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CORPORATE GOVERNANCE AND FRAUD DETECTION: A STUDY FROM BORSA ISTANBUL

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Abstract

Governments give high priority to corporate governance principles after important business scandals. Since the ultimate goal is to enable sustainable life span for the corporations, new regulations and sanctions has been introduced about transparency, and accountability all over the world. The basic corporate governance principles are applied for establishing more reliable financial reporting of firms. In this study, the relationship between corporate governance practices and fraud risk is investigated. There are some studies conducted in literature that investigating fraudulent financial statements, and detection models are tried to be constructed. They are generally based on financial indicators. The aim of this study is to combine financial data with non-financial variables about corporate governance applications, and to construct a fraud detection model via measuring the effectiveness of corporate governance on fraud risk. The hypotheses have been created based on assumptions and tested with the logistics regression. 134 companies listed in Istanbul Stock Exchange have been studied via benefiting their financial statements published between 2010 and 2014, and their corporate governance applications announced. Findings show that the new regulations about corporate governance principles and their applications in Turkey have not made the expected effect on fraud risk yet. On the other hand, profitability and indebt positions of companies have an impact on the risk of preparing fraudulent financial statements, and give clues about the misstatements, consistently with literature.

Keywords: Corporate Governance, Fraud, Fraud Detection, Fraudulent Financial Statements, Financial Ratio Analysis

1. Introduction

Accounting profession is in a change mood with new concepts especially after global corporate scandals. Not only the accounting profession, but also the whole structure of the business life has many rigid terminologies since early 2000s; corporate governance, risk control environment, internal audit mechanisms, code of ethics, transparency, fraud detection and so on. Moreover, governments obligate the corporations with new code of laws and regulations to implement the principles of those critical concepts.

The main question in mind while starting this study is whether implementing corporate governance principles has an impact on fraud risk. Corporate Governance Principles of Turkey which were issued by Capital Market Board of Turkey in 2003 consist of four sub-sections

regarding points about shareholders, disclosure and transparency, stakeholders and board of directors (CMB, 2003). Internal and independent audit mechanisms are the indispensable part of these principles in order to establish close follow-up for both managers and other employees. Thus, a strong structure is aimed to be constructed in care of regulators in Turkey as well as seen all over the world. The ultimate purpose of these regulations is to provide long-lived corporations with healthy structures in collaboration with assured financial performances. As a result, we expect a positive impact of corporate governance implementation on corporate audit function and finally on financial performance, and a reliable financial reporting to stakeholders.

2. Literature Review

Presently, accounting and audit concepts are working in a synchronized fashion in order to establish an ethical business environment. Ethics is a discipline that studies moral reasoning and the goodness or badness of a particular behavior (White and Long, 2000). There are always some conflicts between personal morality and managerial obligations (Fasching, 1981). For business organizations to remain competitive, and survive, business owners and managers must make informed decisions about the organizational structures that are necessary to develop the ethical and moral behavior of its members.

Corporate scandals at the beginning of 2000s generated new concepts for the literature. The first one to be defined is corporate governance: it is a system of rules, practices and processes by which a company is directed and controlled. It involves balancing the interests of many stakeholders in a company - these include its shareholders, management, customers, suppliers, financiers, government and the community.

Management is responsible to the board of directors, which provides governance, guidance and oversight. By choosing management, the board has the most important role in defining what it expects in integrity and ethical values and can confirm its expectations through oversight activities. (Mandaci and Kahyaoglu, 2012). Thus, board of directors and management have both reciprocal responsibility on risk management and corporate internal control mechanisms.

Code of ethics is the initiative in order to perform in a more transparent and reassuring business platform. It can be defined as a guide of principles designed to help professionals conduct business honestly and with integrity. A code of ethics document may outline the mission and values of the business or organization, how professionals are supposed to approach problems, the ethical principles based on the organization's core values and the standards to which the professional will be held (Kaya and Erguden, 2014).

Financial manipulation is a term which is generally used for the stock market manipulations in the literature, but in a broad sense, it can be defined for also financial statement manipulations; or the financial statement frauds that include the intended misstatement of numbers by either false bookings in accounting or intentional misapplying accounting rules and regulations. Fraud includes any intentional or deliberate act to deprive another of property or money by guile, deception, or other unfair means. Fraud against a company can be committed either internally by employees, managers, officers, or owners of the company, or externally by customers, vendors, and other parties (ACFE, 2014).

According to Spathis (2002), falsifying financial statements consist of manipulating elements by overstating assets, sales and profit, or understating liabilities, expenses, or losses. If a financial statement has a falsification in it, its elements no longer represent the true picture. Financial statements fraud is nearly the most expensive fraud type in terms of consequences. Yoruk and Dogan (2009) listed earnings management, income smoothing, big bath accounting, creative accounting practices, and aggressive accounting as some manipulation methods.

Farber (2005) had performed a research on corporate governance and stock price performances on fraud-detected firms. He worked on 87 firms in the study, which conducted fraudulently manipulating activities on their financial statements. Results showed that fraud detected firms had poor governance, fewer proportionate of outside board members, less audit committee meetings and fewer financial experts on that committee, a smaller percentage of big 4 auditing firms, and a higher percentage of CEOs who are also chairmen of the board of

directors compared to other firms within the sampling period (Xue, 2008). After improving their governance within three years, fraud detected firms achieved similar corporate governance characteristics as the control firms. Since fraud detected firms that made changes achieved better stock performance, investors appreciate corporate governance improvements.

Gillian and Starks (2003) examined the relationship between corporate governance and ownership structure, and they found institutional investors are more powerful. Brown and Caylor (2004) stated that better governed firms are more profitable, less risky, more valuable, and pay out more of their cash to shareholders compared to other firms.

3. Research Design and Methods

The purpose of this study is to set a logistics regression model to detect the fraudulent financial statement risk on Istanbul Stock Exchange firms. The ratios in financial statements and non-financial indicators that a company possesses due to corporate governance necessities are the independent variable of our proposed model whereas fraudulent financial statement risk is the dependent one. The main purpose is to investigate whether some clues can be found in financials, and/or corporate governance practices (applied or not applied by firms) have an effect on the fraudulent representations.

Regression analysis is used in order to set the fraud detection model in this study. The relationship between dependent and independent variables are indicated with logistics regression, because the analysis contains categorical dependent data which needs a binary response model (Wooldridge, 2012). The logistic function is represented as below;

$$\text{Prob}\ (y = 1) = \frac{\exp(\ b_1x_1+b_2x_2+\cdots b_nx_n)}{1+\exp(\ b_1x_1+b_2x_2+\cdots b_nx_n\ )} \quad (1)$$

The dependent variable of the model is selected as ‘Fraudulent Financial Statement’ and is displayed with ‘FFS’. This representation is also used by Spathis (2002). The aim is to find the prediction probability of fraudulent financial statement risk via a logistics regression constructed with financial and non-financial variables. FFS is a categorical dependent, and have values of ‘1’ for fraudulent financial statement observations, and ‘0’ for non-fraudulent financial statement observations. Another approach for interpreting the variable can be ‘1’ for the firms that have high risk of fraudulent activities, and ‘0’ for the firms that have no or less risk of fraud in their financials.

