The Macroeconomic Determinants of Credit Risk in the Banking Sector of Kyrgyzstan

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ABSTRACT

Credit risk, i.e. the risk of loan default, is a significant risk faced by banks in every country. While banks make loans in order to generate income, by making loans they also face a risk of losing their principal and the interest. As part of their lending business, a small percentage of loan default (non-performing loans) is always expected. However, large volumes of loan defaults can push banks into bankruptcy and can cause financial instability in the banking sector. Therefore, it is important to know the factors affecting the credit risk, i.e. non-performing loans, in the banking sector. Especially in the newly established countries such as Kyrgyzstan, where most of the economic and financial policies are newly introduced and the banking sector is in its infancy, it is vital for the governments to understand the factors that increase the credit risk. This research uses the econometrics analysis to determine the macroeconomic factors that increase the credit risk in the banking sector of Kyrgyzstan. The findings indicate that real GDP growth rate, exchange rate of Som per US Dollar, corruption and the presence of political instability affect the credit risk in Kyrgyzstan. While GDP growth rate is negatively related with the credit risk, the exchange rate, corruption, and political instability are positively related with the same. The findings of this research suggest that in order to reduce the credit risk of banks and promote stability in the banking sector, the policy makers in Kyrgyzstan must promote political stability and economic growth, while the value of the local currency should be stabilized against US dollar. Furthermore the government must take actions to reduce high levels of corruption in the country.

Keywords: NPLs, credit risk, banks, corruption, macroeconomy, Kyrgyzstan

ÖZ

Kredi riski, yani kredi temerrüdü riski, her ülke bankaların karşılaştığı önemli bir risktir. Bankalar gelir elde etmek için müşterilerine kredi kullandırırken, bu riski göze almak zorundadırlar. Bankalar tarafından verilen kredilerin küçük bir yüzdesinin takipe düşmesi ve geri ödenmemesi normaldir çünkü kredi riski sıfırlanamaz. Bununla birlikte, geri dönmeyen kredilerin toplam kredilere oranı çok yükselirse, bu durum bankaları iflas ettirebilecek hatta finans sektöründe istikarar bozan ciddi bir risk olarak ortaya çıkabilir. Bu nedenle, bankacılık sektöründe, kredi riskini etkileyen faktörleri, diğer bir deyişle, takipteki kredilerin artmasına neden olan faktörleri bilmek önemlidir. Özellikle Kırgızistan gibi yeni kurulan ülkelerde bankacılık sektörünün çok yeni ve başlangıç döneminde olması nedeniyle, hükümetlerin kredi riskini artıran faktörleri anlamaları ve finansal politikalara ona göre yön vermeleri hayati önem taşımaktadır. Bu araştırmanın amacı Kırgızistan'ın bankacılık sektöründe kredi riskini artıran makroekonomik faktörleri belirlemektir. Bu amaçla ekonometrik analiz uygulayarak Kırgızistan'da kredi riskini artıran macroekonomik faktörler araştırılmıştır. Araştırma bulguları reel GSYİH'nın büyüme oranı, ABD Doları/Som döviz kuru, ülkedeki yolsuzluk seviyesi ve siyasi istikrarsızlığın Kırgızistan'daki kredi riskini etkilediğini göstermektedir. Reel GSYİH büyüme oranı kredi riskiyle negatif olarak ilişkiliyken, döviz kuru, yolsuzluk ve siyasi istikrarsızlığın pozitif olarak ilişkili olduğu ortaya çıkmıştır. Bu araştırmanın bulguları, bankaların kredi riskini azaltmak ve bankacılık sektöründe istikrar sağlamak için politik istikrarın sağlanması, ekonomik büyümenin teşvik etmesi, ve yerel para birimi Som'un ABD Doları karşısında değer kaybının önlenmesi gerektiğini ortaya koymuştur. Ayrıca Kırgızistan'daki yüksek yolsuzluk

seviyesinin kredi riskini artıran en önemli faktörlerden biri olduğu ve kredi riskini azaltmak için ülke çapında yolsuzlukla mücadele edilmesi gerektiği de ortaya çıkmıştır.

Anahtar Kelimeler: Batık kredi, kredi riski, banka, yolsuzluk, makroekonomi, Kırgızistan

DEDICATION

To my dearest family…

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Chapter 1

INTRODUCTION

Kyrgyzstan is a post Soviet Union country that achieved independence in 1991. During its 26-year history as an independent republic Kyrgyzstan had many significant events, such as First Kyrgyz Revolution in 2005 and Second Kyrgyz Revolution in 2010. As a result of these two revolutions the presidents were removed from their positions. Political instabilities damaged the development of country's economy and its related sectors.

After receiving the independence the country chose to follow the way of transition from centrally planned to market economies. During that time Kyrgyzstan was one of the countries in ruble zone. All of the economic and financial crises in ruble zone countries had a negative effect on other member states. As a result, in 1992 the economic crises in Russia caused hyperinflation in Kyrgyzstan. The use of common currency in Kyrgyzstan created a lot of difficulties when the country tried to use macroeconomic policies to decrease the level of inflation at that time. In effect, Kyrgyzstan had no control over money supply and interest rates since it had no control over the currency. As a result, in 1993 Kyrgyzstan introduced a new currency – Kyrgyz Som, which is still used in the country today.

Furthermore, the National Bank of Kyrgyz Republic was established in 1993 in order to manage the monetary policies of the country and supervise the banking sector. In

order to transform the banking sector of Kyrgyzstan to a modern, efficient sector with international standards, agreements with international financial institutions such as the World Bank, IMF and the Asian Development Bank were signed. These institutions provided technical assistance during the transition process. For example, under the World Bank projects Barents Group (USA based international consulting company) trained the Kyrgyz banks and provided technical assistance to these banks, such as "Orient Bank of Kyrgyzstan" and "Bank Kyrgyzstan" during that time (Kubanychbekova, 2016).

Today the banking sector is the most developed and dynamic sector in Kyrgyzstan. The Kyrgyz people are more familiar with a banking services, although a big part of the population still do not trust banks. This is because of the political instabilities and the banking crises in 1998, when the Russian financial crisis affected the economies of all post Soviet Union countries. Today the banking sector in Kyrgyzstan consists of the National Bank of Kyrgyz Republic and 22 commercial banks (NBKR, 2016).

The banking sector is one of the most important sectors of the economy that needs to be developed for economic growth and development. According to Demetriades (2012), a well functioning banking system facilitates the exchange of goods and services, provides incentives for savings and efficiently channels them to productive investments. Therefore policy makers needs to pay attention to the development of the banking sector in order to provide conditions for economic growth in the country. More specifically, risks of the banks needs to be measured and controlled in order to promote a sound and stable banking system. To control and reduce the risks of the banks, first we need to identify and measure banks' risk. During their operations,

banks are exposed to many risks, such as the credit risk, interest rate risk, exchange rate risk and operational risks.

The aim of this study is to identify the macroeconomic determinants of the credit risk in the banking sector of Kyrgyz Republic. As defined by Brown and Moles (2012), "Credit risk is the potential that a contractual party will fail to meet its obligations in accordance with the agreed terms". Since loans are the major source of income for banks, the level of credit risks determines the level of potential income of banks. Furthermore, the higher the credit risk, in other words the higher the non-performing loans, the more likely a bank faces liquidity and solvency problems. Hence, in order to prevent banking crises the contributing factor to high non-performing loans needs to be identified.

In this research, the macroeconomic indicators, such as the real GDP growth, foreign exchange rate (Kyrgyz Som to US dollar), the level of corruption, and the presence of political instability are going to be examined as major factors affecting the credit risk in the banking sector of Kyrgyzstan. Macroeconomic conditions such as economic growth and foreign exchange rate affect credit repayment capacity of borrowers and hence affect the level of credit risk of the borrowers. Also the presence of political events, which disrupt the stability in the country, is likely to increase the credit risk. On the other hand, corruption affects the willingness of loan repayment and hence affects the loan repayment rate of the borrowers. Since Kyrgyzstan is a highly corrupted country we expect that this will affect borrowers' loyalty to their banks. In particular when the personal contacts and relationships are used in order to obtain credit from banks, the inclination to repay the loan are usually reduced.

Every year, Transparency International (TI), an international anti-corruption organization publishes Corruption Perception Index (CPI) for 170 countries, ranking the countries according to their level of corruption. According to TI Corruption Perception Index 2016, Kyrgyzstan's score is 28 out of 100. Where 100 means no corruption in a country, while 0 means fully corrupted country. Since Kyrgyzstan's score is closer to 0, it is counted as a country with a very high level of corruption. Therefore it is essential that corruption is included in our analysis.

The thesis consists of 6 chapters and organized in the following way:

- Chapter 1 is an Introduction, that provides an information on background of studies, aim of studies, and organizational structure of the thesis;
- Chapter 2 is an overview of the economy and the banking sector of Kyrgyzstan;
- Chapter 3 is a literature review, where supporting researches and findings are discussed;
- Chapter 4 provides information on data and methodology used to examine the determinants of credit risk in Kyrgyzstan;
- Chapter 5 discusses the empirical results of regression analysis;
- Chapter 6 provides the concluding remarks of the thesis and suggestions.

