Credit Risk Determinants of North Cyprus Banking Sector

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ABSTRACT

This study is aimed at examining the determinants of credit risk of North Cyprus Banking sector. This study uses the sample of seven banks for ten years period from 2005 to 2014. The variables used in this study are credit risk (proxies by ratio of non-performing loans to total loans) as the dependent variable and return on equity, liquidity ratio, credit growth, market power, and exchange rate are used as independent variables. Our findings shows that exchange rate have positive significant impact on North Cyprus credit risk while return on equity has negative significant impact on North Cyprus credit risk.

Keywords: Credit risk, North Cyprus, banking sector, non-performing loans.

ÖZ

Bu çalışma, Kuzey Kıbrıs Bankacılık sektörü kredi riski belirleyicilerini incelenmesi hedefleniyor. Bu çalışmada kullanılan değişkenler kredi riski bağımlı değişken olarak ve özkaynak kârlılığı (toplam kredilere takipteki kredilerin oranı ile vekiller) olan 2005 2014 on yıl süreyle yedi bankanın örnek kullanır, likidite oranı, kredi büyümesi, piyasa gücü, ve döviz kuru bağımsız değişkenler olarak kullanılmıştır. Bulgularımız özkaynak getiri Kuzey Kıbrıs kredi riski üzerinde olumsuz önemli bir etkiye sahipken döviz kuru Kuzey Kıbrıs kredi riski üzerinde olumlu önemli bir etkiye sahip olduğunu göstermektedir.

Anahtar kelimeler: Kredi riski, Kuzey Kıbrıs, bankacılık sektörü, takipteki krediler.

DEDICATION

This research work is dedicated to my father (late) Alh. Babangida Sulaiman. May Allah reward him with jannatul Firdaus. Ameen.

ACKNOWLEDGMENT

In the name of Allah the most Gracious, the most Merciful. Praise be to Almighty Allah (SWT) for His infinite mercy Who gave me the ability and initiative throughout my study, findings and compilation of this thesis. May peace and blessings of Allah be upon the prophet Muhammad (SAW).

At this point I will like to extend my gratitude to my supervisor Assoc. Prof. Dr. Nesrin Ozatac for her tremendous support, guidance and for being patient with me. May Allah bless her and her family, Ameen.

My special tribute to my beloved parents, (late) Alh. Babangida Sulaiman and Hajiya Fatima Auwal for giving me solid foundation in life as well as their support and prayers. May Allah forgive all their shortcomings and grant them jannatul Firdaus, Ameen.

Much regard to my brothers, sisters and my wife Rukayya for their support, encouragement and prayers to me. May Allah bless them all, Ameen.

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LIST OF ABBREVIATIONS

CG	Credit growth
CR	Credit risk
EXR	Exchange rate
IMF	International Monetary Fund
LQDT	Liquidity ratio
MP	Market power
ROE	Return on equity
SDIF	Savings Deposits Insurance Funds
TL	Turkish Lira
TOL	Tolerance factor
USD	United States Dollar
VIF	Variance inflation factor

Chapter 1

INTRODUCTION

Banks and other depository institutions are unique in terms of their ability to channel funds from lenders to borrowers. The capability of banks to find the lowest possible source of fund and monitor the behavior of borrowers allow them to perform such function effectively. The major function of banks is credit provision and by performing this function they convert household savings into loans giving out to corporations, governments, and individual borrowers. Therefore banks accept the risk of default (credit risk) for the loans they issued to such parties.

Credit risk refers to the risk of default by one party in any loan contract (Manab, 2015). Credit risk happens from the failure of borrowers to pay either the principal or interest on a loan. Credit risk is highly related with the returns yield by the loan. The higher the expected return from a loan the higher the risk associated with that loan. For this reason banks usually set higher rate of on loans they think are more risky than others.

A Healthy financial sector is one of the key measures for economic stability and performance of any country. High credit risk in a country could cause systemic risk on the financial sector of a country which then leads into pushing the entire economy of a country in to distress. Basel Committee on Banking Supervision suggests that to maintain stability in the financial sector it is very important to implement credit risk

management. Though banks gain most of its income from interest income, excessive amount of loans issued by banks will likely to increase its credit risk.

Andrade and Kaplan (1998) suggested that one of the major causes of banks failure is lack of proper monitoring of borrowers behavior. Because it is very important to know the business records and credit rating quality of the person you are dealing with. Titman (1994) found that bad loans, lack of regulations, deposit insurance, lack of skills, and mismanagement are the main causes of bank failure. They also found that financial distressed banks tend to lose high market advantages than healthy ones. It was also found that high credit risk can lead to financial distress which eventually leads to bankruptcy (Andrade and Kaplan, 1998). Purnanandam (2008) highlights three major effects of financial distress which are loss of suppliers, customers, and major employees. Secondly financial distressed banks may fail to meet their obligations and finally they may lose opportunity to invest in highly profitable investments.

From our previous discussion one can understand that credit risk is very critical aspect of daily banks' operations that can lead to complete bank failure. For this reason the need for highly sophisticated and effective credit risk model arises.

One of the prominent credit risk models is default prediction model. Default prediction model is a tool that banks and other financial institutions used to determine the probability of default by a borrower in a loan contract. It uses accounting figures to determine the credit quality of a borrower. Default prediction model faces many challenges from different scholars because it deals with accounting figures. Basu (1997) suggested that accounting values may not accurate

predict banks' financial positions because of different accounting standards among countries. Cho, Fu and Yu (2012) found that earnings management based on accounting figures have made z-score weaker in predicting the probability of default due to earnings manipulation among firms.

1.1 Historical Background

The origin of banking dates back to the period of prototype merchant banks of the early human history. These banks made loans to farmers in form of grains and to traders who travelled across cities. This practice began in Babylonia and Assyria during the ancient time. Later during the Roman Empire and in ancient Greece, banks invented two new innovations: they accept deposits and they exchanged money.

Many scholars position the historical evolution of banking system to Medieval and Renaissance Italy. In the 14th century, Perruzi and Bardi families dominated banking in Europe establishing branches in several areas in Europe. However, the most prominent bank during this period was Medici bank established in 1397 by Giovanni Medici. The oldest bank and still in operation is Banca Monte dei Paschi di Siena, with headquarters in Siena, Italy which has being in existence since 1472.

