

# **An Analysis of the Performance of the Canadian Banks during the Global Financial Crisis**

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## **ABSTRACT**

Several studies have evaluated the effect of the credit crunch on banks' performance in different countries. In this study we intend to find its impact on Canadian banking system. We aim to analyze the Canadian banks' performance from year 2006 till 2013 to find weather they remained profitable during years 2008 and 2009 or not, as well as find their strengths and weakness points of banking system. For this reason we have chosen 8 big banks of Canada. ROA and ROE have considered as profitability measure's factors. The CAMEL model has identified as powerful and reliable to evaluate the efficiency of banks operation and its parameters correlation with profitability variables. We have two dummy variables to assess the banks' performance during years 2008 and 2009 separately. All the collected data were displayed by the Panel Data and analyzed through Regression model. The empirical analysis provides us an effective inside regarding bank performance and the impact of the financial credit crisis on the Canadian banking system.

**Keywords:** Bank profitability determinants, CAMEL, financial crisis, Canadian banking system, regression analysis

## ÖZ

Çeşitli çalışmalarda farklı ülkelerdeki kredi krizinin bankaların performansına etkilerini değerlendirilmiştir. Bu çalışmada da amaç Kanada bankacılık sistemi üzerindeki etkisini incelemektir. Kanada bankalarının 2006 ile 2013 yılları arasındaki performanslarını analiz etmeyi, 2008 ve 2009 yıllarında karlı kalıp kalamadıklarını, bankacılık sisteminin güçlü ve ve zayıf yönlerine de işaret ederek bulmayı, hedefliyoruz. Çalışmada Kanada'nın 8 büyük bankası ele alınmıştır. Karlılığı ölçmede ROA ve ROE faktörleri kullanılmıştır. CAMELS modeli, bankaları operasyonun etkilediğini ve karlılık değişkenleri ile parametrelerinde korelasyon değerlendirmek için güçlü ve güvenilir olarak belirlenmiştir.

2008 ve 2009 yıllarını ayrı ayrı değerlendirmek için iki değişkenimiz var. Toplanan tüm veriler panel veri tarafından görüntülendi ve regresyon modeli ile analiz edildi.

Ampirik analiz bize, banka performansı ve finansal kredi krizinin etkilerine ilişkin Kanada bankacılık sistemi üzerinde, etkili bir bildirim sağlamak ve zayıf yönlerini ortaya koymaktadır.

**Anahtar kelimeler:** banka karlılık belirleyicileri, CAMEL, finansal krizler, Kanada bankacılık sistemi, regresyon analizi

## **To My Dear Parents**

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# Chapter1

## INTRODUCTION

Banks always have been considered as trustable places where people can keep their money and valuable assets for safety purposes. Banks are playing a major role in economies in different countries. These institutions are dealing with variety of financial securities. As a matter of fact, an economy cannot survive without banks. Nevertheless, it should be mentioned that the banks were not somehow safe during the previous centuries. For instance, the recent (2007- 2008) global financial crisis affected banking systems around the world. Based on a broad consensus in the financial press and lots of international financial institutions, the Canadian banks managed to withstand the ravages of this turmoil. Nevertheless, there is a paucity of academic work on this issue. The target of this research is to evaluate and analyze the performance of Canadian banks during the US credit crunch. For this purpose we study eight main banks of Canada during the years of 2006 to 2013 and take years 2008 and 2009 as credit periods in Canada.

### **1.1 The goals and objectives of the study**

The goals of this research are to investigate and find proper profitability factors of the Canadian financial systems and the factors (economical and financial) they influenced from them. To do so, we choose the period of 2006 to 2013 which includes the financial crunch years of 2008 and 2009. With this data and by the help of Eviews we will evaluate the situation of Canadian financial institutions during the US credit crisis.

There are two indicators of bank's profitability, Return on Assets and Return on Equity. The indicators which are expected to have impression on ROA and ROE are collected as CAMEL ratio analysis which stands for Capital Adequacy (CAR), Asset Quality (AS), Management Efficiency (ME), Earning Ability (EA) and Liquidity (LQ). As well as Bank Size, Interest Rate, Growth Domestic Products and 2 binary variables are used as crisis years' indicators.

It is essential to mention that all the data used in this research were collected from Canadian Bankers Association website, Bank of Canada website and Data Stream.

## **1.2 Research Questions**

In every study, some major questions are asked to reach the goal of the study and find proper and reliable answer for them. In the current study we try to find answers for the following questions:

1. How were the profitability indicators of Canadian banks during the credit crunch?
2. Which independent variables could significantly affect the performance of banking sector in Canada?
3. Did the financial banking sectors remain resilient during the credit crisis years?

The later founding of these questions will lead us to evaluate and estimate the impact of US credit crisis on performance of Canadian banks.

### **1.3 Hypotheses of the study**

For this survey we intend to figure out the link between internal factors and external ones with the bank's profitability for 8 big banks of Canada. We will check the below hypotheses in the study:

H1: Whether there is a positive link among each of independent variable and the profitability factors.

H2: Whether there is a negative link among each of independent variable and the profitability factors.

### **1.4 The Methodology Basis of the Study**

The financial system of Canada is dominated by 5 big banks. They have 85% of the financial market share. For reliable observation we use data of 8 banks in this research, namely: Bank of Montreal Financial Group, Canadian Imperial Bank of Commerce, Canadian Western Bank, Royal Bank of Canada Financial Group, Laurentian Bank of Canada, National Bank of Canada, Scotiabank and Toronto-Dominion Bank Financial Group.

The selected secondary Data of these banks will be used in correlation analysis and will be tested through panel unit root to figure out whether these data are stationary or not and proper to use in model or not.

Afterwards, the regression analysis will be used to recognize the interaction between the profitability determinants and the factors affecting them. As well as, evaluating the capability of Canadian banks, specifically during the years of financial crisis (2008 and 2009).

## **1.5 Thesis Structure**

The thesis has been divided into 7 chapters. It begins with the introduction of the study including goals and objectives, hypotheses, methodology and structure. The second part focuses on the nature of the recent US credit crunch, its causes and impacts on bank's performance. Third chapter reviews the Canadian banking sectors, their history, structure and reasons of success. The literature review of profitability in banking sectors and few evidences on Canadian banking performance during credit crisis presents in chapter four. Chapter five covers methodology and research design, dependent and independent variables. In sixth part numerous analyses and the obtained results are being carried out. In Chapter 7 the study sums up with a comprehensive conclusion.