Chapter 2

THE ECONOMY AND THE BANKING SECTOR OF KYRGYZ REPUBLIC

This chapter aims to provide an overview of the economy and the banking sector of Kyrgyzstan. The chapter consists of four parts. The first part provides information on economic development of the country by looking at macroeconomic indicators for the period of 2003-2016. The second part of the chapter explains the evolution of the banking sector of Kyrgyzstan. The third part describes the current position of the banking sector in the country. And the fourth part of the chapter provides information on non-performing loans in Kyrgyzstan.

2.1 Overview of the Economy of Kyrgyz Republic

Kyrgyzstan is an industrial-agrarian country, which is located in Central Asia. According to the report of National Statistical Committee (2016), the population of the country in 2016 was 6.019 million people. Agriculture is the leading sector of the economy. More than a half of the labor force of the country is involved in growing agricultural crops, such as cotton, grain, tobacco, and oilseeds. The main natural resources of the country are mercury (20% of the world's reserves), antimony, gold, and coal. The GDP of Kyrgyzstan in 2016 amounted 458 billion Soms (approximately 6.65 billion US Dollars) and GDP per capita was 71,244 Soms (1,112 US Dollars). Economy of Kyrgyzstan is considered as stable and developing, with stable macroeconomic indicators, despite the interruptions in some years due to political instabilities.

Table 2.1. Macroeconomic Indicators of Kyrgyzstan, 2003-2016

	GDP growth, real (%)	Inflation, consumer prices (%)	Unemployment rate (% of total labor force)	Exchange rate (US Dollar/Kyrgyz Som)	Corruption Perception Index
2003	7.0	3.9	9.9	42.9	21
2004	9.5	5.1	8.5	41.6	22
2005	1.2	7.1	8.1	40.9	23
2006	3.1	9.4	8.3	38.9	22
2007	8.5	14.9	8.2	34.9	21
2008	8.4	22.2	8.2	38.6	18
2009	3.9	4.0	8.4	43.8	19
2010	0.5	10.0	8.6	46.8	20
2011	5.9	16.6	8.5	46.0	21
2012	2.1	8.7	8.4	47.3	24
2013	10.9	3.2	8.3	48.9	24
2014	4.0	8.4	8.0	56.9	27
2015	3.5	2.9	8.1	64.2	28
2016	6.2	5.1	8.4	70.4	28

Source: NBKR reports (2003-2016), Transparency International reports (2003-2016)

Real GDP growth indicator shows that the economy has been growing steadily with the average rate of 5.3%. The lowest GDP growth during the period from 2003 to 2016 was in 2010 with a 0.5% growth. The Second Kyrgyz revolution, which took place in 2010, had a destroying impact on the growth of county's economy. The

average inflation rate during the analyzed 13-year period was 9.3%. Unemployment rate has decreased from 9.9% in 2003 to 8.4% in 2016. In general, the unemployment rates are stable and have a slow decreasing pattern. The national currency – Som, is under floating regime, where the economy dictates movements in the rates. Looking at the exchange rate of US Dollar to Kyrgyz Som, the decrease in value of Som can be observed. In 2003 the Dollar/Som exchange rate was 42.9, and after 13 years it became 70.4, showing 39% devaluation of Kyrgyzstan's currency during this period.

Annual Corruption Perception Index (CPI) developed by the Transparency International, indicates the level of corruption in a country. Today the Anticorruption Committee of Kyrgyzstan is actively working with the purpose of eliminating corruption. Nevertheless, the score of 28 in 2016 categorizes Kyrgyzstan as a highly corrupted country. According to Dzyparov (2015), corruption in Kyrgyzstan damages economic development, breaks democratic foundations and destroys public confidence in government. Specifically in the banking sector, corruption leads to a portfolio of borrowers with a weak credit history and poor repayment capacity. Through corrupted bank workers, a loan applicant may get a loan without passing a required credit assessment processes. As a result of this, borrowers lack either the desire or ability to repay loans back to the bank. Corruption is an important issue that needs to be examined when analyzing the economy and banking sector of Kyrgyzstan.

2.2 Evolution of the Banking Sector in Kyrgyzstan

The evolution of the banking system of Kyrgyz Republic from its establishment can be divided into four stages. The first stage covers the years from 1991 to 1995.

During this period the National Bank of Kyrgyz Republic and 17 commercial banks were established. At that time the two tire system of banking sector was originated.

The second stage is from 1996 to 1997. This period is associated with restructuring of banks in accordance with FINSAC, or Financial Sector Adjustment Company. As a result of reforms that were conducted in this period, the financial and economical stability in the country were achieved and inflation was decreased. According to Ayupova (2008), deposits in the banking sector have increased with a monthly growth rate of 10-12%, which has increased the volumes of loans provided by banks in the country. The bank regulation and supervision were introduced during this period. From June 1, 1997 commercial banks of Kyrgyzstan started reporting their financial statements according to the international standards.

The third stage of evolution of the banking system of Kyrgyzstan covers the period from 1998 to 2001. This period is associated with destabilization of the banking system, after the achievement of stability and development in the previous period. The main reason for this contraction and instability was the financial crisis in Russia in 1998, when Russian government and Russian Central Bank announced a devaluation of ruble and default on Russia's debt. Moreover, the currencies of the main trading partners – Kazakhstan and Uzbekistan were devaluated in the same year. All these negative events have stagnated the development of the banking system.

The fourth stage of the banking sector of Kyrgyzstan covers the years from 2002 and until today. During this period the banking sector of Kyrgyz Republic has recovered and it has been growing steadily towards a healthy banking sector. The number of

commercial banks increased from 17 to 22 during these years, and it helped to increase the competition in the banking sector.

However, there were two revolutions taking place during the fourth stage of the development. The First Kyrgyz Revolution, or The Tulip Revolution was in March 2005. The revolutionaries were fighting against corruption and authoritarianism by President Akayev and his family. According to Spesivtseva (2011), the main reasons of the Tulip revolution were deeply rooted corruption in the country, weakness of the central government and law enforcement agencies, the lack of an effective system of governing the country, and the loss of a sense of reality. As a result of this, the first President of Kyrgyzstan – Askar Akayev fell from the power. As a normal consequence of a political instability, The Tulip Revolution had negative effects on the economy. For example, among the macroeconomic factors – the annual real GDP growth rate fell from 9.5% in 2004 to 1.2% in 2005 (NBKR, 2004-2005).

The Second Kyrgyz Revolution had a bigger damage on the economy than the previous one. In the April days of 2010, another revolution took place in Kyrgyzstan. Chernyavskiy (2011) described the process of the revolution as: dissatisfied people led by opposition leaders "stormed" and took the power. President K. Bakiyev run to the south of the country, and on April 8, provisional government headed by Roza Otunbayeva was formed. The revolution turned into a civil war in June 2010 between Kyrgyz and Uzbek nations living on the territory of Kyrgyz Republic. Kurmanbek Bakiyev refused to resign during first stages of revolution. Later he was asked to stop violence and leave the power by international bodies, such as UN, EU and OSCE, and leaders of many countries. The regime of Bakiyev collapsed due to corruption,

reliance on clan and inability to solve social problems. Meantime, the revolution had destroying effects on the economy, and on the banking sector of the country.

The global financial crises that started in 2008 made the problems in economical and financial spheres of Kyrgyzstan even deeper. According to Yamaltdinova and Sulaimanova (2015), the impact of the global crisis and domestic political events of 2010 proved to be essential in reducing the solvency of borrowers of banks, led to an increase in problem credits and deductions for losses and damages. In 2011 the economic growth and the development of the banking sector resumed and both are steadily developing until today.

In 2015 an important event happened in Kyrgyzstan. The country became a member of Eurasian Economic Union (EEU). The Union grants the free movement of people, goods and services, capital, and introduces the common policies in foreign trade and macroeconomic environment for a member states. The EEU consists of five countries, which are Russia, Belarus, Kazakhstan, Kyrgyzstan, and Armenia. The main aim of the union is to promote economical development and strengthen relationships between member countries. Kyrgyzstan is the least developed country in the EEU, with GDP per capita of 1,112 US Dollars in 2016. It is very important to improve the economy of Kyrgyz Republic in order to cooperate on the same level with members of the union. On the other hand the banking sector determines the stability of a country's economy. Therefore, it is important to determine the factors that cause high risk in the banking sector.

2.3 Current Position of the Banking Sector in Kyrgyz Republic

Currently, the banking sector of Kyrgyzstan is classified as two-tire structured system, which consists of the National Bank of Kyrgyz Republic and commercial banks.

