Corporate Governance and Predicting Bankruptcy of Firms Using Survival Analysis (Case Study of Companies Listed in Tehran Stock Exchange)

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Abstract: The purpose of This Study is to Provide Evidence Associated With Corporate Governance Role From the PRESPECTIVE That Whether Internal Mechanisms Are Effective on Bankruptcy of Firms or not. There fore, a Sample Consisted of 76 Listed Companies in Tehran Stock Exchange Over a Nine_ year Period (1380_1388) Was Select and Investigated. For Hypothesis Testing, Cox Regression Have Been Used. Criteria Used for Corporate Governance are : Size of Board of Directors, Percentage of non Executive Directors,Chief Executive Officer (CEO) Change, and Major Ownership. Control Variables of the Study are : Firm`s Size, Profitability, Interest Coverage Ratio, Liquidity,Financial Risk,and Operational Rick. Results indicates a significant Relationship Between CEO Change and Bankruptcy, However a Significant Relationship Was Not Seen Between Percentage of non Executive Directors, Size of Board Of Directors, Major Ownership and Bankruptcy. **Corporate Governance and Predicting Bankruptcy of Firms Using Survival Analysis (Case Study of Companies Listed in Tehran Stock Exchange)** *Life Sci J* 2013;10(1):1089-1095] (ISSN:1097-8135). http://www.lifesciencesite.com. 169

KEYWORDS: Corporate Governance, Bankruptcy, Survival Analysis, Longitudinal Data, Tehran Stock Exchange.

INTRODUCTION:

Corporate Governance is a set of Relationships Among Share Holders, Directors, and Auditors of the Company That Ensures the Establishment of a Control System to Observe the Rights of Minor Share Holders and Proper Implementation of Assembly Legislation and Preventing Potential Abuse (HASSAS REGANEH, and KHEIROLLAHI). OCCURANCE of Financial Crises Around The Word and Bankruptcy of Firms Has Concerned Owners and in General, all the Society. Since Bankruptcy Incurs Heavy Economical and Social Costs on Society and Wastes the Economic Resources of Society (GHODRATI and MANAVI MOGHADAM). With the Increasing Expansion of Corporations and Diversification of Their Capital Structure on one Hand, and Emergence of Severe Financial Crises in Micro and Macro Economic Dimensions on the Other Hand,Owners and Stakeholders are Looking for a Cover to Protect Themselves Against Such Risks, and this will Lead Them to use Tools and Models for Predicting Bankruptcy (GHADIRI MOGHADAM, 1388). Warning Systems of Financial Crises Usually Use Historical Information of Financial Statements and Other Associated information That are Subject to Manipulation Of the Management, While Other Expected Information Such as Ownership Structure of the Firm and Components of Corporate Governance (Features of Board Of Directors) also Could be useful in Predicting Financial Crises.For example, Ownership Structure and Corporate Governance Which are essentially qualitative and Expected, Was Knows as the Main Cause of the Asian financial Crisis in 1997. There fore, an Immediate Alarm System With Both Financial Variables and Corporate Governance is able to Improve Prediction Power of the Model (POURZAMANI, 1385).

1_Raising and Statement of the Issue:

(1-1)_ Concepts, Definitions, and Basics of Corporate Governance: Nowadays, the Term ((corporate Governance)) is an evolving Concept of Concern in the Word of Business. Corporate Governance is the Foundation of the Firm`s relationship With Interested Groups. Like many Discussed and Evolving Issues, There are Various Interpretations and Definitions of Corporate Governance. The main Difference in Attitudes is Associated With the Range of Firm`s Relationship With Stakeholders. Corporate Governance at the Micro Level, aims to Achieve the Objectives of the firm, and at the Macro Level, it Considers Optimal allocation of Society Resources. Historical Background of Corporate Governance, at it is Today,Dates Back to 1990 s and OCCURANCE of Financial Scandals in Some Large Companies. In Spite of Some differences, it Appears That Main Principles of Corporate Governance in Developed and developing Companies Have Travelled the Path of Convergence Over Time. To Develop a Desirable Corporate Governance System, Considering the Internal External Factors as Well as Economic, Political, and Cultural Conditions Of any Country Seems Necessary (BADRI,1390).

