LISBON SCHOOL OF ECONOMICS & MANAGEMENT
UNIVERSIDADE DE LISBOA

MASTER IN
FINANCE

MASTERS FINAL WORK
INTERNSHIP REPORT

CREDIT RISK AND BANKING ACTIVITIES

JOÃO DAVID CLARO FERREIRA DO ROSÁRIO

SEPTEMBER - 2016

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JOÃO DAVID CLARO FERREIRA DO ROSÁRIO

ORIENTATION:
PROFESSORA DOUTORA MARIA TERESA MEDEIROS GARCIA
MESTRE ANDREIA MELLO LUCENA

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RESUMO

O risco de crédito para o sector bancário é um assunto muito importante. Nesse sentido, é primordial adquirir ferramentas para medir este risco com algum grau de segurança de modo a ser possível tomar as decisões corretas sobre o crédito cedido a clientes. O objetivo deste trabalho é compreender o quão importante é o risco de crédito para as instituições financeiras e apresentar uma forma de o medir associado com o crédito a empresas, analisando um modelo de *score* para avaliar que o mesmo seja avaliado. Este trabalho também descreve as atividades desenvolvidas nos principais departamentos de uma instituição bancária, de acordo com um estágio que teve lugar no Banco BIC, desenvolvendo desta forma uma revisão da literatura ao risco de crédito, uma descrição sobre a evolução da banca, modelos de avaliação assim como também uma análise a uma empresa, utilizando o modelo Z-Score, comparando o resultado obtido com a classificação fornecida por uma agência de rating. Os resultados provaram que o modelo em análise foi eficaz, proporcionando uma avaliação, dentro das suas limitações, de acordo com a classificação fornecida por esta agência de rating.

Palavras-chave: Atividades bancárias, risco de crédito, instituições financeiras, modelos de pontuação, Z-Score de Altman.

ABSTRACT

Credit risk in banking industry is a very important subject. Therefore, it is important to acquire tools to measure it, with some degree of reliability, in order to be possible to take the correct decisions regarding client loans. The objective of this final project is to understand the importance of the credit risk to financial institutions and to present a way of measuring this risk associated with loans to companies, analysing a score model to evaluate this risk. This project also describes the activities developed by the main departments of a banking institution in accordance to an internship which took place in Banco BIC, developing this way a literature review to credit risk, banking evolution and score models as well as analysing a company using the Z-Score model, comparing the results obtained with the rating provided by a rating agency. The results proved that the model under analysis was effective, providing a reliable output within its limitations, correspondingly to the rating provided by this rating agency.

Keywords: Altman's Z-Score, banking activities, credit risk, financial institutions, score models.

ACKNOWLEDGMENTS

The preparation of this paper, which is an individual and often solitary work would not have been possible without the help, directly or indirectly, of several people. To all of them I dedicate this work, with my sincere thanks for their contribution.

I would like to thank my supervisor Professor Mª Teresa Garcia for all the support and guidance provided for my masters final paper, her guidance and all the support documents and references which were highly important for the development of this report.

I also want to thank all my colleagues from Banco BIC who helped me with all their practical knowledge and were always supportive and available to teach me and help me throughout my internship.

Last but not the least I wish to thank my family who supported me with their love and advice from the very beginning.

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1. INTRODUCTION

This report is aimed at the description of the internship attended at Banco BIC Portugal, for six months, and constitutes the master's final work of the Master in Finance at ISEG.

This internship was my first contact with the job market within the banking industry. The internship purpose was to acquire experience in banking activities, namely in credit risk valuation, since the programme was to attend nine core departments of Banco BIC Portugal all of them related to finance.

For a better understanding of the internship this report is divided in the following four parts:

(1) The first part presents the internship framework, starting to describe Banco BIC's activities, followed by a description of the internship and also the activities carried out over the course of the six months.

(2) The second part intends to frame the credit risk, starting with a general overview of the credit risk followed bya review of the banking supervision rules and the evolution of credit in banks. This part also addresses credit risk management and analysis, as well as it presents the Altman's Z-Score model.

(3) The following part of the report presents a practical implementation of Altman's Z-Score model to the company Norske Skog, in order to demonstrate a practical usage of the model.

(4) The last part is the result of the work developed during the internship and the report presenting further topics for discussion and limitations of this work.

2. INTERNSHIP FRAMEWORK

2.1 Banco BIC presentation

The bank's first origin comes from Banco BIC S.A. (Angola), which was born in 2005. In 2008 the bank decided to invest in the international expansion, entering the European market by investing in Portugal, opening the Portuguese Banco BIC with the same capital structure of the Banco BIC Angola. The big step in the Portuguese investments market occurred in 2012 with the acquisition of the commercial network of BPN which, at the time, had been nationalized. This acquisition allowed Banco BIC to concentrate its activities in corporate banking, correspondent banking of Angolan banks, retail banking and private banking. In 2013 the bank reinforces its international activities by opening a financial institution in Cape Verde and making an agreement to acquire a bank in Brazil.

In 2014 a new representation office was opened in Johannesburg. The bank is about to open a new commercial bank in Namibia and is planning to open a commercial bank in China. New banking operations where done in Zimbabwe, Zambia, Congo and the Democratic Republic of Congo.

The Portuguese Banco BIC is focused in the cooperation between Portugal and Angola, serving their clients with a global financial service. In this context the bank provides the tools to support companies and entrepreneurs who want to export goods or services and invest in Angola.