Table 2.2. The Banking Sector of Kyrgyzstan

	Bank Name	Establishment Date	Total Assets (US Dollar)	Type of the Bank		Number of Branches
1	Optima Bank OJSC	07/05/1992	353,994,000	Public	Local	18
2	OJSC RSK Bank	25/07/1996	239,245,440	Public	Local	51
3	OJSC Aiyl Bank	27/12/2006	234,895,360	Public	Local	32
4	DKIB CJSC	02/05/1997	222,872,310	Private	Foreign	13
5	CJSC KICB	10/07/2001	206,031,430	Private	Local	16
6	OJSC Commercial Bank Kyrgyzstan	27/12/1991	161,812,800	Public	Local	35
7	FINCA Bank CJSC	03/03/2015	146,636,000	Private	Foreign	24
8	OJSC Rosinbank	24/12/2010	144,915,690	Public	Local	16
9	Bai-Tushum Bank CJSC	13/11/2012	118,639,370	Private	Local	7
10	CJSC BTA Bank	29/11/1996	73,492,240	Private	Local	14
11	OJSC Halyk Bank Kyrgyzstan	13/04/1999	71,609,290	Public	Local	9
12	OJSC BAKAI Bank	29/12/1998	66,244,860	Public	Local	9
13	CJSC EcoIslamic Bank	10/03/1998	42,567,000	Private	Local	8
14	CJSC Bank of Asia	17/11/1998	34,197,200	Private	Local	8
15	CJSB JSCB Tolubai	24/01/1996	31,476,010	Private	Local	2
16	OJSC Dos-Kredobank	18/06/1997	28,090,330	Public	Local	10
17	CJSC RK Amanbank	17/05/1991	26,962,510	Private	Foreign	15

18	Bishkek Branch of the National Bank of Pakistan	24/04/2000	25,285,760	Public	Foreign	1
19	OJSC Finance Credit Bank KAB	30/12/2005	23,968,740	Public	Local	6
20	OJSC Kyrgyzkommertsbank	13/12/1991	22,120,670	Public	Local	3
21	OJSC Capital Bank	30/10/1995	10,140,210	Public	Local	4
22	OJSC Eurasian Savings Bank	17/11/1998	8,223,930	Public	Local	3

Source: NBKR, Annual Reports of the Commercial Banks of Kyrgyzstan
Note: OJSC: Open Joint Stock Company; CJSC: Closed Joint Stock Company.

There are 22 commercial banks in total in the country, 18 of them are domestic banks and 4 are foreign banks. Out of 22, 12 banks are public, 9 are private banks, and one is the branch of the National Bank of Pakistan. The total assets of 22 commercial banks in 2016 are 160,539,517,000 Soms (2,3 billion US Dollars). As GDP of the country was 458 billion Soms in 2016, the banking sector assets represent 34.9% of Kyrgyzstan's economy. The five largest banks by the amount of total assets are Optima Bank, RSK Bank, Aiyl Bank, DKIB, and KICB. The total assets of these largest banks compile 54.8% of the total banking sector assets. There is a concentration of assets in the largest banks of the country, because largest banks have more than a half of total assets of all commercial banks.

The current position of the banking sector has the following characteristics:

- The total assets in the banking sector has been increasing for the last 13 years;
- The number of commercial banks increased during the last 20 years;
- The interest rates on loans are high and the interest rates on deposits are low. Therefore, there is a high interest margin;

- Banks and banking activities are concentrated in the two largest cities – Bishkek and Osh;
- The loans of banks began to diversify among sectors;
- Banks deliver traditional banking services.

Table 2.3. Loans and Deposits of Commercial Banks 2003-2016 (Soms, millions)

Year	Loans of Commercial banks		Deposits of Commercial banks		Deposits/Loans Ratio
	Total	In Soms	Total	In Soms	
		In USD		In USD	
2003	2,011	848	3,057.8	1,044.6	1.42
		1,162.9		2,013.2	
2004	2,846	1,152.5	4,044.2	1,429.1	1.52
		1,693.8		2,615.1	
2005	5,660	1,734.8	4,750.7	1,750.3	0.84
		3,925.7		3,000.4	
2006	7,741.6	2,210.4	7,888.8	2,013.2	1.02
		5,531.2		5,875.6	
2007	13,847.2	5,749.9	9,717.6	3,125.6	0.71
		8,097.3		6,592	
2008	20,947.5	7,792.7	10,244.8	3,991.6	0.52
		13,154.8		6,253.2	
2009	25,154	8,836.6	16,443.4	6,893.6	0.65
		16,317.4		9,549.8	
2010	24,907.3	9,558.1	15,018.2	5,411.3	0.61
		15,349.2		9,606.9	
2011	26,267.6	11,534.6	22,155.3	9,048.9	0.84
		14,733		13,106.4	
2012	30,942.5	13,586	28,096	11,578.3	0.91
		17,356.5		16,518.3	
2013	40,138.5	18,156.1	38,646.1	14,139	0.96
		21,982.4		24,507.1	
2014	54,813.3	23,878.3	53,581.1	21,309.9	0.98
		30,935		37,271.2	
2015	78,456.6	31,941.3	72,100	16,100	0.92
		46,515.3		56,000	
2016	96,327.7	45,040.7	89,300	21,800	0.93
		51,287.1		67,500	

Source: Annual Reports of NBKR (2003-2016)

Table 2.3 shows the total deposits and total loans of commercial banks for 2003-2016. Both loans and deposits values are higher in US dollars than in Soms. The total deposits/total loans ratio indicates how banks can rely on their deposits to make loans to its customers. For most of the years during the observed period the ratio is less than one, which means that banks' deposits in Kyrgyzstan are not sufficient for providing loans to the customers. Therefore, banks need to borrow from foreign sources in order to be able to lend in the domestic market.

According to the data of National Banks of Kyrgyz Republic, the total assets of the banking sector in 2016 amounted 160,541.0 million Soms (2,293.5 million US Dollars).

Figure 2.1 shows the nominal and real values of total assets of commercial banks of Kyrgyzstan.

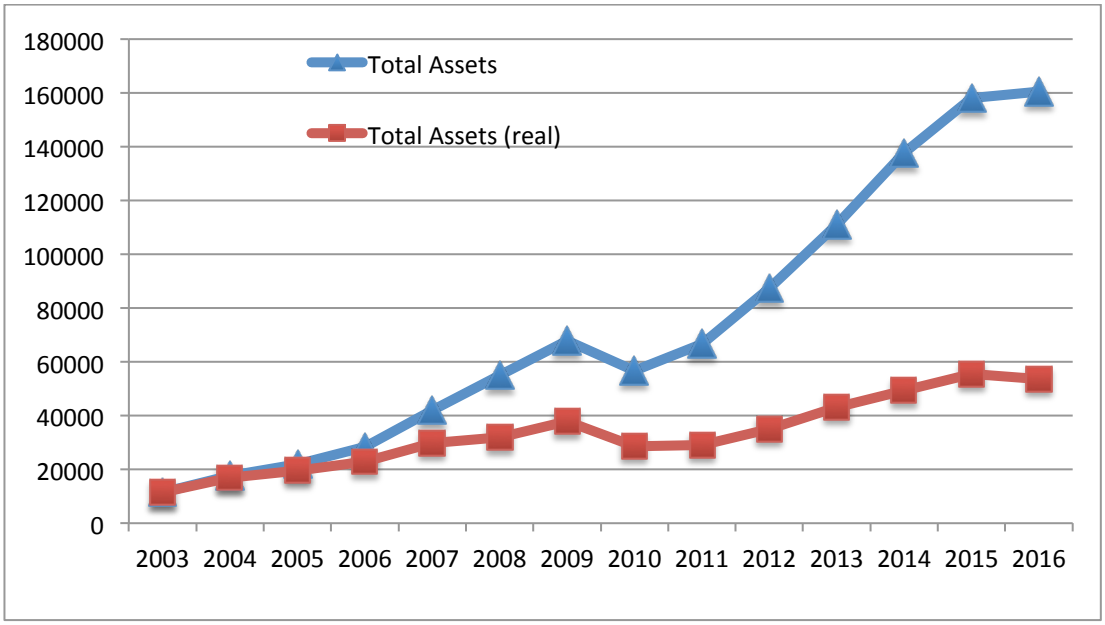

Figure 2.1. Total Assets of Commercial Banks (Soms, millions)
Source: Annual Reports of NBKR (2003-2016)

The banking sector assets have been increasing steadily during the period of 2003-2016. In 2003 total assets of commercial banks amounted 11,401.0 million Soms (271.5 million US Dollars), and in 2016 the total assets reached 160,541.0 million Soms (2,293.5 million US Dollars). The Second Kyrgyz Revolution in 2010 interrupted the growth and the total assets decreased by 20.1% in that year in comparison to the previous year. The real total asset figure shows that the amount of total assets increased from 11,401 million Soms (271.5 million US Dollars) to 53,656 million Soms (1,277.5 million US Dollars). The increase in amounts of total assets during the observed period was mainly facilitated by the growing amounts of loans provided by the banks.

The interest rates on loans and deposits in commercial banks are determined mainly by the National Bank of Kyrgyz Republic. There is a high interest margin in banking sector, which means the difference between interest rates on loans and deposits is large. Table 2.4 provides information on deposit rates, loan rates and inflation rates for the period of 2003-2016.

Between 2003-2016 due to high inflation rate and the low nominal deposit rates, the real deposit rates remain negative almost for the entire period. Whereas both nominal and real loan rates remain high and positive almost for the entire period. The big difference between loan rates and deposit rates can be seen both in nominal and real interest rates. The reason for such high interest margins is the government control over interest rates. Interest rates are forced to remain low and are not adjusted. As the result of this control, the scarcity of financial resources in commercial banks is present. In order to meet the credit demand, commercial banks need to borrow funds from foreign sources.

