



## Replacement of senior management and the risk of non-payment

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### ABSTRACT

The recent financial and commercial crises and the subsequent financial scandals have paved the way for the loss of public trust, especially of the creditors, in management and corporations along with depression of the stock market. Hence recognizing the importance of assisting the banking system in understanding customers is inevitable. In this paper, we first used the KMV model to investigate the relationship between default probability and on-time paying customers as well as late paying customers among the 50 companies in the years 2010 to 2013, having concluded that the probability of default among loyal on time paying customers is less than past due paying customers. Then we made the assumption that there exists a relationship between default risk and change of the senior management (Managing Director) as well as the board of directors. To this end, using logistic regression model, we examined the changes of the 50 companies between the years 2008 and 2013, having concluded that there exists no relationship between the replacement of senior management and the board of directors and the default probability in the companies studied.

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## INTRODUCTION

Forecast of a customer's inability to repay the loan has been discussed as one of the important issues in accounting since Fitzpatrick did some study into the subject. And the relevant risk as the risk of non-payment and credit risk is perceived to be one of the most important risks and a number of methods have been used to predict it.

Determining the credibility of companies is very important and complex and due to the weakness of the traditional methods in corporate credit management control, various models have been developed. For this reason, many banks and financial institutions in order to assess the credit risk have set about developing their own models, aiming to estimate the company's credit risk and allocate the economic capital to their own credit cart in an optimal way.

These concerns have led to repeated studies in the field of validation and ranking of companies as the aim of this study is also to find a way to help the banking system understand customers.

### Literature Review:

Forecast of a customer's inability to refund the loan has been discussed as one of the significant topics in accounting. Over the past 60 years, this has become an area of increasing importance in the field of financial economics. One of the first researchers who has conducted many studies on this subject and can be counted among the pioneers in this topic is Edward Altman (1968). He tried to find a significant relationship between accounting variables of a company and the probability of inability to pay debts of the company in the future, having proposed the Z-score formula. The other such structural model measuring the PD by variables relating to the company was suggested by Merton (1974) which is based on the Black-Scholes's theory of pricing of options. Based on Merton model, the company will be perceived to be in default status when the value of its assets is less than the value of its dues. KMV also proposed Vasicek-Kealhofer model in 1990. To forecast the ability to pay loans, Elmer and Borowski (1998) used the multilayer perceptron neural network models.

Denis and Denis (1995) and Ho Sun and colleagues (2004) show a remarkable improvement of function after the dismissal of senior management due to poor performance. In their writings on the effects of head

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dismissal on stock volatility, Matthew J. Clinton *et al.* (2003) concluded that after the dismissal of the director instability increases even if a manager leaves the company voluntarily and replaced by someone within the company. In his article entitled, "Transfer of private capital, capital controls, and risk of non-payment, Mark L. Wright (2006) considered risk of non-payment for both private and public borrowers, showing that the optimal role of capital controls, taxes and subsidies depend on the risk of non-payment. Drawing on the evidence from the Chinese securities market, Wei ting (2011) also investigated the removal (transfer) of the company and the risk of non-payment of the company. And while referring to the transition of the Chinese economy from a comprehensive planned economy to a market-oriented economy along with a massive financial fraud at the Chinese market, he shows that firms with high-risk non-payment is more likely to change their senior management during the financial reporting period as follows the changes in top management, such firms are less likely to end in defaulting payments than other companies.

Craig H. Furfine efficient Finer *et al.* (2011) have addressed the issue of whether the merger increases the risk of non-payment. They have shown that merger increases the risk of non-payment of the acquiring company.

Ali Rahmani *et al.* (2010) assessed the ability of artificial neural network models compared with logistic regression and discriminant analysis to predict default as well as considering the predictor variables, using ROC analysis, they have been aware of the superiority of neural networks to the logistic regression and discriminant analysis. Ali Ebrahimi *et al.* In the article evaluating the application of bankruptcy prediction models investigated the models by Altman, Fulmer, Springate, Zmijewski, and Shirata in Bank Sepah, having concluded that Springate and Altman models have the highest predictive power. Ali Divandari and colleagues also investigated the portfolio management system designed for bank loans using data mining techniques. Rasool khansari *et al.* (2009) and Mahnaz Afshar in her master's thesis having evaluated the KMV model in predicting companies default, concluded that KMV model is capable of predicting and distinguishing on-time paying companies from late paying companies and it can be used for default prediction of legal firms.