The growth in the banking system spread from Italy throughout the Roman Empire and later in the 15th and 16th centuries to northern Europe. In the 17th century banking system is followed by a number of innovations in Amsterdam during the period of Dutch republic and in London in the following century. In the 20th century, rapid growth in the use of Computer and telecommunications brings major changes in banking operations and help banks to open branches around the world.

In the early 21st century during 2007-2009 financial crisis, many banks failed including some of the largest banks in the globe which causes many changes in the word banking regulations.

Since 1974, the small island of Cyprus has been separated into two countries: North Cyprus and South Cyprus, with Greek Cypriots living in the south and Turkish Cypriots in the north. Despite the country's small size, North Cyprus financial sector has been operating with large number of banks. There were 37 banks operating in the country in 1999 and most of these banks were established after 1980 (Oney, 2002). From 1980 to 1999, with high interest charged on loans and low minimum capital requirement to establish a bank, made it easier for many large firms from different sectors to establish for financing their businesses. Inefficient regulation and supervision of banks during this period made it possible for even middle class businesses to open banks and take high risk with depositors' money.

However, during the financial crisis of 2000 to 2001 twelve banks collapsed with ten seized to exist and the remaining two taken over by other banks. As a result of this in 2002, the laws governing the banking operations in North Cyprus were amended. The new laws have contributed to the establishment of stability and growth in North Cyprus banking sector.

By 2006 the number of banks operating in the country shrunk to 24 (Central Bank of the TRNC). Since then the number of banks operating had been moving between 22 and 24.

1.2 Aims of the Study

The study is aimed at examining the determinants of credit risk in North Cyprus banking sector. The study will examine both bank variables and macroeconomic factors determinants of credit risk. The bank variables considered in this research are return on equity ratio (ROE), liquidity ratio (LQDT), market power (MP), and credit growth (CG), while the macroeconomic determinant used is exchange rate.

1.3 Scope of the Study

The study will use published yearly financial reports (secondary data) for seven North Cyprus banks over ten years (2005-2014). The banks are chosen for their assets size and availability of their data extracted from the Central Bank of North Cyprus (KKTC Merkez Bankasi) website. The ratios were computed using Microsoft Office Excel and the data is to be analyze using panel data regression analysis in E-views.

1.4 Structure of the Thesis

The remaining parts of the work will be chapter two for literature review, chapter three for brief over view of data and methodology of the study, chapter four for analysis and interpretations and finally chapter five for summary, conclusions and recommendations.

Chapter 2

LITERATURE REVIEW

Recent researches shows that there are mainly two factors that affects credit risk of a given country which are microeconomic (bank specific attributes) and macroeconomic factors with many researches putting emphasis on the micro economic variables.

Ganic (2014) study the influence of bank specific attributes in determining the non-performing loan size in the total assets portfolio of Bosnia and Herzegovina commercial banks. He extracted the data of seventeen banks for eleven years (2002-2012). He uses panel regression model in data presentation and analysis. His findings shows that there exists a significant relationship between: profitability (ROE), Deposit rate (DR), Credit growth (CG), Inefficiency (IE) and credit risk while Market power (MP), Loans to deposit ratio (LTD), Solvency (SR), profitability (ROA), Reserve ratio (RR) and Solvency (SR) are not statistically significant in determining credit risk.

Manab, Theng and MD-Rus (2015) explore the determinants of credit risk in Malaysian healthy and unhealthy companies. They also try to look into the effects of earnings management in credit risk forecasting. They found out that liquidity ratio is relevant in determining credit risk before earning management was adapted into the model. Productivity ratio is also significant in the unadjusted model while profitability ratio is significant in the adjusted model. They finally suggest that

unadjusted model is better than the adjusted model in determining credit risk of Malaysian healthy and unhealthy companies.

Andriani and Wiryono (2015) suggested that if credit risk for banking sector was not given much attention can subsequently harm the entire economic condition of a country. They try to work out whether this theory is applicable in Indonesia. After examining the effects of bank ownership and other variables on credit risk of Indonesian banking sector, they found out a significant relationship between the variables and credit risk.

The work of Abdus (2012) explore which among bank determinants of credit risk contributed much to bank failure in United States. His findings proves that among the five determinants they use Loan Loss Provision (PLL), non-current loans to loans, and loan loss allowance to non-current loans are significant in forecasting bank failures, while loan loss to non-current loss and net charge off to loans are not significant in forecasting bank failure. The result further indicates that these factors predict 76.8% of their total observations correctly.

The study carried out by Yildrak and Suer (2013) on the qualitative determinants of credit risk of manufacturing companies in Turkey shows that profitability, non-performing loan volume, level of collateral and guarantees, and short-term financial leverage are the most important determinants of credit default risk among Turkish manufacturing companies. They uses a multi variate regression for the sample of 1772 Turkish manufacturing firms and finally found that the qualitative variables have an impact in predicting credit default risk.

Some researchers suggested that credit risk model will be more efficient if both microeconomic variables (bank specific attributes) and macroeconomic factors are combined together in a single module.

The work of Zribi and Boujelbene (2011) explore the various factors (like technology of information and communication, deregulation, internationalization, globalization and so on) that causes structural changes in the banking sector. The study was carried out on Tunisian banking sector for a sample of ten banks over 1995-2008 time periods. The findings reveals that the main factors affecting credit risk of Tunisian banking sector are: ownership structure, profitability, prudential regulation of capital and macroeconomic indicators.

The paper written by Das and Ghosh (2007) finds that high rate of loan expansion by banks to their customers lead to poor loan position of that bank because if the borrowers are many the cost of monitoring them will be high. The paper studied the nature of credit risk determinants of state-owned banks in India for the period of 1994 to 2005. Their empirical findings shows that real loan growth, bank size and GDP play an influential role in determining problematic loans level of state-owned banks in India.

Vogiazas and Nikolaidou (2008) carried out a study to test whether macroeconomic cyclical indicators, financial markets, interest rate, monetary aggregates, and bank specific variables have an important role to play in determining the level of non-performing loan of a given country. The study tries to include some strange variables (like monetary aggregates, construction index, industrial production index, and financial markets) in credit risk model to know the level of their relevance in the

model. The study was carried out on Bulgarian banking industry for the period of 2001-2010. The work covers both the periods of booming and depression in the world banking system. He then investigates the impacts of global financial crises and Greece debt crises on Bulgarian banking industry. The findings shows a significant relationship between unemployment, industrial production index, construction index, exchange rate, credit growth and global financial with the level of non-performing loans in Bulgarian banking industry, while no evidence have shown a significance relationship between Greece debt crises and Bulgarian level of non-performing loans.

