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The Role of Financial Ratios to Predict Financial Distress A Case Study of Sample Small and Medium Enterprises Algerians in the Period (2009-2014)

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Abstract
This study aims to obtain the best collection of financial ratios from the financial list which can be used to forecast the failure or success of the establishments, using the statistics method known by the Factorial Discriminant Analysis "FDA" to build a model predictable about the financial failure. The sample contains 54 small and medium enterprises under the period 2009 to 2014. Results confirm the exiting of 22 failed 22 establishments, while the rest are good. Tow financial ratios from 18 indicate their ability to distinguish between the failed and good establishment. The ratios of profit before taxation to the total debts and the ratios are able to build a predictable model with quality of grading %76, 2.
Keywords: The risk of failure, failure ratios, forecast, analysis, factorial discrimination analysis.

Introduction

In modern time, the economic sector knew a lot of development due to technology, competition, improvement, financial tools and open financial market. The financial and economic sectors knew some financial crisis in growing and developed countries which makes the economic environmental of the establishment goes through instable situation, and this situation increases risks and the establishment would be under a lunge pressure. The financial failure is considered as one of the major subjects that is made by researchers because of its negative effects at the level of the establishment, workers and at the level of the economy as a whole.

The manager of the economic establishment ought to prevent these risks via using some tools from financial list that are existed in the economical establishment. So, that, the financial ratios is considered as a tool from the financial analysis tools to inference the measurement and the useful important relationship in decision making and use it as a way to evaluate the financial position of a certain establishment or a collection of establishment based on the previous ideas. The issue that this study attempt to answer is:

How far the financial ratios are able to predict the financial failure at the level of small and medium Algerian establishment. In order to answer this question, the following hypotheses have been imposed:

- The financial ratios play a major role that allows predicting the financial risks that may face the establishment in the future.
- The variables have a high ability to distinguish between the failed establishment and the good one.
- The sufficiency of using the measurement of gathering results and the total debts to the total assets to judge the establishment position.
- There is no difference with statistical significance in the discrimination of variables between the good and the failed establishment.
- To test these hypotheses and to answer the risen issue, we opt for a case study by shed the light on some small and medium Algerian establishment by using one of the most known statistic method which is known by Factorial Discriminant Analysis "FDA".

We can define the financial failure as when an establishment become in a situation that can't face their short-term commitment due to a lot of causes that indicates the causes of failure which is different from the establishment to another. These are some causes as stated later:

1. Management causes:

The bad management can't achieve competence and the efficiency as a part of daily activities and future of the establishment. There are some points:

- The lack of control in general, and on costs on specific
- The lack of matching between the organizational shape and the workers' needs.
- A problem in leadership, especially when the establishment is led by a family.

2. Marketing causes:

The misuse of marketing causes the financial failure and this can be seen on these points:

- The lack of studying the market and consumer needs.
- The ignorance of needs and wants besides the consumer's ability to buy the product.
- The lack of product planning that leads to decrease the consummation.
- The misuse of promotion and advertisement by simple publicity.

The bad management:

One of the major causes of financial failure is the disorganization:

- The establishment is not able for financial plan in order to use the sources of the company effectively.
- Being late to pay their commitment in the time.
- The establishment is under huge debts.
- Losing the rights of the establishment due to the big robbery that leads to maladjustment.

One of the major first studies that aims to forecast the financial risks by showing the role of financial ratios is (1966, William Beaver[1]). This study aims to predict the failure of a sample of 79 failed establishment and 79 good establishments in the period (1954-1964) according to some measures: bankruptcy, the establishment is not able to pay the debts, being late to pay the excellent share profits by using 30 financial ratios by testing one by one, by using the simple regression model. The researcher found out that it is possible to predict the establishment failure before 5 years of failure by using the financial ratios; the flows of cash to the total rebates, the profit to the total assets and the total rebates to the total assets.

Whereas the study of (1968 Altman Edward[2]), this study aims to build a model using financial ratios depending on the varied analysis discrimination to prepare a case study on the economic sector in the United States of America. The sample contains 33 bank raptly establishment, 33 non bankruptcy establishment, in the period of (1946-1965.)