(2-1)_ Bankruptcy`s Concepts, Definitions, and Basics:

Nowadays, Rapid Advancement of Technology and Vast Environmental Changes, has Increasingly Accelerated the Economy, and Increasing Competition of Firms has Limited the Achieved Profit (Earnings) and Increased Probability of Bankruptcy (ALIKHANI and MARANJOURI, 1388).Bankruptcy is One of the Most Important Issues Worldwide That Influences the economy of all Countries. Bankruptcy has Always attracted the attention of a Wide Range of Interested Groups of People, Organizations and in General, a Large Part of Society. However it can be Claimed That Management, Investors, Competitors, and Legal Institution are More Influenced by Bankruptcy phenomenon Than Others (SOLEIMANI AMIRI, 1381). It is Not Easy to Determine the Cause (s) of Financial Crisis in any Particular Case. Financial Problems are Often Due to Various Factors That Finally Lead to an Event Which Causes Bankruptcy. in General, Causes of Bankruptcy are Divided into Two Groups: In –Built Causes Including Excessive Expansion of Credit, Inefficient Management, Inadequate Capital, Infidelity and Cheating; and External Causes Including the Characteristics of Economic System, Lock of Proper Understanding of Competitors, Lack of Proper Understanding of Customer, Commercial Fluctuations, Problems associated With Financing, Natural Events and OCCURANCES (SAEIDI and AFSHARIJOU). Investors by Predicting Bankruptcy Not Only Prevent Their Capital From the Risk of Being Unpaid,But also They Use it as a Tool For Decreasing Their Portfolio. Managers of the Firms Can Also Take Preventive Measures if They are Informed of the Risk of Bankruptcy in Time. This is Consider From a Macro Perspective as Well, Because wasted Resources in a firm in Crisis Can be allocated to Other Profitable Opportunities (ALIKHANI and MARANJOURI).

(3-1) _Relationship of Corporate Governance Components With Bankruptcy:

Given That Bankruptcy and Financial Crises Incur High Costs to Firms as Well as Wasting capital and Financial Resources, So Predicting Continuous Activity of Firms in Future Periods is one of the Main Elements in the Investment decisions. In This Regard, Corporate Governance Indicators Have an Effect Role in Predictions. Indicators of Corporate Governance Mainly Focus on Features of Board of Directors. Separation Between Ownership and Management in New Institutions Increases the Role of Management in Company`s Performance. Motivational and Regulatory Issues are Obtained From Such Relationships. Thus, Board of Directors Turns Into a Mechanism With More Influence on the Internal Control System (to Solve the Agency Issues) that Eventually affects the Company`s Performance as Well as the Probability of the OCCURANCE of the Company`s Financial Crisis.

Theoretical Relationship Between Corporate Governance and Bankruptcy has its Root in Literary History of Organizational Theory of Which it is Inferred That Organizations Often Change Corporate Governance With Board of Directors` Composition and Structure When They Have a Descending Trend or Face Financial Crises.

2_ Background of the Study: There Have Been Conducted no Particular Study Regarding the Issue of Corporate Governance and Bankruptcy Prediction Inside the Country (IRAN), However Corporate Governance and Bankruptcy Prediction Have Been Separately Studied Each of Which we Describe as Follows: (1-2) _ Background of the Research Related to Bankruptcy :

Altman (1986) is First to Offer Multivariate Prediction Models. He Sough to Predict Bankruptcy of Firms by Applying Multiple Discriminate Analysis and Using Financial Ratios as Independent Variables. He Presented His Well_ Know Model Titled as (Z) Model. Which is Know in Predicting Bankruptcy.