Garr (2013) examines the impact of bank variables, macroeconomic variables and industry specific factors that affects problem loan in Ghanaian commercial banks. He uses a sample of 33 for 21 years period. The result shows that problem loans in Ghana have significant relationship with financial sector development, government borrowing and management efficiency.

As illustrated by Gezu (2014) bank profitability (ROE), lending rate (LR), and capital adequacy ratio (CAR) has significant negative relationship with non-performing loans in Ethiopia, while effective tax rate and profitability (ROA) have positive significant relationship with non-performing loans in Ethiopia. This work was carried out to measure the impact of both bank variables and macroeconomic determinants of non-performing loans in Ethiopia. The study was conducted using the annual data of eight senior commercial banks for 11 years period.

Funso, Kolade and ojo (2012) examine the impact of credit risk on the performance of commercial banking in Nigeria. They use data for five commercial banks for period of eleven years from 2000 to 2010. They use return on assets (ROA) and

return on equity (ROE) ratios as measures for bank performance, while the ratio of non-performing loans to total loans is used as a proxy for credit risk. They found that credit risk effect on Nigerian banks is uniform across the banking sector.

Ekanayake and azeez (2015) study the determinants of credit risk in Srilankas' banks for a sample of 9 banks over the period of 1999-2012. They used non-performing loan as a proxy for credit risk. They found that the level of non-performing loans in Srilankas' banks is positively related with banks' inefficiency and credit growth.

A significant number of previous literatures study only macroeconomic determinants of credit risk. The study by Poudel (2013) for Nepalese commercial banks for the period of 2001-2011 investigates into the major macroeconomic factors affecting credit risk of Nepal banking industry. The study uses annual financial data for 13 commercial banks. He uses non-performing loan as a proxy for credit risk which is in line with the work of Garr (2013) for Ghanaian banks, Diaconasu, Popescu and Socoliuc (2010). The findings show that foreign exchange fluctuations and inflation rate have negative influence in determining the credit risk of Nepal banks.

Ahmad and Ariff (2007) study the credit risk determinants for commercial banks of some emerging economies (Korea, Malaysia, Thailand, Mexico, and India) compared to some developed nations (USA, France, japan, and Australia). They identified eight factors that affects credit risk and their result showed that four out of the eight determinants have significant influence while the rest are insignificant.

Godlewski (2006) study the institutional and regulatory credit risk determinants and probability of default in some emerging countries. He uses logit econometrics model

to a data of 172 banks from different emerging countries. The study found that institutional environment and regulatory environment determinants are essential in predicting credit risk in emerging economies.

Castro (2013) tries to explore the connections between bank credit risk and macroeconomic development. The work uses the financial data of banks for a group of countries (Greece, Spain, Portugal, Ireland, and Italy).he also tries to analyze the systematic effect of Greece debt crises on the other countries. His findings shows that GDP growth rate, housing prices, unemployment rate and interest rates has significant impact in determining the level of credit risk in this five countries. He also concluded that Greece crises have systematic effects on the rest of the countries.

The work of Mileris (2012) also examines the major macroeconomic determinants credit risk of the loan portfolio for a group of EU countries. The research employ a strange tactics of grouping countries into 3 clusters based on the changes in the level of problematic loans over years. He sets out 20 independent variables from 9 different economic indicators for 3 years. The empirical findings shows that GDP, money supply, inflation rate, interest rates, industrial production index and current account balance have significance influence in determining the level of non-performing loans in the countries. He also suggested that the model predicts non-performing loans with average of 98.06% accuracy.

A research conducted by Souza and Feijo (2011) on the Brazilian banking sector explore the major determinants of credit risk among various macroeconomic factors. They also examine the response of financial segments of the economy to structural changes risks recommending a different method of analyzing credit risk. They also

try to pinpoint the major differences in credit risk evaluation between public and private banks. The research uses the financial data of Brazilian banks for seven years (2000-2006). They concluded that basic interest rate and economic activity are the major factors influencing credit risk.

Diaconasu et al, (2010) study the macroeconomic determinants of credit risk of some middle and Eastern Europe countries after the global financial crises to see if it is different with the determinants before the crises. They examine that most of the countries derive some new ways of managing credit risk. Due to the transformation in the banking sector the found that GDP growth rate and unemployment rate have significant impact in determining the level of credit risk of the countries.

Finally based on our review of the previous literatures we found a single research work on credit risk assessment of northern Cyprus banking sector. The research was conducted by Veli (2007). He aimed at exploring the effects of credit risk on the financial crises of Northern Cyprus. Therefore this research is not in line with our purpose of exploring credit risk determinants of northern Cyprus banking sector.

This research work would seems to become first to examine the determinants of credit risk in the context of northern Cyprus.

Chapter 3

NORTH CYPRUS BANKING SYSTEM

North Cyprus economy has gone through two major banking sector distress first in 1994 and the second in 2000-2002 (Gunsel, 2010). The first one is as a result of bad economic in turkey in 1994 which include persistent devaluation of Turkish currency (Turkish Lira or TL) which is also North Cypriots' legal tender. Because of this close economic and monetary link between Turkey and North Cyprus, the banks in North Cyprus were highly affected from Turkish economic distress. During this crisis period Mediterranean bank ltd and Everest bank ltd were placed under the control of North Cyprus ministry of finance before they were later bailed out by North Cyprus government.

In December 1999, Turkey adapted a pegged exchange rate which was supported by International Monetary Fund (IMF) in order to curtail inflation. However, fourteen months later, with the abundance of the program and with the collapse of Turkish Lira, five North Cyprus banks (Cyprus credit bank ltd, Everest bank ltd, Cyprus liberal bank ltd, Cyprus finance bank ltd and Kibris Yartabank ltd) were placed under the Savings Deposits Insurance Funds (SDIF) and they were eventually closed in 2001. The failure of these five banks brought about serious banking crisis in North Cyprus. As a consequence, North Cyprus authorities started conducting criminal investigations about the causes of these banks' failure. The total losses for these banks was found to be □112 trillion (Gunsel, 2010).