3.1. Variables

Non-financial part includes categorical variables about firms’ corporate governance practices.

3.1.1. Code of Ethics (Ethic Code – EC)

Corporate governance principles require employees and professionals to be act in ethical behaviors. Code of Ethics or Ethic Code should be announced within companies in order to guide people about their business manners. All personnel should be aware towards the codes, and be responsible to communicate and report non-compliance with Code of Ethics, and illegal actions (Mandaci and Kahyaoglu, 2012). Policy violations made by professionals damage the Code of Ethics, and hazard the corporate governance practices of the firm. It is expected that the firms having Codes of Ethics published and/or announced within the company have less risk of falsified financial statements. Firms in study are classified into two groups for this variable; ‘0’ for the firms that have no Codes of Ethics; and ‘1’ for the firms that have.

3.1.2. Existence in Corporate Governance Index

BIST Corporate Governance Index *(XKURY)* is the index in which the companies that apply Corporate Governance Principles are included. BIST Corporate Governance Index aims to measure the price and return performances of companies traded on Istanbul Stock Exchange

Markets (except companies in Watchlist Companies Market and List C) with a corporate governance rating of minimum 7 over 10 as a whole and minimum of 6.5 for each main section. The rating institutions in the list of CMB rating agencies determine the corporate governance rating based on their assessment of the company's compliance with the corporate governance principles (Istanbul Stock Exchange, 2016). In this study, existence in the index is chosen as an independent variable since the firms listed are expected to apply the corporate governance principles more effectively, so fraudulent financial statement risk declines compared to firms that are not listed in the index. Firms in study are classified into two groups for this variable; '0' for the firms that do not exist in BIST Corporate Governance Index *(XKURY)*; and '1' for the firms that exist.

3.1.3. Independent Auditor Rotation

Carcello and Neal (2000) suggest that hiring external auditors who are more independent is associated with the audit committees'' effectiveness. Auditors with greater industry expertise are also chosen by the firms which have efficient audit functions (Abbott and Parker 2000). According to Turkish Commercial Law, No. 6102, independent auditor rotation calculations are made considering ten (10) years retrospectively, and if an auditor audits a firm seven (7) years in total, rotation is made for three years and gives a break for the auditing relationship between parties. This is the mandatory type of auditor rotation. Firms can also change their independent auditors discretionally. There are many reasons for cancelling, or not renewing the contract with the audit company and/or the auditor. A dissatisfaction of service received, expertise capabilities, and financial issues are some of those reasons. On the other hand, a firm publishing falsified financial statements, or committing a fraud tends to change its auditor in order to benefit from new relationship. The new auditor is in the recognition step of the audit commitment, and the firm. Moreover, such kind of firms has a possibility to change their auditor frequently. They do not want to generate close and long term relations with them. Thus, independent auditor rotation can be a red flag for fraudulent activity. Firms in study are classified into two groups for this variable; '0' for the firms that have no independent auditor rotation for the stated year; and '1' for the firms that have the rotation.

Financial part consists of ratios calculated from financial statements and they indicate the performance of companies. Ratio analysis is one of the widely used technique in financial parts of fraud detection studies, and it is very popular in literature (Worthy, 1984).

3.1.4. Debt/Equity (D/E)

The debt structure of a company can give clues about fraudulent financial statements (Persons, 1995). High debt may increase the possibility of the financial statement fraud risk. If debt increases, a shift in risk occurs from shareholders and managers to funders. Managers may perform manipulations on financials in order to meet certain debt covenants (Spathis, 2002). Kirkos *et al.* (2007), Spathis (2002), and Spathis *et al.* (2002) used debt to equity ratio for measuring the effect of debt on fraudulent financial statements. It is expected that high level of debt in a company increases the possibility of fraud risk in financials.

3.1.5. Sales/Total Assets (Sales/TA)

Sales to total assets ratio indicates the firm's sales generation ability with its assets. The competitiveness power of the company can also be measured with this ratio. Managers try to make their companies more competitive, and this incentive may cause fraudulent activities on sales items and their recognition (Dalnial *et al*. 2014). This ratio is included as a variable in studies of Dalnial *et al.* (2014), Spathis *et al.* (2002), and Spathis (2002). The expectation is that the financial statements of firms having difficulties in sales generation have more risk of fraud. This means managers tend to make manipulations on financials in order to show the company more competitive, and successful.

3.1.6. Net Profit/Sales (NP/Sales)

Net profit to sales ratio gives clue about the firm's profitability situation. According to Spathis (2002), a low value of net profit to sales means firm has low returns. Thus, there is a risk for manipulating the financials in order to show the company more profitable either by reducing its expenses, or increasing the revenues. Managers' incentives are usually based on profitability levels of companies. Thus, managers have tendency to maximize their own utility. Increasing trend in earnings and profit also serve for their job security (Spathis, 2002). There is an expectation that managers make manipulations for improving profitability level both in current or past periods (Summers and Sweeney, 1998). Dalnial *et al.* (2014), Spathis (2002), Kaminski *et al.* (2004), and Spathis *et al.* (2002) used net profit to sales ratio in their studies in order to investigate whether profitability is a motivation for preparing fraudulent financial statements. The expectation is that the variables are in negative values. This means, fraud risk increases with lower profit level.

3.1.7. Receivables/Sales (Rec/Sales)

Financial statements contain some accounts that have subjective characteristics. Postings and presentations are made based on estimations, and have different perspectives in their interpretations. Sales, and accounts receivables are good examples to this category of accounts (Fanning and Cogger, 1998). Stice (1991), Feroz *et al.* (1991), Schilit (1993), Persons (1995), Summers and Sweeney (1998), Fanning and Cogger (1998), and Spathis (2002) claimed that accounts receivable amounts can be manipulated. With the differences of timing in revenue recognition, sales can be recorded before they are earned, and this increases receivables in financials.

There is also a subjective judgement in uncollected accounts. Estimations in allowance for doubtful accounts depend on managers' evaluations. The nature of the subjectiveness of accounts causes difficulties in auditing (Spathis, 2002). Kaminski *et al.* (2004), Spathis *et al.* (2002), Spathis (2002), Ravisankar *et al.* (2011), and Dalnial *et al. (*2014) used receivables to sales ratio in their studies as a variable, since receivables are very open for manipulations. The expectation is that the higher the ratio, the higher the risk of overstatements, and higher the risk of fraudulent financial statements.

