Using Contingency Approach to improve Firms' Financial Performance Forecasts

Saman Mousanezhad [a], Esfandyar Mohammadi [b], Farshad Sabzalipour [c], Rahmatollah Mohamadipor [d]*

[a] Department of Financial Management, Ilam Branch, Islamic Azad University, Ilam, Iran
[b] Department of Management, Faculty of Literature and Human Science, Ilam University, Ilam, Iran
[c] Department of Accounting, Faculty of Literature and Human Science, Ilam University, Ilam, Iran
[d] Department of Accounting, Ilam Branch, Islamic Azad University, Ilam, Iran

ARTICLE INFO	ABSTRACT
	One of the challenging issues for investors and professionals is appropriate models to evaluate financial situation of the firms. In this regard, many models have been extracted by researchers using different financial ratios to resolve these issues. However, choosing a model based on the conditions and users' needs is complex. The main objective of this study is to identify the effect of contingency variables on the firms' financial performance forecasting models. The statistical population of the research includes all firms listed in Tehran Stock Exchange during the period 2011-2018, among which 154 firms were selected. The research data were collected from firm's financial statements and other source. Multiple Discriminant Analysis and Logit Regression model were used to test the research hypotheses. According to the results of discriminant analysis, environmental uncertainty and firm size positively improve the predictive power of the firm's financial performance, and business strategy and business competition don't improve the predictive power of the firm's financial performance. Also, the results of logit regression indicated that environmental uncertainty, business strategy, and firm size improve predictive power of the firm's financial performance; but, business competition don't improve predictive power of the model. The results of comparing the two methods showed that the Discriminant analysis method outperformed the logistic regression method

1 Introduction

Performance management and evaluation plays a critical role in the current competitive environment [2]. Organizations are faced with numerous competitive demands, some of which are contradictory.

Considering the higher complexity of global environments in the modern era, organizational managers are pressured to handle several strategic competitive demands and they must be able to manage such contradictions most efficiently [13].

The performance of the enterprise firm is one of the most effective factors on firm stock value, which is realized by maximizing shareholder wealth [24]. The financial aspect of organizations is a functional aspect of the organization that has traditionally been the focus of much attention. Since making a profit is considered to be the main goal of many companies, financial performance and its measurement is very important [29]. Studies on financial performance have often focused on determining the relationships between financial metrics and their impact on firm performance, and in this regard, regression models have been used to show the impact of each of these metrics on performance [33]. In order to make better investment, investors try to differentiate successful companies from unsuccessful ones. In the developed countries, this role is played by ranking agencies. However, there are no such institutions in Iran and the only common and valid ranking is provided by the Tehran Stock Exchange. According to a study conducted in Iran, there is a weak relationship between ranking provided by the stock exchange and ranking based on profitability ratios [13]. In fact, the stock exchange uses criteria such as the amount and frequency of stock trading to rank companies, which are not perfect criteria. Therefore, in order to have a more comprehensive and accurate ranking, it is necessary for the stock exchange to use financial criteria extracted from financial statements as well as non-financial criteria. Another important point is that not all of these criteria, both financial and non-financial, are of equal importance; rather, some criteria are more important than others. Financial performance forecasting models are the tools used to make the decision to invest in a firm [16]. Investors always want to avoid the risk of losing their capital and interest by forecasting the possibility of a firm's bankruptcy. Hence, they are looking for ways to estimate the future financial condition of firms. Bankruptcy prediction has created an extensive literature. The aim of bankruptcy prediction is to assess the determinants of financial distress and relevant models. Therefore, the models that can predict the future financial condition of firms are welcomed. Studies on financial performance have often emphasized determining the relationships between financial measures and their impact on firm's performance, and in this regard, more regression models are used to show the impact of each of these measures on performance [33].

One of the most challenging and exciting issues for many researchers and experts is selecting the firm's performance using a set of financial ratios. Existence of Surplus of financial resources in a firm is of valuable as it ensures availability of enough funds for investing on profitable opportunities for company[34]. one of the key interests of any decision maker is to identify the factors (i.e. financial metrics or financial ratios) that can accurately predict a firm's performance. In the face of changing economic conditions and severe fluctuations in the business environment that have left stakeholders with major uncertainty and numerous possibilities, the existence models for predicting the financial performance of firms that are related to important indicators such as profitability, cash flow and growth is very important. Researchers have extracted many models using different financial ratios that provide different results to economic, environmental and forecasting times. Therefore, it is difficult to select a particular model for financial information users that meets their needs and environmental conditions [23]. The main determinant

of success of a bankruptcy prediction model is the set of variables it utilizes to distinguish firms that are about to default from future solvent firms. While the list of variables that have been employed in various bankruptcy prediction models is quite lengthy, it typically excludes a measure of firms' investment opportunities [14]. The financial ratios are the most commonly used variables for predicting firm's performance, which expresses the relationship between any two items on a balance sheet, income statement, or other financial document [7]. Numerous studies of finance and accounting since the end of the last century have introduced a contingency approach based on the analysis of financial ratios, the main essence of which is that in general, there is no best way to do things, and the best way depends on conditions [6, 31]. Likewise, there is no best model for predicting performance and the best model is dependent to the circumstances. Therefore, the design of the models should be based on firm conditions and business environment. In other words, the attitude of introducing and identifying different contingency situations is more successful in formulating different patterns and models. In general, presenting a model within the context of a contingency perspective is specific to a firm's unique situations.