## **Chapter 2**

### **GLOBAL FINANCIAL CRISIS**

#### **2.1 The Bank Crisis and Its Causes**

All throughout the world during fall of 2008 the banking industry experienced a crisis due to harsh recession. The first sparks of this recession were started in the middle of 2007 when the credit boom reached to the peak. This situation was followed by the demolition of subprime mortgages and other types of financial instruments. This condition makes the government to improve the solvency and liquidity of the banks, which led to a severe banking panic. The prices of most assets and securities were cut down significantly, whereas, the cost of bank borrowing increased significantly, the financial market instability unbelievably racked up. All these parameters led the failure of Lehman Brothers and Washington Mutual. Afterwards, the turmoil of financial crisis got over all around the world (Ivashina and Scharfstein, 2010).

A currency disaster is a situation in which a problem happens on the money and makes it sharply declining or a vast depreciation in international reserves. As well as a combination of this two situation can occur as well (Kaminsky and Linzondo, and Reinhart, 1998). Lots of studies have concerned about tailoring the financial systems in a way to understand and predict them. Nevertheless, any of the studied models were not able to forecast or explain the present global financial crisis. As a matter of fact, the previous models were insufficient in structure to predict the 2007 global

crisis, as that was not a currency crisis in which asset prices played the major role (Tularam and Subramanian, 2013).

By estimating all the financial crisis causes we can find that some of the specific government reactions and intermediations could be the initial reasons of this event. During the global financial crisis the frequently monetary excesses made a housing market boom and bust. This is the causes of the financial turmoil which starts from the United States and goes through other countries (B.Taylor, February 2009).

In the following we will explain the reasons of the financial crunch in more detail based on the research we have done, the decisions made by the U.S. government and their effects on the banking sector, the financial and economic systems of the United States which have led to the crisis.

## **2.2 Causes of Credit Crunch**

### **2.2.1 Low Interest Rate**

After the 2001 recession, the U.S economy took a very slow recovery (Baker, 2008). People looked for alternatives rather than the stock market to invest their money. The misleading of the recovery caused the Federal Reserve Board to carry on reducing interest rates and provides a monetary policy, which was an abnormally big deviation from their financial rule. Continuing the fall in interest rates makes mortgage rates in the U.S. downward, with powerful effects on the real estate markets (Obstfeld and Rogoff, November 2009).

These extraordinarily low interest rates accelerated house prices from years 2002 to 2006, house prices rose approximately %31.6, almost a rate of %7.1 each year. Low real interest rates rather than the ricketing in house's price also had the certain

impact on U.S savings and demand. During years 2005 till 2007 saving rate falls to less than %1.0, whereas the demand boomed over these years (Baker, 2008).

### **2.2.2 House Price Bubble**

The situation happened in the United State is that; home prices had been rising up since the middle 1990s. Home ownership in the U.S. had been widely extended. The ease of borrowing against house collateral, compared to other countries, and quicker home increase, reduced saving significantly and had a major impact on the U.S. deficit (Obstfeld and Rogoff, November 2009). The reality was that the house prices were just an abstract bubble; it did not influenced from the housing market. But this bubble started to blow out in 2007, as the construction industry was completely over supplied that costs could not expand along. By the end of 2007, actual house values had deteriorate for more than %15 from its highest range and in some parts of U.S. the prices had fallen more than 30 percent (Baker, 2008).

As prices declined, people found that they debt much more than the real value of their properties; therefore they found that paying interest of the mortgage is in effect a bad contract. Homeowners realized that they could definitely save a huge amount of dollars by simply withdrawing the interest payment of their mortgages. This extra easy policy which was taken by the government was the cause of quickening the extravagant housing price and by that eventually the housing price burst.

### **2.2.3 Subprime Loans**

An unordinary improvement and deteriorate in the housing markets had an essential impacts on the financial systems which were charged by some other factors such as the use of sub-prime mortgages, especially some of them were issued with adjustable rate which made them more risky. During those times the government of the US designed a program called The Home Ownership Program, which encouraged all its



residents in any level of life to buy a home (B. Taylor, January 2009). Subprime mortgages were loans set to people who do not have reliable credit histories or intermittent employment records. The subprime market exploded during the home ownership program, in 2002 it was less than 9 percent of the market, and by 2005 it gets to 25 percent of the market. However, no one cares about these asymmetry information which are provided by these subprime mortgages can induce the systematic risk and it was one of the vital reasons for the global financial catastrophe. During the years of the rapid rise of house prices default and foreclosure scales fall immediately. The motivations of buying a house and paying the interest of mortgage, by working longer hours, were higher when the prices of the houses were increasing swiftly. When prices were falling below the value of the mortgage, the incentives to do so were much less and turned adverse. Therefore, delinquencies and foreclosures started to rise. It is an example of how unplanned events can take place when policy varies from the norm and misleads many people.

#### **2.2.4 Mortgage Backed Security**

An exaggerated up ward and down ward movement in the housing markets had irresistible effect on the financial systems. A significant reason, which amplified these problems, was the subprime loans with adjustable rate's characteristic along with other mortgages which were wrapped sophisticatedly into mortgage backed securities. The mortgage issuers approved the mortgages where they were aware of the inability of the borrowers to pay the interest of the mortgages. The risk of these mortgages passed to the secondary market when the issuers sold them. The incentive of the issuer was to set mortgages as much as possible. Their only responsibility was to qualify the mortgages just on paper, to make them enough sufficient to liquid them in the secondary market (Baker, 2008). After agencies, the banks bought the loans

and bundled them into mortgage backed securities (MBS). These financial institutes earned income from this process, for the purpose of increasing the sale volume without any consideration to the real quality of the issued loans that they were bundled.

During those times the U.S. government had some intermediate agencies like Fannie Mae and Freddie Mac, they had responsibility to develop and buy mortgage backed securities, even the risky mortgages. The Federal Housing Enterprise Regulatory was expected to control these surpluses, but it was not a regulatory policy for them. The performances of these agencies were another government intervention that caused the crisis to arise (B. Taylor, January 2009).

### **2.2.5 Capital Requirements Misleading**

There were two mistakes regarding capital requirements:

First was that the banks had briefly arranged assets like securitized mortgages in off-balance-sheet individually, so that they did not hold noteworthy capitals against these assets.

The latter term was that the capital regulations also granted banks to decrease the amount of capital they held against assets that remained on their balance sheets. In this way, they repackaged mortgages into other securities, whether written on or off their balance sheets, banks decreased the required amount of capital, which was needed against their loans, thus, banks became primary investors by guaranteeing the underlying credit and passing on the risk from mortgage bankers to themselves, however it was not shown on its balance sheet.