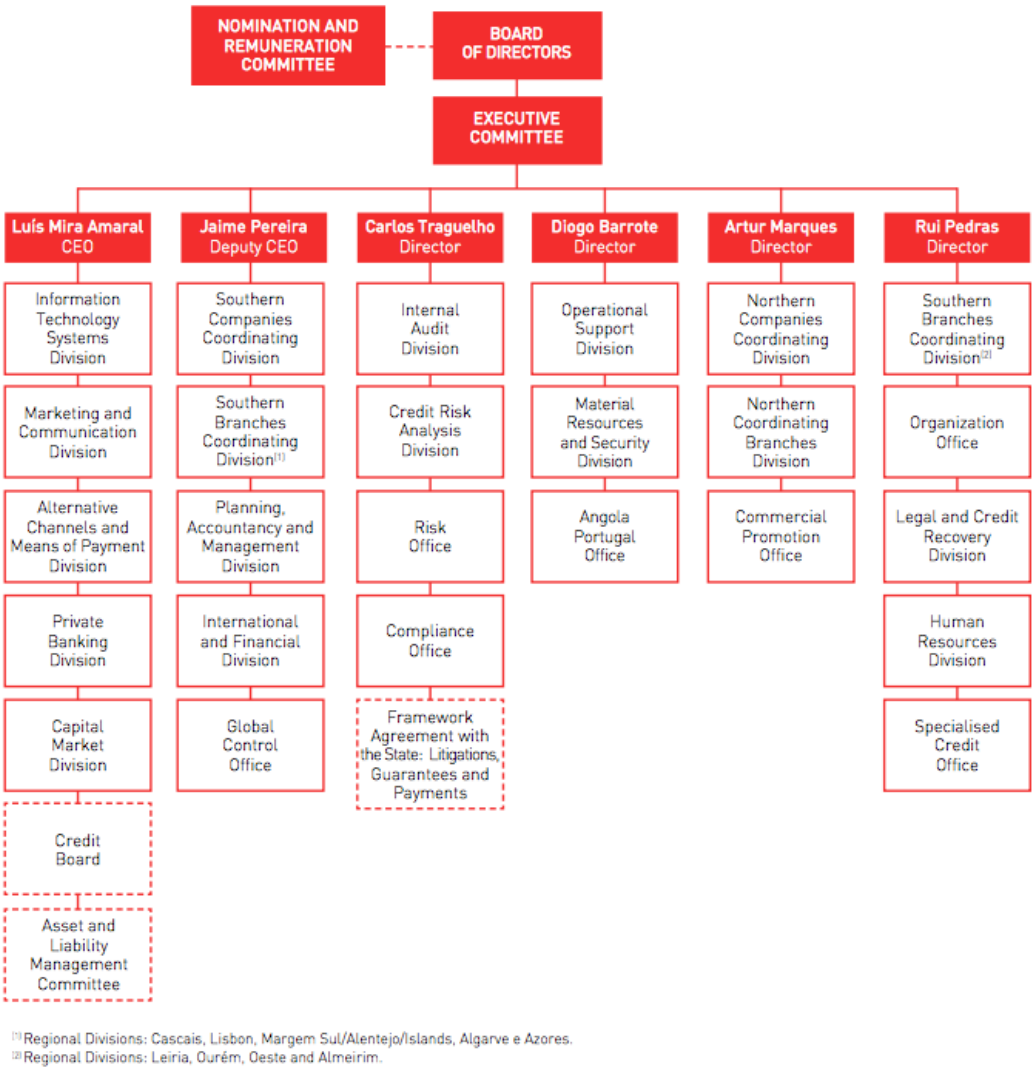

Figure 1 - Organizational Structure of Banco BIC Portugal
Source: Financial Report 2014 Banco BIC

2.2 Internship description

The internship had a duration of six months and was composed by working in the nine main departments of Banco BIC: Retail Banking, Corporate Banking, Specialized Credit, Private Banking, Capital Markets, Risk Analysis, Operational Support, Financial and International Management Department and Planning and Managing Control Department, as exposed in appendix A.

After I passed through the Risk Analysis department, I proposed to change the internship, due to a need of credit analysts in this department, as this was also a position I was interested in, therefore the transfer to the following department was rescheduled: in the morning I would be at the Risk Department and in the afternoon I would work in the other different departments. The plan to attend the Planning and Managing Control department was cancelled, being that time compensated by staying in the Risk Analysis department full time.

The main purpose of this internship was to have a clear view of how a bank operates and how the departments of a bank interact with one another.

2.3 Activities carried out during the Internship

The activities carried out are explained in the following topics which are organized by department:

Private Banking Division – This department is a structural organ of the Bank, which provides specialized services for equity advisory, supporting the management of investment portfolios to private clients of high returns, and the Corporate and Institutional with surplus incomes by providing them customized solutions always developed in full confidentiality and discretion base. Once this department operates in a high confidentiality environment I was only allowed to observe how the operations were processed for the limited period of a week.

Credit Risk Analysis Division – The activities carried out in this department were: to carry out analysis of loans in relation to the risk of the client or group according to the Credit Regulations, to prepare credit risk reports to the loan operations with customer and groups, focusing on score analysis, financial ratios and economical analysis developed to new credit exposures. The less typical credit situations and higher complexity were considered in office Credit Council.

Operational Support Division – This department is in charge of the entire operational component supporting the activity of commercial and financial structures of the Bank. The Operations Unit is structured in three cores: Credit and Contract Centre, Foreign Division and Payments Centre. Documentary processes follow all computer recorded transactions by the Operation Units, the handling and subsequent release is crosscutting assignments to all Units. In this department I followed the assessment and accuracy of legal documents (contracts and credit guarantees) which are part of the process associated to each transaction, providing the respective scanning and digital file by external company and its subsequent physical file also by Foreign Company.

Southern Branches Coordinating Division And Southern Companies Coordinating Division - Both departments are responsible for the definition and implementation of the commercial operation policies within the business strategy determined by the Bank's management, encouraging the uptake of customers and businesses in its target segment, close to analyse the

evolution of the market and competition action by notifying possible changes to the Marketing and Communication Director

The activities developed by me in these departments took place at the Avenida da República´s Bank branch, which is part of the South Agencies Network Coordination Department, and at the Bank's headquarters, during my stay in the South Corporate Network Coordination Department, where I met clients and had to explain credit and financial products, advising them according to their needs, besides I was also in charge of obtaining client documentation about their portfolio investments.

International And Financial Division – This department has two activity areas with the following organic correspondence: the Unit Exchange and Treasury, which ensures the management of foreign exchange positions and the cash requirements of the Bank, through exchange and money markets ("Foreign Exchange & Money Market"), and coverage of risks associated with financial products traded by the Unit for Corporate Desk; the Unit of Corporate Desk which ensures, together with the commercial networks of the Bank, the promotion and trading of financial products to "Corporate" customers. In this department my role was to produce financial analysis reports of the correspondent Banks that Banco BIC Portugal works with.

