experienced in USA are researched, it was identified that 20 % of the companies applying fraudulent financial statements presents understatement debts and expenses, 80 % of the companies presents higher amount of income and assets than they are (Rezaee, 2005:280-286).

Persons (1995) was specified in his study conducted with logistic regression method that company borrowings are effective in identifying fraudulent financial reporting, Natural Logarithm of Total Debts(NLTD), Financial Leverage Ratio(FLR), Liquid Assets/Total Asset(LA/TA), Asset Turnover Ratio (ATR) and

size of the company are significant variables.

In the study conducted by Küçükkocaoğlu, Benli and Küçüksözen (1997), they concluded that when the variables for revealing manipulation in financial information are known, artificial neutral networks approach can be used as a method for estimating future position of the companies newly participated into the model.

Frankel, Johnson and Nelson (2002) identified in their study that there is a positive correlation between the charges related to non-audit services and the degree of preparing fraudulent financial reporting.

Spathis (2002) determined that Inventory/Sales(INV/Sales), Financial Leverage Ratio(FLR), Working Capital/Total Assets(WC/TA), Return on Asset (ROA) are significant variables in identifying fraudulent financial reporting.

Saltoğlu (2003) analyzed accounting manipulations over Enron which is one of the significant accounting scandal of this period negatively affecting the confidence relied on financial reporting at USA having the most developed capital market of the world. He stated that Enron scandal showed Generally Accepted Accounting Principles and Accounting Standards' widely open-ended structure is dangerous. Widely accepted opinion is that accounting principles to be developed henceforward should be coherent and closed much interpretation and easily.

Küçüksözen (2004) selected 126 companies as sample companies operating in real sector and having stocks traded at Istanbul Stock Exchange. 27 companies within the scope of study were determined as applied manipulation in financial information. In addition to the companies applying manipulation in financial information, 99 companies operating in same sectors with these companies and having stocks traded at Istanbul Stock Exchange were also determined as control company not applying manipulation in financial information or having no identification and disclosure related to this issue. It was concluded that the companies considered as manipulator in the model are smaller companies in terms of asset size compared with control companies, finance their operating capital mostly with short term loans , has mostly debt based resource of structure,

has a little bit higher growth rate in sales.

A.Kaminskiet.al (2004) found 16 rates as statistically significant in the discriminate analysis made by using 21 financial rates belong to 7-year period. In last three periods, only two ratios that are TA/TD (Total Assets/Total Debt) and WC/TA(Working Capital/Total Asset) were found significant.

Küçüksözen and Küçükkocaoğlu (2004) aimed to develop a model to be benefitted for revealing inaccurate financial statements by analyzing financial statements of manufacturing industry companies having stocks traded at Istanbul Stock Exchange in 2001. According to the study results, the rate of net profit to total assets and total financing expenses to total operating expenses are the variables, which are useful for revealing Inaccurate Financial Tables in Turkey.

Birgili and Tunahan (2005) analyzed fraudulent financial reporting incidents witnessed in USA between the years of 2000-2001, and it was realized that the most preferred ways in fraudulent financial reporting are the creative accounting applications violating Generally Accepted Accounting Principles, hiding some liabilities required to be shown on financial statements and to inflate incomes and assets.

In their study, Demir and Bahadır (2007) analyzed conceptual framework of accounting manipulation and relation between accounting principle and Standard; objectives of accounting manipulation and its social dimension; accounting manipulation methods and techniques.

Çıtak (2009) addresses whether fraudulent financial reporting is done with creative accounting applications and tried to explain with his study that what the creative accounting technique are, what objectives are targeted and the consequences. Following the study, it was agreed that creative accounting application is fraudulent financial reporting.

Doğan (2009) in his study, it was realized that 7 out of 9 explanatory variables in the model established are significant in estimating and/or revealing applications related to financial information manipulation, which may be done by the enterprises operating under Istanbul Stock Exchange.

In the analysis made by using Beneish original equation with the data of textile companies which shares are traded at Istanbul Stock Exchange, concluded that there are relatively significant findings about the applications of 19 out of 20 textile companies which shares are traded at Istanbul Stock Exchange related to financial information manipulation and 1 company has the possibility to make financial information manipulation.