In the following we will focus in detail the effects of the crisis of 2007-09 on banks' performance.

### **2.3 The Crisis of 2007–09 and Its Impact on Bank's Performance**

The current global financial crisis has caused unprecedented shocks to the banking system in a range of countries. The biggest bank failures during the financial crisis in 2008/09, as a share of total bank system assets, were in Iceland (circa 90%) followed by Kingdom of Belgium (53%), Kazakhstan (28%) and the United Kingdom (26%), (Glass and Kenjegalieva, and Weyman-Jones, 2014). Large financial institutions work internationally had substantial maturity and currency mismatches in their balance sheet, which led them to major vulnerabilities (Van Rixtel and Gasperini, 2013).

The recent turmoil in the banking sector has centered attention on banking performance and, particularly, on the quality of bank assets and credit risks (Glass and Kenjegalieva, and Weyman-Jones, 2014).

In the mid of 2007, stress from North American countries' subprime mortgage markets spread over the banks' short term securities markets, leading liquidity states to decline quickly, predominantly the banks with highly leveraged situation (Van Rixtel and Gasperini, 2013).

During that period obtaining US dollar liquidity was a severely difficult experience for lots of banks around the world. Furthermore, greatly leveraged US financial institutions were hit by bad displacements in their short term security markets (Adrian and Shin, 2010). The insolvency of Bear Stearns and Lehman Brothers in the mid of 2008 were caused the investors no longer have trust in their trade models and

thereby the corporations were got rid of those trades. The US investment banks were not the only ones which encounter this situation, as an example the insolvency of Northern Rock in the UK with its dependence on short term security market (Van Rixtel and Gasperini, 2013).

Based on various studies I found that the financial institutions which are committed more greatly on deposit funding performed better during the credit crunch than those more relied on alternative sources. Banks with Deposit-funded characteristic showed better overall performances and were less risky, they kept their lending manner during the crisis compared to other banks (Demirguç-Kunt and Huizinga, 2010); (Raddatz, 2010); (Beltratti and Stulz, 2012); (Ivashina and Scharfstein, 2010); (Dagher and Kazimov, 2012).

The interruptions in short run security trades prompted central banks in all around the world to provide exceptional numbers of funding. As a matter of fact, liquidity of central bank turned into the main source for wholesale funding. Simultaneously, governments across the world prepared financial aids such as; capital injections, higher deposit insurance ceilings and secured issue programs for bank bonds. Afterward, the crisis enforced banks to bring up new policies on their funding models for the aim of stability; they raised their dependance on customer deposits, at the same time decreasing their sources on short-term debt (Van Rixtel and Gasperini, 2013).

In the next chapter we will go through with the Canadian banks and also explain and understand their financial system and their strong points of their financial system.

## **Chapter 3**

### **BANKING SECTOR OF CANADA**

#### **3.1 Banking History in Canada**

Canada has been widely recognized by experts as possessing the world's best banking system. It was asserted that, during the time when the world's economies collapsed dramatically in 2008, the financial market of Canada survived somewhat well compared to other countries.

Curtiss (1948) has classified the structure and somehow the history of the Canadian banking system into three categories; (1) the experience of operating under Canadian circumstances, (2) the experience of being United States' neighbor, and (3) during recent years, the observations of the British Banking as expressed through the colonial office in numerous ways. The close relationship with United States and Great Britain allows Canada to have the opportunity in selecting these countries' legislation, especially the field of banking.

Banking system in Canada started from colonial overseas banking in 1817 with the foundation of the Bank of Montreal and it turned into local banking system after a while. After Bank of Montreal other banks also established and followed its way of business. In 1935 a revolution happened in Canadian banking system by the establishment of Bank of Canada to be the sole issuer of bank notes and to facilitate the financial management of Canada.

Now the Bank of Canada plays a main role in Canadian banking sector. Some of its main responsibilities are as follow:

- **Monetary Policy**

Monetary policy by the Bank of Canada helps to contribute in solid performance and improve the living standards by keeping inflation low, predictable and stable.

- **Bank Notes**

The Bank of Canada helps Canadians by designing and issuing bank notes to purchase and sell them with the highest confidence.

- **Financial System**

The Bank of Canada helps financial systems to act efficiently, safe and sound in financial markets.

- **Funds Management**

The Bank of Canada provides high quality central banking services also effective and efficient funds management for the banks, federal government and other clients.

<http://www.bankofcanada.ca/about/educational-resources/faq/>

In Canada's modern banking system we can find the five big banks, Royal Bank, CIBC, Bank of Montreal, Scotiabank and TB Bank. These five banks have control over Canada's banking market, which will be explained in more detail further in this chapter.

At this time more details will be given about Canada's banks to have a better understanding about their market, trend and structure.

## 3.2 Banks in Canada

Canadian Bank Association annually reveals a report on its website which goes through all the details of banking sector of Canada. The following information is selected from 2014 report;

- There are 83 numbers of banks in Canada, 29 of them are domestic banks, 24 foreign bank subsidiaries, 27 full-service foreign banks and the remaining 3 are foreign bank lending branches.
- The major domestic banks provide a full range of banking, financial services and investment. They have extensive, nation-wide distribution networks and also are active in the U.S., Latin America, the Caribbean, Asia and other parts of the globe (Canadian Bank Association 2014).
- Many large international banks have a presence in Canada; through a branch of the parent bank, subsidiary or representative office. Most focus on corporate and investment banking and have only one or two branches or offices in Canada. The only exception is HSBC Bank Canada, which has a robust retail presence with branches across the country (Canadian Bank Association 2014).
- In Canada there is a classification between banks based on their ownership. They are classified base on their originality; Whether they are domestic banks, foreign or subsidiaries of foreign.
- Schedule I banks are the domestic banks which are approved under the Bank Act to accept deposits; there are 29 domestic banks as of May 2014 (Canadian Bank Association 2014).

- Schedule II banks included the banks which are Canadian but they are submissions of foreign banks. Base on revealed repots on May 2014, there were 24 of these type banks in Canada.
- Schedule III banks are full services foreign banks with branches in Canada. There are 27 such banks in Canada.
- The number of bank branches across Canada is 6,205. Almost 2,100 branches are in rural and small town. The amount of bank branches in all around Canada between the years 2006 to 2012 is stated in table 3.1.