Table 2.4. Interest Rates in Kyrgyzstan, 2003-2016

Year	Deposit Rate (%)	Loan Rate (%)	Inflation Rate (%)	Real Loan Rate (%)	Real Deposit Rate (%)
2003	2.19	19.31	3.97	15.34	-1.78
2004	2.54	19.83	5.10	14.73	-2.56
2005	2.29	20.46	7.13	13.33	-4.86
2006	2.24	19.93	9.39	10.54	-7.15
2007	2.93	19.27	14.87	4.40	-11.94
2008	3.49	20.98	22.21	-1.23	-18.72
2009	3.32	22.38	4.03	18.35	-0.71
2010	3.72	20.86	10.03	10.83	-6.31
2011	4.05	19.86	16.60	3.26	-12.55
2012	4.11	19.90	8.65	11.25	-4.54
2013	4.18	18.40	3.17	15.23	1.01
2014	4.84	17.58	8.41	9.17	-3.57
2015	4.78	18.89	2.18	16.71	2.6
2016	4.53	18.32	5.13	13.19	-0.60

Source: NBKR Bulletins (2003-2016)

Due to negative real deposit rates people are demotivated to save in financial institutions. Also, the savers still hardly trust while putting their savings into the banks. Therefore, deposits are not growing fast enough to meet the needs of the country. The Kyrgyz Republic's Deposits Insurance Fund guarantees the repayment of deposits in the amounts up to 100,000 Soms in case of bankruptcy of the banks. Despite of these protections, people feel much safer to hold their funds at home.

The country's unstable political environment typically affects savers' decision not to keep their savings in bank accounts. In general it takes a long time for any country to resume after revolutions, civil wars, and other political events. People do not feel confident in the ability of banks to repay their deposits in case of political instability in the country. Since Kyrgyzstan had two big revolutions during the past 15 years, savers still experience the lack of trust to commercial banks when they deposit their funds. Small parts of population, who decide to save in banks, commonly deposit their funds on short periods. As a result of this, banks experience a shortage of long-term funds available for lending. Hence, they borrow funds from external financial markets with high interest rates and lend in the domestic market with a high margin.

For an economy to grow, money needs to be continuously circulating from the parties who have excess funds to the ones with deficit of funds. For this purpose, the loans provided by banks represent the movement of capital in a country. The nominal total loans and total deposits are continuously increasing in Kyrgyzstan. But looking at the real total loans and total deposits figures provides a much real picture. Figure 2.2 shows the real growth rates of loans and deposits of commercial banks for the period of 2003-2016.

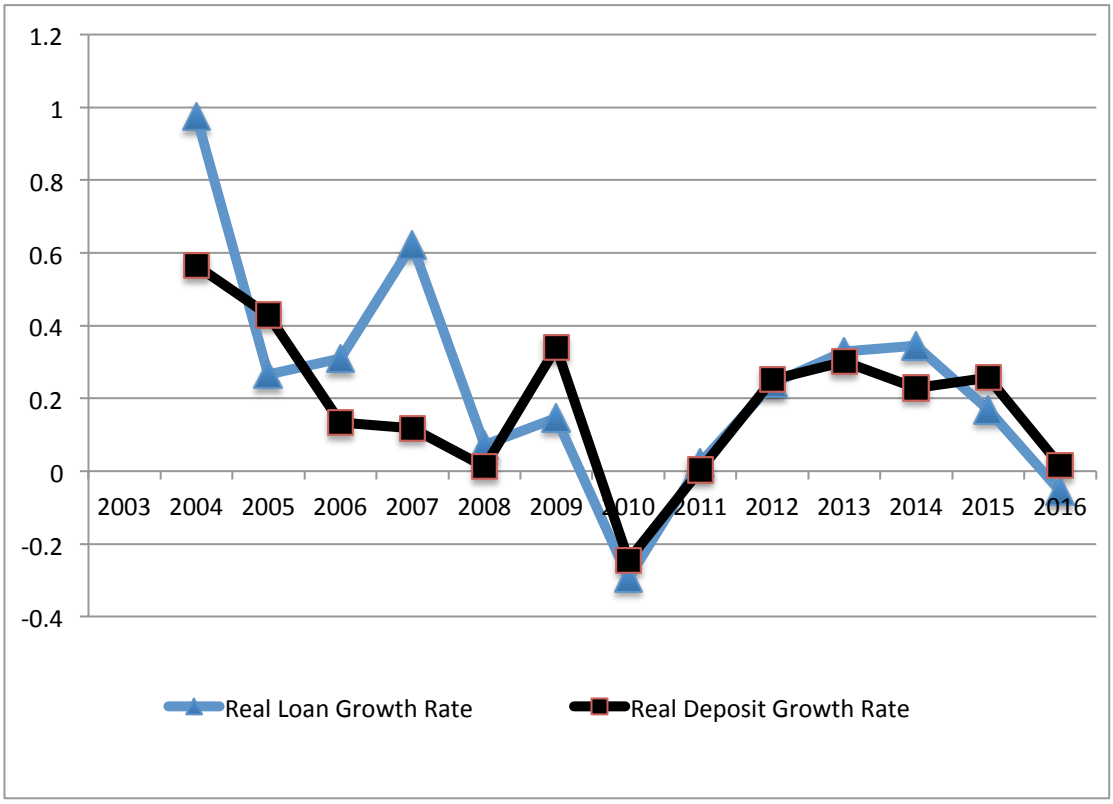

Figure 2.2. Real Growth Rates of Loans and Deposits of the Banking Sector (%)
Source: Annual Reports of NBKR (2003-2016)

The real growth rates of loans and deposits were fluctuating during the previous 14 years. The average real growth rate of deposits during the 2003-2016 period is 18.5%, and the average real growth rate of loans during the examined period is 24.2%. The first significant reductions in real growth rates of loans and real growth rates of deposits happened as the result of the First Kyrgyz Revolution, which was in 2005. After the president of the country fell from the power in 2005, the president elections took place in Kyrgyzstan. The instability in the country and the negative real deposit rates negatively affected the growth of total deposits and total loans in commercial banks. During the following years the inflation adjusted growth rates of loans and deposits were increasing until 2010, when the Second Kyrgyz Revolution happened.

In 2010 the real loan growth rate had a negative value of -0.3%, and real deposit growth rate was -0.24%. The reason for these enormous reductions was the Second Kyrgyz Revolution, which resulted in stagnation of the economy and the banking sector. The next year after the second revolution, the real loan and deposit growth rates started to increase steadily. But in 2016 due to a large devaluation of Som (16.9% loss in the value of Som in relation to Dollar), and the coming elections of the president, the real growth rates of loans and deposits started to decrease.

The lending activities of banks in Kyrgyzstan are regulated by the National Bank. The main condition under which the bank can effectively manage the lending activities is to follow the requirements and norms of the National Bank of Kyrgyz Republic, which is responsible for supervision and regulation of activities of the banks and other financial credit institutions licensed by the NBKR. It carries out continuous control of banks' activity for the purpose of preservation of a stable financial system.

Loan Portfolio of commercial banks consists of industrial loans, agriculture loans, consumer loans, trade and shipment loans, construction and mortgage loans, and others. From Table 2.4 it can be seen that during the previous 8 years the portion of trade and shipment loans decreased from 36.7% in 2008 to 29.5% in 2016. Nevertheless, the largest part of the loan portfolio of commercial banks is still composed of trade and shipment loans. Industrial loans amount for the smallest portion of the loan portfolio. During the observed period the portion of industrial loans increased from 5% to 7.3% in the commercial banks' loan portfolio.

Table 2.5. Structure of the Loan Portfolio of Commercial Banks, 2008-2016(%)

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Industry	5	4.6	4.5	4.1	4.4	4.9	5.7	6.8	7.3
Agriculture	17.2	20.0	22.4	23.2	23.4	23.6	22.5	21.7	23
Trade & Shipment (%)	36.7	39.7	38.8	37.8	35.6	32.6	32	31	29.5
Construction & Mortgage	18.9	15.4	13.6	10.9	11.6	12.1	13.4	13.6	13.5
Consumer Loans	7.2	7.1	6.7	8.5	9.2	9.8	9.9	10.7	11
Other	15.1	13.2	14	15.6	15.8	17	16.5	16.2	15.7
Total (%)	100	100	100	100	100	100	100	100	100

Source: NBKR Financial Stability Reports (2008-2016)

The portion of consumer loans in the loan portfolio increased from 7.2% in 2008 to 11% in 2016. Construction and mortgage loans had a decreasing pattern during the observed period, their portion in loan portfolio decreased from 18.9% in 2008 to 13.5% in 2016. The portion of agriculture loans in the loan portfolio of commercial banks increased during the previous 8 years from 17.2% to 23%.