In the analysis made by using financial statement data of 23 companies operating at the index of XMESY related to the years of 2006-2010, concluded that among financial rates, AQI, FSCI, TRI and TATA are statistically significant determinants to identify whether the companies applies manipulation in financial information.

Varıcı and Er (2013) researched whether there is a relation between manipulation and company performance, and industry companies operating at Istanbul Stock Exchange 100 apply accounting manipulation according to Beneish model. Company performance measurements, which may cause applying accounting manipulation, were researched and it was realized that asset turnover, financing rate and operating profit margin might be effective. Classification percentage of this model using logistic regression model was determined as 79,5 %.

3.   Research And Findings

3.1.   Purpose of research

In this study, it was researched whether the companies operating in Istanbul Stock Exchange Manufacturing Industry between the years of 2010-2012 apply accounting manipulation. Beneish model was taken as basis as the most preferred model in identifying manipulation in the literature. In the study, it was aimed to determine which criteria cause the companies drawn into manipulation.

3.2.   Research Data and Variables

In the study, data acquired from 132 companies which are continuously operating and having stock certificates are traded in Manufacturing Industry at Istanbul Stock Exchange (BIST) were used. The companies excluded from BIST quotation since their information could not be acquired due to bankruptcy, consolidation and

any other reasons and they could not ensure the continuity criteria. In the study, data related to the companies have been acquired from financial statements downloaded from official web site of Public Disclosure Platform (PDP).

Possibilities of the company applying (1) and not applying (0) manipulation were used as dependent variable in the research. Possibilities of the company applying and not applying manipulation were determined by converting values acquired in Beneish model into standardized normal variable. In case standardized values acquired are lower than 0,035, it was concluded that there is no finding related to the manipulation applied by this company (Varıcı and Er, 2013: 47).

Variables used in this study were previously used in other studies in the literature. For the selection of variables and abbreviations used, it was benefitted from the study of Terzi (2012). Dependant variable (Y) used in the research is manipulation identified (1) / no manipulation identified (0), and independent variables are Asset Turnover (AT), Receivable Turnover (RT), Gross Profit/Total Assets (GP/TA), Gross Profitability Rate (GPR), Current Ratio (CR), Working Capital/Equity (WC/E), Working Capital /Sales (WC/Sales), Working Capital /Total Assets (WC/TA), Operating Income Rate (OIR), Financial Leverage Rate (FLR), Earnings Before Interest and Tax /Sales (EBITA/Sales), EBITA/Total Assets (EBITA/TA), Short Term Debt/Total Assets (STD/TA), Liquidity Rate (LR), Fixed Assets/Total Assets (FA/TA), Net Working Capital/Equity(NWC/E), Net Working Capital /Sales (NWC/Sales), Net Working Capital / Total Assets (NWC/TA), Equity Turnover Rate (ETR), Equity Profitability Rate (EPR), Equity/ Total Assets (E/TA), Sales/ Total Assets (Sales/TA), Inventory Turnover (INVT), Inventory/Short Term Debt (INV/STD), Inventory/Sales (INV/Sales), Inventory/ Total Assets (INV/TA), Total Debts/Equity (TD/E), Natural Logarithm of Total Debts (NLTD), Natural Logarithm of Total Assets (NLTA), Long Term Debts/Equity (LTD/E), Long Term Debts / Total Assets (LTD/TA).

3.3. Determining Significant Variables By Statistical Tests

For determining parametric and nonparametric variables, normality test should be done. Since the number of observation in each group is higher than 29,

Kolmogorov-Smirnov was used. Following the analysis conducted, it was determined that while the variables GPR, FLR, EBITA/TA, FA/TA, E/TA, NLTD and NLTA comply with normal distribution (p>0,05), other variables do not comply with normal distribution.

If the data acquired from independent two samples comply with normal distribution, t test should be applied. Otherwise, non-parametric test Mann-Whitney U test should be applied (Özdamar, 2004:317).

In order to test whether there is a statistical difference among the variables normally distributed, independent sample t test was used. While benefitting from T test, homogeneity of sample variants should be tested. In this respect, Levene Test was used.