The researcher discovered that over 22 financial ratios analysis extracted from the financial list of these establishments to precise the financial ratios that has a strong ability to forecast about the establishment bankruptcy which the major capital to the total assets profits that are locked to the total assets; profit before benefits and taxation to the total assets; selling to the total assets.

However, (Zulkarinian, Hasbullah 2009[3]) study; the researcher built a model that allows predicting the failure of the establishment in Singapore (Privet Local Model.) starting from 64 financial ratios as independent variables. The study is made on 17 failed establishments and 17 good establishments. As results of the study, there are two ratios that are more predictable of establishment:

The cash flows of the total assets, selling to earning this model has a ratio of précising about the failure is the establishment is 80%. Whereas, as (Mosculu, Vintila 2012[4]), the researchers aims to investigate the ability of financial ratios to predict the failure of the establishment. The study is made about Romanian establishment in the period of (2009-2010). The method that is used is this study is “t test”, to test the differences the establishment. The result of the study is that the differences are at the level of the ratios of profits, debts and shape of the capital. In contrast, there is no difference in cash flows and the ability of preparing the debts paying the interests; besides, the discrimination between the good and the failed establishment, also, the predictable of failure before many years. At last, the study indicates the necessity to extend the period while analyzing.

But, (Emin, Yasmine 2013[5]), in their study, aims to get a model that allows to predict the financial failure of 115 establishment that are existed in Istanbul listed in the period of (2009-2011), in order to discriminate between the good and the failed establishment by using the method of “Altman”, also, by using the Discrimination Factorial Analysis. To test the ability of financial ratios which was 20 financial ratios under the cash flows, activity, debts and profits. The result of this study is the ability to predict failure before happening about a year by ratios of the factorial capital to the total assets about %88.7, %90.4 in the period of (2009-2010), and %92.2 to the year of 2011, in order to show the importance of financial ratios when it is used in Mathematical Methods to predict the risk of financial failure at the level of the establishments that are listed in Istanbul.

For the study of (Mary Holston Keener 2013[6]), it made about retail companies in the United States of America in the period of (2005-2012), by using some information that is relevant to the companies by using logistic deviation. This study aims to build a method that allows forecasting the financial bankruptcy of the companies. The researchers built a method by using five variables which are: the number of workers, the average returns to the assets, and the ratios of cash flows of the total selling, the ratios of actual assets to the total of debts and the ratios of cash flows of actual rebating. The researchers tested the efficiency of this method using many statistics tests such: several tests, Durbin Watson and its value 1,938 that shows there is no problem for making mistakes in this method.

The previous literature review aims to find a model that allows predicting the financial risks such as failure, losing bankruptcy and so is our study. In terms of the style of that has been used most of the Arabians and the foreign studies used the statistics style to reach the aims and it is varied between Discrimination Factorial Analysis, the logistic deviation and investigation via questionnaire; but in our study we opt for Factorial Discriminant Analysis, FDA because it is appropriate to our sample. The literature review depends on different establishments in different sectors from one study to another according to the financial environment of the establishment. However, our study is made on about 54 establishments small and medium and the data is collected via direct communication or via direction of the small and medium establishment or via commercial register of Ouargla.

II).The method:

This study is about a group of small and medium establishments that have been chosen randomly from all over the country including Ouargla, Algiers, Bejaia and Oran. We can attempt to ensure as much as possible on establishment in order to generalize the results on the rest of establishment. So that the study is based on 54 establishment from different sectors that lead to 105 view represented in the annual financial list of the establishment in the period of (2009-2014.)

Failure is considered as financial risk and its variable that should be adjusted with quantitative variables that helps to use data of the study to the program SPSS to measure the financial failure. in order to forecast this kind of situation and we apt for the failed establishment in the study:

- The establishment that has achieved a consecutive negative annual results (negative cumulative results.)
- The establishment that has achieved the ratio of total debts to the total assets equals to one.

In order to clarify the sides of the study more than addressing the variables and the way to measure we should consider the following:

1. The dependent variables: it represents the financial failure that is ratiocinated through the previous principles.
2. The independent variables: which is the financial ratios relying on 18 financial ratios distributed on 4 groups as the following; the 4 ratios cash, 5 beneficial ratios, 5 debt ratios and 4 beneficial ratios. We select the four ratios according to the literature review as well as the sample of the study that contains data.
3. We use some points of the study in excel 2007 program then, we calculate all the ratios of each establishment and over the years of the study, starting from the available financial list.