2.4 Non-Performing Loans in Kyrgyzstan

In their daily operations banks face several types of risks. The main risks are liquidity risk, interest rate risk, foreign exchange risk, market risk, credit risk, and political risk. One of the largest risks in the banking sector is the credit risk, the risk of having customers failing to perform their obligations to commercial banks regarding the loan and interest repayment. Lending serves as the main source of income for commercial banks, and risks related with credit must be controlled and estimated thoroughly. Although it is impossible to fully eliminate the credit risk, a

good understanding of its determinants may help to accept it without large losses and possibly reduce it.

This research analyzes the credit risk in Kyrgyzstan. The non-performing loan ratio is a common measure of a credit risk in commercial banks. Non-performing loan (NPL) ratio represents the portion of total loans that is not repaid back by the borrowers within 90 days or more. Figure 2.3 provides information on NPL rates in commercial banks of Kyrgyzstan for the period of 2003-2016.

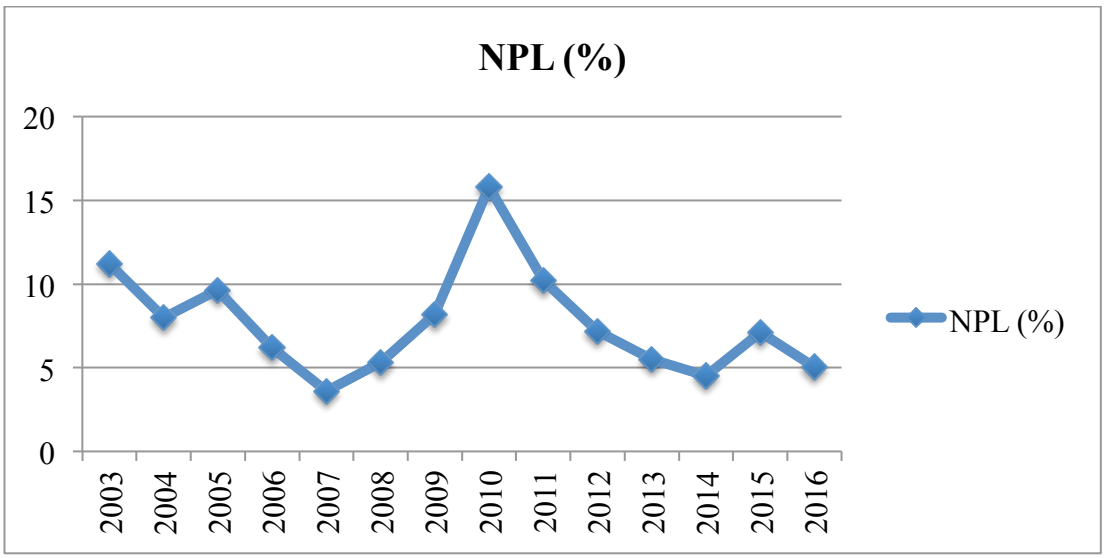

Figure 2.3. NPL ratio of commercial banks in Kyrgyz Republic, (%)
Source: NBKR Bulletins (2003-2016)

The average NPL rates during the examined period were 7.93%. The highest NPL rate in commercial banks during the period of 2003-2016 was in 2010 and amounted 15.8%. As was mentioned earlier in this chapter, the Second Kyrgyz Revolution was in 2010. Civil war and revolution resulted in large job losses by people. Political instability, which lasted for 3 month, had a damaging impact on the whole economy of the country. The banking sector also stagnated in that year. The NPL rates increased dramatically as the consequence of revolution.

Chapter 3

LITERATURE REVIEW ON CREDIT RISK

This chapter aims to review the literature on factors of credit risk. Researchers of this subject are commonly examining the effects of variables like GDP growth, foreign exchange rate and corruption on levels of non-performing bank loans (NPLs) in various countries.

3.1 Effects of GDP Growth and Foreign Exchange Rate on NPLs

Castro (2013) analyzed the link between macroeconomic factors and credit risk in the banking systems of Greece, Ireland, Portugal, Spain, and Italy (GIPSI). In this study, by using panel data regression and quarterly data covering from 1997 to 2011, Castro (2013) concluded that the credit risk in GIPSI countries increases when GDP growth and housing price indices fall. This indicates that there is a negative relationship between NPL rates and GDP growth as well as NPL rates and housing price indices. Also the results of his analyses showed that there is a positive relationship between credit risk and unemployment rate. The researcher argues that in order to achieve low NPL rates and unemployment rates, countries must have high GDP growth rate.

In a similar research on Indonesia, Farhani and Koo (2016) examined the impact of macroeconomic factors on credit risk in banks of Indonesia. They found effects of macroeconomic factors on NPL rates for two types of banks - Islamic banks and conventional banks. In this study, panel data regression was used for 91 conventional

and 11 Islamic banks spanning from 2008 to 2015. Farhani and Koo (2016) obtained similar results as Castro (2013). The findings indicated that the NPL rate in Indonesian banking sector increases as the local currency Rupiah lose value against US Dollar. Therefore, the inflation rates must also be kept lower and financial crisis should be prevented in order to reduce NPL rates of banks.

Furthermore, Louzis et al. (2011) attempted to investigate the effect of macroeconomic and bank specific factors on the amounts of bad loans in Greek banking system. As a result they found that macroeconomic factors such as GDP growth, unemployment rate, public debt and interest rates affect the non-performing bank loans in Greece. In their analysis, the authors used quarterly panel data of non-performing bank loans of the 9 largest Greek banks and macroeconomic variables such as GDP growth rate, unemployment rate, public debt and interest rates spanning from 2003 to 2009. The authors found that GDP growth rate have a significant negative relationship with NPL level. However unemployment rate, lending rates and public debt were shown to have a strong positive relationship with the level of NPL rate in Greece. Concerning bank specific factors, authors concluded that factors, such as performance, efficiency and quality of management might also affect the amounts of bad loans.

Balgova and Plekhanov (2016) investigated a sample of 100 countries for a period of 1997-2014 by using the probit regression analysis. The authors used two different scenarios. The first scenario examining the impact of the reduction in NPL rates and second scenario examining the impact of ignorance of NPL problem to on GDP growth rate of the sampled countries. By decreasing NPL rates, they found that economies of the observed countries grew significantly with increased values of

GDP growth rate, investment growth rate and labor market participation. Importantly, it is revealed that ignoring the levels of NPL could make the economic performance stagnant. Also, a foregone growth of not more than 2 percent annually is encountered because of the lack of attention toward the NPL problem. This shows that in order to stimulate economic growth, NPL rates in the banking sector of a country should be continuously controlled and reduced.

In the context of Central, Eastern and Southeastern European countries, Jakubik and Reininger (2013) investigated the key determinants of non-performing loans. The research implored quarterly data on NPL rates, real GDP growth rates, private sector credit-to-GDP ratio and exchange rates for Bulgaria, Croatia, the Czech Republic, Hungary, Poland, Romania, Russia, Slovakia and Ukraine for the period 2004 to 2012. Results of panel data regression indicated a negative statistically significant relation between GDP growth and NPL rates. Also, credit aggregate (credit-to-GDP ratio) and foreign exchange rates of the investigated countries is observed to have a positive effect on credit risk. This implies that depreciation of local currencies results in higher rates of NPL. However, the authors concluded that among all these observed factors, the main driver of NPL is GDP growth rate, because changes in real GDP growth rates have more impact on bad loans than all other determinants. The findings of this research can be used to deal with problems of NPL rates of the observed countries. Hence, real GDP growth rates must be continuously increased and the depreciation of local currencies should be avoided.

In their research, Vogiazas and Nikolaidou (2011) investigated the determinants of non-performing loans in the Romanian banking system. Monthly data spanning from December 2001 to November 2010 of macroeconomic indicators and specifically the

GDP, unemployment rate, Consumer Price Index, Foreign Direct Investment, construction expenditure and the exchange (using the exchange rate of Romanian national currency (Ron) to Euro) were collected. Additionally, bank-specific factors like the credit growth rate, loans to deposit ratio and leverage ratio were also collected. Using these data and a time-series modeling, the research aimed in determining the relationship between the macroeconomic and bank-specific factors as related to credit risk in Romanian banks. Among the resulting discoveries, the authors noted a negative relationship between variables like GDP and construction expenditure and level of bad loans. On the other hand, inflation rate, unemployment rate and depreciation of local currency in relation to Euro are observed to be positively related with the level of NPL rate of the Romanian banking system. Their study also indicated that bank specific variables like the determinants of credit risk show no-statistical significance. Against this backdrop, the authors concluded that macroeconomic are the leading indicators of credit risk. This is an indication that when dealing with high NPL rates, policy and regulations is a vital tool.

Peyavali (2015) conducted a similar study on the impact of macroeconomic determinants of NPL rates in Namibia. The research used macroeconomic variables data of Namibia, which are the GDP growth rates, inflation rates and interest rates. A time series regression analysis of the estimated quarterly data from 2001 to 2014 revealed a significant relationship between NPL rates in Namibian banking sector and the aforementioned variables. While GDP growth is observed to have negative correlation with levels of NPL rates, interest rates and inflation rates are positively related with NPL rates. This means that at higher interest rates on loans, borrowers are more likely to fail to repay the debt. And when inflation in a country is high, local currency is observed to lose its value and resulting to a higher possibility of

increase in credit risk. The author also suggested that macroeconomic environment should be thoroughly monitored in order to prevent the large damages caused by credit risks on the banking sector and the economy as a whole.