Table 3.1: The whole bank branches in Canada during years 2006 to 2012

<b>As at October 31st</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>Number of bank branches in Canada</b>	5,902	6,021	6,142	6,136	6,151	6,175	6,205

- 33 percent of Canadians state that their use of in-branch banking has dropped. As demand for regular banking decreased, this has led to some branches becoming more specialized in the field of financial products, services and Investment advice.
- Canadians are conservative borrowers. As a result the mortgage debts in Canada stayed at very low level (in fact, as of March 2014 only 0.31% of bank mortgages are in arrears).
- Regulatory structure of the Canadian Banks is studied and upgraded every five years to find out whether they keeping pace with changes within the industry.



Banks play vital role in Canada's financial industry; they are in interaction with millions of clients. Banks' embody individuals, variety of businesses and firms, financial investors and administrations (Canadian Bank Association 2014).

### **3.3 Five Banks**

Big Five is the name informally given to the top 5 largest banks that dominate the Canadian banking industry . These five banks are operationally based in Toronto (Duffy, 2003). The Big Five dominates the sector (which is included of 29 domestic banks) with market shares of more than 85% of total assets. The strategies and positioning of these five banks help the Canadian banking sector to effectively respond to the changes in their business environment even during negative events such as the financial crisis of 2008. The banks forming the Big Five group are Royal Bank of Canada (RBC), Toronto Dominion Bank (TD), Canadian Imperial Bank of Commerce (CIBC), The Bank of Nova Scotia (BNS) and Bank of Montreal (BMO).

All these banks' primary market is Canada but they have variety of corporate strategies. Few of these banks have broadened their activity into developing countries and the rest have grabbed new opportunities in developed retails or targeted their efforts on specific fields of the Canadian market.

The Big Five are not just Canadian banks, it is better to describe them as international financial mixture, each with a large Canadian banking division.

The five banks have somehow similar business lines in the fields of retail and commercial banking, insurance, wholesale banking, capital market and wealth management. While at the same time these banks make themselves different in the field of international growth strategy.

Some banks do not have a definite international division, like BMO. It does international business under a combined Canadian and U.S. business line called Personal and Commercial Banking. Versus sample regarding the international banking business is TD, it operates under US Personal and Commercial Banking; a business line which focuses on the US market. However the BNS is the most international one between these five banks. Its international branches employ nearly half of the bank's staff and generate almost quarter of all the banks' net income.

Most of the international divisions of Canadian banks concentrate in Latin America, the Caribbean and the United States. All the Big Five's headquarter are located in Toronto, Ontario. Although some of them have legal headquarter in the city of their origin, like BMO in Montreal. Within Canada no one person can hold the entire share of the banks in Canada. In fact, shareholders cannot hold more than 10 percent of the voting shares.

On 2002 the Department of Finance Canada revealed that:

“The Canadian banking industry is effectively an oligopoly. It is stable, very well developed and highly concentrated, with the five largest financial institutions controlling more than 85% of the sector's total assets”.

By considering total assets and market capitalization we can rank the five banks from first to least; RBC, TD, BNS, BMO and the last CIBC. CIBC lost the ground in recent years due to several strategic changes and reorganizations.

Other banks in Canada, besides the big five banks, are smaller second tire banks. The notable ones are ATB Financial, National Bank of Canada, Desjardins Group,

Laurentian Bank and HSBC Bank of Canada which are Canadian domestic banking organizations (Wikipedia).

After studying the Canadian banks, it is important now to study the crisis effects on the financial system and banks in Canada.

### **3.4 Reasons of Canadian Banks' Success**

The following five factors have been widely seen as main reasons for the success of Canadian banks.

#### **3.4.1 Good Strong Prudential Bank Regulator**

Arjani and Paulin (2013) stated that the major Canadian banks' investment activities, monitoring by a single regulator, under the name of the OSFI (Superintendent of Financial Institutions).

OSFI is a Canadian national regulator that is totally concentrated to efficient regulation. OSFI has been known as aggressive but flexible in working with banks to anticipate and mitigate risks. The superintendent of the Financial Institutions has the power to issue guidance and clarifications of guidance, and the responsibility of bringing compliance with these (Porter, 2010). The stability of Canadian banking sector and the heavy regulation has led into a tight restriction on banking systems entry. That is why the Canadian banking system mostly dominated by five big competitors (Gill and Raiser, 2012).

#### **3.4.2 Leverage Cap**

Canada and the US regulators were the only countries among G7 that made their banks impose leverage caps. OSFI added some off-balance sheet exposures in to the

assets definition, such as credit derivatives. Leverage cap in Canada for both Tire 1 and 2 is at the lowest level (Porter, 2010).

### **3.4.3 Market Structure**

The Canadian banking industry is very concentrated. As it is dominated by the top five banks which hold the majority of domestic banking assets (Arjani and Paulin, 2013). Banks are allowed to engage in both securities markets and insurance (Porter, 2010).

Another potentially important element is the shadow banking system and its interaction with the traditional banking sector. The Shadow banking is a term given to the financial institutions which perform like as traditional banks but in fact they are non-bank intermediaries. Shadow banking is smaller in Canada than the U.S. but it is not unimportant. The repo market of these shadow banks is heavily based on Canadian government paper and the mortgages are securitized by the government-backed National Housing Act Mortgage-Backed Securities (NHA MBS) (Arjani and Paulin, 2013). Canadian banks are unique among OECD banks as the term of the share of depository funding to total assets (Porter, 2010). They dependent more on depository financing and less on wholesale funding, these financing mostly came from retail sources. The financing structure of Canadian banks is another element of their success (Ratnovski and Huang, 2009).

### **3.4.4 Conservative Mortgage Markets**

Another key reason of staying resilience of Canadian banks during the crisis is the domestic housing finance system. One of the positive points is that mortgages (provided by federally regulated lending institutions) must be insured against default. The mortgage insurance is mostly provided by CMHC, which are fully backed by the Canadian government. Besides the insurance matter, Porter (2010) stated that the

prudent regulation made the defaulting on loans more difficult in Canada than the US. He specified that the loan arrears in Canada were about a tenth of the rate in the US during the turmoil period. Housing prices is the other issue. Canada experienced a relatively mild deceleration on house prices. This trend helped the mortgage defaults remain at comparatively low levels. However, as the economy moved into recovery, the housing sector improved swiftly (Arjani and Paulin, 2013).

## **Chapter 4**

### **LITERATURE REVIEW**

In this chapter we provide a brief review of the relevant literatures; studies that have examined the elements of bank profitability and the ones that have focused on the performance of Canadian banks during credit crisis. In the former case, the fundamental factors determining domestic banking sector profitability will be studied, and in the latter case, evidence relating to performance and efficiency of Canada's banks.