3.1.8. Net profit/Total Assets (NP/TA)

As stated in net profit to sales ratio, profitability level of a company is an important indicator in fraud detection. In the study of Spathis (2002), Net Profit/Total Assets (NPTA) resulted with a significant coefficient and he proved that the ratio gives clues about fraud risk. Spathis *et al.* (2002), Spathis (2002), Kirkos *et al.* (2007), Varici (2011), and Ravisankar *et al.* (2011) included this ratio in their studies of fraud detection models. The expectation is that fraudelent financial statement risk increases when net profit to total assets ratio increases.

3.1.9. Working Capital/Total Assets (WC/TA)

Working capital to total assets ratio indicated the firm's ability to manage its short term financial obligations with its assets. The success of working capital management via utilizing the assets and resources of the company is also a good indicator of the overall firm performance (Spathis, 2002). Spathis (2002), Spathis *et al*. (2002), Kaminski *et al*. (2004), Kirkos *et al.* (2007), Varici (2011), and Dalnial *et al.* (2014) used working capital to total assets ratio in their studies as a variable about liquidity of the firm. It is expected to be resulted in negative values since low working capital to total assets ratio indicates an inability for meeting the obligations of the firm. Thus, lower firm's liquidity may cause higher risk of fraudulent financial statements (Dalnial *et al.* 2014).

3.1.10. Gross profit/Total Assets (GP/TA)

Gross profit to total assets ratio is included as an independent variable to this research, because the components of the gross margin (especially cost of goods sold account) may also be manipulated by managers. Falsified cost of goods sold amounts which do not match with sales amounts can be booked, thus gross margin is increased as well as the net income, and is strengthened the balance sheet (or vice versa – gross margin is decreased intentionally) (Fanning and Cogger, 1998). Spathis *et al.* (2002), Spathis (2002), Kirkos *et al*. (2007), and Ravisankar *et al.* (2011) put gross profit to total assets ratio in their studies, and examined the effect of gross profit fluctuations. The expectation is to find whether higher or lower gross margins are related with publishing manipulated financials (Spathis, 2002).

3.1.11. Inventories/Sales (INV/Sales)

One of the other account that has subjective nature is inventory. Pierre and Anderson (1984) indicated that there are many lawsuits about inventory and receivables. Since the methodology of inventory bookings are open for preferences and interpretation, manipulations on this account can be performed more easily (Summers and Sweeney, 1998). Obsolete inventory bookings are an important part of such manipulations. Firms can increase their total assets via reporting higher inventory including obsolete stocks. Another known tactic is reporting inventory at lower cost, or market value. There are different methods for inventory valuations, and shifting from one method to another considering cost effect is frequently used by firms that make manipulations (Spathis, 2002; Dalnial *et al.* 2014). Persons (1995), Spathis *et al.* (2002), Spathis (2002), Kaminski *et al.* (2004), Kucuksozen (2004), Varici (2011), and Ugurlu (2011) used inventories to sales ratio in their studies. The expectation is that the ratio gives positive values, and this indicates that the higher the inventories to sales, the higher the risk of overstatement in inventories account. Thus, the risk of fraudulent financial statements is also expected to increase (Dalnial *et al.* 2014).

3.1.12. Total Debt/Total Assets (TD/TA)

This financial leverage ratio is calculated to measure the ability of companies' obligation meeting capabilities. As mentioned before, overstatement of assets is an important manipulation method, and can be performed via revenues recorded fictitiously (especially at quarter and year-ends), understated allowances for doubtful accounts, overstated tangible and/or intangible assets, and inventories. Assets which do not exist can also be recorded. Asset misappropriation is the other way of effecting financial statements. There could be some thefts in cash accounts, as well as inventories, and property, plant, and equipment accounts (Spathis, 2002).

Debt structure is also an important indicator in fraudulent financial statements. High debt is a motivation for managers to manipulate financials. Their aim is to show company less in debt in order to attract stakeholders. In studies of Spathis *et al.* (2002), Spathis (2002), Kaminski *et al.* (2004), Kirkos *et al.* (2007), Varici (2011), and Dalnial *et al.* (2014), total debt to total assets ratio is used as a variable. The expectation is that possibility of fraudelent financial statements may increase with high level of debt ratio.

3.1.13. Financial Expenses/Operational Expenses (FE/OE)

Financial situation of a company gives clues about its tendency for fraud. Debt structure of the company is crucial for its continuity and sustainability. Financial expenses mainly include interests paid, and exchange rate difference effects on operations. If financial expenses get higher than the operational expenses, this means firm is in risk for managing the financial burden of its operational items. Spathis (2002), and Kucukkocaoglu, and Kucuksozen (2005) used financial expenses to operational expenses ratio in their studies. Higher ratio results indicate higher financial risk. The expectation is that the risk of fraudulent financial statements

increases with high financial expenses to operational expenses ratio, because the managers tend to show the company in less financial burden.

3.1.14. Stock Price Volatility (Volatility)

The variation of stock prices is expected to be an indicator of fraudulent activities. Since the main objective of a company is making money, manipulations made on financial statements are for stock price increases, and equity strengthening. Higher profit is a good signal for market in order to buy the stock of the firm. As soon as stock prices increase, the firm value increases, and this shows a proper management, and leads bonuses and premiums paid for managers. In Agency Theory (Jensen and Meckling, 1976) and Positive Accounting Theory (Watts and Zimmerman, 1978) as well, manager's selections of accounting techniques with self-interest can affect the profitability of companies, and incentives based on short-term success or fraudulent financial can be given. Market-adjusted stock return, earnings-to-price, and book-to-market ratios are studied in the literature, and found that book-to-market and earnings-to-price are significantly lower for misstating firms; this means they have high valuations when compared with fundamentals (Dechow *et al.* 2011). The expectation in this study is that firms which announce fraudelent financial statement have higher volatility in their stock prices. The investors are expected to be very sensitive in evaluating the profitibility and/or financial distress, so when a company publishes an unexpected result, buying and selling activites increase in market.

For the calculation of volatility, the highest and the lowest prices of each related year for sampled companies traded in Istanbul Stock Exchange are taken from Foreks (2016). The numerical results are obtained from below formula:

$$\text{Volatility of company X in year t} = \frac{(\text{Highest price} - \text{Lowest price})}{\text{Lowest price}} \quad (2)$$

3.2. Sample Selection and Data Collection

The research was conducted on the publicly available stock companies listed in Istanbul Stock Exchange for five years period from 2010 to 2014. There is a common belief in literature that fraud becomes evident after some time. According to Kaminski *et al.* (2004), fraud can be detected after five years. Thus, the time period is considered as five years which construct a broad chance area for detection. Considering the sample size it offers, and the way of accounting practices the companies in the industry follows (operational approach), manufacturing industry was chosen for sample selection. Firms with insufficient (missing) data will also be eliminated from the sample set (Some firms are not listed in Istanbul Stock Exchange starting from 2010; their entrance could be after indicated year). The number of firms available for sampling is 134. With five years period, we obtained 670 (134 x 5) observations set.