3.2 Effects of Corruption on NPLs

Study and evidence of vast literature review shows that research on macroeconomic determinants of credit risk is enormous. However, only a limited number of researches have been conducted on corruption as a factor of NPL rates. These analyses showed that corruption is a determinant of credit risk. In his study, Bougatef (2016) studied how corruption affects loan portfolio quality in emerging markets. Data sample of 22 countries on levels of corruption and NPL rates were collected for the period 2008 to 2012. The result of the panel data analysis showed that corruption widens the problem of NPL. Evidence showed a statistically significant and positive relation between the country's level of corruption and credit risk in the banking sector. Also, the presence of corruption was observed to cause decrease in the quality of bank's loan portfolio. Consequently, the author sent a suggestion to the governments and policy makers of corrupt countries that corruption should be fight in order to achieve an economic growth.

Also, Park (2011) analyzed the impact of corruption on economic growth and banking systems. His research retrieved data on corruption and 76 macroeconomic variables from various countries. A regression analysis of the data for the period 2002 to 2004 showed a positive significant relationship between corruption level and banks' bad loans. Hence, the presence of corruption is observed to downgrade the quality of bank loans. The author revealed one more crucial result: corruption leads to misallocation of resources and investment in bad projects. Specifically, it was

noted that offering bribes to bank workers, a manager of a bad project might receive the loan for his project and in the nearest future be unable to repay the loan. These bad investments result in the country's waste of resources, large amount of NPL and a decreased economy growth. As bad loans of banks increase, loan portfolios become risky, the banking system and the whole economy weakens leading to possibility of financial crisis. Because of this, corruption is observed to be one of the causes of financial crisis.

In their investigation, Goel and Hasan (2011) conducted a research, which shows the effect of economy-wide corruption on banks' bad loans. Analyses of annual country-level data of 100 countries for the year 2007 with their respective countrywide (corruption types) were conducted. Estimated types of corruption includes: bureaucratic corruption, political corruption and sectorial corruption (corruption in a banking sector). Other explanatory variables of bad loans include GDP growth and dummy variable (variable showing whether the country is European Union country or not). This research revealed that economy-wide corruption increases amounts of bad loans in banking sector. The reason for this is that in corrupt economies, borrowers are sure that giving a bribe will help them to avoid the cost of default. Furthermore, GDP growth rate was found to have a negative relationship with NPL rates. Provided other things held constant, ceteris-paribus, Euro Zone countries are expected to have lower NPL rates. This is due to the fast rate of economic growth and low levels of corruption.

Weill (2008) in his study examined the effects of corruption on bank lending activities in Russia. In his analysis, the survey results of 40 out of 89 Russia's regions were used to measure corruption level. The author emphasized that using the

Transparency International Index for country such as Russia will not be accurate, because the country is too large in which each region has a very different level of corruption. In addition, quarterly bank level data on lending activities such as total loans, non-performing loans, size of the bank and type of bank ownership were used for four (4) quarters of 2002. The results of the regression analysis for the 882 sampled banks of 40 regions showed the negative impact of corruption on bank lending activities. It is explained that corruption leads to larger amount of non-performing loans, which are classified as bank expenses. The attempt to decrease these expenses results in reduction of lending amounts by the banks. The findings further indicated that corruption hampers lending to households and firms and not to the government. For an economy to grow the money need to be transferred from surplus units do deficit units. However, reduction in lending activities due to corruption breaks this circulation process of funds. This leads to financial underperformance, which is presently faced by Russia. Hence, policy makers need to take right steps that are targeted to eliminating corruption in the country.

3.3 Political Instability and NPLs

Macroeconomic indicators and corruption level are found to be reliable and relevant determining factors of credit risk. Among other determinants of NPL rates in banking sector is the political situation of a country. Civil wars, revolutions and government collapse – all these events result in political instability. As history reveals, political instability spontaneously causes the collapse of the economy of a country without sparing its banking sector. Although there seems to be rare study that directly link political instability with NPL rates, it is expected that political events do have significant impact on banks' credit risk simply because of its damaging effect on the economy. Handful number of studies has established that certain causative events

that smear political stability are believed to be main factors stagnating countries' economies.

The painstaking work of Aisen and Jose Vega (2006) attempted to investigate a relation between political instability and inflation rates. In conducting the research, sample data of 100 countries for a period of 1960 to 1999 were collected. The following political instability events were the estimated variables: government crisis, cabinet of ministers' changes and index of economic freedom. The results of the dynamic panel data estimation indicated that there is a positive and significant relationship between political instability events and inflation rates. This means that countries with less stable political situations are more likely to face higher inflation rates. Consequently, the study helps policy makers to prevent a country from political instabilities as a way of controlling high inflation rates.

In a very similar study, Khan and Saqib (2010) examined the political instability and its effect on inflation in Pakistan. The research estimated variables such as Money Supply M2, GDP per capita, yearly growth rate of credit to the private sector and political factors – government crisis and cabinet changes by using data for the period 1951 to 2007. The research revealed that among all the estimated variables, political instability in Pakistan had the most statistically significant and largest effect on inflation. They also found out that presence of government crisis and cabinet changes are positively associated with inflation in Pakistan.

Indirectly, a link between political instability and credit risk could be deduced from some of the aforementioned research analyses. As already mentioned in this chapter, large number of researches has been conducted on macroeconomic determinants of

credit risk. In most of these researches, the devaluation of local currency in a particular country and high rates of inflation were found to be significant determinants of high numbers of bad loans. Thus, research that reveal a significantly positive relation between political instability and inflation can also be linked with political instability and credit risk. So political instability, which is positively related to inflation rates, is expected to have a positive relationship with non-performing loans. Hence, political instability in a particular country is most likely to result in higher credit risk.

Chapter 4

DATA AND METHODOLOGY

This chapter provides information on data and methodology of our research on determinants of credit risk in the banking sector of Kyrgyzstan. While the first part of the chapter explains how data was collected and describes the variables used for the study, the second part of the chapter will describe the applied methodology and the model used for analysis.

4.1 Data

For this research we used quarterly data between 2003-2016. We collected data on non-performing loans (NPLs) of banks, real GDP growth rate, exchange rate of Som per US Dollar and corruption perception indices. The NPL rate indicates the amount of credit risk in the banking sector. Real GDP growth rate, exchange rate of Som per US Dollar, corruption index and dummy variable are used to denote effects of political instability in the country.

4.1.1 Dependent Variable

The ratio of NPL rate is the dependent variable that represents the credit risk. NPLs are loans that borrowers fail to repay back within 90 days or more. Large amounts of NPLs cause banks to lose a large part of their assets and reduce their equity. Consequently, it increase the solvency risk of banks. The ratio of NPL is a fraction of bank's NPL to total loans. The higher the NPL ratio represents the higher credit risk faced by a bank. The quarterly data from the bulletins of NBKR for the period of 2003 to 2016 is collected for the NPL rates.

4.1.2 Explanatory Variables

Real GDP Growth

The first explanatory variable is the real GDP growth (this is measured in percentage terms), which measures the inflationary adjusted growth of GDP in relation to previous year. It is suggested by the literature, that real GDP growth reduces the credit risk in the banking system. Economic growth in a country is generally characterized by reduced unemployment rates and higher incomes of both consumers and firms. Therefore, it is expected that borrowers have sufficient funds to repay their loans during the economic growth period. Because of this, GDP growth is included in our analysis and intuitively expected to affect the level of NPL rates in the banks of Kyrgyzstan. The real GDP growth data with a quarterly frequency for the period of 2003 to 2016 was collected from the National Statistical Committee. The research is aimed to test the following hypothesis concerning the effects of real GDP growth rate on NPL rates:

H1: There is a negative relationship between GDP growth in Kyrgyzstan and the credit risk (NPL rate).

Exchange rate

The second explanatory variable, which is the Exchange rate, is the rate at which one currency can be changed to another currency. The values of the different currencies vary with time, depending on the prevailing circumstance, which could either cause an increase or decrease in the value of a country's currency in comparison with other currencies. The currency of Kyrgyz Republic is Som. We expect to see that devaluation of local currency is associated with an increase in the numbers of borrowers failing to repay their debts. Kyrgyzstan is highly dependent on imports, and devaluation of Som makes importing more expensive. Also banks in the country

are lending mostly in US Dollars. The reason is that banks borrow the funds from foreign sources and transfer the foreign exchange risk to borrowers by lending in US Dollars. Therefore, as Som loses value, borrowers with income in Soms face difficulties repaying their debts in US Dollars. This means that the NPL rates of banks are expected to increase with the devaluation of local currency. Among the available empirical studies, Lin et.al (2016) and Jakubik and Reininger (2013) support that exchange rate is one of the determinants of credit risk. The quarterly data on exchange rate of Som per US dollar for the estimated period of 2003 to 2016 was collected from the NBKR reports. In this study, the following hypothesis concerning effects of exchange rates on level of NPL is tested:

H1: There is a positive relationship between exchange rate of US dollar/Som and the credit risk (NPL rate).