The use of contingency approach to various issues in accounting knowledge has become common in recent years. In the past, theorists believed that models could be designed for all companies and organizations that fit most of them. But in recent years, there has been some doubt about this, and as a result it has become clear that designing models depends on several factors. The development of contingency views in organizational theory has been another important factor in the application of contingency approach in firms. Based on the contingency approach, all influencing variables must be considered to design the appropriate pattern. According to the contingency approach, designing an appropriate model depends on circumstances and choosing the right combination of environmental and intra-organizational factors. Due to the complexity of identifying all the important contingent factors and the type of relationship between them, trying to identify and differentiate different models to match the situation, and identifying and analyzing existing relationships can facilitate and guide decision-making as far as possible [27]. Various factors have been identified in the literature that affect firm performance and in order to predict firms' bankruptcy and financial performance, most accounting models of bankruptcy and firm's performance have used quantitative accounting information (financial ratios). But according to research results, in addition to financial ratios, other variables also affect firm's performance. Therefore, the present study addresses whether contingency variables significantly improve the predictive power of a firm's financial performance. In this regard, the researcher seeks to answer the question whether contingency variables such as environmental uncertainty, business strategy, firm size, and business competition improve the predictive power of a firm's financial performance.

1.1 Theoretical Foundations

The increasing expansion of financial markets has led to intense competition in industries, and the existence of appropriate models to assess the firm's financial condition is one of the issues that can help decision-making of different groups [29]. Scientific methods and models have been widely used to help make rational decisions about the firms' financial and other affair. For instance, performance measurement based on the accounting models, economic benefit calculation models and use criteria economic value-add, balanced

scorecard, value-based management. On the one hand, rapid technological advances have accelerated economic growth, and on the other hand, increased competition between companies has led to limited access to resources and increased the likelihood of bankruptcy. For this reason, financial decisions have become more strategic than in the past, and as a result, much accounting and financial research has focused on creating an appropriate model for predicting the financial condition and performance of companies. It is important to predict the firm' financial and economic performance. There are many factors affecting the firms' performance and there have been many studies on the influence of these factors on the firm's performance, each of which has investigated one or more factors affecting the firm's performance. Among the many ways to measure a firm's performance, the most effective way is to measure the models' sequential ability to differentiate between firms with high probability of bankruptcy [32]. Firm's performance forecasting is one of the most important issues for investors, creditors, managers and governments. Establishing a proper model for forecasting firm's performance is essential in today's competitive world. Performance forecasting is a process that helps shareholders decide on the optimal investment. The firm's performance is assessed by the users of different financial statements using the firm's financial statements and value. Given that financial performance contributes to the health, survival and success of a business, it is always one of the most important issues and concerns of all business members [1]. The roots of contingency theory are derived from the sociological theory perspective of organizational structure. Contingency theory offers explanations on the interrelationships between organizational system and its environment [8].

This theory is based on the argument that an efficient organization structure is contingent upon an organization's context, i.e. it enables the organization to change its structure to fit the contingencies. According to the theory, no single type of organizational strategy is equally applicable to all organization s [9], in other words, there is no one best way to design an organization within the contingency framework. Therefore, contingency theory can play an important function in organizational design by specifying which structures fit which circumstances [31]. In the 1960s and 1970s, contingency theory introduced in the management literature as opposed to classic management theories. Before that, classic management theories were the best way for managers to get to the bottom of classic organizational management theory. To put it simply, contingency theory argues that the structure of effective management is contingent. The contingency approach is based on the assumption that there is no universally applicable management accounting system applicable to all organizations and conditions. The advantages of the contingency theory are that the theory has enriched the management theories by addressing the environment as one of the keys for managerial decision making. The theory has also helped management of organizations in improving the quality of decision making by addressing the contingent variables [6]. According to the contingency approach to management, there is no universal approach to success, and organizations are affected by their own situation and circumstances in organizing their activities within the organizational structure. Initial contingency studies therefore tried to identify variables that influence how theories of organization are used. In one of these studies, factors such as strategy, technology, environmental size, and power distribution were proposed by Stephen Robbins as contingency variables. Variables such as environment, strategy, and

organizational culture were also studied in other studies as effective contingency variables in the organization [16].

2 Literature Review

Table 1 shows the summary of content analysis of previous studies that are closely related to the subject of the present study.