In data collection process, relevant financial information was obtained from financial statements of the companies that are announced at 'Public Disclosure Platform'. Corporate Governance Compliance Reports and the company websites were also used for investigating the variable of 'ethic code' existence. Moreover, Capital Markets Board Bulletins (weekly) were a source of fraud announcements, tax penalties news, and other related issues about firms.

All 'material event disclosures' about the companies in the sample set have been read and documented from Public Disclosure Platform. This was the first step for classifying the firms into two; '1' for the companies that have a risk of publishing fraudulent financial statement, and '0' for the companies that have no/less risk of fraud in their financials. The auditors' reports and their decisions were another source for the classification. The classification of firms was done based on following factors.

3.2.1. Fraud Announcement

In Public Disclosure Platform; firms that have a fraudulent activity are announcing the type of fraud, - sometimes - the time interval affected and the subject amount. If the fraud is committed

by a specific employee, the name and the position of that person is also declared. Firms can bring an action against the employee or employees getting involved in fraudulent cases. Weekly published Capital Markets Board Bulletins also announced the firms that have fraud or material misstatements in their financials. There is a special part in the bulletin with sub-title of 'Official Complaints, Administrative Fines, Other Sanctions, and Precautions'. The audit reports are also a source of fraud risk determination. If a company gets an audit opinion other than unqualified, it is evaluated as in high risk category in fraudulent financial statements, and classified as '1'.

3.2.2. The Error Announcements of Companies in Their Financial Statements

Under 'material event disclosures' subtitle in Public Disclosure Platform, companies announce some corrections, reclassifications or updates in their financials. Some of them are related with technical problems, or presentations, but some others are directly related with numerical items, or results. If a correction performed in financials, due to classification of accounts, currencies, and mathematical calculations, or sometimes material presentation errors are considered a risk for fraudulent financial statement and the firm is classified under category '1'. The announcements are made with a template including the word of 'inadvertently', but as a researcher we behaved skeptical due to lack of evidence about the firm's intention.

3.2.3. Penalties

Companies that are encountered with tax penalties or some other administrative sanctions due to their financial statements in between 2010 and 2014 are classified under the high risk firms about fraudulent financial statements. Most commonly, tax penalties are fined to the firms after legal or tax audits, and issued due to inaccurate tax assessment declarations. This indicates a misstatement about tax accounts in the financial statements. As a procedure, the companies have sued the fines, but in most cases, they have to pay in total or restructure their penalties.

3.2.4. The Existence of Court Proceedings

The companies in the sample set have many kinds of court issues. Cases about labor issues, with The Competition Board, with Capital Markets Board, execution proceedings, suspension of bankruptcy, distrains, action of debts, and cases between partners disputes are the main lawsuit examples. Considering the content of each case, the classifications were made for the firms. Except labor and The Competition Board related cases, many of them gave clues about the risk of fraudulent financial statement presentations. They are classified under category '1', and mean bearing high risk for fraud.

3.2.5. Material Event Disclosures Requested by Istanbul Stock Exchange about Stock Price Movements

There are some companies that have frequent fluctuations in their stock prices. The reasons of these changes are obliged to be announced by Istanbul Stock Exchange. Even if the companies have no effect on market prices, they are benefited / suffered from the increases / decreases, and this can be observed in the equity part of their balance sheet. Firm value also fluctuates with price changes. On the other hand, there could be some manipulations made by the management team in order to strengthen the balance sheet, and give the impression of success. Some firms with few disclosures cannot be considered as bearing a risk of fraudulent financial statements. However, there are firms with remarkable disclosures (consecutive days, more than one in a month, etc.), and they were classified under category '1' in the study.

3.2.6. Other Remarks

There can be some other points that are not sufficient alone to classify the firm under category '1', but remarkable. Companies sometimes ask for additional time from Capital Markets Board

for publishing their financial statements. It cannot be always due to makeups on financials, but some situational necessities. However, some audit firms can ask corrections before issuing their opinion reports, and that could be an indicator about misstatements in financial reports. If corrections are done before publishing, we cannot classify the firm under category '1', although we have doubts about fraudulent activities. On the other hand, some companies have time requests more than one time (for different reporting deadlines, and sometimes consecutive reports). This is a strong indicator of faulty process. If there are any other classification reasons for the same company, we classified it as in high-risk category of fraudulent financial statements.

In Turkish Commercial Code Article Number 376 (old article number of 324), loss of capital, and deep in debt situations are arranged. According to this article, firms in such cases have to prepare interim financial statements in order to indicate that two thirds (2/3) of principle capital has not been lost. In case of capital loss, the firm has to present the actions decided to suppress the loss. These interim financial statements have to be audited by independent auditors. Thus, material event disclosures regarding Article 376 prove the financial distress of the firms. Loss of capital is the demonstration of unsuccessful management of the company, and the expectation is that the management team can make fraudulent manipulations on financials in order to recover the firm, or show as it survives. Companies making announcements according to Article 376 were categorized as high risk in fraudulent financial statements.

There are also some other points giving clues about the situations of companies. Disclosures of top management changes, or frequent rotations, restructuring of debts, and announcements about intercompany relations/transactions were also considered, but not accepted solely as an indicator for fraud. If there were above listed reasons additionally, the firm was categorized under '1' for fraudulent financial statements variable.

After classification of firms based on above mentioned criteria, 71 firms out of 134 (52.99%) were classified as '1' which means bearing the risk of publishing fraudulent financial statements, and 63 firms out of 134 (47.01%) were classified as '0' which means there is no sign for a fraudulent activity based on determined criteria.

3.3. Hypotheses Development

There are two main hypotheses in this study. Each main hypothesis has its own sub-hypotheses. Since New Turkish Commercial Code obliges to apply corporate governance principles to companies, a model constructed for fraud detection in Turkey should include some variables with the application of these principles. Corporate governance index is the measure of the four main principles; disclosure and transparency, equality, responsibility, and accountability. Independency is also an important milestone for corporate governance. Code of ethics, and the rotation in independent auditors are the requirements of corporate governance practices. The purpose is to investigate the effect of the application of these basic principles on prevention from fraudulent financial statements.

First main hypothesis is related with corporate governance necessities of the companies, and represents the non-financial part of the study. The expectation is that the application of corporate governance principles decreases the risk of fraud in companies, thus the risk of fraudulent financial statements.

H_1: Corporate governance practices and FFS have a negative relationship.

Each variable in this category has its own effect on the detection model. Existence of a code of ethics in a company is expected to decrease the risk of fraudulent financial statements.

H_{1a}: Existence of a code of ethics and FFS have a negative relationship.

Another expectation is about being listed in corporate governance index. If a firm is listed in corporate governance index in Istanbul Stock Exchange, less risk in fraudulent activities is expected.

H_{1b}: Existence in corporate governance index and FFS has a negative relationship.

Last sub-hypothesis of the first main hypothesis is about independent auditor rotation. Companies' frequently switching one auditor to another is expected to have more risk in publishing fraudulent financial statements.