#### Methodology:

1- Description of the process of calculating the Probability of Default (PD)

9- Cited by Wei Ting (2011)

Based on Merton model, PD counts in this that in the T maturity the value of assets is less than the value of liabilities. The value of corporate debt is calculated by the balance sheet and the distance to default as well as the PD are calculated by the following formulae.

$$DD = \frac{\ln A_t + \left(\mu - \frac{\sigma^2}{2}\right)(T - t) - \ln L}{\sigma\sqrt{T - t}}$$

$$\text{prob}(\text{Default}) = \Phi(-DD)$$

In the above formulae  $A_t$  of the asset value at time t, the value of debt at time t,  $\mu$  of momentum rate and  $\sigma$  of annual fluctuations is logarithm of the asset value. Value of assets is not directly available and therefore the value of shares can be calculated with the help of the asset value through solving equations with Newton's method with the help of software;

$$E_t = A_t \Phi(d_1) - Le^{-r(T-t)} \Phi(d_2)$$

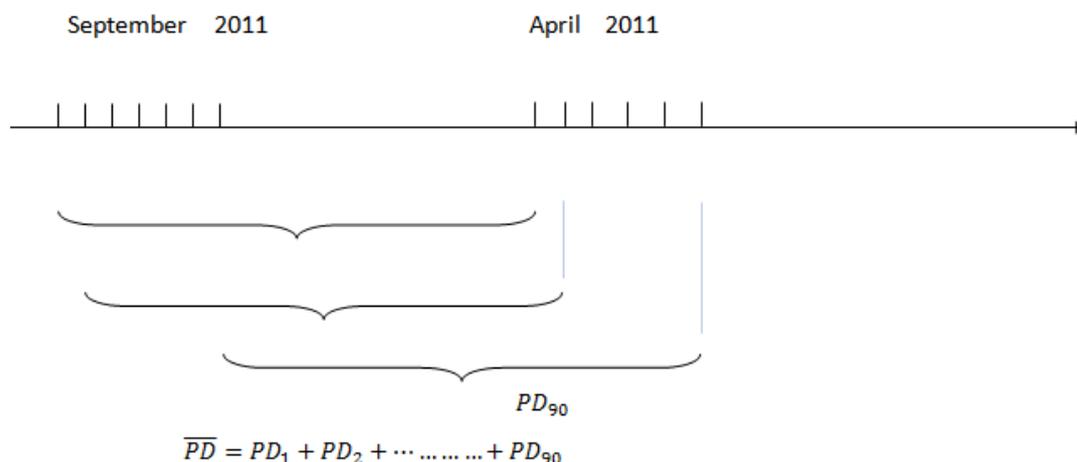
$$d_1 = \frac{\ln \frac{A_t}{L} + \left(r + \frac{\sigma^2}{2}\right)(T - t)}{\sigma\sqrt{T - t}}$$

$$d_2 = d_1 - \sigma\sqrt{T - t}$$

Where the stock value is calculated from the following equation:

Stocks value = stocks price  $\times$  stocks number

Obviously, until the asset value is less than the value of liabilities, the stock value will be zero and all assets will be belonged to the creditors. After completion of the stock price time series, these values, along with the overall market index, number of shares, debt and risk-free rate of return are characterized as inputs to the model. Then the distance to default as well as the PD are calculated by the above mentioned method. The distance to default as well as the PD values were calculated for a period of three months (90 days) from the first half of 2010. The first calculated PD is related to a six-month period (half year 2010). The subsequent PD was calculated by adding a trading day to the end of the initial data.