Capital Market Division – The main competencies of this department are to promote investment solutions, selected with complete independence and precision in the due diligence process. These solutions are presented to the clients by the Commercial Directions of the Bank, including the discretionary portfolio management. This department is also responsible for the registration

of the orders and for the settlement of securities, ensuring the necessary control mechanisms, the analysis and regularization of detected situations on the operations performed, the daily file operations and to ensure regulation compliance imposed by regulators. I followed all the procedures involved in this work.

Specialised Credit Office - The main activities developed by me were to follow up the technical support to the commercial network with regard to specialized credit products (Leasing, Factoring and Confirming), following up the simulation of new proposals to be sent out to potential customers, and to monitor and ensure the issuance of new contracts.

Due to the change in the internship programme and schedule, I spent most of my time in the credit risk analysis department analysing company financial statements, in this sense I decided to focus my study on credit risk and a in a score model applied to companies as a way to identify this risk.

3. LITERATURE REVIEW

3.1 What is Credit Risk

Since the subprime crisis we have seen dramatic losses in the banking industry. Suddenly, some firms that had been performing well began to announce large losses due to the crisis and also to excess debt amount in the balance, or in some firms which had exposure in derivatives to hedge balance sheet risk, which may or may not have been assumed.

Banco de Portugal (2007, pp17) says that credit risk is the probability of the occurrence of negative impacts in the income or in the equity, due to the incapacity of a counterparty agreement on its financial obligations to the financial institution, including the possible restrictions to transfer payments made from other countries. Credit risk is mainly present of financial exposure in credit, credit lines, warranties and derivatives.

According to Harvey and Merkowsky (2008), credit risk can be defined as the risk of the counterparty failure to meeting its obligations or, in other way, the risk of default. Santomero (1997) affirms that in a case of inability or unwillingness to pay a certain debt by the borrower this could affect the lender of that certain debt or other lenders to the creditor. So, it is implicit that the financial condition of the borrower as well as the current value and liquidity of the possible underlying collateral is important to the bank to prevent for eventual losses.

Agreeing to Bank Negara Malaysia (2001), the consequence of those eventual losses can disturb the intermediation of the affected lender and can

also generate large financial burdens imposed by governments in order to prevent the recapitalization of such banking institutions.

3.2 Basel Committee on Banking Supervision

Regulation and banking supervision are key-elements for financial security. By establishing well defined prudential norms and assuring their correct implementation is very important to reduce the development of systematic crisis. To avoid these situations, the well-known Basel Capital Accord was created. Nowadays there are three versions of this Accord.

In 1988, the committee decided to introduce a capital measurement system, known as Basel I Capital Accord. This document included a credit risk measurement structure which imposed a minimal capital reserve of 8%, until the end of 1992.

A new accord (Basel II Capital Accord) was made in June 26th of 2004, after a review of the first accord made by the interaction of banks and supervision authorities that are no part of the committee. According to BCBS (2006 and 2009) the capital structure consists in three basic pillars: (1) minimal capital requirements, (2) supervisory review and (3) market discipline.

In response to the financial crisis of 2008, a reform programme was developed in order to apply the changes which were made with the lessons acquired with this crisis, being developed Basel III Capital Accord, with, according to Silva et al. (2011), the objective of reducing the excessive risk assumed by these institutions during the pre 2008 world crisis period.

3.3 Credit Risk Management

Banks always face the risk of not receiving the money borrowed by its clients, which represents a risk that has to be managed. In Portugal, it is well known the risk that this represents in the economy, given that, according to Banco de Portugal, it is registered in the balance sheet of Portuguese banks an approximate total of 17.7 billion euros of overdue loans. By the end of 2010 the total amount of overdue loans was around 8.7 billion euros, representing 3.40% of the credit given by Portuguese banks at the end of 2015 this percentage was around 8.84%, observing an evolution of 5.44% in the last five years.

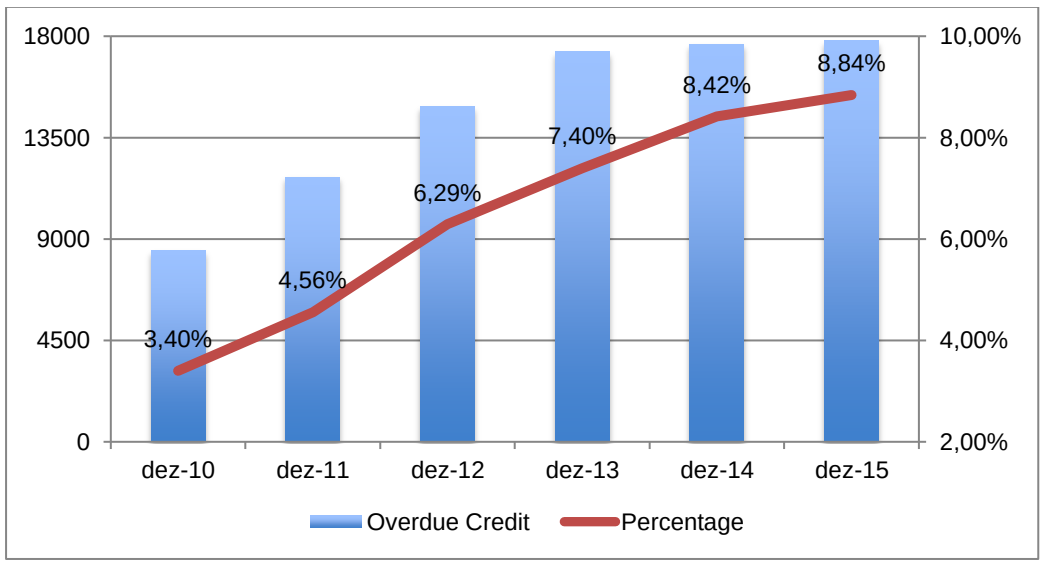

Figure 2 - Overdue credit amount in million euros its and weight in total credit
Source: Adapted from 2016 Bank of Portugal's statistical bulletin

Given the necessity of banks to give credit, it is a requisite, to adopt all the necessary precautions to avoid overdue credit.

The risk management process in banks begins with the definition of the global objectives intended for the management of credit. Hence, it is necessary to

identify all situations that expose the bank to credit risk. The next step is to evaluate and quantify this risk, being this a crucial step given that greater accuracy at this stage will lead to better decisions taken after.