Ahlsvn(1980), as Well, Was the First to Use Logit Regression Model in the Area of Bankruptcy Prediction in (1980). Given That His Sample Consisted of 105 Bankrupt Companies and 2058 Bankrupt and Healthy Companies, His work Was the Most Comprehensive Study Ever Done in Those Times. His Extracted Prediction Model Could Predict Companies` Bankruptcy For First to Third Years With 85/1, 87/6, and 82/6 Percent Accuracy, Respectively. Variables of Debt to Total Assets Ratio and Net Profit to Total Assets Ratio Were Best Discriminant Ratios in his Model.

Adnan_ Aziz (2006), Compared Various Bankruptcy Prediction Models one Year Prior to Bankruptcy and By Analyzing the Results of 46 Studies (43 Papers, a Technical Report, and Two Q and A Papers) And Investigating 89 Companies Concluded That % 60 of the Studies Used Financial Ratios as Descriptive Variables of Their Research, %7 of Them Used Cash Flow Information, and The Remaining %33 Used a Combination of Financial Ratios and Other Variables Such as Variables of Micro and Macro Economy, Industry_ Specific Variables, and Company_ Specific Variables. These Findings Suggest That Information Content of the Company`s Accounts are Valid.

Chitnomera et al in (2011) in a Study Entitled (Corporate Governance and Reorganization Performance After Bankruptcy) Using a Sample Consisted of the Company, Level of Cash Bonuses Awarded to Employees By the Administrator, Number of Planning Managers Outside Board of Directors, and Check Project Managers Outside Board of Directors With Company`s Performance after Bankruptcy.

KARIMI and ASHRAFI (2011) Conducted a Study Titled as((Investigation of The Association Between Corporate Governance Mechanisms and Capital Structure in Tehran Stock Exchange))in Order to Provide Evidence Related to the role of Corporate Governance from the Perspective That Not the Internal and External Mechanisms of Corporate Governance are Effective on the Company`s Capital Structure.

3_ the Study Hypotheses :

Considering the Background and Exploratory Studies, the Basic Hypotheses of This Study are as Follows: 1_ there is a Significant Relationship Between CEO Change and Bankruptcy. 2_There is a Significant Relationship Between Board of Directors` Size and Bankruptcy. 3_There is a Significant Relationship Between non Executive Directors and Bankruptcy. 4_ There is a Significant Relationship Between MAJOR Shareholders Ownership and Bankruptcy.

The Study Methodology: in This Study, Survival Analysis Along With Longitudinal Data are Used. General From of The Model is Described as Follows: Bankrutcy= b_1 CEO Change+ b_2 Major OWNERSHIP+b_3 Number of Non Executive Directors + b_4 Board of Directors` Size+ b_5 Operational Risk+ b_6 Financial Rick+ b_7 Profitability + b_8 Liquidity+ b_9 Company1s Size+b_{10} Interest Coverage Ratio+4 (1)

In This Model, Bankruptcy is a Dependent Variable Which is Defined as Follows: Companies Whose Accumulated Losses are at Least Over %50 of the Company`s Capital are Considered Bankrupt and Code (1) is Allocated to Them, Otherwise (Healthy Companies) Code (0) is allocated. Independent Variables are described as Follows: CEO Change : It is

CEO Tenure Which Means the Number of Years That a CEO Holds This Post. Board of Directors` Size: Log of Number of Directors in the Board. Major Ownership : Ownership Percentage of Owners Having Over %5 of the Company`s Stock. Number of Non Executive Directors: the Ratio of number of non Executive Directors to Total Number of Members. Control Variables (Accounting Standards) are Described as Follows:

*Financial Risk $= \frac{Total\ Debt}{Total\ Asset}$

*Interest Coverage Ratio $\frac{Earnings\ Brfore\ Interest\ and\ Tax}{total\ Interest}$

*Operational Risk$=\frac{Total\ Assets}{Total\ Sales}$ *Company`s Size= log of Total assets

*Liquidity$= \frac{Current\ Assets}{Current\ Debts}$

*Profitability Indicators $=$
$\frac{Earning\ Brfore\ Interest\ and\ Tax\ (EBIT)}{Sales}$

*E= the Value of Regression Model Error

(1-4)_ the area of the Study: Given the Importance of the issue, the Study Area Has been Considered in Terms of Time, Place and Subject as Follows: 1_Time Domain : Time Zone of the Study is a 9_ Year Period from 2001 to 2009.