Table 1: Summary of Research Related to the Present Study Subject

Researchers	year	Title	Result
Mosleh Shirazi et al.[17]	2018	Performance modeling of the financial system using the system dynamics approach of the sand producer company	The results indicate that the project of increasing production capacity is cost -effective. Adventure and temperate scenarios of managing accounts receivable and payables in the current situation and conservative and temperate scenarios in the case of increased production capacity lead to an increasing trend of financial system variables. Financial experts can utilize the model as a tool to support and support corporate development plans and performance management of financial system.
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Tingbani[31]	2016	Working capital management and profitability of UK firms: A Contingency theory approach	Results show that: (1) there is a significant relationship between WCM and two of its components (AR and AP) and profitability. (2 Firms can maximize the benefits and minimize the cost of investment in working capital by aligning their working capital management policies with their environment and also arrange their resources internally to support such alignment as postulated in the contingency framework
Safaee Qadiklaee and Khalili[26]	2015	Evaluation of financial performance of active companies in Tehran Stock Exchange using multi-criteria decision-making techniques	Results show that the importance of value-based metrics is more than accounting metrics in corporate financial performance, and the results of the three ranking methods were highly consistent. The final ranking was also achieved by integrating the results of these three methods.
Pourzamani et al.[23]	2011	Evaluation of LOGIT Model Performance and Multiple Discriminant Analysis in predicting financial performance of companies listed in Tehran Stock Exchange	Results show that the discriminant analysis model is more efficient and works more efficiently with the LOGIT model two years before the baseline data but there is no significant difference between the two models.

Table 1: Continue

Researchers	year	Title	Result
Pourheydri and Kupai Haji[22]	2011	Corporate financial crisis predicted using linear discriminant model.	The finding show that model predictive power has been evaluated using information from the companies with and without financial crisis and non-financial crisis and the results show that up to five years before the financial crisis can be predicted using relatively high accuracy model.
Taleb Nia et al.[28]	2009	Performance evaluation of financial and economic variables in predicting financial crisis of companies	Four financial crisis forecasting models (Sprite Gate, SAF Shirata, Wallace and Ta Da) with cash flow ratios and macroeconomic variables were extended over a one and two-year time interval in this research. According to the results, Sprin Gate and Wallace models developed with cash flow ratios and macroeconomic variables have variables affecting forecasting.
Nazemi Ardakani[19]	2014	A Model for Corporate Financial Performance forecasting using Corporate Governance and Conservative Mechanisms	The results show that adding corporate governance and conservatism variables improves the model's predictive accuracy.
Najvin et al.[21]	2014	investigating and providing dynamic estimate of the relationship between corporate governance mechanisms and corporate financial performance	The findings indicate that the relationship between corporate governance mechanisms and corporate performance is inherently dynamic. In addition, the results of this study showed that the internal corporate governance mechanisms are stronger than corporate governance mechanisms in Singapore.
Chang and Hsieh[5]	2011	Investigating the relationship between components of Intellectual Capital and three Operational, Financial and Market Performance on in Electronics Industry in Taiwan Stock Exchange	The results show that the relationship between operational performance and positive capital is not correlated with structural and human capital. Also, intellectual capital components have a negative relationship with market and financial performance. R&D spending is positively correlated with the three functions, but intellectual property is only positively correlated with operational performance.
Hu et al[11]	2011	Modeling and Simulating the financial system performance of construction projects at China used a system dynamics approach	The results show that delays in paying off debt and delaying payments to suppliers and workers lead to lower financial indicators such as liquidity and profitability.

3 Research Methodology

The present study is a descriptive-correlational in terms of nature and method. The data were collected through archival sources. The population of the study consists of all companies listed in Tehran Stock Exchange from 2011 to 2018. To be included in the sample, a firm should fulfil all the criteria below:

(1) It should be listed in Tehran Stock Exchange for the years 2011–2018.
(2) It should not be listed under the financial, property, real estate and building construction industries.
(3) It should have complete data for the years 2011–2018 as required.
(4) It should not be delisted from the stock exchange or listed on the stock exchange during the research period
(5) It should not have blackout period for more than 3 months during the research period

The final samples include 154 firms (1232 firm-year observations).

Multiple discriminant analysis (MDA) is a statistician's technique used by financial planners to evaluate potential investments when a number of variables must be taken into account. This technique reduces the differences between some variables so that they can be classified in a set number of broad groups, which can then be compared to another variable.

Multiple Discriminant Analysis is a common method used in research on bankruptcy performance and financial status. Pourzamani et al [23] examined the efficiency of Logit model and multiple discriminant analysis in predicting corporate financial status and showed that the discriminant analysis model worked more efficiently with data from one year prior to baseline, and the Logit model works better by data from two years before but, there is no significant difference between the two models. Therefore, the Multiple Discriminant Analysis and logistic regression were used in this study [23].