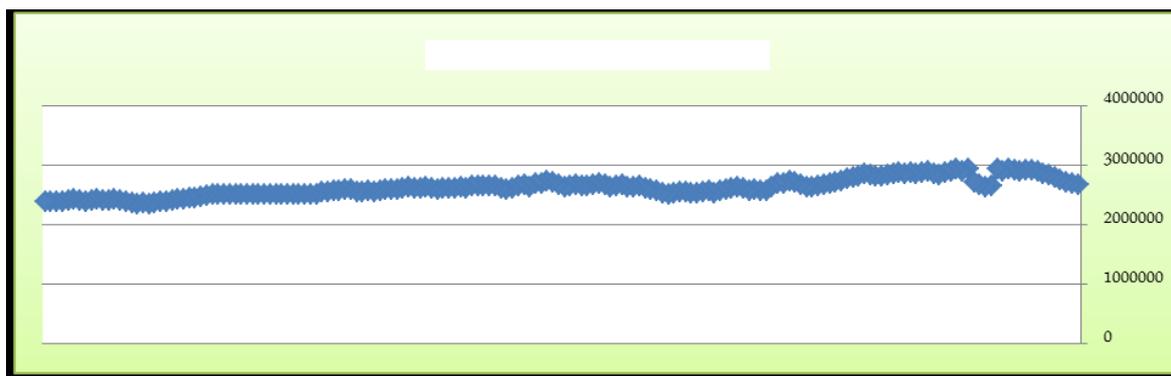


**Fig. 1-1:** Procedures to calculate the probability of default for a particular company

2- *Research findings:*

1-2 *A descriptive analysis of PD:*

Among the 50 companies that the model was applied to them and are under the study, 22 companies have been deferred (past due paying customers) and the remaining 28 ones have not been deferred (loyal on time paying customers). Figure 1 shows that the value of shares of a late paying company decreases during the 270-day period.



**Fig. 1-2:** The value of shares of a late paying company

Table 1. presents the distance to default as well as the PD for the late paying company for the last day. This value was obtained based on the 180-day data from the 90th day until the 270<sup>th</sup> day during the study period.

**Table 1:** Standardized values to calculate the distance to default and the PD for the late paying company in the last day

Values	Variable
1296692	Value of Assets (Million Rls)
58/63percent	Fluctuations in Asset Values
2/69	Momentum Rate of Return on Assets
329392	Value of Debts Book
3/23	Distance to Default
$1/98 \times 10^{-v}$	Probability of Default

The results above show that the probability of default among loyal on time paying customers is less than past due paying customers.

## 2-2 Testing hypotheses:

If companies are divided into two groups according to the status of the Managing Director, then, the hypothesis can be evaluated in two separate categories. In the first category of hypotheses, the relationship between managing director dismissal and default probability as well as the risk of non-payment can be investigated, using the KMV model. And in the second category of hypotheses the PD difference in companies whose managing director has been replaced can be explored.

*The first hypothesis: "there exists a direct and significant relationship between the managing director dismissal and the PD in the companies listed on the Stock Exchange receiving facilities":*

To examine the above hypothesis, we used the logistic regression model. In this hypothesis the CEO status was considered as the dependent variable and the probability of default was considered as the independent variable. In the present study, if the CEO is changed, it gets a value of one otherwise it will receive zero. The fit results are summed up as follows:

$$\log(\theta_i) = a_i + \beta_i x_i + \varepsilon_i \quad i = 1, 2$$

The above results testify that 32 companies of the companies in the study had not seen a CEO change containing more than half of the companies. Thus, the software at this stage anticipated that 100% of the companies placed in this category were forecast correctly. It also shows that 64% of cases were correctly categorized.

**Table 7:** Summary of logistic model of CEO status

-2 Log likelihood	Nagelkerke R Square	Cox & Snell R Square
65.312 <sup>a</sup>	.001	.001

**Table 8:** shows the results of regression analysis after the PD's input, the model. In this case, the classification table is not different from zero blocks.

Predicted			Observed		Block zero
Predicted percentage by the model – block one	CEO status		Has not changed	CEO status	
	Has not changed	Has changed			
% 100	0	32	Has not changed		
0	0	18	Has not changed		
% 64	Total				