In 2001 four other banks (Asia bank ltd, Cyprus commercial bank ltd, Tilmo bank ltd, and Yasa bank ltd) were also placed under the control of SDIF followed by Cyprus industrial bank ltd in 2002.

Furthermore, several mergers and acquisitions occurred during the crisis period among which Finbank ltd was taken over by Artam bank ltd in 2000, Hamza bank ltd and Med bank ltd were taken over by Seker bank ltd in 2000 and 2002 respectively. During the period of 2000 to 2002 ten banks were instructed by North Cyprus authorities to seize operations due to their deteriorated economic conditions. Safakli (2003) states that, the failure of these ten banks causes about □200 trillion economic loss in North Cyprus which was almost 50% of the country's Gross National Product (GNP). From 1999 the number of banks in North Cyprus drop drastically from 37 to 25 in 2002.

3.1 Structure of North Cyprus Banking Sector

Despite the country's small size, its financial sector has been operating with large number of banks. There were 37 banks operating in the country in 1999 and most of these banks were established after 1980 (Oney, 2002). From 1980 to 1999, with high interest charged on loans and low minimum capital requirement to establish a bank, made it easier for many large firms from different sectors to establish for financing their businesses. Inefficient regulation and supervision of banks during this period made it possible for even middle class businesses to open banks and take high risk with depositors' money.

However, during the financial crisis of 2000 to 2001 twelve banks collapsed with ten seized to exist and the remaining two taken over by other banks. As a result of this in

2002, the laws governing the banking operations in North Cyprus were amended. The new laws have contributed to the establishment of stability and growth in North Cyprus banking sector.

By 2006 the number of banks operating in the country shrunk to 24 (Central Bank of the TRNC). Since then the number of banks operating had been moving between 22 and 24.

Table 3.1: list of banks in North Cyprus

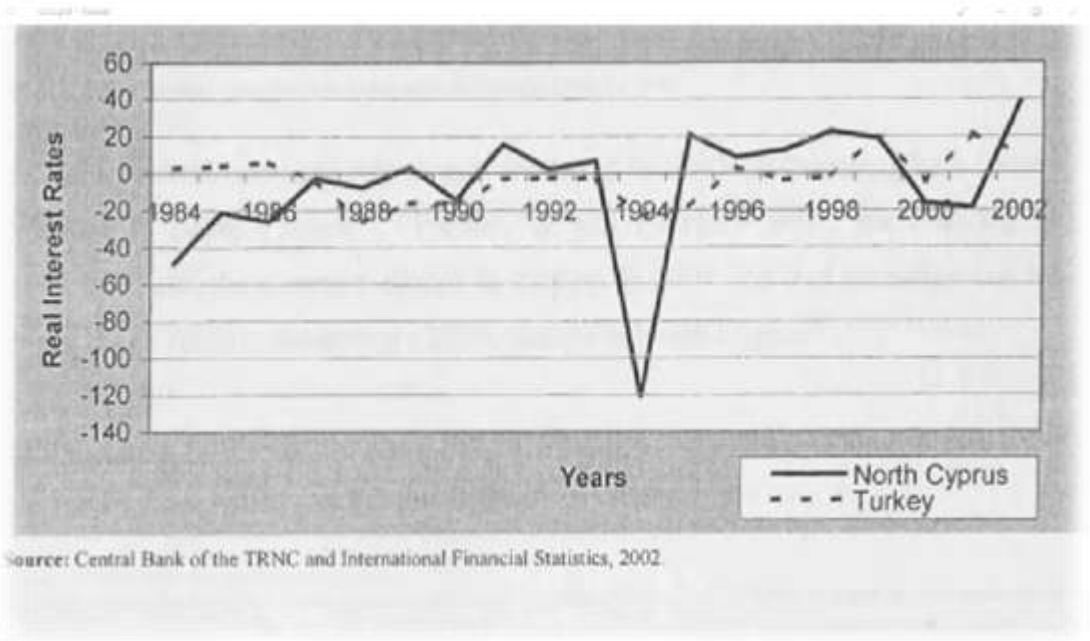
No.	**Bank name**	**Ownership type**	**Asset size (TL million)**
1	Akfinans Bank Ltd.	Private	100
2	Asbank Ltd.	Private	577
3	Creditwest Bank Ltd.	Private	1,404
4	Cyprus Economy Bank Ltd.	Private	1,017
5	Faisal Islamic Bank of Cyprus Ltd.	Private	51,628
6	Foundations Bank of Cyprus Ltd.	Public	822
7	HSBC	Foreign	754
8	Ing Bank Inc.	Foreign	28,175
9	K. Kapitalbank Ltd.	Private	295
10	KT Koop. National Bank Ltd.	Private	3,356
11	Limassol Turkish Cooperative. Bank Ltd.	Private	589
12	Near East Bank Ltd.	Private	503
13	Nova Bank Ltd.	Private	90,016
14	Şekerbank (Cyprus) Ltd.	Private	188
15	Turk Ekonomi Bankasi AS	Foreign	451
17	Turkey Garanti Bank	Foreign	732
18	Turkey Halk Bankası A.Ş.	Foreign	380
19	Turkey İş Bankası A.Ş.	Foreign	1,313
20	Turkish Bank Ltd.	Foreign	753
21	Universal Bank Ltd.	Private	338
22	Viyabank Ltd.	Private	138
23	Ziraat Bankası A.Ş.	Foreign	939

Source: Central Bank of the TRNC Annual Financial Reports, 2016.

3.2 Effects of 2001 Turkish Financial Crisis on North Cyprus Banks

Atici and Gursay (2011) come up with the major causes of 2001 Turkish financial crisis. In 1999, Turkey atarted having distress in the economy due to high rate of inflation. This began with the Turkish agreement with IMF on pegged exchange rate that will help to cut down inflation in their economy. During the fourth quarter of 2000 the program started to show some shortcomings by pushing banks into difficulties. During this period of difficulties, interest rate flew to arounds 900% overnight. As a result Turkish Central Bank lost confidence on IMF and by November 2000, the dramatic increase of interest rate damage the entire Turkish banking sector.