H_{1c}: Increase in independent auditor rotation is a signal for the possibility of fraud in the financial statements.

On the other side of the coin, financial statements contain many signals and check-points with financial data. Results from literature about ratios give us clues about the financial part hypotheses and research questions of this study.

Second main hypothesis is constructed as follows;

H_2: Financial statements' ratio analysis and FFS detection have relationship.

Liquidity problems and cash shortages can be important problems in companies. Working capital ratio is a good indicator about the situation of liquidity for firms. The expectation is that the shortages in liquidity increase the tendency of management in publishing fraudulent financial statement.

H_{2a}: Firms that have liquidity problems tend to be fraudulent in their financial statements.

Second sub-hypothesis of this part is about debt situation of companies. Debt ratio (total debt / total assets) and debt to equity ratio are the indicators of a company's financial leverage. Firms with high debt are expected to have high risk in preparing fraudulent financial statements.

H_{2b}: Highly indebted firms tend to be fraudulent in their financial statements.

Third sub-hypothesis of this part is about performance management. We can find clues about the performance of companies with return on assets and profit margin ratios. If the performance is not satisfactory, i.e. low, fraudulent manipulations are expected on statements.

H_{2c}: Firms that have low performance tend to be fraudulent in their financial statements.

Last sub-hypothesis is about market value of firms. The expectation is that the stock prices of firms publishing fraudulent financial statements fluctuate more than the others. This can be an indicator in two ways; investors may react unexpected good/bad performance results of the companies, or management team may aim to manipulate firm value via fluctuating the equity part of balance sheet. Thus, price volatility can be a clue for detecting fraudulent financial statement.

H_{2d}: High stock price volatility is a signal for the possibility of fraud in the financial statements.

3.4. Measures

In order to test the constructed hypotheses, a logistics regression was conducted with 670 observations from 134 companies. The type of data used in the study can be named as panel data cross section across time.

The proposed model at the beginning of the study is as follows:

$$Prob\,(FFS=1) = \Pi\,((b_0 + b_1(EC) + b_2(ECGI) + b_3(IAR) + b_4\left({}^{D}/_{E}\right) + b_5\left({}^{Sales}/_{TA}\right) + b_6\left({}^{NP}/_{Sales}\right) + b_7\left({}^{Rec}/_{Sales}\right) + b_8\left({}^{NP}/_{TA}\right) + b_9\left({}^{WC}/_{TA}\right) + b_{10}\left({}^{GP}/_{TA}\right) + b_{11}\left({}^{INV}/_{Sales}\right) + b_{12}\left({}^{TD}/_{TA}\right) + b_{13}\left({}^{FE}/_{OE}\right) + b_{14}(Volatility)) \quad (3)$$

Where FFS = False Financial Statements; Π = cumulative distribution fit of a logistic random variable; EC = Code of Ethics existence; ECGI = Existence in corporate governance index; IAR = Independent auditor rotation; D/E = Debt/Equity; Sales/TA = Sales/Total assets; NP/Sales = Net profit/Sales; Rec/Sales = Receivables/Sales; NP/TA = Net profit/Total assets; WC/TA = Working capital/total assets; GP/TA = Gross profit/Total assets; INV/Sales = Inventories/Sales; TD/TA = Total debt/Total assets; FE/OE = Financial expenses/Operational expenses; Volatility = Stock Price Volatility.

In order to recognize and identify the data before constructing the model, descriptive statistics can be analyzed.

Table 1. Summary of Descriptive Statistics

Variables	Mean	Median	Maximum	Minimum	Std. Dev.
FRAUD	0.530	1.000	1.000	0.000	0.500
D_E	1.310	0.830	188.500	-29.130	7.680
EC	0.750	1.000	1.000	0.000	0.430
ECGI	0.120	0.000	1.000	0.000	0.320
FE_OE	0.550	0.340	6.250	-1.890	0.710
GP_TA	0.180	0.170	1.120	-0.050	0.130
INV_SALES	0.200	0.170	1.360	0.000	0.170
IAR	0.190	0.000	1.000	0.000	0.400
LVOLATILITY	-0.150	-0.200	2.520	-1.610	0.600
NP_SALES	0.040	0.040	8.910	-3.340	0.450
NP_TA	0.040	0.040	6.800	-1.110	0.280
REC_SALES	0.250	0.220	1.510	0.000	0.170
SALES_TA	0.940	0.880	2.910	0.010	0.470
TD_TA	0.510	0.470	8.670	0.020	0.510
WC_TA	0.150	0.170	0.920	-7.980	0.470

Notes: FRAUD: *fraud;* D_E: *debt / equity*; EC: *code of ethics existence*; ECGI: *existence in corporate governance index*; FE_OE: *financial expenses / operating expenses*; GP_TA: *gross profit / total assets*; INV_SALES: *inventories / sales*; IAR: *independent auditor rotation*; LVOLATILITY: *logarithm of volatility*; NP_SALES*: net profit / sales*; NP_TA: *net profit / total assets*; REC_SALES: *receivables / sales*; SALES_TA: *sales / total assets*; TD_TA: *total debt / total assets*; WC_TA: *working capital / total assets*

As seen in Table 1, highest range within all variables is observed in debt to equity (D_E) ratio. Other high data ranges exist in net profit to sales (NP_SALES), net profit to total assets (NP_TA), total debt to total assets (TD_TA), and working capital to total assets (WC_TA) ratios. This has also effect on kurtosis results. Although they have wide ranges, the mean and median of each ratio results are not so extreme. It can be interpreted that we have a proper data set on hand for the study.

In order to test the multicollinearity, which is one of the assumptions in regression analysis, a correlation matrix was constructed and found that there were two variables that have the correlation more than 70% and one of them should be selected for omitting. These variables are working capital to total assets (WC_TA) and total debt to total assets (TD_TA) ratios with a correlation of 89.28%. When searching the correlations of these variables with others, it is seen that working capital to total assets (WC_TA) ratio has 42.46% correlation with net profit to total asset (NP_TA), and 24.75% correlation with financial expenses to operational expenses (FE_OE). Although these percentages are below the threshold, it shows more correlations with others when comparing with total debt to total assets (TD_TA). Total debt to total assets (TD_TA) has correlations with other variables less than 15% except financial expenses to operational expenses (FE_OE) with 26.31%. Thus, working capital to total assets (WC_TA) ratio was decided to omit from variable set, and total debt to total assets (TD_TA) ratio was included.

Based on the correlation matrix, dependent variable ‘fraud’ has a significant correlation with debt to equity (D_E), and inventories to sales (INV_SALES) ratios, the variables of

existence in corporate governance index, and the logarithm of volatility. There is a positive relationship with ratios, whereas a negative relationship exists between others. A high debt to equity (D_E), and inventories to sales (INV_SALES) results lead higher fraud occurrence in financials at 0.05 significance level. There is a negative relationship between existence in corporate governance index and fraud, and this means a firm listed in index has a less tendency to make fraud. When a fraudulent financial statement is announced, volatility of stock prices are decreased, because the reason behind fraud is hiding the poor points and, cut down the reactions of investors. Furthermore, other variables in the study have low and acceptable correlations, and except working capital to total assets (WC_TA) ratio, all others were included in model building process.