#### **4.1 The Determinants of Profitability**

Bourke (1989) is considering the factors which are treating financial market structure. They distinguished the internal effects like cost efficiency, liquidity, asset quality and capital adequacy from external factors such as economic growth, inflation and market interest rate.

Goddard and Molyneux, and Wilson (2004) have used cross-sectional dynamic panel to categorize the profitability factors in six major banks of Europe, such as; Denmark, Germany, UK, France and Italy for the years 1992 up to 1998. They urged that there is direct connection between profitability of banks and Capital Adequacy. In addition, they found that there's significant relation between size and profitableness in some of their estimation.

Jiang et al. (2003) in their research tried to evaluate parameters, which made the bank's efficiency of Hong Kong vulnerable between 1992 and 1996. They found that the macroeconomic environment has played the major role in affecting bank profitability during those years. They also discovered that the Asset quality, equity capital ratio and the deposits are not considerably related to bank profitability.

Vong and Chan (2009) studied Macao's case for 15 years, 1993 to 2007. The sample consists of five banks of Macao in order to find the vital elements of their profitability. By the use of panel data regression for the analysis, they figured out the banks with more equity capital ratio are benefited from safer financial market where can provide them with higher profitability.

Study about profitability determinants of Malaysian bank has done by Sufian and Chong (2008) revealed that, the lower level of profitability of years 2000- 2004 has close relation with credit risk and high loan concentration. The determinants like operational expense, capitalization and the amount of non-interest income have positive relation with profitability. Regarding external determinants they found that inflation rate has positive effect on Malaysian bank's profitability whereas GDP affect it negatively.

In the case of Switzerland, 453 commercial banks were studied for the period 1999-2006 by Dietrich and Wanzenried (2009). They bring to the point that the lucrative banks are those who have higher interest income and the ones properly capitalized. The age variable seems have no effect on bank's performance. The ownership is an important parameter; the Swiss owned banks are more profitable base on their study. Regarding environmental variables they pointed out that GDP has positive effect on

bank's profitability, whereas the tax rates and market focus have negative relation with the profitability factors of the banks.

In event of Indonesia, by Syafri (2012), she found that bank's profitability can be affected by the operation efficiency, equity, amount of loans and inflation. Credit risk, bank size and inflation are negatively affecting the bank's profitability. The interest income and GDP has positive effects on banks efficiency.

Hoffman (2011) analyzed the banking industry of US during years 1995 up to 2007. To prevent indigeneity problems he used Generalized Method of Moments (GMM). The results show that capital adequacy and size have negative relationship with bank's profitability. The influence of investment securities on bank's profitability is positive.

It is good to mention that CAMEL analysis has been used very successfully by many researchers to evaluate the financial performance of banks; for example Nazir (2010) has found the CAMEL parameters useful to evaluate the performance condition of banks in northern India. For this case he evaluates capital adequacy, liquidity, management quality and asset quality. CAMEL has been applied successfully in measuring the performance of banks.

#### **4.2 Evidence on Canadian Bank Performance during Credit Crisis**

Ratnovski and Huang (2009) studied the reason of resilience of Canadian banks during credit crisis. The paper evaluated details of the pre-crisis balance sheet of the Canadian banks and compared them with the banks in other OECD countries. Their finding revealed that broad retail depository financing was the main reason of resilience of the Canadian banks during the financial credit crisis. Adequate capital



and liquidity were further vital parameters but played a less special role. Furthermore, some of regulatory and basic issues have made the Canadian banks to take less risks. Outcomes revealed that strong structural fundamentals of Canadian banks have led to their resilience during and after financial turmoil.

Bandyopadhyay and Jha, and Kennedy (2014), this study investigates whether the Canadian banking sector afflicted from the crisis in the United States. The analysis of the asset quality provides some support for higher quality of monitoring of Canadian banks versus US banks during and after the crisis period. The results of the study indicates that the Canadian banks' return are more associated with US bank return during downturns as compared to upturns during post crisis period.

They also find that superior asset quality transparency offset the impact of contagion during the financial crisis. Though the quality of Canadian regulatory monitoring has improved that, it could not totally prevent the spread of the US financial crisis contagion to the Canadian banks. The results enhanced that despite the strength of the Canadian financial sector and its prudent regulation, the Canadian banking sector could not stay away from cross border contagion from the US.

## **Chapter 5**

### **METHODOLOGY**

#### **5.1 Data and Research Design**

We utilize financial data (annual income statement and balance sheet) for the Canadian banks from the Office of the Superintendent of Financial Institution of Canada or OSFI website. Banks had to meet the following qualities in order to be included into the sample: First, they had to be domestic Canadian banks among the financial institutions operating within the Canada banking sector. Second, they were classified as commercial banks in the OSFI Database. Third, they had available data (obtained from the annual balance sheet and income statements in the OSFI Database) for the years 2006 till 2013.

The concerned banks of Canada in this thesis are the well-known Big five banks; BMO Financial Group, Canadian Imperial Bank of Commerce (CIBC), RBC Financial Group, Scotiabank, TD Bank Financial Group, plus three small size banks; Canadian Western Bank, National Bank of Canada, Laurentian Bank of Canada (we add these three banks to have reliable observation in our analyses).

The sample period extends from 2006 to 2013, which includes the subprime crisis. For the reason of finding the crisis affliction on Canadian banks' performance we defined two variables; DUMMY as year 2008 and DUMMY1 as year 2009. By the

help of regression analysis we can find whether the performance of these 8 main Canadian banks was affected by the crisis or not.

Besides the bank- specific data, we use two macroeconomic variables, Interest Rate and Growth Domestic Products. These data observed from Canada Statistics website.

## **5.2 Methodology**

The technique of analysis used here is a panel data regression model as I use cross-sectional and time-series data. There are two types of panel data; 1- fixed effect 2- random effect. The data for dependent and independent variables are introduced to the regression model.

There is a substantial legislative system of banking, namely CAMEL, in terms of controlling internal system, readjustment, asset quality, management ability, earning quality to adjust the level of risk and financial growth. The CAMEL will be used in this thesis to assess and estimate the performance of the Canadian banks. The variables of this study are divided into two categories as follow;

### **5.2.1 Dependent Variables of the Regression Model**

Dependent variables are those which values are depend to the variation of the independent variables. In this case, the chosen dependent profitability factors are Return on Assets (ROA) and Return on Equity (ROE). There are several evidence like Hasan and Bashir (2004) and Faysal (2005) that they also have used these parameters as dependent profitability variables.