Corruption Index

The third explanatory variable of credit risk is the corruption level of the country. Corruption is measured by Corruption Perception Index (CPI). Corruption is an illegal, dishonest and fraudulent activity of people who misuse entrusted power for personal gain. These people accept bribes and act against laws and regulations. In the banking sector, the borrowers who pay bribes to bank officials are most likely to be awarded a loan, without necessarily meeting the required qualifications. Borrowers who are in this category expected to have very high probability of default. Also borrowers, who already received the loan and feel that they may fail to repay it back, may demand to reschedule the loan by corrupting bank workers. Therefore, trailing from the above-mentioned points, corruption is expected to have an increasing effect on the level of credit risk in the banking sector of corrupt states.

Transparency International (TI) provides annual Corruption Perception Index (CPI) for countries and territories. The rank of CPI until 2012 was from 0 to 10, where 0 referred to a highly corrupt country and 10 is for a very transparent country. However, beginning from 2012 and until today, TI has adopted a scale of 0 to 100 in its reports on CPI, where 0 means very corrupt country or territory, and 100 is for very transparent nation. Kyrgyzstan's score for an observed period of 2003 to 2016 has always been in the first half of the scale. In 2016 TI reported that Kyrgyz Republic's score was 28. This shows that the country is ranked as highly corrupt. The following computations were made to create a corruption index which will indicate that higher score is related with higher corruption level:

Corruption Index = 10 - CPI (for the period of 2003-2011);

Corruption Index = 10 – CPI/10 (for the period of 2012-2016).

The research is testing the below hypothesis on corruption and its influence on level of NPL rates in the banking system:

H1: There is a positive relationship between corruption and the credit risk (NPL rate) in the banking sector of Kyrgyzstan.

Dummy Variable for Political Instability

The last explanatory variable is a dummy variable, which shows the presence of political instability in the country. Political instability arises in a country with the presence of revolutions, civil wars, frequent cabinet changes and government collapse. These disturbing circumstances always create serious adverse effect, which are mostly noticed through the lop-sided nature of the country's' economy. Most common consequences of these political events are reduction in economic growth,

decrease in the value of local currency, increased levels of unemployment and overall instability in the country. There is no doubt that such consequences negatively influence the banking sector of a country. Furthermore, it reduces the ability of borrowers to repay their debts.

Kyrgyzstan experienced two revolutions between the periods 2003 to 2016, with both leading to the collapse of government and marked by removal of the country's presidents from power. Of course, we expect these events to affect the NPL rates in banks. The dummy variable is used for this analysis, where 0 shows the absence of political instability and 1 refers to the presence of political instability in the country. The research attempts to test the below hypothesis about the effects of political instability on the NPL rates in the banking system:

H1: There is a positive relationship between political instability in Kyrgyzstan and credit risk (NPL rate).

Lag of NPL

The lag value of NPL for one quarter was included in the model, because the earlier period's value of NPL rates affects the current NPL rates. Therefore, it is important to include the lag of NPL in order to make the model more complete.

4.2 Methodology

In this research we used the regression analysis to find the macroeconomic determinants of credit risk in the banking sector of Kyrgyzstan. Using the E-Views software program and above dependent and independent variables with 56 observations, we run the regression analysis.

Table 4.1 provides information on variables included in regression model with their notations and the expected nature of effects they should have on credit risk.

Table 4.1. The Dependent and Independent Variables

Type of Variable	Variables	Notation	Expected Effect on Credit Risk
Dependent Variable	Non-Performing Loans	NPL	
Explanatory Variables	Lag of NPL	LAG1NPL	(+)
	Real GDP Growth	GDPGR	(-)
	Exchange Rate	EXC	(+)
	Corruption	COR	(+)
	Political Instability	DUMMY	(+)

The regression model used for this analysis is:

$$LnNPL_i = f\ (Lag1NPL,\ LnGDPGR_i,\ LnEXC_i,\ LnCOR_i,\ DUMMY_i)$$

This implies that the regression equation is:

$$LnNPL_i = \beta 0 + \beta 1 Lag1NPL + \beta 2 LnGDPGR_i + \beta 3 LnFX_i + \beta 4 LnCOR_i + \beta 5 DUMMY_i + \varepsilon t,$$

Where:

$\beta 0$ is the intercept of regression model

$\beta 1, \beta 2, \beta 3, \beta 4$ and $\beta 5$ are coefficients of independent variables

εt is the error term of the model.

Chapter 5

EMPIRICAL RESULTS

The regression analysis should always start with the check of variables used in the model. In other words, correlation analysis on variables must be conducted.

Correlation Analysis

To check the linear relation between variables, the correlation matrix was used. Table 5.1 represents correlation coefficients of variables used in our analysis.

Table 5.1. Correlation of variables

	LnNPL	LnGDPGR	LnEXC	LnCOR	DUMMY
LnNPL	1.000000				
LnGDPGR	-0.162171	1.000000			
LnEXC	0.032574	0.195591	1.000000		
LnCOR	0.105660	0.192165	0.552979	1.000000	
DUMMY	0.170328	-0.016829	0.183420	-0.020191	1.000000

In order to use variable for regression analysis, the correlation between explanatory variables should be no more than moderate. As Table 5.1 shows, in our model the correlation is weak between all variables, except “LnCOR” and “LnEXC”. The coefficient of 0.55 indicates moderate correlation between variables “LnCOR” and “LnEXC”. Therefore, the model does not have a problem of multicollinearity.

The Augment Dickey-Fuller (ADF), the Phillips-Perron (PP) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests were applied for our data. The results of these tests indicated that variables are stationary and represented as time-series integrated in order zero I (0).

The Result of the Regression Analysis

After checking the variables of our model, we run the regression. The total number of observations is 56. The results of regression analysis are shown in Table 5.2.

Table 5.2. The Results of the Regression Analysis

Independent Variables	Coefficients	Std. Errors	t-statistics	p-values
C	-12.47	2.51	-4.98	0.00
LLAG1NPL	0.89	0.04	23.06	0.00
LNGDPGR	-0.04	0.02	-2.17	0.03**
LNEXC	0.96	0.20	4.86	0.00***
LNCOR	4.41	0.89	4.95	0.00***
DUMMY	0.25	0.07	3.43	0.001***
R-squared = 0.92; Adj. R-squared = 0.91; F-statistic = 120.10; Prob(F-statistic)=0.0000; Durbin-Watson Stat = 1.85.				
Note: *coefficient is significant at α = 10%, **coefficient is significant at α=5%, *** coefficient is significant at α=1%.				

According to Table 5.2, three of our explanatory variables (LnEXC, LnCOR, DUMMY) are significant at 1% level, and one (LnGDPGR) at 5% level. The findings support the theory, and hypothesis that we were testing. GDP growth rate has a negative relation with NPL rates. The estimated coefficient of LnGDPGR is

interpreted as follows: if GDP growth increases by 1%, the NPL rate of the banking sector is expected to decrease by 0.042%. It means when economy of the country is growing, the credit risk tends to decrease.

Exchange rate of Som per US Dollar is positively related to NPL rates in the country. The estimated coefficient for LnEXC shows that as exchange rate of Som per US Dollar increases by 1%, the NPL rates are expected to increase by 0.956%. Since country is highly dependent on imports, devaluation of local currency makes inputs for businesses more expensive. Moreover, banks provide most of the loans in US Dollars. While borrowing funds from foreign sources, banks bear high foreign exchange risk. To reduce this foreign exchange risk, banks commonly lend in US Dollars and transfer the risk to its borrowers. However, borrowers have their income in local currency and repaying the loans in US Dollar becomes difficult whenever the Som loses its value. In other words, as national currency of Kyrgyzstan depreciates in relation to US Dollar, the credit risk in the country increases.

Corruption Index has a positive relationship with NPL rates. The estimated coefficient of 4.405 indicates that 1% increase in corruption index is expected to result in 4.405% increase in NPL rates of the banking sector. This shows that higher corruption levels in the country are associated with higher credit risk.

Dummy variable representing the political instability is positively related with NPL rates. The estimated coefficient for DUMMY shows that as political instability is present in Kyrgyzstan, the NPL rates in the country are expected to increase by 0.251%. In other words, with the presence of political events that result in not stable environment, the credit risk in the country increases.

The lag value of NPL is also affecting the current NPL rate. The estimated coefficient of the lagged NPL is statistically significant at 1% level of significance. This means that the non-performing loans of the earlier periods encourage people to default their loans. Therefore, adding lag value of NPL made our model more complete and robust.

Robustness of the Regression Results

In order to check the robustness of the model we conducted several tests. Coefficient of determination, or R-squared, shows the portion of variation in dependent variable, which is explained by the model. In our case, R-squared is equal to 0.92. This shows that 92% of variation in NPL rates is explained by independent variables (LnGDPGR, LnEXC, LnCOR, and DUMMY), while 8% is explained by other factors, which are not included in our model.

F-statistic tests the significance of the model as a whole. Regression results show that F-statistic of our model is equal to 120.10 with the probability value of 0.0000. In other words, the model as a whole is statistically significant. Durbin-Watson statistic shows the possible existence of autocorrelation problem. After including the lagged NPL in our model, the Durbin-Watson became 1.85. This value indicates non-existence of autocorrelation problem in the regression model.