3.1 Research Variables

The main criterion (dependent) variable of the study is earnings per share (EPS). It has been adopted as a measure of performance because it has more desirable distributional properties than other accounting measures, such as return on equity [9] and also allows easy comparability among companies. To identify the important variables in predicting corporate financial performance, the relevant financial ratios were identified using archival sources. The indicator that is considered should be among the main financial performance indicators from the investors' point of view.
In his book named "Measuring Business Performance: from theory to practice", Neely [20] considers the earnings per share as most important financial performance indicators from the investors' perspective, Therefore, in this study, instead of using indicators such as inclusion or exclusion in Article 141 of the Commercial Code or the Tobin Q criterion, the earnings per share is used to distinguish between poorly performing firms and strong ones. The study has two sets of predictor variables. Predictor variables are also sometimes known as independent variables. The first set of predictor variables include financial ratios (i.e. liquidity ratios, leverage, profitability, activity, and market value) adopted by previous studies [12, 17, 18,

21]. The second set of variables includes the set of contingent variables (Business strategy, firm size, Environmental uncertainties, business competition). Table 2 shows the variable used in this study.

Table 2: Research Variables

Variable type	Variable name	Variable type	Variable name
Liquidity ratios	Net working capital to total assets	Market Value Ratios	Earnings per share
			Price to profit
	Current Ratio		Book value
	quick ratio		Dividend yields
Leverage ratios	Debt Ratio		Pay dividends
	Debt-to-equity ratio		P / B
	Interest Cost Coverage Ratio	Activity ratios	Turnover of received accounts
Profitability ratios	Gross profit margin		Average Receivables Period
	Net profit margin		Inventory of goods
	Total Return on Assets (ROA)		Product turnover period
	Ordinary shareholder returns (ROE)		Operation Period
	Equity Returns		Total assets turnover
External Organizational Contingency Variables	Environmental uncertainty	Intra-organizational contingency variables	Business strategy
	Business competition		Firm size

3.2 Financial Performance

Earnings per share (EPS) is used in this study to calculate financial performance index and differentiate between weak and strong performance companies. The use of earning per share to discriminate between strong and poor companies is in such a way that firms with more than 50% increase in their EPS over previous year are considered as strong company, and companies with more than 50% decrease in their EPS are considered as poor company [27].

3.3 Financial Ratios

The main financial ratios of companies are calculated using company-level information (available in basic financial statements). Generally, core financial ratios cover all aspects of firm's performance, and these can be used to identify corporate strengths and weaknesses. The main financial ratios used in this study are classified into five general categories: 1) liquidity ratios, 2) activity ratios, 3) debt or leverage ratios, and 4) profitability ratios and 5) market value ratios.

3.4 Contingency Variables

Contingency variables used in the present study are classified into two categories: intra and extra organizational. Intra-organizational contingency variables include: 1) business strategy and 2) firm size, and extra-organizational contingency variables include: 3) environmental uncertainties, and 4) business competition. The calculation of each variable is as follows:

1) Business strategy: This study uses the strategy concept by Miles and Snow (1978), hence, would focus on prospector and defender strategy type. There are many indicators used in previous studies to distinguish between the prospectors and defenders. Some studies use only three indicators, but others use five or more indicators. This study uses five indicators, of which the data are available. These indicators are as follows:

A) Asset efficiency: Calculated by dividing fixed assets to total sales. It is argued that defensive firms maximize efficiency. They are expected to have a smaller ratio of fixed assets to total assets [4].

B) Corporate Organizational Stability: Following Bentley et al [4], employee turnover ratio is used to measure organizational stability. This ratio is calculated using the standard deviation of the total number of employees over three years. A higher ratio is expected to represent prospectors.

C) The company's ability to efficiently produce and distribute products and services: calculated by the ratio of staff to sales (ES). Since firms with a defensive strategy are focused on performance, they are expected to have fewer employees per sales [4].

D) The firm's ability to innovate: calculated by the ratio of intangible assets to total assets (IA). Prospectors are argued to find new products and markets. Hence prospectors are characterized as innovative firms [4].

E) Firm growth: calculated by sales growth (GWTS). As the prospector strategy always tries to exploit new markets and opportunities [15], firms pursuing this strategy are expected to have greater growth [4].

2) Firm size: the stock market value logarithm at the end of the period is used to calculate this variable [17].

3) Environmental uncertainties: The measure of environmental uncertainty is used to measure environmental uncertainty, i.e. the ratio of the standard deviation of a firm's sales over a five-year period to the average sales of a firm over a five-year period [24].

4) Business competition: The Herfindahl Index is used to measure business competition variable. This index reflects industry concentration. The Herfindahl index (HHI) is computed as the sum of the squared firm's market share within an industry. HHI index is formulated as:

$$HI = \sum_{i=1}^{n} S_i^2 \tag{2}$$

Where, S the market shares of firm in industry. The Index is calculated for each year; market share is calculated by using a firm's net sales divided by the total net sales of the industry. The higher the HHI, the more concentrated is the industry, which means a less competitive or stable environment. On the other hand, lower HHI shows a more competitive or dynamic environment [30].

3.5 Research Hypotheses

This study investigates the effect of contingency variables on improving the predictive power of the firm's financial performance. Therefore, in this study, first, the predictive power of the financial performance using financial ratios is measured, then, the effect of contingency variables including environmental uncertainty, business strategy, firm size and business competition on the predictive power of the financial performance are investigated. In the other hand, using the profitability criterion of each company, firms are divided into two groups with strong and poor performance. And by examining the financial ratios of the two groups, their ability to predict them is measured in the correct classification of firms with strong and poor performance.