It is mandatory to analyze all the company's financial information obtained as well as to evaluate the amount of money to be loaned and its economical context. Only after this the bank is ready to establish a relationship with the client.

Once there is a credit granted by the financial institutions the credit department is responsible to monitor the credit risk. This relation only finishes wen the loan is paid off. Given this we conclude that credit risk is a continuous process which begins before the commercial relationship with the customer.

Figure 3 - Credit Risk Management Process
Source: Adapted from Carvalho (2009)

The structural organization of a bank is divided in: Front Office, Middle Office and Back Office. The risk management occurs in the Middle Office. Usually there are three departments which are essential to risk management: (1) Lending department, (2) Credit Monitoring department, (3) Credit recovery department. The first department is in charge of analysing, in an economic-financial perspective, the credit proposed by its clients, being approved, rejected or reformulated by this department. The second department has the

responsibility of preventing the degradation of the risk portfolio, giving support to customer default regularization from clients with negative evolution. The last one has the responsibility of negotiating with problematic clients that have already been registered with defaults, if the deficiencies are not resolved in this way, it proposes its passage to the litigation (judicial) department according to Alcarva (2011).

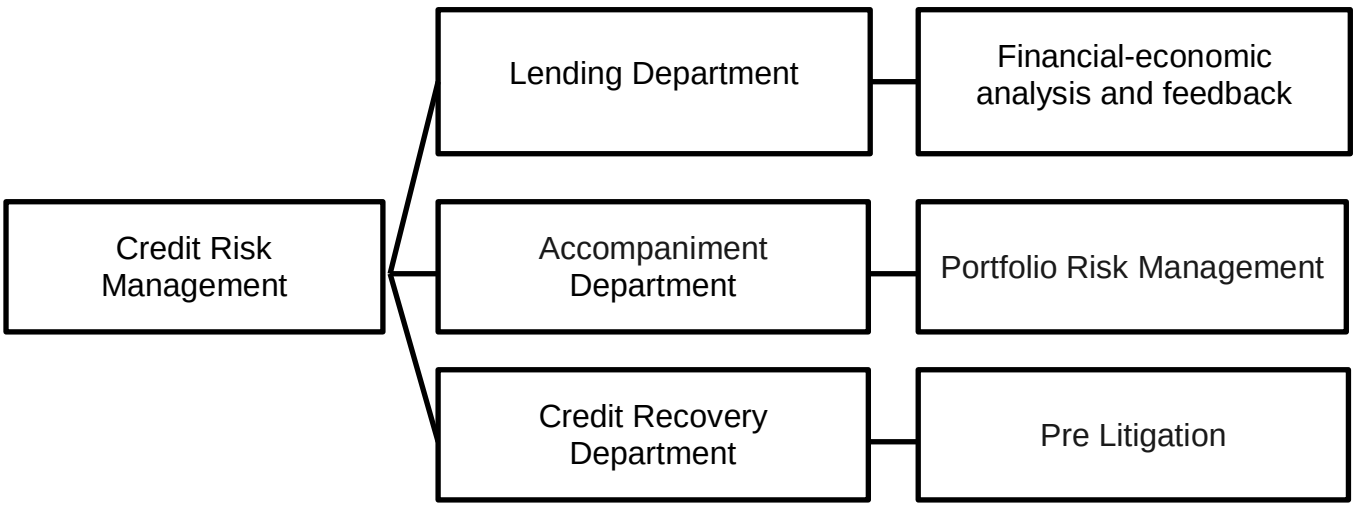

Figure 4 - Middle Office Distribution
Source: Alcarva (2011)

3.4 Credit Risk Analysis

There are different methods of approaching and evaluating credit risk of the clients of banking institutions. Here we are going to present a widely used methodology by financial institutions to provide a credit score to corporate clients and help them to establish the level of risk for each one, calculating the

probability of default and based on this score decide on the credit limits to be applied to their clients.

There are different models to calculate the score of a company and usually each bank has its own model which is adapted to their specific needs. Generally, the score is calculated based on background information, ratios and financial indicators with relevant information to the risk perception level. Together with this financial information it is also applied to the model statistical information to anticipate the default probability of the analysed company.

According to Carvalho (2009), there are three different types of scoring models, the (1) *bureau* scoring, the (2) acceptance scoring and (3) behavioural scoring.

(1) The *bureau* scoring is the score provided by credit rating agencies assigned to companies.

(2) The acceptance scoring models try to predict company credit risk to support decision-making in lending. The variables that are usually applied to these models can be observed in the table below.

Variables	**Socio-demographic data**
	Age of the stockholders Marital status of the managing partners Geographical area Contact phone type
	Company data
	Business sector Number of employees Business antiquity
	Financial data
	Annual sales volume Annual costs Inventory Share capital Other available financial data

Table 1 - Data applied to scoring models
Source: Adapted from Carvalho (2009)

(3) The Behavioural scoring models constantly evaluate the information provided by clients looking into their internal accounts data behaviour. This way it is possible to preview and readjust the risk segment and credit limits applied to each corporate client.

Scoring models became to banks a support tool in decision making, essential

to quantify and risk management. These models used by banks are often used with other different risk analysis tools from external entities in order to predict company bankruptcy and score them. In Portugal there are some companies which have the function to collect marketing, economic and financial information from companies and provide access to this database to their clients.

3.5 Altman Z-Score - Credit Risk Rating

The Altman Z-Score model was developed in 1968, being nowadays one of the models which are mostly used in banking to valuate companies by score analysis.

Altman (1968), in order to develop his model, selected a set of ratios, risk and profitability measures which he combined in a linear forecast model in order to preview with high probability of success the default risk of companies within 2 years. This model was initially presented with an analysis of 22 ratios and a sample of 66 companies, in which 33 were in default risk and the other 33 were financially healthy. The sample was collected from 1946 to 1965.

The conclusion from the statistical analysis of these data was that five of the ratios analysed, presented values that were significantly different between companies in default and “healthy companies”.

Altman’s model predicted with 70% certainty a default in a two year time period analysis and with 94% certainty a default in a one year time horizon, being able to prove its effectiveness in the company’s sample analysed.