As a result of Levene Test, significance level exceeds 5 % and FLR, FA/TA, E/TA and NLTD variables considered as significant (p<0,05) as a result of t test were found significant in identifying manipulation.

According to Mann-Whitney U test which is the non-parametric alternative of t test as independent two samples test, the variables RT, CR, WC/Sales, WC/TA, STD/TA, LR, NWC/E, NWC/Sales, NWCTA, INV/STD, TD/E, LTD/E and LTD/TA were found as statistically significant (p<0,05). Other variables were excluded from the analysis.

As a result of factor analysis made in order to decrease the number of variables, five factor groups having total variant as 79,87 % were determined. FA/TA (0,29) and STD/TA (0,11) variables having low factor weight were excluded from the analysis.

3.4. Research Model

Model is the configuration of information or thoughts related to an occurrence based on certain rules. The purpose of the model is to generate optimum acceptable model, which can define the relation between dependent and independent variable as having the best compliance with the lowest number of variables (Çokluk, 2010:1359). Logistic regression is a model generation technique

used in statistics and a method used in identifying cause-effect relation with independent variables in case dependent variable is observed in binary, ternary and multiple categories (Özdamar, 2004:589).

Since our dependent variable has two choices (Yes/No) category in this study, Binary Logistic Regression Analysis was used. Multivariate logistic regression model is generally defined as follows (Özdamar, 2004:590);

$$P(Y) = \frac{e^Z}{1 + e^Z} \qquad (1)$$

Herein Z is a linear combination of independent variables.

$$Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_p X_p \qquad (2)$$

$\beta_0, \beta_1, \beta_2 \, ve\beta_n$ regression coefficients.

Calculation related to logistic regression coefficients are as follows:

$$Q(Y) = 1 - P(Y) \qquad (3)$$

$$\frac{P(Y)}{P(Q)} = e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_p X_p} \qquad (4)$$

Below mentioned formula is acquired in case natural logarithms related to both sides of the subordination rate equation are calculated:

$$\ln\frac{P(Y)}{P(Q)} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_p X_p \qquad (5)$$

$$OR = \frac{P(Y)}{P(Q)} = e^Z = e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_p X} = Exp(\beta) \qquad (6)$$

Exp (β) of each parameters in above mentioned equations are taken as OR values. By this way, Exp (β) specifies how many times or which percentage the possibility of observing Y variable with the effect of X_p variable with increased. Significance of β_p coefficient is evaluated as the significance of $OR_P = Exp(\beta_p)$ as well.

Logistic regression can be applied with two basic methods as Enter and Stepwise. Stepwise methods are also divided into two as forward and backward methods. Selection of enter and stepwise model in the analysis of logistic regression is done at the section of "method". Here from, totally six different stepwise regression models can be developed as three forward (Conditional, LR and Wald) and three backward (Conditional, LR and Wald) (Karagöz et.al., 2010:349). In this study,

using a stepwise method was preferred since this study has the characteristic of exploratory. Todman and Dugard (2007) emphasized that forward methods ensure more reliable results in the studies conducted with few number of parameters. Therefore, logistic regression analysis Likelihood Ratio Statistics and Forward: LR Methods were used in study.

3.5. Analysis and Findings

"Correlation analysis" examining whether there is a relation between two or more variables, if any, direction and strength of the relation varies between -1 and +1. High correlation between independent variables shows that the possibility expressing same facts are also high. The variables RT, FLR, NWC/TA, E/TA and LTD/E showing high correlation with other variables were excluded from the analysis as a result of correlation analysis conducted. Correlation coefficients between 10 variables included into the analysis are as follows:

Table 2. Correlation coefficients

	RT	WC/TA	WC/Sales	NWC/E	NWC/Sales	LR	NLTD	INV/STD	TD/E	LTD/TA
RT	1,000									
WC/TA	-0,272	1,000								
WC/Sales	-0,412	0,102	1,000							
NWC/E	0,141	0,503	0,060	1,000						
NWC/Sales	-0,328	0,266	0,494	0,272	1,000					
LR	-0,130	0,125	0,176	0,225	0,542	1,000				
NLTD	0,237	-0,047	-0,267	-0,041	-0,237	-0,353	1,000			
INV/STD	0,110	0,183	-0,017	0,267	0,381	0,319	-0,315	1,000		
TD/E	-0,248	0,250	0,009	-0,304	-0,106	-0,208	0,207	-0,242	1,000	
LTD/TA	0,349	-0,245	-0,196	0,084	-0,361	-0,308	0,397	-0,244	0,049	1,000

When Table 2 examined, it is realized that there is no high correlation among variables. All variables will be included into regression analysis.