However, linking the North Cyprus economy with Turkish unstable economy brought so many disadvantages to North Cyprus because any economic dilemma in Turkey hits North Cyprus economy directly. As a result North Cyprus banks were seriously affected by Turkish deteriorated economic indicators like interest rate and exchange rate.



Source: Central Bank of the TRNC and International Financial Statistics, 2002

Figure 3.1: Turkey and North Cyprus interest rates

The above figure shows the level of interest rate in both Turkey and North Cyprus between 1984 and 2002. The graph shows a similar trend between the two countries indicating that North Cyprus economy is directly affected by Turkish economy. Most of the times high interest rate causes instability in the banking sector because banks find it difficult to perform assets and liabilities transformation.

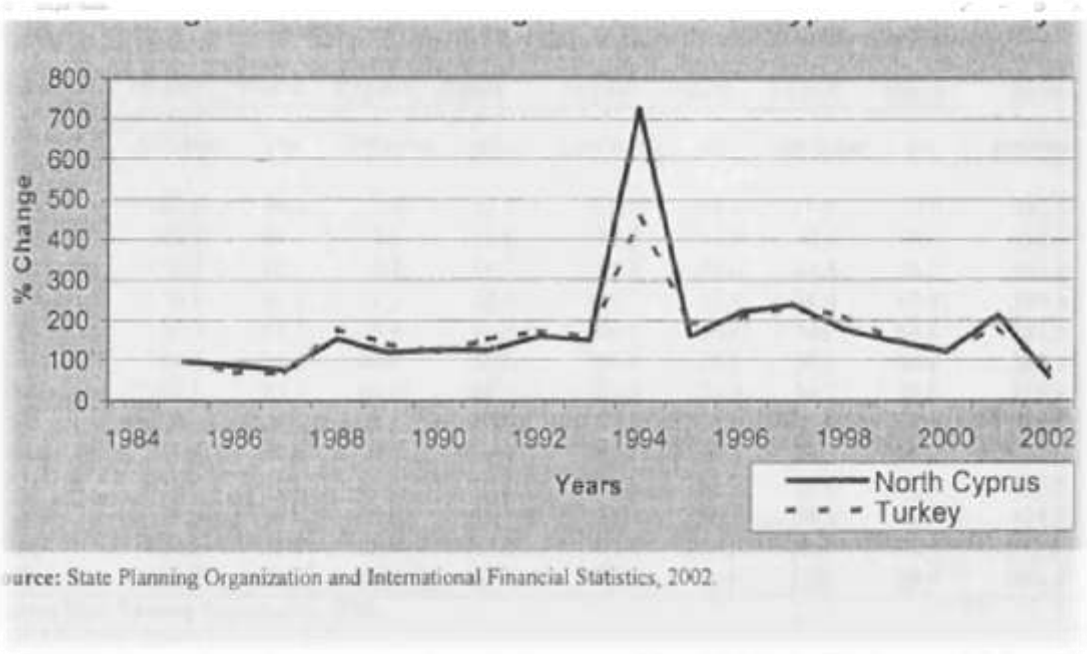


Figure 3.2: Turkish and North Cyprus Exchange rates

The above figure shows a similar trend in the movements of exchange rate in both Turkey and North Cyprus between the periods of 1984 to 2002. The exchange rate figure shows how Turkish Lira depreciated against US Dollar. As a consequence many North Cyprus banks lost their loans they offer in foreign currencies.

3.3 Effects of 2008 Global Financial Crisis on North Cyprus Banks

The 2008 global financial crisis is originated from USA as a result of increase of interest rate by FED which led many of the sub-prime mortgage holders default on their payments and eventually the crisis spreads to other financial sector businesses in USA and later spreads all over the world.

However, this crisis had no relevant impact on Turkish and North Cyprus economy (Erdem, 2010). This is because Turkish authorities are well aware of the 2001 crisis and the measures they took to keep the economy as stable as possible. During the period of 2008 Global financial crisis Central Bank of Turkey cut interest rate from

6% to 5% in order to decrease intermediary cost and to keep the economy as liquid as possible.

Chapter 4

DATA AND METHODOLOGY

4.1 Data

The data of North Cyprus banks published on Central Bank of the North Cyprus website is processed using Excel and used in this study. The data covers seven banks from 2005 to 2014 which makes it seventy observations. The data for Turkish Lira (TL) to US dollar exchange rate used in this study was obtained from data stream. We use regression analysis to explore the major determinants of credit risk in North Cyprus banks among our variables. We use panel regression approach which was considered to be appropriate for our study because of the nature of our data.

Table 4.1: List of banks used in the Analysis

No	**Bank name**	**Ownership type**	**Asset size (TL million)**
1	Asbank Ltd.	Private	577
2	Foundations Bank of Cyprus Ltd.	Public	822
3	HSBC	Foreign	754
4	Limassol Turkish Cooperative. Bank Ltd.	Private	589
5	Near East Bank Ltd.	Private	503
6	Turkey Garanti Bank	Foreign	732
7	Turkish Bank Ltd.	Foreign	753

4.2 Variables

In this study we use five bank variables and one macroeconomic variable to investigate the determinants of credit risk of North Cyprus banks. The bank variables used are: credit risk (non-performing loan to total loan ratio), return on equity (ROE), liquidity ratio (LQDT), credit growth (CG), and market power (MP), and the macroeconomic variable used is exchange rate (EXR).

Table 4.2: Variables used in the Analysis

NO	Variable	Type	Measure
1	Credit risk (CR)	dependent	non-performing/loan to total loan ratio
2	return on equity (ROE)	Independent	Net income/total shareholders' equity
3	liquidity ratio (LQDT)	Independent	Cash + due deposits/total assets
4	credit growth (CG)	Independent	Change in loan size
5	market power (MP)	Independent	Share of bank i loan in the market
6	exchange rate (EXR)	Independent	TL/USD exchange rate

Non-performing loans to total loans (credit risk)

The ratio of banks nonperforming loans to total loans is the value of total problem loans (loans that the payment of their principal and or interest passes its due date by 90 days or above) divided by the total gross loans (total value of bank's loan portfolio). The loan value to be recorded as a nonperforming loans comprises of the total value of the loans as recorded in the balance sheet. It is not just the loan value

that is overdue. The total value of the loans also includes the value of the nonperforming loans before deduction of any provision for loan loss. High ratio of nonperforming loans to total loans indicates high credit risk. The ratio of nonperforming loans to total loans indicates high credit risk has been used by many researchers as a proxy for credit risk.