4. Results and Discussion

In order to find the best model fit via giving equal chance to all variables stepwise logistic regression was applied. There were 11 steps performed in order to reach last three significant variables constructing the model (backward elimination). EViews 9 SV package was used as the software for the calculations of this study.

Table 2. Output of first step with all independent variables

Variable	Coefficient	Sig.
D_E	-0.002 (0.008)	0.811
EC	-0.265 (0.209)	0.206
ECGI	-0.010 (0.247)	0.969
FE_GE	-0.156 (0.126)	0.215
GP_TA	-4.712*** (0.978)	0.000
IAR	0.168 (0.213)	0.429
INV_SALES	-0.588 (0.464)	0.205
LVOLATILITY	-0.171 (0.143)	0.233
NP_SALES	0.165 (0.160)	0.305
NP_TA	-3.792*** (1.371)	0.006
REC_SALES	-1.206** (0.527)	0.022
SALES_TA	0.021 (0.210)	0.921
TD_TA	0.443** (0.214)	0.039
C	1.520*** (0.373)	0.000
McFadden R-squared	0.092	
S.E. of regression	0.473	
N	670	

Notes: Standard errors are in parantheses. *, ** and *** represent 10%, 5% and 1% significance level respectively.

Table 2 summarizes the output of first step with all independent variables. This was the starting point of the tests and considering the p-values (Prob.), first variable that needs to be omitted was decided as existence in corporate governance index (ECGI) with the highest insignificant result (0.9687). Second iteration was performed with variables other than existence in corporate governance index (ECGI).

At the second step, sales to total assets (SALES_TA) was decided to exclude. Debt to equity (D_E), independent auditor rotation (IAR), net profit to sales (NP_SALES), financial expenses to operational expenses (FE_OE), ethic code (EC), logarithm of volatility (LVOLATILITY), and net profit to total assets (NP_TA) were excluded, respectively. At step #10, inventories to sales (INV_SALES) with insignificant p value of 0.6065 was omitted, and finally came to last step. At final step, gross profit to total assets (GP_TA), receivables to sales (REC_SALES), and total debt to total assets (TD_TA) remained, and the output was created as in Table 3.

Table 3. Output of final step

Variable	Coefficient	Sig.
GP_TA	-5.268*** (0.773)	0.000
REC_SALES	-1.080** (0.470)	0.022
TD_TA	1.016*** (0.238)	0.000
C	0.849*** (0.213)	0.000
McFadden R-squared	0.075	
S.E. of regression	0.476	
N	670	

Notes: Standard errors are in parantheses. *, ** and *** represent 10%, 5% and 1% significance level respectively.

All three variables gave significant results with p values < 0.05 at 95% confidence level. At first glance, it is seen that gross profit to total assets (GP_TA), and receivables to sales (REC_SALES) ratios have negative relationship with fraud risk whereas total debt to total assets (TD_TA) ratio has a positive relationship.

In linear regression, adjusted R-squared gives the researchers an opinion about the explanatory power of the model. It is indicated how well data fits a line with R-squared. However, it cannot determine whether the predictions are prejudiced and coefficients are biased (Frost, 2013). In logistic regression, there is no linear relationship between dependent and independent variables, so revised version of R-squared is used instead of basic adjusted R-squared. Such R-squared ratios are called 'pseudo-R squared' generally. Cox & Snell R Squared (1989), Nagelkerke R Squared (1991), McFadden R-squared (1974), and Tjur (2009) are the ones that used in binary regression models (Allison, 2013). As a rule of thumb, R-Squared results are expected to be higher. Although, prediction ability of the model is measured with R-squared percentages in linear regressions, pseudo-R squared results are not primary indicators in logistics regression interpretations.

Eviews calculates McFadden R-squared automatically for logistic regression models as pseudo-R squared. In above output, a very low percentage is seen for the last step with 0.074%. This means the explanatory power of the model is extremely low. However, this result cannot demonstrate that the model has no prediction ability, since R squared percentage is not a critical indicator in logistic regression. Kucukkocaoglu and Kucuksozen (2005) performed a logistic regression with 122 companies in Turkey (23 manipulator and 99 control firms), and resulted an R-squared of 34%.

Table 4. Output of expectation-prediction evaluation step

	Estimated Equation		
	Dep=0	**Dep=1**	**Total**
Total	315	355	670
Correct	159	260	419
% Correct	50.48	73.24	62.54
% Incorrect	49.52	26.76	37.46

According to the Table 4, that shows the results of expectation-prediction evaluation step, 62.54% of the firms were predicted correctly in total. The model predicted 73.24% of firms publishing fraudulent financial statements in correct class, whereas 50.48% of firms that do not have any fraud were predicted correctly. Spathis (2002) conducted at Greek stock market predicted 84.21% of fraud companies in correct classification with his logistic regression model. The final step was constructing the equation with variables on hand. In logistic regression, coefficients of variables cannot be directly included in equation since it is a binary response model, and dependent variable gets a value between 0 and 1.

The significant variables in this model are all continuous type of data. The magnitude of each variable was calculated with a scaling factor:

$$\frac{\partial p(x)}{\partial x_j} = g(\beta_0 + x\beta)\beta_j, \text{ where } g(z) \equiv \frac{dG}{dZ}(z) \quad (4)$$

The calculation was performed via EViews 9 SV package and the scaling factor was resulted as 0.248934. The final equation of the model can be constructed as:

$$P(\mathrm{FFS} = 1\mathrm{lx}) = 0.211256 - 1.31134\,\mathrm{GP/TA} - 0.2689\,\mathrm{Rec/Sales} + 0.253018\,\mathrm{TD/TA} \quad (5)$$

Gross profit to total assets (GP/TA), receivables to sales (Rec/Sales), and total debt to total assets (TD/TA) ratios are the independent variables of our final model. Dependent variable is fraudulent financial statements publishing risk.

Before testing the hypotheses (Table 5), the equation should be resolved. Independent variables in equation are ratios which are calculated via dividing figures in financial statements, and give us proportionate results. If we analyze the coefficients with a percentage perceptive, it leads an unrealistic interpretation. For instance, gross profit to assets (GP/TA) ratio has a coefficient of -1.31134, that means 131% decrease in ratio result is a red flag for fraud risk in financials; or 131% increase in gross profit to assets (GP/TA) decreases the fraud risk. This conclusion is far away from the reality in business, because the increase percentage is very high. Such high increase is questionable as a matter of course, and investigated by auditors and investors as well regardless of a fraud detection model.

In order to solve myopic perspective, and make more realistic interpretations, standard deviations of each independent variable was considered. With multiplying coefficients and related standard deviations, marginal effects of ratios on financial statement fraud risk were calculated.