2_Spatial Domain: Spatial Domain of this Study is this Study is the organization of Tehran Stock Exchange. 3_ Subject Domain : Subject Domain of the Study is investigation of the Effects of Some Corporate Governance Criteria Including : Size of Board of Directors, CEO Change, Number of Non Executive Directors, and Major Ownership on Firms` Bankruptcy Using Survival Analysis.

Chart(1) : Number of Companies in any Industry

Industry Code	Type of Industry	Number of Companies in the Sample
1	Automobile and Parts Manu Facture	5
2	Manufacturing Radio, television, and Communication Devices and Tools	2
3	Manufacturing Metal Products	5
4	Other Non_ Metallic Mineral Products	6
5	Cement, Lime, Chalk	8
6	Basic Metals	6
7	Tile and Ceramics	5
8	Rubber and Plastic	6
9	MACHINARY and Equipment	3
10	MACHINARY and electric Devices	1
11	Chemical Products	5
12	Food and Beverage Products Except Sugar	7
13	Textiles	2
14	Pharmaceutical Materials and Products	7
15	Other Industries	8
16		78

6_Data collection Method: to Collect the Date,Financial Statements Presented to Tehran Stock

exchange and Other associated Information Resources Such as (TADBIR PARDZA) and (RAHAVARD _E_ NOVIN) Databases Have Been Used.

7_ Data Analysis: Cox Regression is the Statistical Method Used in this Study to Predict Companies` Financial Was Conducted By (SPSS))18th Version. In This Set of Data, One of the Variables of Concern is the time Required to the OCCURANCE of a Certain Event Which is Called Survival Time or Failure Time. In Certain Companies For Reasons Such as Passing of the Study time. In This Case, we Consider Survival Time Censored. Ordinary Regression Models Can Not be Used to Model the Survival Data For Two Regression. Survival Data Generally Do Not Have a Symmetrical Distribution and Their Context Writer Have a positive Strain.

(1-7)_ Modeling Bankruptcy : (1-1-7)_Model Fitting:
In Modeling Process, We Seek To Establish a Relationship Between dependent Variable (Here, Survival Time (t)>0) and Independent Variables. Cox Model Instead of Establishing a Relationship Between (X). This is Conducted By Various Methods Such as Step_ By _ Step, Back word and Forward. In this Study, Backward Method is Used. to Show the Impact of Corporal Governance Features on Bankruptcy Time, Cox Proportional Hazard Model is used as Follows:

$$\frac{h(t)}{h_o(t_0)}=EXP[b_1x_1 + b_2x_2 + \cdots + b_px_p]$$

Where, H(t) is Hazard Rate Which Shows the Probability of the OCCURANCE of Bankruptcy in Next Moment, Provided That it Has Not Occurred Till That Moment: Ho(to)is Basic Hazard Rate Which is Determined When the Values of Independent Variables are Zero. In Fact, Hazard Rate Equals an Exponential Number Multiplied By Ho(T) Function. This Numerical Coefficient Depends on Regression Coefficients.

*h(t)=Ho(t) $EXP[b_1x_1 + b_2x_2 + \cdots + b_px_p]$ (3)

(2-1-7) Testing Significance of the Model : the First Statistical hypothesis States that None of the Independent Variables Have an effect on Hazard Rate of Bankruptcy. in Contrast, the Alternative Statistical Hypothesis States That at Least there is One Independent Variable That is Effective on Hazard Rate of Bankruptcy (S.GARAJAI). in Other Words:

$H_0:b_1=b_2=\ldots=b_{10}=0$ (4)
For at Least One (I) $H_1:b_i \neq 0$

Chart (2): **Omnibus Tests of Model Coefficients [a,b]**

-2 Log Likelihood	Overall (score)			Change From Previous Step			Change From Previous Block		
	Chi-square	df	Sig.	Chi-square	df	Sig.	Chi-square	df	Sig.
350.579	166.352	10	.000	51.548	10	.000	51.548	10	.000