Nevertheless, Poston et al., (1994) concluded that using financial indicators to preview companies default is an ineffective methodology because these models don't take into account the possibility of companies in to become financially healthy. In the critics to Altman's Z-Score, it is stated that his model tends to classify slantwise companies in pre-bankruptcy leading to a wrong valuation which might represent a loss of opportunity for potential investors, leading to an opinion that the company is not financially healthy, restricting the ability to obtain external financing and ultimately leading the company to default.

Waqas et al. (2014) also consider that the assumptions made by Altman have no grip in today's markets, concluding that models of multivariate discriminant analysis like Ohlson (1980) and Zmijewski's (1984) are more accurate than Altman's.

On the other side, Balcaen and Ooghe (2004) and Boritz et al. (1995) analysed a wide range of predictive bankruptcy models and concluded that although the newer methods are computationally more complex and sophisticated than the classic analysis of financial indicators models, that doesn't make them better bankruptcy forecast models.

In order to tackle some criticisms to Altman model saying that it does not apply to modern economies, Lui (2002) applied the model to a sample of telecommunication companies and concluded that the model is an accurate way to forecast businesses that are at risk of bankruptcy. Anjum (2012) states that the Altman Z- Score is one of the most effective models of multivariate analysis developed in the past 40 years, concluding that the same can be

applied to modern economies to predict the potential bankruptcy of a company with one to three years in advance. Eidleman (1995) also concluded that the model is a useful tool in predicting failures in a wide variety of contexts and markets, if the model uses a database which is comparable to the company under analysis forecasts.

4. CASE STUDY

4.1. Altman Z-Score Model

Altman (1968) found that the use of a set of financial ratios in assessing the potential bankruptcy of a company should not be analysed individually but on an aggregate basis, because some of the were highly related to one another.

To build this model Altman collected historical financial information from a sample of companies then he identified a set of ratios potentially relevant to the prediction of bankruptcy. The variables were classified into five categories of ratios: liquidity, profitability, leverage, solvency and turnover. After a careful analysis of all the indicators and correlations between them, five ratios were picked from the initial set of twenty-two ratios selected, since these ratios revealed better ability to forecast the bankruptcy of a company.

The appropriate statistical technique chosen by Altman was the multiple discriminant analysis. This technique is used to arrange an observation into one of a few from the earlier groupings depending on the individual characteristics perceptions. This model derives from a linear combination that discriminates the best characteristics among groups. In this case the financial ratios can be applied to all companies under analysis, because they share the same characteristics that can be equally quantified. This way the multiple discriminant analysis determines a set of discriminant coefficients to the ratios.

The Altman's Z-Score model combines five objective measures which are weighted and added to an overall ratio of a company, as represented below:

Z = 0.012 (X1) + 0.014 (X2) + 0.033 (X3) + 0.006 (X4) +0.999 (X5)

Z = Discriminant Score (Z Score)

X1 = Working Capital / Total Assets

X2 = Retained Earnings / Total Assets

X3 = EBIT / Total Assets

X4 = Market Value of Equity / Book Value of Total Liabilities,

X5 = Sales / Total Assets

- **X1 = Working Capital / Total Assets**

The Working Capital to Total Assets ratio measures a company's ability to cover its short-term financial obligations, it can be seen as a safety fund that is kept to fulfil short term expenses. The rule underneath this concept states that the capital used to finance the assets must have maturity equal to or greater than its economic life.

Altman argued that a company which shows consecutive operating losses will see a reduction of its current assets compared to its total assets, considering this has a useful and objective ratio when predicting bankruptcy.

- **X2 = Retained Earnings / Total Assets**

Retained earnings are the sum of beginning retained earnings and the net income minus dividends. The retained earnings reflect the total amount of retained earnings over the company's life, including undistributed profits. Altman states that this ratio demonstrates the ability of the company to

generate results to finance its activities, without resorting to excessive leverage.

- **X3 = EBIT / Total Assets**

EBIT is an important and widely used indicator to determine the profits without taking into account the payment of interest and taxes, the comparison of the assets' ability to generate returns in companies operating in different jurisdictions, once it does not take into account taxes and the company's capital structure. To Altman, this ratio reflects the ability to generate value through its assets, revealing its importance to predict bankruptcies.

- **X4 = Market Value of Equity / Book Value of Total Liabilities**

In the beginning of the research, Altman develops the model to a sample of companies which were quoted on the stock markets, where the market value of the company is represented by the market value of its stocks. Altman believed that this ratio reflected a better indicator of the existence of financial problems than the book value of the company, once changes in price can indicate possible problems if the liabilities of a company exceed its assets. Lately Altman changes this indicator to the book value of equity to adapt the model to the private sector.

- **X5 = Sales / Total Assets**

The asset turnover is a largely used ratio that demonstrates the weight of sales in the assets of the company and demonstrates the efficiency of the assets being used. In the beginning of Altman's research he considered

this ratio had little relevance when analysed individually, however together with the other variables of the model it revealed to be a relevant ratio to the Z-Score model.

Altman concluded that his model presented a high rate of precision showing that 95% of the sixty-six companies analysed were within the correct group of bankrupt or non-bankrupt company.

In order to make the analysis of this model possible Altman determined the values of Z to be taken, this way the value of 2.675 has been considered the cut-off point which separates financially healthy companies from those that are in bankruptcy risk. Nevertheless taking into account the sample test potential risk of error, Altman defines a zone of ignorance between 1.810 and 2.990 in which there would be doubt about the continuity of businesses. Therefore, the companies which are scored below 1.81 are assumed to be at a high risk of bankruptcy and companies scored above 2.990 are considered of low risk of bankruptcy.

However, the author points out immediately a limitation of the model, since the sample of the companies analysed were quoted in the financial market and were all industrial companies where the financial information and its market quote were available to analyse. To overcome this assumption, the author re-estimated the model to be possible to also analyse private firms in the following way:

$$Z' = 0.717 (X1) + 0.847 (X2) + 3.107 (X3) + 0.420 (X4) + 0.998 (X5)$$

In this formula the market value of the company used in X4 is replaced by its book value of equity, thereby the weights of the model were re-adjusted. The grey zone values were also re-adjusted, being 1.230 the cut-off point that indicates bankruptcy to companies with a score below this value and for the companies considered with low risk of bankruptcy the cut-off point is 2.900.