The Factorial Discriminant Analysis FDA helps us in this study and in the collection of statistical styles that aims to reduce the number of variables or relevant information of certain phenomena. Stepwise, precisely, that starts from a method which contains one variable, then add collection of variables consecutively. After that, regarding the good and the failed establishment by creating a Matrix of variables and reviewing that represents the financial ratios which are extracted from the financial lists of the establishment under the study of (balance sheet & table of calculated results) by using Excel program.

Column represents the independent variable of study, 18 financial ratios. Lines represent the number of the viewing. 105 view. So, to discriminate between the groups we symbolize the good establishment by the number 0 and take the data collection to Excel program to SPSS program after that we select discrimination that leads to acquire appreciation. That means to measure the financial failure at the level of these establishments by using factorials as well as using the factorial B in methods deviation; besides, to gain results that is significant legal discrimination helps to achieve prediction of the financial failure.

III). Discussing the results:

1. Presenting results: it is the output of SPSS program as follows.
    - The précising of logarithm as it explained in table -1-, especially in the column “Rank”, it turns out that variables are predictable from eighteen variables suggested in our study.
    - Test the hypotheses in similarity of variables by using F. Fisher via “M de Box” as it is explained in table -2-. If the significance less than 0.05, we accept that alternative hypotheses which is about dissimilarity statistically, and the significance is 0.000. Thus we refuse the zero hypothesis that leads to the similarity of the differences of the variables between the dependent variable that is represented with financial failure and we accept the alternative hypothesis.
    - From the table -3-, it shows that two variables (financial ratios the results from 18 variables suggested which is organized according to the ability of the discrimination.
    - The actual assets to the total debts.
    - Profits before benefits and taxation to the total assets.
    - The significance of statistics F exact less than 0.05 which explains the high ability of these variables when it is gathered to discriminate.
    - The results show also in table 4 that the value of significance 0.001, it means that the test significance at the level at the level 0.05 and expresses that there are differences in the groups in the inferential predictable variables from the suggested.
    - The significance of the mathematical measured legal discrimination that is taken from the results in the table 5.
    - We can see that the ratios of total assets to the total debts D3 have a big impact in discrimination.
    - The significance take the form of mathematical not measured legal discrimination and it is taken from the results of the table 6.

Z= -0,384 – 3,051 P2 + 0,118 D3

- This mathematical structure aims to estimate the subordinate variable and it is used for prediction or expecting by using different future scenarios in the case of subordinate variable - financial failure- in order to make the right decision.
- The position of the company can be made through calculating the financial ratios (predictable). According to the discrimination legal not measured mentioned earlier and then inferent the space that the company belong and the table 7 shows the test OLAP cubes to recognize the discrimination value of every group.
- The mathematical structure aims to reorganize the members of the sample in one of the two groups, it means to recount the value of each one member and this member will be reorganized in the right group based on the table 8, the organizational mathematical structure will be taken in the form of mathematical:
    - The mathematical structure of the small and medium failed company:
      Z = 0,752 P2 + 0,30 D3 – 0,726.
    - The mathematical structure of the small company and medium good company:
      Z = 1,481 P2 + 0,117 D3 – 1,009.
- Based on the table 9 from 53 views belong to the first group (failed), the mode V consider 40 views belong to this group. Whereas, 13 views belong to the second group (good) like the other groups, so ratio of standardization the right in the first group is 75,5 and the ratio of the wrong one is 24,5.
- In the other hand we have 52 views belong to the second group (the good one). The model considered 40 right views that belong to the second group. Whereas, 12 views have the shape of the first group (failed). So, the ratio of the standardization in the second group 76, 9%, and the ratio of the wrong is 23, 1%. So, the total of views that have standardized effectively are 80 views from 76, 2%.
- To test the significance of the variables of two discriminations (P2 & D3) we can use Anova because there are only two groups in our study, there we opt for the equivalence of the medium test as it is shown in the table 10, by testing the null hypothesis that deals with the lack of the difference within a statistical significance in the medium of every predictable variables of the two groups and the alternative hypothesis that admits its existence.