Table 3: Descriptive Statistics of Research Variables

Variable	Symbol	mean	Median	max	min	SD
Earnings per share	EPS	925.134	768.101	6934.34	-1932.2	1289.12
The first criterion of business strategy	BS1	0.345601	0.308912	2.3451	0.08921	0.330981
The second criterion of business strategy	BS2	29.12341	21.1238	98.123	8.08951	14.90781
The third criterion of business strategy	BS3	0.000341	0.00046	0.00345	0.00002	0.000601
The fourth criterion of business strategy	BS4	0.004980	0.001781	0.07632	0.00001	0.009781
The fifth criterion of business strategy	BS5	0.198056	0.230891	2.14351	-0.89561	0.810231
firm size	Size	34.56091	30.1255	40.11087	17.8945	3.33901
Environmental uncertainties	EnvUnc	0.276011	0.28901	1.70981	0.02156	0.12098
Business competition	BC	0.055671	0.03412	0.078901	0.00021	0.010901
Net working capital to assets	NWCDA	0.142131	0.135671	0.85601	-0.98671	0.11651
Current Ratio	CR	1.56781	1.43901	10.0894	0.34125	1.03980

Table 3: Continue

Variable	Symbol	mean	Median	max	min	SD
quick ratio	QR	1.08965	0.907812	9.90541	0.07986	0.64562
Accounts receivable turnover	ART	56.0893	59.1265	141.102	8.08921	20.45781
Average Receivables Period	ACP	129.564	112.1045	192.453	25.9087	40.1234
Inventory turnover ratio	INT	34.78911	29.1234	288.119	10.9087	31.76211
Product turnover period	INTC	415.8716	398.056	987.012	21.5631	70.4512
Operation Period	OT	501.3456	498.447	1023.12	90.765	194.5912
Asset Turnover Ratio	ATR	0.678091	0.508951	2.13421	0.02318	0.213881
Price to Earnings Ratio	PE	218.8959	98.1128	184.9013	-121.521	34.9087
Book value per share	BV	2098.134	1981.12	17652.7	-2311.42	1023.78
Stock Return	RET	34.1234	21.8951	163.128	11.9061	22.3344
Dividend per share	DPS	601.09	750	9000	0	213.542
Market value to book value Ratio	MTB	2.60876	2.3456	19.509	-1.67832	3.56091
Debt to Total Assets Ratio	DTA	0.457133	0.38907	0.56091	0.01273	0.240981
Debt to Equity Ratio	DE	0.560981	0.45091	0.82094	0.03214	0.14178
Interest Cost Coverage Ratio	TIE	12.90871	9.56312	106.345	-31.0878	112.452
Gross profit margin	GPM	0.358628	0.29934	0.78931	-0.39671	0.193149
Net profit margin	NPM	0.307504	0.21377	0.87416	-0.56781	0.490778
Return on assets	ROA	0.137813	0.11098	0.69134	-0.76123	0.20193
Equity Returns	ROE	0.230984	0.260764	2.40648	-2.0891	0.448241

In the next step, by entering contingency variables, the accuracy of the new model was calculated that the effect of contingency variables on the model's ability to predict is determined.

The hypotheses of this study are as follows:

First hypothesis: Financial ratios have the ability to predict financial performance.

Second hypothesis: Contingent variables significantly improve the ability to predict financial performance

4 Data Analysis

The data were analyzed in two descriptive and inferential parts. The results of the research descriptive statistics are reported in Table 3. The descriptive statistics of the variables used in this study for 1232 firm-

year observations are presented in Table 3. Based on the data in this table, the mean and median of all variables are close together and the standard deviation of all variables is within the appropriate range.

Table 4: Results of the Multiple Discriminant Analysis before adding All Contingency Variables

The first part: Tests of Equality Group Means								
Sig	f-statistic	Variable	Sig	f-statistic	Variable	Sig	f-statistic	variable
0.150	1.441	DE	0.115	1.456	OT	0.000	98.112	EPS
0.014	2.321	TIE	0.000	14.231	ATR	0.000	14.103	NWCDA
0.000	10.119	GPM	0.236	0.939	PE	0.014	3.118	CR
0.000	5.192	NPM	0.000	23.010	BV	0.029	2.661	QR
0.000	112.321	ROA	0.000	18.431	RET	0.330	1.042	ART
0.008	3.779	ROE	0.000	4.981	DPS	0.000	12.089	ACP
			0.748	0.032	MTB	0.219	1.331	INT
			0.000	16.001	DTA	0.217	1.305	INTC
Second part: Eigenvalues								
Canonical Correlation			Cumulative		% of variance		Eigenvalues	Function
0.412			100.0		100.0		0.341	1
Third part: Wilks'lambda								
Sig		DF		Chi-square		Wilks'lambda	Test of Equition (s)	
0.000		22		289.109		0.692	1	
Fourth part: Structure Matrix								
	Value	Variable		value	Variable		Value	Variable
	-0.054	OT		0.201	GPM		0.721	ROA
	-0.081	DE		0.167	NPM		0.636	EPS
	-0.072	INTC		0.163	CR		0.482	BV
	0.098	INT		0.128	DPS		0.361	RET
				0.145	QR		0.386	NWCDA
				0.121	ROE		0.234	TAT
				0.094	TIE		-0.241	DTA
							-0.281	ACP
Fifth part: Classification Results								
Total		Predicted Group Membership				Method		
		1	0	EPS				
771		189	582	0	value	Original		
461		305	156	1				
100		24.6	75.4	0	Percent			
100		66.2	33.8	1				
771		176	595	0	value	Cross-Validated		
461		302	159	1				
100		22.9	77.1	0	percent			
100		65.6	34.4	1				