Gross profit to assets (GP/TA) ratio has a coefficient of -1.31134 in the model, and its standard deviation is 0.13. By multiplying two (-1.31134 x 0.13 = - 0.17047), a 17% inverse relationship between the ratio and fraud is found. This means 17% decrease in gross profit to assets (GP/TA) ratio, increases the fraud risk in financial statements.

Gross profit is an indicator about the operational profitability of a company. Gross profit to assets (GP/TA) ratio shows the profit generation ability of the company with its assets on hand. Investors place high importance on this ratio since it gives clues about the profitability in general and total efficiency. That is the reason when the profit generation ability decreases, a tendency to make fraudulent activities on financials increases by management teams. The result is consistent with the expectation, either higher or lower gross margins are related with publishing manipulated financials (Spathis, 2002).

Table 5. Summary of Findings

Main Hypothesis	Sub-Hypothesis	Indepent Variables Used for Testing	Findings
H1: Corporate governance practices and FFS have a negative relationship.	H1a: Existence of an ethic code and FFS have a negative relationship.	Code of Ethics	Not supported
H1: Corporate governance practices and FFS have a negative relationship.	H1b: Existence in corporate governance index and FFS has a negative relationship.	Existence in corporate governance index	Not supported
H1: Corporate governance practices and FFS have a negative relationship.	H1c: Increase in independent auditor rotation is a signal for the possibility of fraud in the financial statements.	Independent auditor rotation	Not supported
H2: Financial statements' ratio analysis and FFS detection have relationship.	H2a: Firms that have liquidity problems tend to be fraudulent in their financial statements.	Working capital/total assets	Not supported
H2: Financial statements' ratio analysis and FFS detection have relationship.	H2b: Highly indebted firms tend to be fraudulent in their financial statements.	Debt/Equity, Total debt/Total assets	Total debt/Total assets is significant at the 5% level Supported
H2: Financial statements' ratio analysis and FFS detection have relationship.	H2c: Firms that have low performance tend to be fraudulent in their financial statements.	Sales/Total assets, Net profit/Sales, Receivables/Sales, Net profit/Total assets, Gross profit/Total assets, Inventories/Sales, Financial expenses/Operational expenses	Receivables/Sales and Gross profit/Total assets are significant at the 5% level Supported
H2: Financial statements' ratio analysis and FFS detection have relationship.	H2d: High stock price volatility is a signal for the possibility of fraud in the financial statements.	Stock Price Volatility	Not supported

Receivables to sales (Rec/Sales) ratio has a coefficient of -0.2689 in the model, and its standard deviation is 0.17. By multiplying two (-0.2689 x 0.17 = - 0.04571), a 5% inverse relationship between the ratio and fraud is calculated. This means 5% decrease in receivables to sales (Rec/Sales) ratio is a red flag for the increase of the fraud risk in financial statements.

The expectation before the study was that the higher the ratio, the higher the risk of overstatements, and higher the risk of fraudulent financial statements. However, companies do not make manipulations via increasing the receivables only. When they make fraud, the balance between two accounts can be affected. They generally make their sales on credit. When sales increase, receivables are expected to be increased under normal circumstances. However, receivables to sales (Rec/Sales) ratio decreases when receivables do not increase as much as sales increase; or opposite to normal conditions, receivables decrease when sales increase.

The inconsistency between receivables and sales is a good indicator of fraud risk. There may exist fictitious sales or receivable bookings in financials.

5% decrease in this ratio increases the risk of fraudulent financial statements. Although the percentage seems low, it is remarkable since the characteristics of accounts composed ratio are eligible for subjective bookings. It should be noted that companies can make high collections from time to time (for instance, a large scale bad debt collection), and this could be the limitation of that %5 marginal effect in interpretation. Nevertheless, financials should be analyzed in depth due to high risk, and unless sufficient audit evidence found for collections, the fraud risk should also be investigated.

Total debt to total assets (TD/TA) ratio has a coefficient of 0.253018 in the model, and its standard deviation is 0.51. By multiplying two (0.253018 x 0.51 = 0.129039), a 13% relationship between the ratio and fraud is found. This means 13% increase in total debt to total assets (TD/TA) ratio, increases the fraud risk in financial statements.

As mentioned before, high debt is a motivation for managers to make fraud on financials. The ultimate aim is to indicate company less in debt in order to attract stakeholders. The expectation at the beginning was that fraudelent financial statements risk increases with high level of debt ratio. The result is consistent with the expectation and 13% increase in the ratio can be accepted as a red flag for fraud risk in financials. If the company has difficulties in managing its debt position, the management team has a tendency to manipulate either debt or asset bookings. Decreasing the debt level with fictitious postings as well as increasing assets with overstatements are the ways of make-up on financials. In light of these findings, hypotheses are able to be evaluated. All of the variables represented a claim that serves for a hypothesis.

The results of financial part of the study, the findings are mixed. Liquidity and stock price volatility are not effective indicators in fraud detection models. Their relationship between fraudulent financial statement risk is not proved. On the other hand, debt structures, and profitability indicators of firms are effective for detecting any possible fraud case via analyzing the financial statements. It can be stated that financial statements give apparent clues about their fraud risks to the careful users.

5. Conclusion

This study mainly focuses on the topics of corporate governance, and fraud. The aim is contributing the literature of fraud detection with a model studying on Turkish firms empirically. In the agenda of Turkish firms, corporate governance seems as a hot topic. Turkish government places special emphasis on this issue and via introducing new laws, takes actions to regulate the applications of corporate governance practices.

Turkish firms are especially family-owned companies, and the most important problem of such organizations is the sustainability from generation to generation. Properly applied corporate governance principles lead a sustainable and successful business life. Since the success is the key point of sustainability, companies try to be profitable or some of them try to seem as profitable. Companies may choose to perform manipulations in order to indicate their performance solid, although it is not. Thus, fraud is made for the same purpose; being sustainable and to survive. The most common technique of fraud applied by management team is publishing fraudulent financial statements. By doing so, investor interests are easily directed.

The expectation before starting this study was finding relationships between corporate governance applications and fraud. Corporate governance principles, and financial ratios were expected to be the indicators of manipulations, and by choosing correct variables (financial and non-financial) a model for fraud detection can be constructed.

The time interval selected for the study was between 2010 and 2014. There are 134 companies and 670 observations in this 5-year period. Firm selection, classification and data collection processes were followed fussily and in detail.

After analyzing and classifying each company, data about variables were collected. The dependent variable of the study was false financial statements (FFS). Non-financial independent variables were; ethic code (EC), existence in corporate governance index (ECGI),

and independent auditor rotation (IAR). Additionally, there were financial independent variables which were; debt/equity (D/E), sales/total assets (Sales/TA), net profit/sales (NP/Sales), receivables/sales (Rec/Sales), net profit/total assets (NP/TA), working capital/total assets (WC/TA), gross profit/total assets (GP/TA), inventories/sales (INV/Sales), total debt/total assets (TD/TA), financial expenses/operational expenses (FE/OE), and stock price volatility (Volatility). Data for these variables were collected from 'Public Disclosure Platform', Corporate Governance Compliance Reports, the company websites, and Capital Markets Board Bulletins (weekly).