2. Explaining the results:

From what have been presented in the tool or statistic style in our study which is the Analysis Factorial Discrimination, it turns out that the financial ratios have important role to predict the failure of the company; and it is listed in mathematical model which is the mathematical standard law discrimination that is used to achieve the aim of prediction of the phenomena under study which shows the validity of the first hypothesis.

A. The first hypothesis: the financial ratios have a major role in prediction by listing it under mathematical ratios to expect the financial risks that face the company in the future. By considering the Factorial Discriminant Analysis which aims to find the best collection suggested variables two financial ratios prove their ability to discriminate between the failed company and the good one from 18 financial ratios listed as:
    - Benefits before interest and taxes to the total assets P2; this ratio is considered the best ratio that is used to measure the benefits of the company in the long and short term. When it raises means the competence of the investment policy, it helps also, to make a decision that is relevant to loans by comparing it with the coast of the credit; and it and it is considered the best tool of comparing the performance of the other companies, and it doesn't reflect the impact of the financial raising because it is not affected by financing the company to its assets.
    - Actual assets to the total debts (D3); this ratio is considered on the ability of the company's assets that has more cash to cover part of its debts. This ratio helps decision makers to determine the financing policy and get loans in the company; also, it is used to evaluate the risks that the answer and creditors can hold.

We could build a model discrimination based on the results of variables and it helps in determining the importance of variables that is associated with discrimination between the failed company and the good one. This reflects the importance of the two variables that are associated with discrimination between the two groups, so it will have the basis to organize one of the two group which shows the validity of the second hypothesis.

B. The second hypothesis: the variable of the study has a powerful ability to discriminate we between the failed and good company. To measure the degree of distance between the two groups we use Wilk's Lambda, and its significance equal 0,000 which explains that there is a statistical difference between the two groups.

- There are some standardizing factors that was extracted from gathered matrix inside the groups and the medium centers of the discriminated variables, so that we attempt to determine the standardization of the small and medium on the good one and we obtain this results (failed-good), by multiplying (x) the value of financial ratios in the standardized factors and adding (+) or (-) to a constant number of each group of the company.
- According to the result of discrimination we obtain the following results which contains two financial ratios to following results which contains two financial ratios to predict the failure of the company as the following:
    - If the discrimination value belongs to this space [1,938, -6, 2574] the company is failed.
    - If the discrimination value belongs to this space [6, 0804, -2, 9372] the company is good.

The quality of organizing the views 76, 2% and it is good ratio; the first mistake is considered the most dangerous of type two by considering it a cost. Because making a mistake in organizing a failure company as a good one which cause a higher cost by falling this company, but when making a mistake in type two, in organizing a good company by considering it a failed one which means increasing the importance of the company; and making procedures and some new policies that lead to improve the company's situation.

Making mistake of type one may happen due to the insufficiency of the measure of the failure while classifying the small and medium company. Whereas, making a mistake in type two is due to:

- The financial list presented by the company is not much valid.
- The financial list doesn't cover some aspects, especially, the artistic, marketing or managerial ones.
- Select collection of a group of some companies that are related to industrial or services.
- The company is selected randomly in case of expanding the actual assets of ratios to raise the total debts.
- When we see some special data of the company, it turns out that some are new, what explains the rise of debts. Here the raise of the company remains not just beneficial but continuity and acquiring the new technology of the economical company that leads to refuse the third hypothesis.

C. The third hypothesis: depending on the measure of results and the ratios of total debts to the total assets as two measures to judge the position of the company. By testing the equality of the mediums, we refuse the null hypothesis and accept the alternative hypothesis because the value is sig < 0,05 which shows the existence of statistical significance in the medium of the benefits ratios before taxation to the total assets and in the medium of the ratio of the actual assets to the total assets by considering the difference of the type of the company which proves the ability of two financial ratio(P2) and (D3) to discriminate between the failed and good company which shows that the fourth hypothesis is not correct.

D. The fourth hypothesis: there is no significance difference in discrimination variables between the good and the failed company.

Conclusion

In this article we attempt to verify the ability of financial ratios to forecast the financial failure at the level of the Algerian medium and small companies.

Based on the results, two financial ratios from 18 have a great capacity to discriminate between the failed and good company together; the profit ratios before taxation to the total assets (P2) and the ratios of actual assets to the total debts (D3). Therefore, the first ratios express the company's profits and it reflects its investment competence. on the other hand, the second ratios expresses the ability of the company assets that have more cash to cover parts of its debts as it reflects the policies of financing and debiting inside the company.