Return on equity (ROE)

Return on equity (ROE) is defined as the amount of net income divided by the value of shareholders' equity. Return on equity shows how much a bank is able to generate from the money invested by the shareholders. The net income used in calculating return on equity is the amount generated for the whole fiscal year before the payment of dividend to common stockholders but after payment to preferred stock holders. Return on equity is used as a measure for efficiency in profits generation. High return on equity ratio may signifies low credit risk while low return on equity ratio indicates high credit risk.

Liquidity ratio (LQDT)

Liquidity ratio is used to determine the bank's ability to cover its customers daily cash needs and its short-term debt obligations. High ratio indicates that the bank is in margin of safety to cover customers' daily withdrawal needs and short-term debts. The most commonly used liquidity ratios are the quick ratio, current ratio, and operating cash flow ratio. However, for the purpose of this study we used cash plus due deposits from other banks to total assets which many researchers consider it to be the best liquidity measure as it is the first claim for customers' withdrawals and payment of short-term debts.

Credit growth (CG)

Credit growth is defined as the increase in the amount of loan that banks lend to individuals, governments, corporations etc., either in the form of institutional loans, retail loans or any other form of loans. Rapid growth of credit is considered to be one of the major causes of credit risk (Pietro 2012). In periods of economic growth banks often engaged in competition for the market share of loans which causes rapid growth in loan expansion. Credit risk is expected to be high when there is growth in credit expansion because the credit quality of many customers is not known to the banks more especially ne customers.

Market Power (MP)

Market power is defined as the ratio of total loan portfolio of bank I in year t to total loan portfolio of all banks in the industry. It measure the changes of total industry loan portfolio to changes in the value of bank I loan in year t.

Exchange rate (EXR)

Exchange rate is defined as the currency of one country in terms of another country's currency. Exchange rate has two main components, the foreign currency and domestic currency. There are mainly two types of exchange rate, the direct quotation and indirect quotation. In a direct quotation the prices for foreign exchange transactions are expressed in terms of domestic currency, while in indirect quotation the prices are expressed in terms of foreign currency. Most exchange rates uses US dollar as the base currency and then any other country's currency as a counter currency. If the domestic currency of a country depreciates against the US dollar, the exchange rate will be unfavorable to them, and if their currency appreciates against the US dollar the exchange rate will be favorable to them. Therefore, in periods of

favorable exchange rate credit risk is expected to be low and in periods of unfavorable exchange rate credit risk is expected to be high because banks tend to loss the loans they lend in foreign currencies.

Table 4.3: Explanatory variables and their expected sign

No.	Variable	Expected sign
1	Return on equity (ROE)	-
2	Liquidity ratio (LQDT)	-
3	Credit growth (CG)	+
4	Market power (MP)	+
5	Exchange rate (EXR)	+

4.3 Methodology

In this study we used published financial reports of North Cyprus banks over ten years period between 2005 and 2014. The data was processed using Excel to make it ready for analysis in E-views and the relationship between our dependent variable (credit risk) and the independent variables (return on equity ratio, liquidity ratio, market power, credit growth and exchange rate) was analyzed using panel data regression in E-views which is considered to be most appropriate method because of the nature of our data. We also conducted a unit root tests to check the stationarity of our data and Hausman and maximum likelihood tests to select the appropriate model.

4.3.1 Unit Root Test

A data is said to be stationary when its mean and variance is constant over time and the value of the covariance between two time periods does not depend on the actual time for which it is computed, but on the lag or gap between the time periods

(Gujarati, 2004). If data is not stationary it is said to have unit root (that is the root of the process is 1). Regression with non-stationary data has many shortcomings because the regression result may be spurious or nonsense and the forecast or estimate will be misleading.

Levin Lin Chu, ADF Fisher Chi-square, and PP Fisher Chi-square tests for unit root have been conducted to test for the stationarity of the data. After conducting the tests it was found that all the variables are stationary at I(0) and we can continue with the regression.

4.3.2 Hausman Test

The econometrics model used to measure the impacts of return on equity ratio, liquidity ratio, market power, credit growth and exchange rate on credit risk is panel data regression model which is selected based on Hausman test result. Hausman test is used to select the appropriate model between fixed effect and random effect under the null hypothesis that the error terms are uncorrelated with one or more of the explanatory variables. When the null hypothesis is not rejected, random effect is appropriate, while if the null hypothesis is rejected fixed effect is appropriate.

The null and alternative hypotheses for Hausman test are:

H_O: random effect is appropriate

H_1: random effect is not appropriate

To test the hypothesis it requires to compare between the random effect and fixed effect estimates. Random effect estimator is only consistent under the null hypothesis while the fixed effect estimator is consistent under both the hypotheses. If the probability value of the Hausman test is not statistically significant we fail to reject

the null hypothesis and conclude that random effect is appropriate while if the probability value of the Hausman test is statistically significant we reject the null hypothesis and conclude that fixed effect is appropriate. Also if the periods included is greater than the number of cross sections, fixed effect is appropriate.

4.4 Model Specification

Like many previous literatures, this study uses non-performing loans to total loans ratio as the dependent variable and our independent variables (return on equity ratio, liquidity ratio, market power, credit growth and exchange rate) also where chosen based on some previous literatures.

The panel regression equation that was used in many previous literatures is given as:

$$Y_{it} = \beta_1 + \beta X_{it} + U_{it}$$

Where: Y_{it} is the dependent variable in the equation, β_1 is the intercept or constant term, β is the coefficient of the explanatory variables, X_{it} is the independent variable, U_{it} is the error term, subscript i represents the cross section part, and subscript t the time series part.

However, in this study we modified the conceptual model which was adopted by Ganic (2014).

Our estimated model is given as:

$$CR = \beta_1 + \beta 2(ROE_{i,t}) + \beta 3(LQDT_{i,t}) + \beta 4(MP_{i,t}) + \beta 5(CG_{i,t}) + \beta 6(EXR_{i,t}) + U_{i,t}$$

Where CR,ROE,LQDT,MP,CG,EXR are ratio of non-performing loans to total loans, return on equity ratio, liquidity ratio, market power, credit growth and exchange rate respectively.