Two main hypotheses were created for the study. Each of them has its sub-hypotheses in order to analyze more in detail. Although there were limitations in pre-test results, and the overall explanatory power of the model was less than comparable studies performed, the findings can be considered parallel to reality. The debt positions and the profitability level of companies are the key indicators of their tendency to publish fraudulent financial statements in Turkey as well as seen all over the world proved in literature.

The findings of this study indicate that the financials of firms with high in debt situations bear more risk of fraud compared to the ones that have less debt. This result gives us a clue about the management behavior. Managers are in doubt about the investors' reactions when the financials declare much debt, or a fluctuation in debt position. That is the reason they manipulate the debt accounts, or their presentations especially in balance sheet and cash flow statements.

A similar concern exists about the profitability of companies. Investors are accepted as rational, and their investment decisions are expected to be highly related with the profitability due to prospected return. If a company is in loss, or do not make profit as expected, shareholders react, and shift their interest to the new investment areas. This means a loss for the company overall and also a deficiency for managers, and their interests (might get no bonus, no salary increase, no other benefits like stock options, social packages, etc. and a reputation loss for their career). Moreover, financing expenses of the company may be affected in the long-run, banks, credit institutions, and other fund providers can ask for expensive prices due to risk in profit. All stakeholders are accepted to be sensitive to the profitability. Thus, when profitability of a company decreases, the management team tends to publish fraudulent financial statements in order to conceal the real position.

Above findings are consistent with other studies in literature about fraud detection. This constitutes the second part of our empirical study. We aimed to find the variables that indicate the fraud risk, but first, the relationship of corporate governance practices with mentioned risk. In the first part of the empirical study, our expectation was that corporate governance applications have an effect to lessen the manipulations on financials, if so the existence of selected practices would be the indicators of less risk about publishing fraudulent financial statements. However, our findings were not sufficient to prove the relationship. Nevertheless, the existence of a Code of Ethics or being listed in corporate governance index is a good message of companies about their attitudes toward fraud.

The variable of stock price volatility was added to the study in order to find a clue about fraud risk from investor behaviors. However, we cannot say that there is a significant movement in stocks when fraud risk occurs, or a fraud is detected. Investors in BIST may have no or less foresight about fraudulent financial statements, or they do not mind about such manipulations.

5.1. Limitations

Especially in Turkey, total awareness on fraud, and its consequences are very new concepts. There are different dynamics compared to other countries. Due to cultural and organic structure of Turkey, fraud detection is a tough job. The economic conditions are highly changeable, and the data on firms' financials can fluctuate unless there is a fraud. A confusable situation may exist. That is the main reason why a fraud detection model can be unsuccessful on Turkish firms. As mentioned before, the explanatory power of our model is low, but in reality, a fixed model cannot be expected to explain fraudulent financial statements at high rates in this country, so it is somehow satisfactory.

Turkey has also some cultural limitations. Turn to prosecution when detecting a fraud or manipulation is an out of favor action according to Turkish custom. Thus, many fraud cases are accepted as undiscovered, and are not announced to public. As a Type I error, a fraud company could be classified as non-fraud at data selection process (Kirkos *et al.* 2007).

Moreover, there is also one limitation about the firms selected in this study. The companies quoted on Istanbul Stock Exchange (BIST) which belong to manufacturing industry were used in empirical analysis part. Total of 134 firms are from three different markets which are Watchlist Companies Market (6 firms), Second National Market (21 firms), and National Market (107 firms). The question is; do they represent other companies listed in other indices, and/or other markets? Additionally, to what extent BIST firms represent all other companies in Turkey that are not listed in BIST?

The other remarkable point is about the preparations of financial statements. The companies quoted on BIST have strict guidelines for financial statement presentations. Generally Accepted Accounting Principles -locally and globally-, and International Financial Reporting Standards are followed in preparation process. Generally speaking, the human resources in Turkish companies are not so sufficient for meeting such requirements. There are only accounting departments performing daily bookings, and few of those firms employ reporting analysts. Thus, independent audit teams have to prepare the financial statements with their expertise first, and then perform the audit. This causes a case of being performer rather than auditor. A fraud detection model remains incapable, since in such cases, the auditor makes necessary corrections while preparing, before the audit.

5.2. Future Research

There are numbers of open improvement areas in this research subject, especially in Turkey. The studies for constructing the fraud detection models were performed in many countries based on financial ratios calculated from firms' financial statements. In Turkey, these studies are very limited, and mainly focusing on the success of the prediction ability of methodologies (logit or probit analysis, or Artificial Neural Networks, etc.) using for the model instead of the diversifying the variables (ratios, or financial indices). In fact, the main indicator of fraud risk is the variables found significant rather than structuring a full model.

This study was conducted for years from 2010 to 2014 in order to minimize the missing data risk. New researches can be performed for different and more recent time periods. The expectation is that the corporate governance principles will settle in time, and prospective benefits will be more visible. Thus, new studies with same or different samples with the data after 2014 can be conducted in order to observe the improvement, and/or comparing the results with this study.

Mentioned as a limitation of this research, only manufacturing industry was selected form BIST companies. Other industries from BIST list or the other companies that are not traded in any Stock Exchange can be used for a fraud detection study. The drawback of selecting companies out of BIST list can be reaching available data in Turkey. Getting the help of Chamber of Commerce, or Chamber of Industries, and Development Agencies would be a solution of data collection problem. Working on the industries rather than manufacturing in BIST has also a disadvantage; there are limited numbers of firms listed under other industry groupings. Rather than manufacturing industry, only financial institutions have sufficient number of firms to work on. The different logic in the preparation of their financial statement cannot be forgotten and should be noticed. Another solution can be combining two or more industries that are similar to each other. Thus, sample size effect should be evaluated carefully before starting the study.

The fraud detection literature contains many studies conducted with financial variables. Especially financial ratios, and indices were included in studies, and sometimes non-financial data were added to the models. However, corporate governance practices of companies can be good indicators of their fraud risk. This study only contains three application variables since a combination of financial and non-financial data was aimed at the beginning. The most popular applications within Turkish companies after New Turkish Commercial Code became effective

were tried to be selected as variables in this study, in order to limit the numbers of dummies. A study only with non-financial data constructing dummy variables may be performed for measuring the effect of corporate governance principles on fraud risk solely.

Furthermore, audit firms can be included in future studies. Information should be collected about audit firms, or individual auditors that auditing the fraud detected companies. Are they good at detecting frauds on financials, or which firms are not successful in fraudulent financial statements? This study could be very beneficial for the audit sector for their self-evaluation as well as the investors and other information users.

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