#### **5.2.1.1 Return on Assets (ROA)**

We use the return on assets (ROA) as the measure of bank profitability with respect to its total assets. The ROA is defined as the ratio of annual earning to total assets

indicated as a percentage. The higher percentage of ROA reveals that the extra earning of the bank. The formula is:

$$\text{Return on Assets} = \frac{\text{Net Income}}{\text{Total Assets}}$$

#### **5.2.1.2 Return on Equity (ROE)**

Our second measure of profitability is the return on equity (ROE), which shows the ability of a bank to make income from its shareholders' investment. The higher percentage of ROE indicates the proficiency of the bank in generating more profit with less capital. The formula is:

$$\text{Return on Equity} = \frac{\text{Net Income}}{\text{Total Equity}}$$

#### **5.2.2 Independent Variables of the Regression Analysis**

These Independent variables which use in regression model are CAMEL ratios. CAMEL is an acronym for five components: Capital Adequacy, Asset Quality, Management Quality, Earning Ability and Liquidity. Besides them other economic variables like Size, GDP and Interest Rate have applied to this regression to assess the overall performance of the Canadian banks.

### **5.2.2.1 Capital Adequacy**

We use Capital Adequacy as a proxy of bank capital; this variable indicates the overall condition of financial institutions. Capital Adequacy as can be seen in the following formula is the scale of total bank's equity over total assets of bank. By this ratio the amount of total shareholders' investment on assets can be figured out. A better capitalized bank should have positive effect on its profitability as it is able to sustain losses without becoming insolvent and keep the leverage by means of the extra credit. Therefore, banks with higher equity asset ratio are less risky. The formula is:

$$\text{Capital Adequacy (CAR)} = \frac{\text{Total Equity}}{\text{Total Assets}}$$

### **5.2.2.2 Asset Quality**

Asset quality is an element to examine the level of financial stability and loan quality. This variable presents those loans which are risky to the credit of financial institutions. It is measured as the scale of provision for loan losses (LLP) over total loans. The higher ratio, the more problematic the loans are. This means, the high credit quality has negative effects on bank's profitability. However, a high value of this variable could imply that there are sound amounts of loan loss reserve to reduce risk and improve profitability. Therefore discovering the relation between asset quality and profitability is difficult, Kosmidou, Tanna & Pasiouras (2005). The formula is:

$$\text{Asset Quality (AQ)} = \frac{\text{Provision for loan losses}}{\text{Total Loans}}$$

### **5.2.2.3 Management Quality**

The ratio of Interest Income over Interest Expense has been used to determine the quality of management. The result of this ratio reveals the capability of board of directors' management in growth and survival of the bank. Dang (2011) states that management quality is one of the most important parameters in the CAMEL rating system as it is a key factor of a bank's success. Management Quality shows the management ability in risk-taking and development of strategic plans. The higher level of this ratio reveals the management efficiency in improving the bank's profitability. The formula is:

$$\text{Management Quality (MQ)} = \frac{\text{Interest Income}}{\text{Interest Expense}}$$

### **5.2.2.4 Earning Ability**

Earning Ability or bank's Operational Efficiency could be measured by the operating costs (such as the administrative costs, staff salaries and property costs, excluding losses due to bad and nonperforming loans) over operating revenues. The lower the expenses to income ratio the more efficient the bank is. Different studies have confirmed the negative relation between Earning Ability and profitability (Ben Khediri and Ben-Khedhiri, 2009). Likewise, we expect a negative correlation between EA and the profitability determinants of Canadian banks. The formula is:

$$\text{Earning Ability (EA)} = \frac{\text{Operating Expense}}{\text{Operating Income}}$$

### **5.2.2.5 Liquidity**

Liquidity is a vital variable which assess the bank's ability, whether it is able to meet its financial obligations; in fact it reveals the amount of available cash. By division of liquid assets over the entire assets the amount of liquidity can be measured. The higher ratio means the bank's liquid assets are not sufficient to meet the creditors and

depositors need, this situation pops up the liquidity risk for the financial institute. Although, other theory says that the loan market is risky but it has greater return between other assets of banks. Therefore, there can be a positive relation between Liquidity variable and the profitability factor (Bourke, 1989).The formula is:

$$Liquidity (LQD) = \frac{Liquid\ Assets}{Total\ Assets}$$

#### **5.2.2.6 Size of a Bank**

The Bank size can be easily measured by the log of total assets of the banks. Bank size can play an important role in terms of bank's profitability. When banks get bigger they have access to the bigger and different market. However it cannot be considered as an improvement of profitability. In some cases, as long as banks get bigger their costs raise. Some studies assume scale of economy between banks' size and demand, like European Commission (1997) and Berger Humphrey (1997) others like Vander Venet (1998) believes that there are a diseconomy of scale for big banks. The formula is:

$$Size = Total\ Assets$$

#### **5.2.2.7 Economic Variables**

The economic variables which will be used to find their relation with profitability are as follow:

- GDP ( Gross Domestic Product)
- Interest Rate

These 2 external determinants have shown a positive relationship with profitability indicators in other studies (Bourke, 1989 and Demirgüç-Kunt and Huizinga, 1999).

### 5.2.2.8 Dummy Variables

For the purpose of studying performance of Canadian bank during credit crisis, two dummy variables were needed to assess the banks performance during 2008 and 2009. These binary variables represent year 2008 (Dummy) and year 2009 (Dummy1) separately in this regression analysis.

### 5.2.3 Model Estimation Process

The following regression models are estimated for ROA and ROE, through the Eviews software;

$$ROA = \alpha_0 + \beta_1 (CAR) + \beta_2 (AQ) + \beta_3 (MQ) + \beta_4 (EA) + \beta_5 (LQD) + \beta_6 (LSIZE) + \beta_7 (IR) + \beta_8 (GDP) + \beta_9 (DUMMY) + \beta_{10} (DUMMY 1)$$

$$ROE = \alpha_1 + \beta_1 (CAR) + \beta_2 (AQ) + \beta_3 (MQ) + \beta_4 (EA) + \beta_5 (LQD) + \beta_6 (LSIZE) + \beta_7 (IR) + \beta_8 (GDP) + \beta_9 (DUMMY) + \beta_{10} (DUMMY 1)$$

Where  $\beta_k$ , (k=0-10) are coefficient of the regression model.  $\alpha_0$  and  $\alpha_1$  are constant parameters.



## Chapter 6

### EMPIRICAL ANALYSIS AND RESULTS

#### 6.1 Panel Unit Root Testing

Before doing analysis we need to do Panel Unit Root Testing to find out whether our panel data series are stationary or not. Stationary data are data which have constant variance and covariance over the time horizon. If the data are not stationary (they change over time), regression analysis must be applied to data.