The latest adjustment of Z-score model allowed the model to be applied to Manufacturers, Non-Manufacturer Industrials and Emerging Market Credits. The revised model assumes the following expression:

Z" = 6.56 (X1) + 3.26 (X2) + 6.72 (X3) + 1.05 (X4)

The first four variables remained unchanged from the previous model, being only eliminated the variable X5 and its weights adjusted. To this model the grey zone between 1.1 and 2.6, being the companies below the lower limit of the interval in bankruptcy risk and for scores above the higher limit of the interval considered with low risk of bankruptcy.

4.2. Practical application to Altman Z -Score

4.2.1. Norske Skog Group Description

The Norske Skog group was the chosen entity for this empirical study object. The main reason for this choice was that once there wasn't any Portuguese group presented on the 2015 Annual Global Corporate Default Study And Rating Transitions from Standard & Poors, I chose this European group that

was rated CCC+. In this way I can compare its rating provided by Standard & Poors with the Z-score calculated in the following analysis.

Norske Skog was established in 1962. The company grew in Norway until 1990 by acquiring businesses in paper pulp, paper production, and wood-based construction materials.

During the following years, Norske Skog expanded internationally, building a mill in France and acquiring other newsprint and magazine paper companies all over the world. The activities within other paper grades, market pulp mass and construction materials were sold and the company has entered into several projects related to newsprint machine, bio energy and bio composites.

Due to the surplus capacity and partly lower prices for finished products and a raise in input factors prices in recent years, Norske Skog presented weaker results. In this way, Norske Skog had to adapt its capacity through shutdowns, cost reductions and sale of assets to reduce debt.

Nowadays, Norske Skog works in 6 countries and is one of the world's largest producers of publication owning 8 mills to cover its production, and it is also listed on the Oslo Stock Exchange. (Norske Skog, 2016)

4.2.2. Analysis and Discussion

To accomplish this analysis, I chose the Original Z-Score model since its assumptions are that the company must be quoted in financial markets, where the financial information and its market quote are available, and must be an industrial company.

For this reason, the following paragraphs present an analysis of Norske Skog from the last five years Z-Score ratings, comparing also the score from 2015 with the rating presented by Standard & Poors on their 2015 Annual Global Corporate Default Study And Rating Transitions, thus verifying if the model is effective on this rating assigning.

With the application of the model adjusted to Norske Skog, based on the financial statements of the company from the past five years we have the following results:

VARIABLES		**2015**	**2014**	**2013**	**2012**	**2011**
X1	Working capital/Total assets	-0.07	-0.05	0.03	0.14	0.10
X2	Retained earning /Total assets	-1.39	-1.10	-0.97	-0.71	-0.31
X3	EBIT/Total assets	-0.04	0.02	-0.25	-0.55	-0.41
X4	Market value of equity/Total liabilities	0.02	0.03	0.04	0.04	0.04
X5	Net sales/Total assets	0.91	0.87	0.91	1.03	0.86
Z-Score		**-0.56**	**-0.24**	**-0.24**	**-0.05**	**0.28**

Table 2 - Historical Z-Scores of Norske Skog
Source: Own source

As it can be observed in the chart below The Z-Score value present in the period under analysis has very low values and it is much below the bankruptcy line, indicating a high probability of bankruptcy.

In graphic terms, the evolution of the Z-Score is presented as follows:

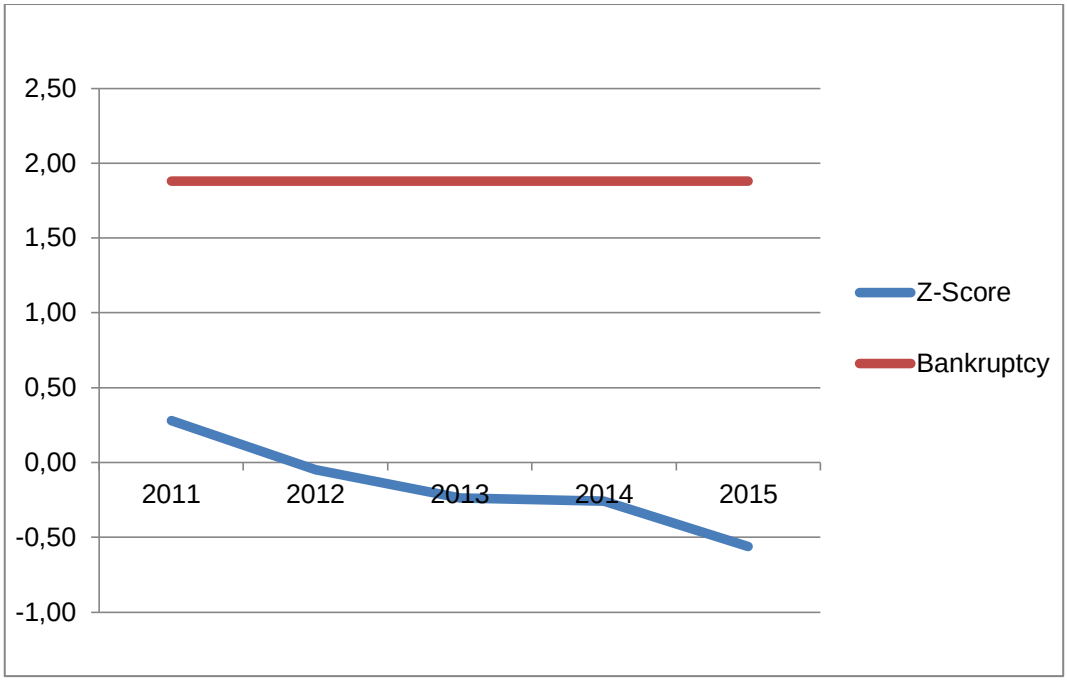

Figure 5 - Z-Score Evolution Chart
Source: Own source

By analysing, in general, the reference indicators, we can observe that the trend is different for each one, highlighting the X2 indicator which decreases more and X3 which significantly increases from 2012 to 2014.