4.1 Testing Hypotheses

In this section, the research hypotheses are tested by using discriminant analysis logit model.

First hypothesis: Financial ratios have the ability to predict financial performance.

The results of estimating the firm's forecasting model using financial ratios are presented and analyzed using discriminant analysis model to test this hypothesis. The results are provided in Table 4. The regression equation is as follows according to the table above:

$$Eps_{i,t} = -.386NWCDA_{i,t} + .163CR_{i,t} + .145QR_{i,t} - .230QR_{i,t} - .281ACP_{i,t} + .098INT_{i,t} - .072INTC_{i,t} - .054OT_{i,t} + .234TAT_{i,t} + .482BV_{i,t} + .361RET_{it} + .128DPS_{i,t} - .241DTA_{i,t} - .081DE_{it} + .094TIE_{i,t} + .201GPM_{i,t} + .167NPM_{i,t} + .721ROA_{i,t} + .121ROE_{i,t}$$

The first part of Table 4 (Tests of Equality Group Means) shows the results of the mean equality test of the two dependent variable groups (firms with poor and strong performance) for each of the independent variables. An F-test was performed to assess the individual discriminating ability of the independent variables in the poor performance and strong performance samples. It tested the difference between the average values of the ratios in each group and the variability of these ratios. Variables that were found to have significantly different means at the 0.05 level, indicating strong variation between groups. It follows that these ratios are effective for discriminating between poor performance and strong performance firms. The results presented in the first part of Table 4 shows that the earnings per share variables, net working capital, current ratio, quick ratio, average receivables ratio, asset turnover ratio, book value per share, stock return, dividend per share, debt to total assets ratio, interest cost coverage ratio, gross profit margin, net profit margin, return on assets and equity returns are significantly different among firms with poor performance; however, the other variables did not differ between the two groups. Based on these results, it can be stated that the average value of earnings per share in poor performing companies differs from the average value of this variable for strong companies. The interpretation of the other results of this section is also the same. The second part of Table 4 (Eigenvalues) indicates the total number of canonical discriminant functions identified at the stage of performing the discriminant analysis. In this estimate, the discriminant analysis has been able to identify a canonical discriminant function that accounts for 34.1% of the total variance. The part 3 of Table 4 (Wilks'lambda) examines the model significance. According to the Sig level of (0.000), the average of two groups of firms with poor performance is different in the presence of all variables. However, this function only accounted for 30.8% (1-0.692=0.308) of the total variation between the two groups.

The part 4 of Table 4 (Structure Matrix) indicates the correlation between each independent variable with the discriminant function. These values are equivalent to factor loadings in factor analysis. The closer these numbers are to one, the more effective the variable in the discriminant function. The values show that the variables of return on assets, profit per share, book value of each share, return on equity, net working capital to assets and asset turnover ratio have a significant role in the firm's classification by performance, however, other variables actually have a little role. The last part of Table 4 (Classification Results), which is the most important part of it, shows the success of the discriminant function in the correct classification of observations. A classification matrix was calculated to assess the accuracy of the discriminant function. There are two original and cross-validated methods for the sorting process in this table, the latter being usually more accurate. This approach is based on the assumption that we should not take the observation we intend to forecast as part of the classification process. Hence in this method, each observation is classified at each stage according to a function that is constructed from observations other than the

observation itself. According to the results, 595 poor performance firms (77.1% of the 771 poor performance firms) and 302 strong performance firms (65.6% of the 461 strong performance firms) are correctly classified according to the discriminant function.

Second hypothesis: Contingency variables significantly improve the ability to predict financial performance.