According to the Value (Chi- SQURE= 166/352, Sig= 0/000), We Can See That Test Statistic is Located in reject District of ho. Thus at Least there is One Effective Independent Variable, and there is No reason For Rejecting the Significance of the Whole model. As Mentioned in the Previous Section, the Method used in Modeling is a Backward Method. This Method is Such That First all Variables Get Into the Model and then, at Different Stages, Insignificant Variables Get Out of the Model and Finally, a Model With an Appropriate of Variables is Obtained.in Association With This model, 3 Steps Are Formed. In the First Step, the Model is Obtained as Follows:

$b_1 \frac{h(t)}{h_0(t)} = $ Major Ownership+b_2 Liquidity b_3 +Financial Rick (5)

Table 3

Proportional Hazard (EXPCB)	Significance (Sig)	Standard Deviation (SE)	Regression Coefficients (b)	Variable`s
.878	.481	.184	-.130	**Number of Non Executive Directors**
1.179	.192	.126	.164	**CEO Change**
1.001	.000	.007	.001	**Major ownership**
.218	.001	.468	-1.523	**Liquidity**
1.422	.000	.091	.352	**Financial Rick**
1.105	.354	.108	.100	**Operational Rick**
.999	.605	.002	.000	**Interest Coverage Ratio**
.989	.831	.051	-.011	**Productivity Ratio**
.845	.211	.135	-.169	**Company`s Size**
./298	./638	2/568	-1/210	Board of Director`s Size

$$\frac{h(t)}{h0(t)} = 0.0001\, Major\ Ownership - 1.523 Liquidity + .352 Financial\ Rick *$$

Results of Initial Fitting of Cox Model Shows that Only Variables of Major Ownership, Liquidity, and Financial Rick are Present in the Model (Sig<%5). if this Set Has Other Conditions of Cox Model, it Will Be the Final Model. In Next Sections, First We Check the Hypotheses of the Model, and than We Will Introduce the Final Model and Analyze its Results.

(2-7)_ Checking the Model Hypotheses

Hypothesis of the Proportionality of Hazard:
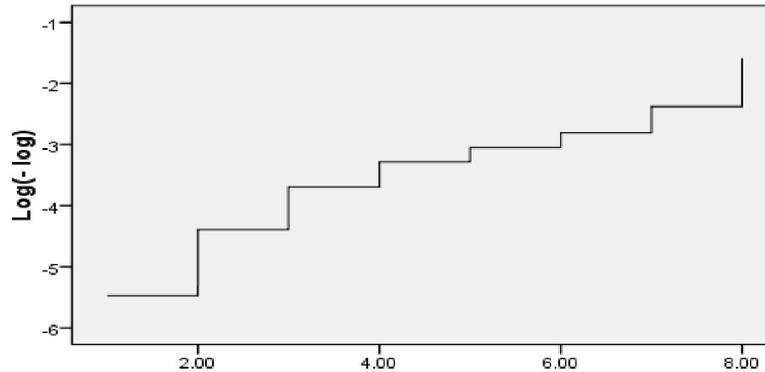
(2-2-7)- Outliers: the Following Graph Shows the Distribution of the remaining deviations For Cox Model. According to the Observations, the Two Data (2385 and 2384) are Outliers.
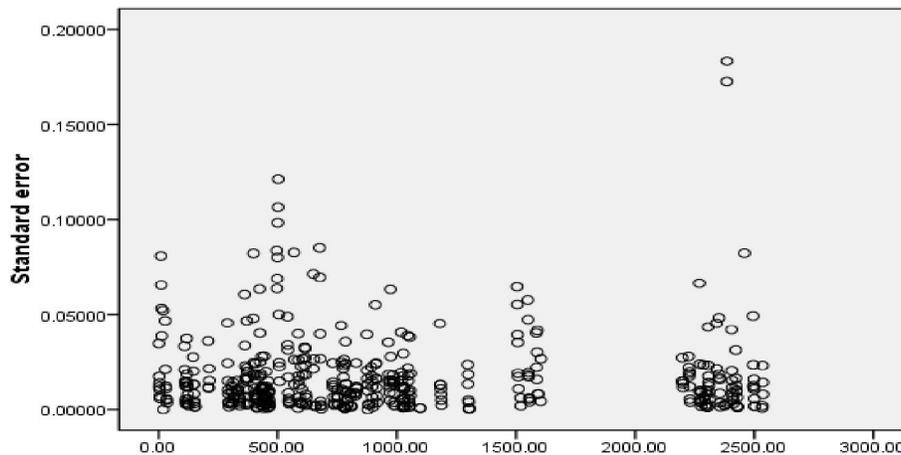
(3-2-7) Recognizing the Effective Data