Individually, we can observe that in 2012, due to a reduction of 1.555 million NOK comparing to the previous year, a little raise in the X1 indicator is observed. Nevertheless this indicator became negative in 2014 due to their current assets being lower that the current liabilities, leading the working capital to be negative, revealing difficulties in their treasury. The same can be verified in 2015. Besides, the total assets were reduced all over the years.

For the X2 indicator, we observe a gradual reduction of retained earnings over the years and they have been negative since 2011, revealing lack of profitability.

EBIT has been negative since 2011, meaning that the expenses have been higher than the income, except for 2014 that EBIT was 65 million NOK due to a higher operating revenue and lower restructuring expenses, taking the X3 indicator to be negative except for 2014.

The total liabilities were reduced by 2.645 million NOK in 2012 when compared to 2011, being the biggest variation during the 5 year analysis period, however the liabilities were in average 12.891 million NOK.

The market value of the company has been gradually reduced since 2011, except for 2013 when the company had 900 million NOK registered as its market value has raised compared to the previous year 148 million NOK. In the following years the market value continued to drop, being in 2015 505 million NOK. Hereupon this explains the low value for the X4 indicator and its financial difficulties.

Analysing the X5 we can observe that sales have constantly decreased since 2011which registered 18.904 million NOK and in 2015 the sales were 11.538 million NOK. The indicator was constant throughout the years of the analysis except for 2012 when the X5 indicator was 1.03, which was due to a major decrease in the assets occurred in 2012. Still the asset turnover was corresponding to the industry sector.

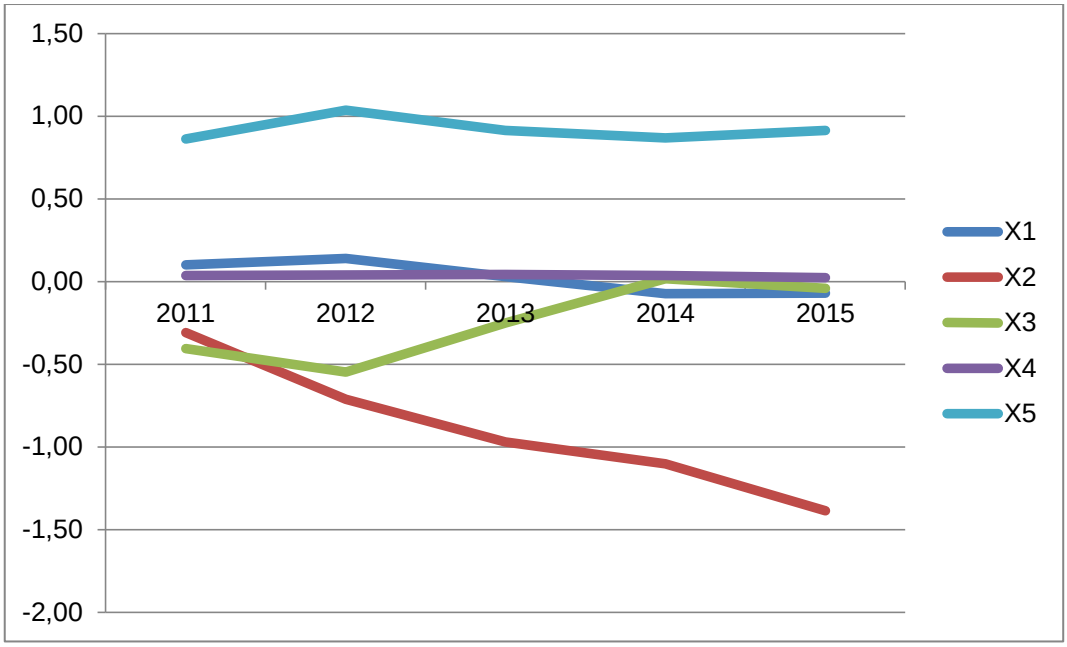

Figure 6 - Historical Ratios, 2011-2015
Source: Own source

As a consequence of the values obtained using the z-score model and the individual analysis of the financial indicators and the knowledge of the company, we can conclude that there is evidence of major flaws in its financial structure and in the ability to generate income, which results in great threats regarding the continuity of the company. Even its Z-score is well below the threshold of bankruptcy in agreement with CCC + by Standard & Poor's rating.

5. WORK LIMITATIONS AND FUTURE TOPICS FOR RESEARCH

The main limitations of this research are associated with the structure of the internship report and the master's final work. It would be interesting to compare other rating and score models and compare their results.

Regarding the research topics it would be interesting to apply this methodology to companies which are quoted in the Lisbon stock exchange and compare them with the ratings provided by international rating agencies. Other suggestion is to compare the different rating models applied to Portuguese companies with the ratings provided by rating agencies.

Another important research is an economic analysis to complement the financial analysis provided by Z-Scoring in order to make a correct judgment about the company.

This report was more focused in credit risk analysis due to the structure of the internship, since I spent more time in the credit risk analysis department. This research could as well be expanded in order to to analyse other models applied to the other different departments where I also developed some work

6. CONCLUSION

This internship at Banco BIC was very important and gratifying, because it was my first professional experience. The six months internship were enough to enrich my knowledge on banking concerning on how does a bank operate in addition to the knowledge I acquired during my academic career.

The knowledge obtained during the master, mainly in Corporate Investment Appraisal, in Financial Markets and Investments and in Forwards, Futures and Swaps courses, was very useful for the perception of the operations in which I was included. The courses mentioned were important during the preparation of financial statements and their analysis, as well as for the understanding of the products used by companies considering the fact that during the majority of the internship I had to look at to companies financial statements and to interpret them, putting into practice the analysis techniques l had learned during my academic path.

The analysis of the Norske Skog using the Z-Score made possible to draw a conclusion about the model's effectiveness in allocating a score, since that by comparing the result with the rating provided by Standard & Poor's I was able to verify that the company is in financial difficulty and that bankruptcy may occur in the coming years.

This study was done in order to understand how banks assign scores to their company clients in order to minimize the credit risk. In this sense the Z-Score was naturally chosen since it is one of the most used models by the banking industry, even if the weights and variables are different from Altman's Z-Score and more tailored to the needs of the bank, but with the same principle.

Furthermore, this study was done with the purpose of describing the activities carried out in a bank. In this sense, I believe that this work is going to be helpful for other people who wish to know more about these topics.