In order to identify whether there is multicollinearity problem among independent variables, tolerance and Variance Inflation Factor-VIF are examined. Menard (1995) indicated that having tolerance value as <0,1 means serious multicollinearity problem, having tolerance value as <0,2 means potential multicollinearity problem. Myers (1990) expressed that VIF value exceeding 10 indicates the existence of multicollinearity problem. According to Field (2005), in

case VIF value is closed to 1, then there is no multicollinearity problem. Çokluk (2010) specifies that in the examination of whether there is multicollinearity problem; standard errors related to non- standardized regression coefficient (β)should be assessed. In case Standard errors related to all variables are lower than 2, it is decided that there is no multicollinearity problem.

Table 3. Analysing Multicollinearity Problem Among Independent Variables Through Standard Error, Tolerance And VIF Values

	β	Standard Error	Tolerance	VIF
(Constant)	0,547	0,527		
RT	-0,016	0,012	0,582	1,719
WC/TA	0,811	0,296	0,427	2,340
WC/Sales	-0,110	0,090	0,612	1,634
NWC/E	0,173	0,122	0,423	2,366
NWC/Sales	0,214	0,134	0,415	2,410
LR	0,045	0,034	0,614	1,629
NLTD	-0,025	0,026	0,655	1,527
INV/STD	0,095	0,090	0,642	1,559
TD/E	-0,026	0,026	0,597	1,675

When Table 3 examined, it is realized that standard errors related to independent variables are lower than 2. When tolerance values examined, it is realized that the values are higher than 0,2 for all variables. When VIF values examined, it is identified that the values are lower than 10 for all variables. Average VIF value is 1,85. All these values show that there is no multicollinearity problem among variables.

Table 4. Omnibus Tests of Model Coefficients

Chi-square	sd	P
70,853	4	0,000

Hypothesis regarding whether there is a significant difference between initial model having only constant term and the targeted model after including independent variables into analysis are as below:

$$H_0 : \beta_0 = \beta_1 = \beta_2 = ... = \beta_p$$

$$H_1 : \beta_0 \neq \beta_1 \neq \beta_2 \neq .. \neq \beta_p$$

When Table 4 analyzed, the hypothesis H_0 was rejected since the value of 70,853 with the degrees of freedom as chi-square 4 representing the difference between initial model having only constant term and the targeted model is higher than the value of $/^2$ (0,05;4)=9,49. In other words, the relation between dependent and independent variables were supported.

Table 5. Model Summary

-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
112,138	0,415	0,554

The value -2 Log likelihood is used for testing the significance of logistic regression coefficients in researching contributions of independent variables included into the model (Raftery,1995). This value is 112,991 at the significance level of 95 %. It shows the improvement occurred model-data compliance and developments occurred while including independent variables into the model.

Cox & Snell R Square and Nagelkerke R Square shows the amount of variant explained by logistic model and 1 refers to perfect model compliance. High values indicate better model compliance (Çokluk, 2010:1386). Nagelkerke R Square value related to the model was found as 0,554. Explanation rate of constituted logistic model with the variables used is 55,4 %.

Table 6. Hosmer and Lemeshow Test

Chi-square	sd	P
17,309	8	0,027

Hosmer and Lemeshow Test evaluates the compliance of logistic regression model as a whole. This test examines whether all logit coefficients except constant term are equal to zero.

H_0: There is no significant difference between the values observed and perceived by the model.

H_1: There is significant difference between the values observed and perceived by the model.

When Table 6 examined, H_0 was accepted since the model's value of 17,309 with the degrees of freedom as Chi Square 8 is lower than the value of χ^2 (0,01;8)= 20,09. Moreover, insignificant test result (p>0,01) shows that model-data compliance is not at sufficient level.