Further, we checked the normality of the model, and found that it is normally distributed (Appendix B). The results of Breusch-Godfrey serial correlation test suggested that residuals are not serially correlated (Appendix C). Also, Breusch-Pagan-Godfrey test for heteroskedasticity showed that the model does not have the problem of heteroskedasticity (Appendix D). In other words, residuals are not

heteroskedastic. All of the above-described tests prove that our model is robust. Hence, the GDP growth, exchange rate, corruption index, and political instability are the factors affecting the level of NPL rates in the country.

Chapter 6

CONCLUSION

Kyrgyzstan achieved its independence 26 years ago with the collapse of USSR. The main objective of the country's government today is to increase its economic growth and maintain stability. After analyzing the current status of the banking sector in Kyrgyzstan, we found that it is developing steadily. Since the banking sector is one of the drivers of the economy, it is important to determine which factors may affect the stability and continuity of the growth of the banking sector.

The objective of this thesis was to find the macroeconomic determinants of credit risk in Kyrgyzstan. Credit risk is one of the largest risks faced by the banks. The right management and estimation of its factors may help the banking sector to avoid large losses. Using the quarterly data on real GDP growth rate, exchange rate of Som per US Dollar, corruption index, and political instability, we run the regression analysis. Analysis helped us to identify the direction and association of these factors with levels of NPL rate in the country.

The results of our regression showed that economic growth in the country has a significant negative relationship with the credit risk. Therefore, the government and policy makers should continuously work toward maintaining high GDP growth rates, in order to have low NPL rates in the banking sector. On the other hand, we found that exchange rate of Som per US Dollar is positively related with credit risk. This

means that whenever local currency depreciates in relation to US Dollar, the NPL rates tend to increase.

Corruption is one of the biggest problems in the country, which stagnates the development of the economy. Kyrgyzstan is ranked as a highly corrupted country by international organizations like TI. Unfortunately, corruption is the lifestyle in the country, and it is a factor that cannot be excluded when analyzing the economy and the banking sector. Hence, we included corruption index in our analysis and found a significant positive relationship between corruption and credit risk in the country. Furthermore, the estimated coefficient of corruption is very large, indicating that corruption plays the most important role in increasing the credit risk. So, policy makers are recommended to start fighting corruption by increasing salaries of people in order for them to stop looking for an extra income.

As final determinant of the credit risk we included political instability in the country. During its 26-year history as an independent country Kyrgyzstan had two political revolutions, when people demanded to overthrow the president. These revolutions affected the economy and the banking sector negatively. Therefore, we included political risk into the analysis of the country's credit risk. The variables showing the presence of any events causing instability in the country was introduced in our model. The political instability was found to be positively related to the NPL rates. In other words, the presence of revolution in Kyrgyzstan results in higher credit risk in the country. We would recommend to the government and policy makers to prevent any political instability in order to avoid high NPL rates in the country.

The main limitation of this study is that we conducted the analysis of credit risk on macroeconomic level. In other words, the variables included in our model are macroeconomic variables. Although the model explains the great part of variations in credit risk, other variables, like bank-specific indicators, may also affect the NPL rates.

As the result of conducted research we found that macroeconomic variables, like real GDP growth rate, exchange rate of local currency Som per US Dollar, corruption, and presence of political instability are the main determinants of credit risk in Kyrgyz Republic.

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APPENDICES

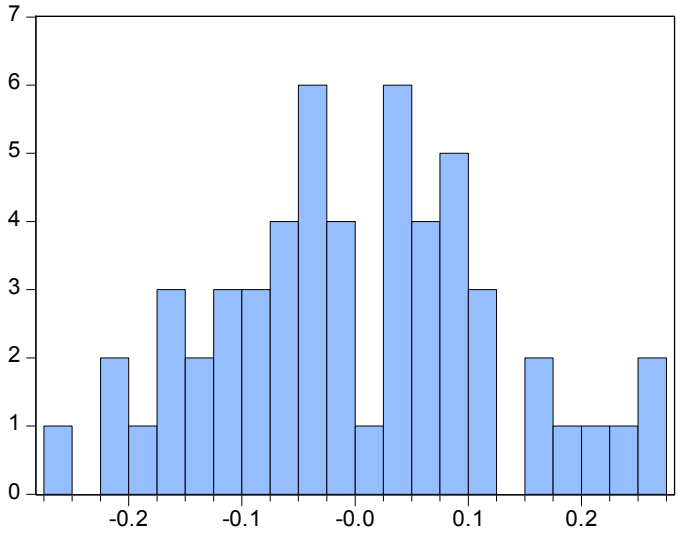
Appendix A: The Results of Regression Analysis

Dependent Variable: LNNPL
Method: Least Squares
Date: 05/12/17 Time: 13:15
Sample (adjusted): 2003Q2 2016Q4
Included observations: 55 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-12.47199	2.505450	-4.977943	0.0000
LLAG1NPL	0.890836	0.038631	23.06011	0.0000
LNGDPGR	-0.042245	0.019437	-2.173404	0.0346
LNEXC	0.955822	0.196485	4.864615	0.0000
LNCOR	4.405443	0.890493	4.947194	0.0000
DUMMY	0.250660	0.073169	3.425765	0.0012

R-squared	0.924558	Mean dependent var	1.157843
Adjusted R-squared	0.916860	S.D. dependent var	0.448496
S.E. of regression	0.129320	Akaike info criterion	-1.150389
Sum squared resid	0.819456	Schwarz criterion	-0.931407
Log likelihood	37.63570	Hannan-Quinn criter.	-1.065707
F-statistic	120.1008	Durbin-Watson stat	1.851893
Prob(F-statistic)	0.000000		

Appendix B: The Results of Normality Test



Series: Residuals	
Sample 2003Q2 2016Q4	
Observations 55	
Mean	2.04e-15
Median	-0.007300
Maximum	0.273180
Minimum	-0.274153
Std. Dev.	0.123187
Skewness	0.142631
Kurtosis	2.671350
Jarque-Bera	0.434008
Probability	0.804927

Null Hypothesis: The residuals are normally distributed

Alternative Hypothesis: The residuals are not normally distributed

*We fail to reject the null hypothesis at 1%, 5% and 10% level of significance. Therefore, the residuals are normally distributed.

Appendix C: The Results of Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.266640	Prob. F(1,48)	0.6080
Obs*R-squared	0.303837	Prob. Chi-Square(1)	0.5815

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 05/12/17 Time: 13:19
Sample: 2003Q2 2016Q4
Included observations: 55
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.080113	2.529175	0.031676	0.9749
LLAG1NPL	-0.005955	0.040596	-0.146693	0.8840
LNGDPGR	-0.001338	0.019755	-0.067745	0.9463
LNEXC	0.006052	0.198318	0.030517	0.9758
LNCOR	-0.022769	0.898316	-0.025347	0.9799
DUMMY	0.000492	0.073729	0.006675	0.9947
RESID(-1)	0.078218	0.151476	0.516372	0.6080

R-squared	0.005524	Mean dependent var	2.04E-15
Adjusted R-squared	-0.118785	S.D. dependent var	0.123187
S.E. of regression	0.130298	Akaike info criterion	-1.119565
Sum squared resid	0.814929	Schwarz criterion	-0.864086
Log likelihood	37.78804	Hannan-Quinn criter.	-1.020769
F-statistic	0.044440	Durbin-Watson stat	1.973227
Prob(F-statistic)	0.999601		

Null Hypothesis: Residuals are not serially correlated

Alternative Hypothesis: Residuals are serially correlated

*We fail to reject null hypothesis at 1%, 5% and 10% level of significance. Therefore, residuals are not serially correlated.

Appendix D: The Results of Breusch-Pagan Godfrey Test for Heteroskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.672827	Prob. F(5,49)	0.6460
Obs*R-squared	3.533477	Prob. Chi-Square(5)	0.6183
Scaled explained SS	2.343724	Prob. Chi-Square(5)	0.7998

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/12/17 Time: 13:26
Sample: 2003Q2 2016Q4
Included observations: 55

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.075747	0.382456	-0.198054	0.8438
LLAG1NPL	0.005308	0.005897	0.900036	0.3725
LNGDPGR	-0.000738	0.002967	-0.248702	0.8046
LNEXC	0.009227	0.029993	0.307621	0.7597
LNCOR	0.059429	0.135934	0.437192	0.6639
DUMMY	0.002396	0.011169	0.214475	0.8311

R-squared	0.064245	Mean dependent var	0.014899
Adjusted R-squared	-0.031240	S.D. dependent var	0.019439
S.E. of regression	0.019741	Akaike info criterion	-4.909607
Sum squared resid	0.019095	Schwarz criterion	-4.690625
Log likelihood	141.0142	Hannan-Quinn criter.	-4.824925
F-statistic	0.672827	Durbin-Watson stat	2.494852
Prob(F-statistic)	0.645954		

Null Hypothesis: The residuals are not heteroskedastic

Alternative Hypothesis: The residuals are heteroskedastic

*We fail to reject null hypothesis at 1%, 5% and 10% level of significance. Therefore, the residuals are not heteroskedastic.