To test second hypothesis, the proposed contingency variables are added to the model obtained in the previous hypothesis and the results are compared with the results provided in Table 4. The regression equation according to the table above, is as follows:

$$Eps_{i,t} = -0.074BC_{i,t} + .341NWCDA_{i,t} + .165CR_{i,t} + .172QR_{i,t} + .011ART_{i,t} - .109ACP_{i,t} + .098INT_{i,t} - .051INTC_{i,t} - .041OT_{i,t} + .197AAR_{i,t} - .061PE_{i,t} + .359BV_{i,t} + .299RET_{it} + .151DPS_{i,t} + .085MTB_{i,t} - .051DTA_{i,t} - .045DE_{i,t} + .141TIE_{i,t} + .243GPM_{i,t} + .199NPM_{i,t} + .650ROA_{i,t} + .086ROE_{i,t} + .412ENVUNC_{i,t} + .312RBS5_{i,t} - .270BS1_{i,t} + .137TIE_{i,t} - 0.131BS3_{i,t} + .086BS2_{i,t} + .601SIZE_{i,t} - .018BS4_{i,t}$$

The first part of Table 5 (Tests of Equality Group Means), which presents the results of the equality test of two dependent variable groups (firms with poor performance) for each of the independent variables, shows that the significance level of the independent variables of business strategy (The first, third, and fifth criteria) and environmental uncertainties were less than 5%, indicating that these contingency variables had a significant difference in the two dependent variable groups. The interpretation of the other results of this part is similar to Table 4. The second part of Table 5 (Eigenvalues) indicates the total number of focal discriminant functions identified at the stage of performing the discriminant analysis. In this estimate, the discriminant analysis has been able to identify a focal discriminant function that explains 37.1% of the total variance. According to the calculated value for this index, it can be stated that by adding the contingent variables to the performance discriminating model, the model's ability to explain the total variance has slightly increased before adding the variable variables presented in Table 4 (34.1).

Section 3 of Table 5 (Wilks'lambda) examines the model significance. Considering the Sig level of (0.000), the average of two groups of firms with poor performance is different in the presence of all variables. However, this function only accounted for 33.7% (0.337 = 0.663-1) of the total variation between the two groups. According to the calculated value for this index, it can be stated that before adding the contingent variable presented in Table 4 (30.8), the model forecasting power to explain the total changes between the two groups is increased by 2.9 percent by adding the variables to the performance recognition model.

The part 4 of Table 5 (Structure Matrix) shows the correlation between each independent variable with the discriminant function. The value presented for the contingency variable of business competition (0.031) in the fourth part of Table 4 indicates that this variable has no significant effect on the firm's classification by performance. The last section of Table 5 (Classification Results), which indicates the success of the discriminant function in correct observation categorization, states that by adding contingency variables, 597 poor firms (equivalent to 77.4% of 771 poor performance firms) and 306 strong firms (66.3% of the 461 strong performance firms) are correctly classified according to the proposed model.

Table 5: Results of the Multiple Discriminant Analysis after adding All Contingency Variables

First part: Tests of Equality Group Means								
Sig	f-statistic	variable	Sig	f-statistic	variable	Sig	f-statistic	variable
0.904	0.123	MTB	0.007	2.751	QR	0.000	95.012	EPS
0.000	14.133	DTA	0.753	0.329	ART	0.000	15.643	bs1
0.108	1.621	DE	0.000	13.161	ACP	0.009	2.801	bs2
0.019	2.371	TIE	0.192	1.310	INT	0.000	7.109	bs3
0.000	15.090	GPM	0.210	1.219	INTC	0.591	0.542	bs4
0.000	5.902	NPM	0.101	1.640	OT	0.000	28.011	bs5
0.000	119.321	ROA	0.000	15.102	ATR	0.314	1.012	Size
0.000	4.227	ROE	0.275	1.091	PE	0.000	48.021	Envunc
			0.000	25.149	BV	0.714	0.378	BC
			0.000	40.012	RET	0.000	28.112	NWCDA
			0.000	6.116	DPS	0.000	5.956	CR

Second part: Eigenvalues				
Canonical Correlation	Cumulative	% of variance	Eigenvalues	Function
0.512	100.0	100.0	0.371	1

Third part: Wilks'lambda				
Sig	DF	Chi-square	Wilks'lambda	Test of Equition (s)
0.000	10	298.671	0.663	1

Fourth part: Structure Matrix								
	value	variable		value	Variable		value	variable
	-0.074	BC		0.197	ATR		0.650	ROA
	0.601	Size		0.165	CR		0.610	EPS
	-0.041	OT		0.172	QR		0.412	Envunc
	-0.061	PE		0.141	TIE		0.359	BV
	-0.051	INTC		0.151	DPS		0.299	RET
	-0.045	DE		-0.131	Bs3		0.312	Bs5
	-0.018	Bs4		-0.109	ACP		0.341	NWCDA
	0.011	ART		0.086	Bs2		0.270-	Bs1
				0.086	ROE		0.230-	DTA
				0.098	INT		0.243	GPM
				0.085	MTB		0.199	NPM

Fifth part: Classification Results					
Total	Predicted Group Membership				method
	1	0	EPS		
771	187	584	0	Value	Original
461	294	167	1		
100	24.2	75.8	0	Percent	
100	63.8	36.2	1		
771	291	597	0	Value	Cross-Validated
461	306	155	1		
100	22.6	77.4	0	Percent	
100	66.3	33.7	1		