REFERENCES

Alcarva, P. (2011). *O guia completo sobre a Banca e as PME*. Lisbon: Vida Económica - Editorial, SA.

Altman, E. (1968). Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. *The Journal of Finance*, Vol. 23, Nr. 4, 589-609.

Anjum, S. (2012). Business bankruptcy prediction models: A significant study of the Altman's z-score model. *Asian Journal of management Research* Vol. 3, 212-219.

Balcaen, S. and Ooghe, H. (2004). Alternative methodologies in studies on business failure: do they produce better results than the classical statistical methods?. *Universiteit Gent, Faculteit Economie en Bedrijfskunde*.

Banco BIC (2015) – *Annual Report: 2014.*

Banco de Portugal (2007). *MAR - Modelo de Avaliação de Riscos*. Available in: https://www.bportugal.pt/pt-PT/OBancoeoEurosistema/ConsultasPublicas/Documents/Consulta_BP_2_07_MAR.pdf [Accessed in: 2016/10/01].

Banco de Portugal (2016). *Boletim Estatístico.* Available in: https://www.bportugal.pt/pt-pt/estatisticas/publicacoesestatisticas/bolestatistico/paginas/boletimestatistico.aspx [Accessed in: 2016/10/09].

Bank Negara Malaysia (2001). Best Practices for the Management Of Credit Risk. *Bank Negara Malaysia*.

Basel Committee on Banking Supervision (2006). *International Convergence of Capital Measurement and Capital Standards: A Revised Framework Comprehensive Version*. Available in: http://www.bis.org/publ/bcbs118.pdf [Accessed in 2016/04/06].

Basel Committee on Banking Supervision (2009). *History of the Basel Committee and its Membership*. Available in: http://www.bis.org/bcbs/history.pdf [Accessed in 2016/04/06].

Boritz, J.,Kennedy, D. and Albuquerque, A. (1995). Predicting Corporate Failure Using a Neural Network Approach. *Intelligent Systems in Accounting, Finance and Management*, Vol. 4, 95–111.

Carvalho, P. (2009). *Fundamentos da Gestão de Crédito*, 1st edition. Lisbon: Edições Sílabo, Lda.

Eidleman, G. (1995). Z scores - a guide to failure prediction. *The CPA Journal,* 52.

Harvey, N. and Merkowsky, M. (2008). The Role of Credit Ratings in Managing Credit Risk in Federal Treasury Activities. *Financial System Review - June 2008,* 61-66.

Lui, J. (2002). Estimating the Probability of Bankruptcy: A Statistical Approach. *Leonard N. Stern School of Business.*

Norske Skog (2012) – *Annual Report: 2011.*

Norske Skog (2013) – *Annual Report: 2012.*

Norske Skog (2014) – *Annual Report: 2013.*

Norske Skog (2015) – *Annual Report: 2014.*

Norske Skog (2016) – *Annual Report: 2015.*

Ohlson, J. (1980). Financial ratios and probabilistic prediction of bankruptcy. *Journal of Accounting Research* Vol. 18, 109-131.

Poston, K., Harmon, K. and Gramlich, J. (1994). A test of financial ratios as predictors of turnaround versus failure among financially distressed firms. *Journal of Applied Business Research* Vol. 10, 41-56.

Santomero, A. (1997). Commercial Bank Risk Management: an Analysis of the Process. *The Wharton Financial Institutions Center.*

Silva, E., Pereira, A. and Lino, A. (2011). *Do Acordo de Basileia I ao Acordo Basileia III*. Lisbon: Atas do 4º Congresso Nacional dos Economistas.

Standard & Poors (2016). *2015 Annual Global Corporate Default Study and Rating Transitions from Standard & Poors.* Available in: http://www.spratings.com/documents/20184/774196/2015+Annual+Global+Corporate+Default+Study+And+Rating+Transitions/6d311074-5d56-4589-9ef8-a43615a6493b [Accessed in 2016/08/10].

Stern School of Business New York University (2015). *The Use of Credit Scoring Models and the Importance of a Credit Culture.* Available in: http://people.stern.nyu.edu/ealtman/3-%20CopCrScoringModels.pdf [Accessed in 2016/05/31].

Waqas, H., Hussain, N. and Aness, U. (2014). Zmijewski Financial Distress Prediction Model and Its Predictability, A Case of Karachi Stock Exchange. *Journal of Basic and Applied Scientific Researc*h, 155-163.

Zmijewski, M.E. (1984). Methodological Issues Related to the Estimation of Financial Distress Prediction Models. *Journal of Accounting Research* Vol. 22, 59-82.

Appendix A

BancoBIC

PROGRAMA DE ESTÁGIO E RESPECTIVO CRONOGRAMA

Nome do Orientador de Estágio: Andreia Mello Lucena	Nome do Estagiário: João Rosário

CRONOGRAMA

Atividades a Desenvolver	Responsável	Tempos	Local
DCAN - DIREÇÃO COORDENADORA REDE AGÊNCIAS SUL	DR. PEDRO ALEIXO	1 MÊS	LISBOA
DCEN - DIREÇÃO COORDENADORA REDE EMPRESAS SUL	DR. MIRA DE OLIVEIRA	1 MÊS	LISBOA
GCE - GABINETE CRÉDITO ESPECIALIZADO	DR. CARLOS ALVES	1 SEMANA	LISBOA
DPB - DIREÇÃO DE PRIVATE BANKING	DR. NUNO RIBEIRO DA CUNHA	1 SEMANA	LISBOA
GMC - GABINETE MERCADO DE CAPITAIS	DR. MANUEL VASCONCELOS	1 SEMANA	LISBOA
DARC - DIREÇÃO ANÁLISE DE RISCO	DRA. MARTA PAULA / DR. AUGUSTO DAMAS	1 MÊS	LISBOA
DSO - DIREÇÃO SUPORTE OPERACIONAL	SR. ABÍLIO FONSECA	15 DIAS	LISBOA
DIF - DIREÇÃO INTERNACIONAL E FINANCEIRA	DR. BRUNO BATISTA	1 MÊS	LISBOA
DPCG - DIREÇÃO PLANEAMENTO E CONTROLO DE GESTÃO	DR. MANUEL DA LUZ	3 SEMANAS	LISBOA