Chapter 5

EMPIRICAL ANALYSIS

This chapter presents the analysis of our data and discussion of the results based on the set objectives of our research. The data was analyzed using panel fixed effect regression in E-views. This study uses six variables in the empirical analysis. The variable credit risk (proxies by the ratio of non-performing loan to total loans) is used as the dependent variable, while return on equity (ROE), liquidity ratio (LQDT), credit growth (CG), market power (MP), and exchange rate (EXR) are used as independent variables. The study uses these variables to define one linear equation that is used in describing the effects of the independent variables on the dependent variable.

The techniques used in this study include unit root test, multicollinearity test, auto-correlation and finally panel fixed effect regression analysis.

5.1 Descriptive statistics

This part presents the descriptive statistics of our dependent and independent variables used in this study generated in E-views. Descriptive statistics shows the standard deviation, mean, minimum, and maximum value figures of our variables. Table 4.1 presents the standard deviation, mean, minimum, and maximum value figures for our variables using 70 observations for each variable.

Table 5.1: Summary of Descriptive statistics

NO	Variables	Mean	Standard deviation	Minimum value	Maximum value
1	Credit risk (CR)	15.38601	1.489816	10.73842	17.84031
2	Return on equity (ROE)	20.67400	19.97875	-33.37000	93.69000
3	Liquidity ratio (LQDT)	37.44843	26.04460	12.94000	187.3000
4	Credit growth (CG)	45.08671	17.74311	-27.98000	932.7000
5	Market power (MP)	14.28600	8.317505	1.980000	43.63000
6	Exchange rate (EXR)	1.661000	0.349767	1.160000	2.330000

Credit risk measured by the ratio of non-performing loans to total loans ranges from 10.73 to 17.84 percent. It has a mean value of 15.39 and a standard deviation of 1.49. The mean value indicates that North Cyprus banks incurred 15.39% non-performing loans from their total loans on average. Return on equity (ROE) measured by net income divided by shareholders equity ranges from -33.37 to 93.69 percent. It has a mean value of 20.67 and standard deviation of 19.98. The values show that North Cyprus banks are very efficient in generating profits from shareholders money.

Liquidity ratio (LQDT) ranges from 12.94 to 187.30 percent. It has a mean value of 37.45 and standard deviation of 26.04 which is the highest deviation from the mean value from above table. Credit growth (CG) ranges from -27.98 to 932.70 percent showing a rapid growth in loan expansion by North Cyprus banks over the period of

our study. Exchange rate (EXR) ranges from 1.16TL/1USD to 2.33TL/1USD over the period of our study. It has a mean value of 1.66 and standard deviation of 0.35 which is the lowest deviation from above table.

5.2 Unit root test

To test for the stationarity of the data three tests were conducted (LLC, ADF chi-square, and PP chi-square). The null hypothesis for these tests is: the variable has unit root and the alternative hypothesis: is the variable is stationary. Based on these tests we concluded that the data is stationary because most of the probability values of the variables are significant so we can reject the null hypothesis that the variable has unit root and continue with the regression analysis. The table below shows the result for the unit root tests.

Table 5.2: Unit root test

Variables		Levin Lin Chu	ADF Fisher Chi square	PP Fisher Chi square
ROE	τ_T	-17.1944*	54.1649*	56.9529*
	τ_μ	-23.0767*	51.4792*	46.9114*
	τ	-3.47553*	29.3782*	37.6395*
LQDT	τ_T	-8.92442*	39.3151*	54.9337*
	τ_μ	-7.82304*	41.1753*	46.1568*
	τ	-2.44370*	30.8635*	38.9189*
EXR	τ	-35.5632*	12.4357*	76.5432*
τ	τ_μ	-17.2351*	56.1340*	65.2167*
	τ	-8.1060*	26.4323	47.7553
CG	τ_T	-2.65595*	39.6680*	53.1581*
	τ_μ	-5.29004*	51.5985*	58.2973*
	τ	-17.4762*	63.2154*	63.5323*
MP	τ_T	-12.3155*	36.9921*	40.9732*
	τ_μ	-6.77323*	33.7452*	23.0959***
	τ	-0.61437	17.2033	22.6782***
CR	τ_T	-6.63573*	29.2324*	43.2854*
	τ_μ	-24.1322*	47.1297*	25.5641**
	τ	-12.8378*	32.3031*	22.7731***

5.3 Heteroscedasticity

The classical linear regression model (CLRM) assumes that the disturbances error terms have constant variance (homoscedasticity). The opposite of homoscedasticity is heteroscedasticity (that is where the disturbances error terms have inconstant variance).

In this study we used Glejser test to detect the presence of heteroscedasticity in our model. The null hypothesis for Glejser test is: the variables are homoscedastic. The test was conducted by regressing the independent variables on the absolute value of the residual series. If the probability value of any of the independent variables is statistically significant we may conclude we have heteroscedasticity.

After conducting the test we found that all variables are not statistically significant therefore we don't have heteroscedasticity.

5.4 Multicollinearity

Multicollinearity refers to the presence of exact linear relationship among some or all of the independent variables in the regression model. In case of perfect linear relationship, the coefficients of the independent variables are undetermined and their standard errors are infinite.

To test for multicollinearity we observed the correlation matrix which shows that all the independent variables are not highly correlated. Tolerance Factor shows that all the values are not closer to zero and Variance inflation factor (VIF) values are all less than ten therefore we can conclude that we don't have serious correlation problem (Ganic, 2014).

Table 5.3: Correlation Matrix

No	**ROE**	**EXR**	**LQDT**	**CG**	**MP**
ROE	1.000000				
EXR	0.012543	1.000000			
LQDT	0.111267	0.063456	1.000000		
CG	0.025745	-0.023124	0.719113	1.000000	
MP	-0.134944	-0.012865	-0.372791	-0.149544	1.000000

Table 5.4: Tolerance Factor and Variance Inflation Factor

Dependent Variable	**R^2**	**TOL(1- $R^{2)}$**	**VIF(1/1- $R^{2)}$**
ROE	0.0363	0.9637	1.772
EXR	0.4356	0.5644	1.361
LQDT	0.5615	0.4385	2.281
CG	0.5404	0.4596	2.176
MP	0.1747	0.8253	1.212

5.5 Autocorrelation

The classical linear regression model (CLRM) assumes that the disturbances error terms should have zero covariance. This means the error terms of one observation are independent from the error terms of any other observation. Therefore autocorrelation occurs when the error terms are correlated.