Table 7. Classification Table

Reality/Observed Situation		Expected Situation		Accurate Classification Percent
		Manipulation		
		0	1	
Manipulation	0	55	11	83,3
	1	14	52	78,8
Total Accurate Classification Percent				81,1

Table 7 presents classification acquired as a result of logistic regression model. Total accurate classification rate of the model is 81,1 % at the significance level of 5 %. In the initial step classification table, it is seen that the classification rate as 50 % increased to 81,1 % as a result of the model.

Table 8. Coefficient Estimation of Model Variables

	B	Standard Error	Wald	sd	p	Exp(B)
WC/TA	7,362	1,620	20,654	1	0,000	1.575,313
WC/Sales	-3,866	1,233	9,840	1	0,002	0,021
NWC/Sales	7,425	1,913	15,064	1	0,000	1.678,109
NLTD	-0,311	0,156	3,973	1	0,046	0,733
Constant	2,765	3,037	0,829	1	0,363	15,871

Standard errors (S.E) related to independent variable coefficients, Wald statistics (Wald), significance levels (Sig) and Exp (B) statistics are given in Table 8. In logistic regression, Wald statistics having a special distribution known as chi-square distribution is a measurement related to the significance of ß (Çokluk,2010:1388). Exp (B) indicates the level of changes to be realized in the rate of odds when relevant variable is increased 1 unit where other variables are stabilized. Results obtained related to independent variables in the model are as

follows:

Since logistic regression coefficient of WC/TA variable is 7,362 and standard error is 1,620, Wald statistics is 20,654. Since Sig<0,05, *WC/TA* variable was found significant.

Since logistic regression coefficient of WC/Sales variable is -3,866 and standard error is 1,233, Wald statistics is 9,840. Since Sig<0,05, *WC/Sales* variable was found significant.

Since logistic regression coefficient of NWC/Sales variable is 7,425 and standard error is 1,913, Wald statistics is 15,064. Since Sig<0,05, *NWC/Sales* variable was found significant.

Since logistic regression coefficient of NLTD variable is -0,311and standard error is 0,156, Wald statistics is 3,973. Since Sig<0,05, *NLTD* variable was found significant.

The model acquired by using forward stepwise method is as follows:

In [P/ (1-P)] = 2,765 + 7,362*WC/TA -3,866*WC/Sales + 7,425*NWC/Sales – 0,311*NLTD

4.   Conclusion

While preparing financial reports as the outputs of accounting in order to misguide or misdirect the users of financial statements intentionally by the enterprises causes losing confidence to the financial statements, it also causes scandals as Enron. Among many models used in identifying accounting manipulations, Beneish model is the most preferred one.

In this study, financial rates of 132 firms having continuous operating in BIST manufacturing Industry between the years of 2010-2012 are used. In this study, dependent variable consists of two categories having the possibilities for applying (1) and not applying (0) manipulation. It was observed that there has been a possibility to apply manipulation for 66 companies related to the values acquired from Beneish model compared to standardized normal variable. Number of significant variable was determined as 10 as a result of statistical tests conducted with 31 independent variables selected as in compliance with the literature.

Logistic regression analysis likelihood rate statistics and forward method were used.

When analyzing the correlation table generated, Tolerance and VIF values, it is seen that there is no multicollinearity problem between variables. Results of Omnibus test support the relation between dependent and independent variables. Explanation rate of created model with independent variables is 55,4 %. According to the result of Hosmer and Lemeshow test, model-data compliance is at sufficient level. The model makes accurate classification at the rate of 81,1 % in total.

In the empirical study conducted, it was determined that Working Capital /Sales (WC/Sales), Working Capital/Total Assets (WC/TA), Net Working Capital/Sales (NWC/Sales), Natural Logarithm of Total Debts (NLTD) rates are effective in identifying manipulation. As the rates of WC/TA and WC/Sales increase, the possibility to apply accounting manipulation increases; as the rates of WC/Sales and NLTD increases, the possibility to apply accounting manipulation decreases. Working capital, enterprise's assets, sales and enterprise's debts may be asserted as important criteria in identifying accounting manipulation.

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