Fig.(3) Delta Graph: Shows Beta (B) For Cox Model. The Figure Suggests That Excluding Outlier Observations Changes the Regression coefficient, and Even it Changes the Significance of Variables. In Other Words, Instead of the Ownership Variable, CEO Change Variable Became Significant.
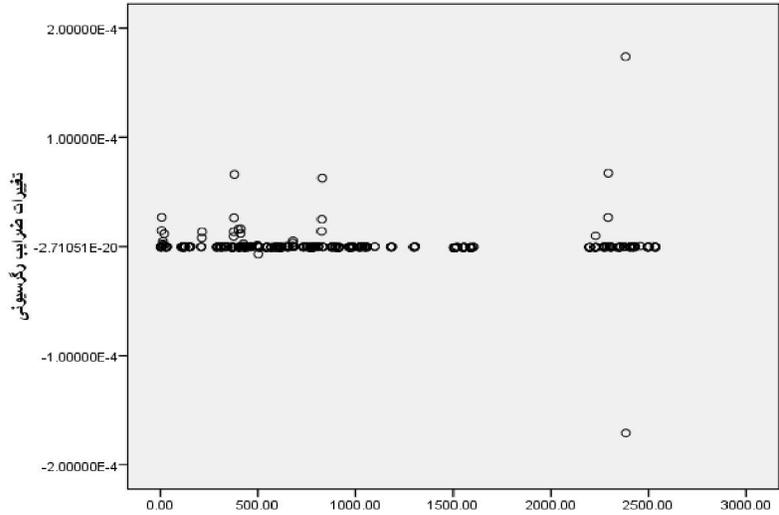
(4-2-7) Final Model : as We Mentioned Above, Two Data are outlier and Effective that Should be Removed. By Removing These Two Observations, the Final Model is Gained as Follows:

$*b_1 \frac{h(t)}{h0(t)} = \text{CEO Change} + b_2 \text{ Liquidity} + b_3 \text{ Financial Rick (6)}$

Table (7) : Final Step Data *

Independent Variables	Regression Coefficient(b)	Standard Deviation (CE)	Significance (SIG)	Proportional Hazard (EXP(B))
CEO Change	0/268	0/126	0/034	1/308
Liquidity	-1/613	0/479	0/001	0/199
Financial Rick	0/378	0/091	0/000	1/459

$\frac{h(t)}{h0(t)}$= 0/268 CEO Change_ 1/613 Liquidity + 0/378 Financial Rick Results of Final Fitting of COX Model (Table2). Shows That Only the Variables of CEO Change, Liquidity, and Financial Risk are Present in the Model (Sig< 0/05). Coefficients of the Model Shows That as the Variables of Financial Risk and CEO Change Increase, Bankruptcy Hazard Increases as Well, And as Liquidity Increases, Bankruptcy Decreases. Proportional Hazard Greater Than 1 Shows that as the Independent Variable increases, Bankruptcy Hazard I increases as Well, and Proportional Hazard Smaller Than 1 Shows That as Independent Variable Increases, Bankruptcy Hazard Decreases. For Example, Proportional Hazard of CEO Change is 1/308, Which Shows That Per One Unit Increase in This Variable, Bankruptcy Hazard Increases a Much as %30/8.