Starting from the results of the study; the necessity of applying the statistical methods to predict the financial failure at the level of medium and small company before its happening and then take the right decision to treat it in advance; the necessity of applying honestly in accounting data and the financial ratios to present the opportunity to follow the position of the company right from the start.

The availability of financial market that is active in Algeria to provide sufficient financial information to the users. This study remains limited and it does not handle all the sides of financial failure as a phenomena which leads to add some variables not accounting to predict the financial failure as age of the company, its activities, its volume, and its location. As well as develop a larger sample size in order to generalize the results. Finally, studying the risk of financial failure amid registered companies in the stock market.

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Appendix

Table 01 : Log Determinants

Log Determinants		
D	Rank	Log Determinant
Failure 0	2	-,456
Good 1	2	-1,271
Pooled within-groups	2	,684
The ranks and natural logarithms of determinants printed are those of the group covariance matrices.		

Table 02 : Box's Test Result

Test Results		
Box's M		159,047
F	Approx.	51,904
	df1	3
	df2	1932453,337
	Sig.	,000
Tests null hypothesis of equal population covariance matrices.		

Table 03 : Variables Results

Variables Entered/Removed[a,b,c,d]									
Step	Entered	Wilks' Lambda							
		Statistic	df1	df2	df3	Exact F			
						Statistic	df1	df2	Sig.
1	D3	,933	1	1	103,000	7,374	1	103,000	,008
2	P2	,880	2	1	103,000	6,968	2	102,000	,001
At each step, the variable that minimizes the overall Wilks' Lambda is entered.									
a. Maximum number of steps is 36.									
b. Minimum partial F to enter is 3.84.									
c. Maximum partial F to remove is 2.71.									
d. F level, tolerance, or VIN insufficient for further computation.									

Table 04 : Wilks' Lambda' Test Results

Wilks' Lambda				
Test of Function(s)	Wilks' Lambda	Chi-square	Df	Sig.
1	,880	13,062	2	,001

Table 05 : Standardized Canonical Discriminant Function Coefficients

Standardized Canonical Discriminant Function Coefficients	
	Function
	1
P2	,690-
D3	,732

Table 06 : Canonical Discriminant Function Coefficients

Canonical Discriminant Function Coefficients	
	Function
	1
P2	3,051-
D3	,118
(Constant)	-,384
Unstandardized coefficients	

Table 07 : OLAP cubes Test

OLAP Cubes				
Predicted Group for Analysis 1: Total				
	Mean	Std. Deviation	Maximum	Minimum
Failed Enterprise	-.3626192	1.00866993	1.93850	-6.24740
Good Enterprise	.3695926	.99108199	6.08041	-.29372

Table 08 : Classification Function Coefficients

Classification Function Coefficients		
	D	
	Failure	Good
P2	-,752	1,481
D3	,030	,117
(Constant)	-,726	-1,009
Fisher's linear discriminant functions		

Table 09 : Classification Results

Classification Results[a,c]					
		D	Predicted Group Membership		Total
			Failed	Good	
Original	Count	Failed 0	40	13	53
		Good 1	12	40	52
	%	Failed 0	75,5	24,5	100,0
		Good 1	23,1	76,9	100,0
Cross-validated[b]	Count	Failed 0	35	18	53
		Good 1	13	39	52
	%	متعثر0	66,0	34,0	100,0
		Good 1	25,0	75,0	100,0
a. 76,2% of original grouped cases correctly classified.					
b. Cross validation is done only for those cases in the analysis. In cross validation, each case is classified by the functions derived from all cases other than that case.					
c. 70,5% of cross-validated grouped cases correctly classified.					

Table 10 : Independent Samples Results

Independent Samples Test									
	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
P2 Equal variances assumed	6,916	,010	-2,556	103	,012	-,11283	,04415	-,20039	-,02528
Equal variances not assumed			-2,579	56,310	,013	-,11283	,04376	-,20048	-,02519
D3 Equal variances assumed	17,910	,000	-2,715	103	,008	-3,29962	1,21514	-5,70955	-,88968
Equal variances not assumed			-2,694	60,034	,009	-3,29962	1,22491	-5,74978	-,84945