In order to test for autocorrelation we compare the Durbin-Watson stat. (d) from our regression result with the critical upper and lower d-values from the Durbin-Watson table. The null hypothesis for the Durbin-Watson is "no negative autocorrelation" and our values match the decision that $d_U<d<4-d_U$ (1.802<2.174<4-1.802) therefore we don't have positive autocorrelation.

5.6 Hausman test

To determine which method we are going to use between fixed and random effects we conducted a Hausman test which shows that fixed effect is appropriate because our probability value for the Hausman test (0.0640) is significant and we can reject the null hypothesis that random effects is appropriate. To confirm we also conduct a likelihood ratio test and it also shows that fixed effect is appropriate because we can reject the null hypothesis that fixed effect is not appropriate therefore we conclude fixed effects is appropriate.

5.7 Regression analysis

Table 5.5: Regression analysis

No	Variables	Coefficients	Standard error	T-statistics	Prob. Values
1	C	14.19204	0.873644	16.24466	0.0000
2	ROE	-0.025448	0.005741	-4.432738	0.0000
3	LQDT	-0.004099	0.010144	-0.404110	0.6876
4	CG	-0.001297	0.001497	-0.866217	0.3899
5	MP	0.016707	0.021747	0.768226	0.4455
6	EXR	1.019488	0.271992	3.748223	0.0004
7	R^2	0.512233			
8	F-Statistics	23.53356			0.0000
9	Durbin-Watson Stat.	2.173746			
10	Hausman test				0.0640
11	Likelihood ratio test				0.0000

The significance level of the whole model was examined using F-stat. The prob. Value for the F-stat. is 0.0000 which is significant at alpha 1% therefore we reject the null hypothesis that all coefficients together are equal to zero. And the value for the F-stat is 23.534 so it is big enough and we can say that the model is well fit.

The individual significance of the variables was observed using t-stat. which shows that two variables in our regression (ROE and EXR) are significant at alpha 1%. Our R^2 is found to be 51.22% implying that the whole model explained 51.22% of the

variability in credit risk while the rest of the 48.78% is explained by other variables which are not included in our model.

By assessing the individual impact of the significant variables we can say that if ROE increase by one unit credit risk will decrease by 0.026 units holding other variables constant. And if EXR increase by one unit credit risk will increase by 1.02 units holding other variables constant. The above findings are in line with the findings of Nikolaidou (2008), Ganic (2014) and Andriani & Wiryono (2015).

Chapter 6

CONCLUSION AND RECOMMENDATION

While there have been many literatures aimed at examining the determinants of credit risk of several countries, literatures focusing on developing economies are very limited. However, this study examines the determinants of credit risk of North Cyprus as an emerging nation. The aim of this study is to examine the impacts of return on equity (ROE), liquidity ratio (LQDT), credit growth (CG), market power (MP), and exchange rate (EXR) on credit risk of North Cyprus banks. The study uses a sample of seven banks for ten years period from 2005 t0 2014. The data was analyzed using panel data regression analysis in E-views.

The finding shows that return on equity (ROE) and exchange rate (EXR) had significant impact in determining the credit risk of North Cyprus banks, while liquidity ratio (LQDT), credit growth (CG), and market power (MP) are insignificant in determining the credit risk of North Cyprus banks.

The finding shows that return on equity (ROE) had negative significant impact in determining the credit risk of North Cyprus banks. This finding implies that North Cyprus banks are very effective in utilizing the funds invested by the shareholders.

The finding for the exchange rate shows a positive significant impact between exchange rate and credit risk of North Cyprus banks which implies that when TL

depreciates against USD, credit risk will be high, while if TL appreciates against USD credit risk will be low.

Based on our findings we recommend that North Cyprus banks should always pay attention to the health or quality of their loan portfolio in order to sense the sign of credit risk so that they can easily prevent it. Secondly banks should monitor the behavior and credit quality of borrowers in order to prevent low credit rated borrowers from accessing their loans. Thirdly banks can provide financial advices and counselling services to borrowers on how they can use their loans wisely. Finally since exchange rate has influential over credit risk in North Cyprus, banks should always extend loans in domestic currency in order to prevent credit risk during periods of unfavorable exchange rate.

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APPENDICES

Appendix A: Regression Result

Dependent Variable: CR
Method: Panel Least Squares
Date: 06/30/16 Time: 09:10
Sample: 2005 2014
Periods included: 10
Cross-sections included: 7
Total panel (balanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	14.19204	0.873644	16.24466	0.0000
ROE	-0.025448	0.005741	-4.432738	0.0000
LQDT	-0.004099	0.010144	-0.404110	0.6876
CG	-0.001297	0.001497	-0.866217	0.3899
MP	0.016707	0.021747	0.768226	0.4455
EXR	1.019488	0.271992	3.748223	0.0004

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.512233	Mean dependent var	15.38601
Adjusted R-squared	0.782244	S.D. dependent var	1.489816
S.E. of regression	0.695212	Akaike info criterion	2.265604
Sum squared resid	28.03252	Schwarz criterion	2.651061

Appendix B: Hausman test result

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	3.899328	5	0.0640

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
ROE	-0.025448	-0.026035	0.000002	0.6516
LQDT	-0.004099	-0.008514	0.000015	0.2619
MP	0.016707	0.021365	0.000065	0.5625
EXR	1.019488	0.980834	0.002032	0.3912
CG	-0.001297	-0.000730	0.000000	0.2103

Appendix C: Likelihood test result

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	10.274035	(6,58)	0.0000
Cross-section Chi-square	50.685559	6	0.0000

Cross-section fixed effects test equation:
Dependent Variable: CR
Method: Panel Least Squares
Date: 06/09/16 Time: 02:13
Sample: 2005 2014
Periods included: 10
Cross-sections included: 7
Total panel (balanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	14.76709	0.759039	19.45497	0.0000
ROE	-0.026861	0.005929	-4.530621	0.0000
LQDT	-0.028549	0.006922	-4.124323	0.0001
MP	0.051549	0.015211	3.388954	0.0012