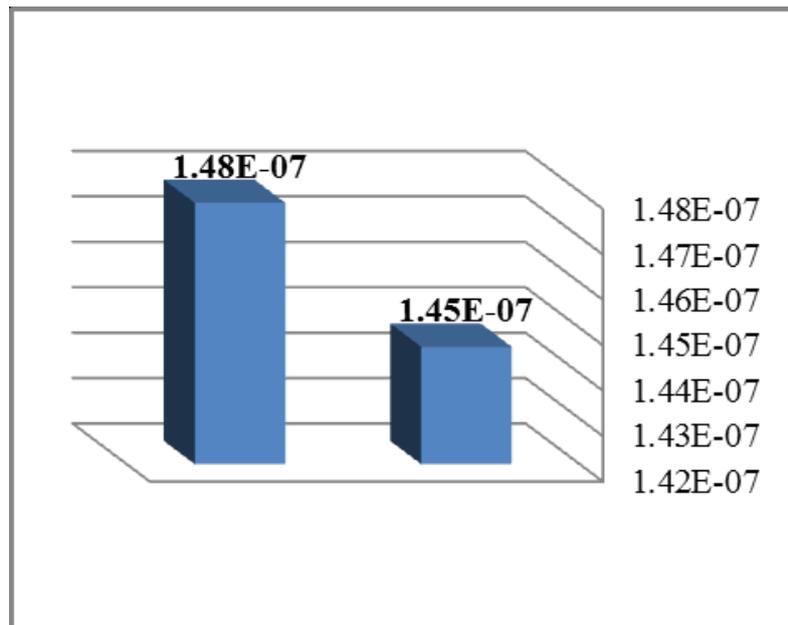
In the first column of Table 9, the estimated coefficients for the intercept (constant) and PD is shown. By applying these coefficients the model will be achieved as follows:

$$\log(\theta_i) = -0/636 + 0/918 (PD)$$

Table of coefficients of independent variables testifies that the PD has no significant effect on CEO dismissals. In both cases, the significance levels were more than 05/0. Therefore, regarding the null hypothesis of no significance, the research hypothesis that "there exists a direct and significant relationship between the managing director dismissal and the PD in the companies listed on the Stock Exchange receiving facilities" will be rejected with 95% confidence.

**Table 9:** Estimated regression coefficients (logistic)

Coefficients	Significance level	Degree of freedom	Wald estimator	Standard deviation	Coefficients estimation		Block one
2.504	0.863	1	0.030	5.311	0.913	PD	
0.530	0.165	1	1.929	0.458	-0.613	Constant coefficient	



Obviously the above results do not testify to the absence of difference in PD between the two categories of companies in terms of the CEO status. As seen below the histogram indicates the difference between companies that can be analyzed by t-test (inferential). Indeed, the following tests compared the average PD of firms that have changed their CEO versus the ones that has not changed their CEO. It should be noted that totally, of the 50 companies discussed 36% changed the CEO and 64% reported no change. To study the differences between the corporate PD of firms that have changed their CEO and other companies, we used the t test. The calculated value of the statistic  $t = -0/148$  lower than the corresponding value in Table t - Student's ( $t = 1/73$ ). We therefore conclude with 95 percent confidence that there is no significant difference in PD between the two groups under study. Thus, consistent with the data collected the research hypothesis that "Probability of Default is different in terms of the CEO status" will be rejected with 95% confidence. Therefore, given the topics discussed Probability of Default does not affect the CEO status. Also, there is no difference in the PD of the companies with and without CEO change.

*The second hypothesis: "there exists a direct and significant relationship between the change of the board of directors and the PD in the companies listed on the Stock Exchange receiving facilities":*

To investigate this hypothesis, we used the Spearman correlation test. In fact, to examine the relationship between the variables if one (or both) are in the sequential manner we used Spearman correlation test. The test results are presented in Table 11. The calculated correlation coefficient between the PD and the status of the board of directors equals to 0/133 of. Given the significant level of 0/258 or more than 0/05 ( $p > 0/05$ ) with 95/0 probability we conclude that there is no significant relationship between the variables. The calculated value of the statistic  $t = 0/782$  in this case is less than the corresponding value in Table t - Student's ( $t = 1/73$ ). Therefore, with the 95 percent probability we conclude that there is no significant difference in PD of the two groups under the study. Thus, the research hypothesis that "Probability of Default is different in terms of the board of directors' status" will be rejected with 95% confidence.

#### *Conclusion:*

In this article, first, we calculated the probability of Default (PD) through utilizing KMV model. The results showed that the average PD for on-time paying companies is less than late paying ones. Later, we assumed that there was a relationship between the manger displacement as well as the board of directors and the PD, which the hypothesis based on changes in the board of directors about the companies, was rejected during the years 2008 to 2011.

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