According to these results, by adding contingency variables to the performance forecasting model, the model's ability to forecast poor firms and strong firms is increased by 0.3% and 0.7%, respectively (correct forecasting for weak and strong firms is 77.1 and 65.6, respectively before adding the contingency variable

of business competition). Table 6 show the results of the second hypothesis test with logit regression model. Logit regression model is a technique which allows for estimating the probability that an event occurs or not, by predicting a binary dependent outcome from a set of independent variables. According to the results presented in Table 5 and comparing it with the results presented in Table 4, it can be stated that the ability of the firm's forecasting model of diagnostic performance in terms of explaining the total variance and explaining the total changes between the two groups and the power of the whole model in forecasting strong firms is increased after adding all contingency variables; however, the power of the whole model in forecasting poor firms decreases; these results confirm the research hypothesis that the model forecasting power for the firm's financial performance is significantly improved by contingency variables.

Table 6: The Results of the Research Hypothesis Testing with Logistic Regression

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	size	.341	.051	39.112	1	.000	1.401
	Constant	-8.453	1.287	37.221	1	.000	.001
Step 2[b]	Bs	-.024	.005	23.546	1	.000	.891
	size	.412	.051	62.090	1	.000	1.601
	Constant	-12.013	1.389	68.451	1	.000	.001
Step 3[c]	Bs	-.038	.006	19.431	1	.000	.954
	Size	.502	.061	79.001	1	.000	
	Bc	-2.401	.625	15.451	1	.000	.090
	Constant	-13.901	1.607	78.234	1	.000	.000
Step 4[d]	encunc	1.669	.459	12.564	1	.000	4.908
	Bs	-.043	.004	18.443	1	.000	.961
	Size	.434	.069	59.239	1	.000	1.711
	Bc	-2.789	.633	12.132	1	.000	.091
	Constant	-11.561	1.778	56.001	1	.000	.001

The results presented in Table 6 show that we can say that contingency variables of environmental uncertainty, business strategies, firm size and business competition entered in the logit regression are able to predict the dependent variable (firm financial performance) and its ability to predict the error level is significant at 0.05.

5 Conclusion

The purpose of this study is to investigates the effect of contingency variables on the predictive power of the financial performance. In other words, this study examines whether contingency variables improve the predictive power of the financial performance. Therefore, first, the predictive power of the financial performance using financial ratios is examined, then, the effect of contingency variables including environmental uncertainty, business strategy, firm size and business competition on the predictive power of the financial performance investigated. According to the results obtained from the hypothesis test in both discriminant analysis and logistic regression model, the mentioned hypothesis is confirmed, meaning that the predictive power of the firm performance using discriminant model and total variance explanation are increased after adding the contingency variable; however, the total model's predictive power of poor and

strong firms is increased. Discriminant analysis model has identified a canonical discriminant function explaining 37.1% of the total variance, but the logistic regression analysis method shows that four independent variables namely environmental uncertainty, business strategy, firm size, and business competition do not have a high degree of explaining power about the variance of firm financial performance. Indeed, contingency variables of environmental uncertainty, business strategy, firm size, and business competition accounted for between 14.3% and 18.2% of the variation in a firm's financial performance. According to discriminant analysis model, by adding contingency variables to the performance prediction model, 597 poor firms (77.4% of the 771 poor performance firms) and 306 strong firms (66.3% of the total 461 strong performance firms) are correctly classified according to the proposed model. According to these results, by adding contingency variables to the performance prediction model, the model's ability to predict poor performance firms is increased by 3% and the power of forecasting model for strong firms is increased by 0.7% (correct prediction for poor and strong firms). However, according to the logit regression model, by adding contingency variables including environmental uncertainty, business strategies, firm size and business competition, the classification accuracy increased to 67%. This classification accuracy indicates that we can explain the variation of the financial performance using contingency variables such as environmental uncertainty, business strategies, firm size and business competition by 67% confidence. Furthermore, the classification error was in such a way that 132 data from strong financial performance were mistakenly classified as poor financial performance and 269 data from poor financial performance were incorrectly classified as strong financial performance at this stage. That is, at this stage, 329 data on poor financial performance and 502 data on strong financial performance have been properly discriminated. Therefore, it can be concluded, by comparing the two methods that the overall accuracy of the discriminant analysis method is more than the logistic regression method and, in general, the discriminant analysis method is a more appropriate tool for the firm financial performance predicting.

The findings indicate that contingency variables including environmental uncertainty and firm size are the factors affecting the improvement of predicting firm performance. Therefore, investors and researchers in the field of accounting and finance are advised to consider these two variables in addition to the inputs of the model while conducting research in the field of evaluating the firm's financial performance forecasting models along with other variables. Also, it is recommended to pay attention to the high risk factors in choosing a firm for investing in buying securities of companies listed in Tehran Stock Exchange considering the impact of these variables on investors, since the risk of firm bankruptcy is reduced to a large extent. Also, the findings of the research hypothesis test showed that contingent variables of business strategy and business competition do not significantly improve the forecasting power of a firm's financial performance. Hence, there is no need to consider these two variables when evaluating a firm's financial performance predicting model.

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