The current study uses following methods for dependent and independent variables of the regression analysis; Pesaran and Shin (IPS), Maddala and Wu (M\_W) and Levin, Lin and Chu (LLC).

There are two hypotheses for Panel Unit Root Test as below:

$H_0$ : Series are not stationary

$H_1$ : Series are stationary

Table 6.1: Panel Unit Root Test for Canadian banks

<b>ROA</b>	<b>LLC</b>	<b>IPS</b>	<b>M-W</b>
$\tau_T$	-7.32*	-0.34	43.37*
$\tau_\mu$	-6.58*	-1.61***	20.09
$\tau$	0.27	-	11.06

  

<b>ROE</b>	<b>LLC</b>	<b>IPS</b>	<b>M-W</b>
$\tau_T$	-5.43*	0.02	30.01**
$\tau_\mu$	-14.07*	-7.16*	32.09*
$\tau$	-1.76**	-	20.62

  

<b>CAR</b>	<b>LLC</b>	<b>IPS</b>	<b>M-W</b>
$\tau_T$	-5.03*	0.188	26.98**
$\tau_\mu$	-2.42*	0.84	5.14
$\tau$	0.91	-	5.99

  

<b>AQ</b>	<b>LLC</b>	<b>IPS</b>	<b>M-W</b>
$\tau_T$	-17.67*	-1.97**	62.56*
$\tau_\mu$	-0.07	0.78	28.52**
$\tau$	-1.59***	-	12.91

  

<b>MQ</b>	<b>LLC</b>	<b>IPS</b>	<b>M-W</b>
$\tau_T$	-3.71*	0.60	10.54
$\tau_\mu$	-1.46***	0.94	5.19
$\tau$	2.91	-	1.34

  

<b>EA</b>	<b>LLC</b>	<b>IPS</b>	<b>M-W</b>
$\tau_T$	-7.42*	-0.65	50.61*
$\tau_\mu$	-12.89*	-3.92*	55.27*
$\tau$	-2.34*	-	12.28

  

<b>LQD</b>	<b>LLC</b>	<b>IPS</b>	<b>M-W</b>
$\tau_T$	-8.16*	-0.11	36.66*
$\tau_\mu$	-1.25	0.85	7.61
$\tau$	-2.95*	-	32.12*

  

<b>LSIZE</b>	<b>LLC</b>	<b>IPS</b>	<b>M-W</b>
$\tau_T$	-10.23*	-1.08	69.24*
$\tau_\mu$	-2.26	1.13	9.13
$\tau$	8.09	-	0.01

<b>IR</b>	<b>LLC</b>	<b>IPS</b>	<b>M-W</b>
$\tau_T$	-9.37*	-0.88	67.28*
$\tau_\mu$	-8.06*	-2.61*	36.93*
$\tau$	5.75*	-	46.94*

<b>GDP</b>	<b>LLC</b>	<b>IPS</b>	<b>M-W</b>
$\tau_T$	-5.46*	0.15	23.92***
$\tau_\mu$	-5.83*	-1.61***	33.76*
$\tau$	-2.27*	-	41.94*

Base on the results observed throw panel data it can be stated that the variables are stationary and continue the procedure by regression analysis.

## 6.2 Correlation Analysis

The Pearson correlation coefficient is a measure of the strength and direction of the linear relationship between two variables. Its values vary from -1 to +1. The acquired results can be interpreted as below;

If the value of the correlation coefficient is -1.00, it means that there is a negative linear relationship between two variables. If the value of the correlation coefficient is +1.00, it can be interpreted that there is a positive linear relationship among two variables. If the value of the correlation coefficient is 0.00, it means that between two variables there is no even relationship. If the value of the correlation coefficient is between 0.00 and 0.50, it can be interpreted that between two variables there is a positively weak connection. If the value of the correlation coefficient is between -0.50 and 0.00, it means that there is a negatively weak correlation among two variables. If the value of the correlation coefficient is between 0.50 and 0.90, it means that there is a positively strong correlation between two variables. If the value of the correlation coefficient is between -0.90 and -0.50, it can be interpreted that between two variables there is a negatively strong connection. If the value of the

correlation coefficient is between 0.90 and 1.00, it can be interpreted that between two variables there is a positively perfect connection. If the value of the correlation coefficient is between -1.00 and -0.90, it means that there is a negatively perfect correlation between two variables.

By the help of correlation coefficient we can find the link between variables and recognizing whether there is a multicollinearity dilemma between them or not. The problem of multicollinearity arises when the link between coefficients is very close to either 1.00 or -1.00 and models contain high  $R^2$  and low T- ratios. Existence of this problem can lead into miscalculation of the coefficients in regression analysis.

The variables of the study are analyzed by EVIEWS software. The below matrix table shows the result of correlation coefficient method:

Table 6.2: Results of correlation analysis

	ROA	ROE	CAR	AQ	MQ	EA	LQD	LSIZE	IR	GDP
ROA	1.00									
ROE	0.64	1.00								
CAR	0.52	-0.31	1.00							
AQ	-0.01	0.05	-0.09	1.00						
MQ	0.12	-0.20	0.35	0.25	1.00					
EA	-0.83	-0.53	-0.41	-0.10	-0.15	1.00				
LQD	-0.10	0.43	-0.58	0.09	-0.16	0.09	1.00			
LSIZE	-0.04	0.36	-0.46	0.48	0.25	0.00	0.63	1.00		
IR	-0.10	0.023	-0.09	-0.17	-0.38	0.30	0.13	-0.10	1.00	
GDP	0.37	0.43	-0.05	0.07	0.05	-0.29	-0.10	0.03	-0.55	1.00

Base on the above results we can state that, there is no multicollinearity problem in regression analysis. There are five strong correlations between variables. Return on Asset -Capital Adequacy (0.52) and size- liquidity (0.63), which are positive values. The others are negative values, which are Return on Assets -Earning Ability (-0.83),

Return on Equity -Earning Ability (-0.53), Capital Adequacy -Liquidity (-0.58) and between Interest Rate -Growth Domestic Products (-0.55).

By studying through all the above examination it can be stated that; there is a positively strong correlation between Return on Asset and Return on Equity. It means that increase in Equity has a positive strong effect on Assets.

ROA has positively weak correlation with Management and Growth Domestic Products. Also, it has strongly positive correlation with Capital Adequacy. With other variables has negatively weak correlation, the exception is Earning Ability with negatively strong correlation.