(3-7) Descriptive Statistics of the Study

The Study`s Descriptive Statistics Which Include Average, Median, Max, Min, and Standard Deviation of the Study`s Data, are Calculated and Presented in the Following Chart:

The Values Mentioned Only Present a Schematic of Data Distribution Status of the Study

*Chart (8) : descriptive Statistics of the Study

Max	Min	Standard Deviation (SD)	Median	Average	Number	Variable
6	0	0/985	3	2/987	635	Number of Non executive Directors
10	0	2/015	2	2/787	635	CEO Change
5597	7/28	3/252	81/86	97/59	553	Major Ownership
10/1	0/02	0/889	1/13	1/265	567	Liquidity
15/2	0/04	1/802	1/31	1/787	558	Operational Risk
7539	-1162	5098/1	5/19	422/48	507	Interest Coverage Ratio
225/9	-29/3	9/970	0/21	0/722	534	Profitability
16/17	7/09	1/580	12/63	12/664	559	Firm`s Size
98/37	0/03	4/151	0/68	0/916	567	Financial Risk
2/2	1/1	0/091	1/609	1/624	635	Board of Director`s Size

Results Presented in the Above Chart Shows That the Average (Median) if the Ratio of Non Executive Directors is (3) 2/98, CEO Change is (2) 2/78, Major Ownership of Shareholders is(81) 97/5, Liquidity is (1/13) 1/26, Operational Rick is (1/31) 1/78, Interest Coverage Rata is (519) 422/4,Profitability is (21) 72, Firm`s Size is (12/62) 12/66, Financial Risk is (68)91, and Board of Directors` Size is (1/60) 1/62. Max and Min of the Number of Non Executive Directors is (0/000) 6, CEO Change is (0/000) 10, Major Ownership is (7/28) 5597, Liquidity is (0/02)10/10, Operational Risk is (0/04) 15/20, Interest Coverage Ratio is (-1162) 75395, Profitability is (-29/3) 225/9, Firm`s Size is (7/09) 16/17,Financial Risk is (0/03) 98/37, and Board of Directors` Size is (1/10) 2/20 Also Standard Deviation of the Variables of the Number of Non Executive Directors is 0/98, CEO Change is 2/01, Major Ownership is 3/25,Liquidity is 0/88, Operational Risk is 1/80, Interest Coverage Ratio is 5098/12, Profitability is 9/97, Firm`s is 1/58,Financial Risk is 4/15, and Board of Directors` Size is 0/09.

CONCLUSION

In First Hypothesis of the Study, Investigating the Association Between CEO Change Variable as the First Agent of the Corporate Governance and Bankruptcy Showed Significant relationship Between These Two Variables. This Implies That First Hypothesis is Confirmed. A Significant Relationship Between These Two Variables (CEO Change and Bankruptcy) Shows That Companies frequently Experiencing a CEO Change are More Subject to Bankruptcy Than Other Companies. in Second Hypothesis of the Study, the Relationship Between the Board Of Directors` Size and Bankruptcy Was Examined. Results of the Estimation of the Model Indicates That There Isn`t a Significant Relationship Between the Variable of the Board of Directors` Size and Bankruptcy. Thus, Second Hypothesis of the Study is Rejected.

In Addition, in Third Hypothesis of the Study, Regarding the Percentage of Non Executive Directors and its Relationship With Bankruptcy, the Results of the Model`s Estimation Indicate the Insignificance of the Relationship Between the Two Variables. This Means That There is Not a Significant Relationship Between the Percentage of Non Executive Directors and Bankruptcy. There Fore Third Hypothesis of the Study is Also Rejected. In Fourth Hypothesis,RESUTS of Examining the Relationship Between Major Ownership Variable and Bankruptcy Show That the Relationship between These Two Variables is Insignificant and Finally, the Fourth Hypothesis is Reject.

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