ROE has positively weak correlation with Asset Quality, Liquidity, Logarithm of Size, Interest Rate and Growth Domestic Products. However, it has negatively weak relation with Capital Adequacy, Management Quality and negatively strong correlation with ROE.

Base on the examination, the only independent variable which has negative strong effect on both profitability parameters is Earning Ability. This implies that operating expenses to operating income ratio will reduce strongly with profitability ratio improvement. Furthermore, the only independent variable that has positively weak effect on the dependent variables is GDP rate. Growth Domestic Products will increase when the profitability ratios rise.

Capital Adequacy is positively strong connected with Return on Asset and negatively weak connected to Return on Equity. The relation reveals that as long as the ratio of

total assets to total equity improves the ROA ratio will increase. Capital Adequacy has negatively strong correlation with Liquidity. In regards to the other variables (AQ, EA, LSIZE, IR and GDP), they have negatively weak correlation except MQ, it has positively weak correlation.

Asset Quality is negatively but very weak correlated with Return on Asset, which means that Loan Loss Provision over Total Loans does not have a significant correlation with ROA. It is, on the contrary, positively weak correlated with Return on Equity, at the same time with MQ, LQD, LSIZE and GDP. There are negatively weak correlation between EA and IR with CAR.

Base on the observations of Management Quality, it can be stated that MQ has positively weak correlation with ROA as well as Car, AQ, LSIZE and GDP. It, also, negatively correlated with other independent variables and ROE.

As previously mentioned, Earning Ability has negatively strong correlation with profitability. It has negatively weak correlation with CAR, AQ, MQ and GDP, whereas it has positively weak correlation with LQD and IR. Interestingly, it has no correlation with LSIZE, it shows that Operating Expenses to Operating Income has not affected by the logarithm of bank size in Canada.

According to the table, Liquidity has negatively weak correlation with Return on Asset. So it can be assumed that the Liquid Asset to Total Asset will decrease by increasing ROA. It, also, has negatively weak correlation with MQ and GDP whereas negatively strong correlation with CAR. LQD has positively weak correlation with ROE and other independent variables (AQ, EA, LSIZE, and IR).

Logarithm of SIZE has negatively weak correlation with Return on Asset and positively weak correlation with Return on Equity. This implies that Logarithm of bank's Asset will decrease when ROA increase, whereas the rises of ROE will lead to increase of LSIZE. Logarithm of SIZE has negatively low correlation with CAR and IR. It has no correlation with EA. However, it has positively strong correlation with LQD and positively weak correlation with AQ, MQ and GDP.

As mentioned earlier, GDP has positively weak correlation with ROA and ROE, as well as AQ, MQ, LSIZE. GDP has negatively strong correlation with IR and negatively weak correlation with CAR, EA, and LQD.

### **6.3 Regression Analysis**

In this part of study, by the help of regression analysis' results we will find the impact of the independent variables on profitability factors of Canadian banks. For each of the profitability factors (ROA and ROE), there is a regression analysis.

Prior to the estimation of the analysis, I would explain some of expressions which will be used in this study;

#### **Autocorrelation**

In statistic Autocorrelation or serial correlation, is the cross-correlation of values separated from each other by a given time lag.

In E-views, there is a test under name of Durbin-Watson which is located under the table of each regression analysis. The value of this test could help us to find out the existence of problem between the data. The Durbin-Watson results ranges in value from 0 to 4. A value near 2 specifies non-autocorrelation. A value toward 0 shows positive autocorrelation and a value toward 4 show negative autocorrelation.

## **Heteroskedasticity**

Heteroscedasticity is defined as the circumstance in which the variability of a variable is unlike across the range of values of a second variable that predicts it. In this study white test has been used to see whether the residual variance of a variable in a regression model is constant or not.

The result of the Durbin- Watson and white test strongly rejected the existence of any Autocorrelation and Heteroskedasticity problem.

Following we can determine the appropriate regression analysis for the study. There are two kind of regression analysis:

- Fixed Effect or LSVD Model
- Random Effect Model

Base on the available data of Canadian banks and the results in E-views, we will use the fixed effect model for our analysis. The Fixed Effect Model is more adequate and steady model for assessment in the regression analysis.

Hausman test has two hypotheses which will be used in this analysis:

$$H_0: \beta_i = 0$$

$$H_1: \beta_i \neq 0$$

Null Hypotheses ( $H_0$ ) is that, there is no significant linear relationship between independent variable and dependent variable.



Alternative Hypotheses ( $H_1$ ) is that, there is significant linear relationship between independent variable and dependent variable, which will be our conclusion if the experimental test indicates that  $H_0$  is false.

The experimental test indicates that if in Hausman test, the probability value of a variable is equal to 0.01, 0.05, 0.10 or any value between them, the  $H_0$  will be rejected and the  $H_1$  will be accepted.

### **6.3.1 Results on Return on Assets (ROA)**

The below table (6.3), reveals the results of regression analysis on ROA and 10 independent variables. Base on the observations it can be stated that, out of 10 chosen variables, 7 of them are reported to be statistically significant (CAR, AQ, MQ, EA, IR, DUMMY, DUMMY1). It can be interpreted, by a percentage change of the above variables, the ROA dependent variable will modify accordingly. Regarding LQD, LSIZE and GDP we cannot measure them in this regression model.

Table 6.3: Regression Analysis for ROA

<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
C	0.021442	0.019010	1.127918	0.2655
CAR	0.087459	0.020672	4.230821	0.0001
AQ	0.023837	0.013686	1.741716	0.0885
MQ	-0.000629	0.000356	-1.765062	0.0845
EA	-1.957216	0.249446	-7.846258	0.0000
LQD	0.000238	0.002780	0.085423	0.9323
LSIZE	-0.000688	0.000963	-0.714194	0.4789
IR	0.035403	0.010949	3.233561	0.0023
GDP	-0.014165	0.027758	-0.510294	0.6124
DUMMY	-0.001495	0.000661	-2.262940	0.0286
DUMMY1	-0.002900	0.001260	-2.301494	0.0262

  

<b>Effects Specification</b>			
<b>Cross-section fixed (dummy variables)</b>			
<b>R-squared</b>	0.908376	Mean dependent var	0.007652
<b>Adjusted R-squared</b>	0.872976	S.D. dependent var	0.002166
<b>S.E. of regression</b>	0.000772	Akaike info criterion	-11.25793
<b>Sum squared resid</b>	2.62E-05	Schwarz criterion	-10.64038
<b>Log likelihood</b>	366.9959	Hannan-Quinn criter.	-11.01547
<b>F-statistic</b>	25.66025	Durbin-Watson stat	2.185987
<b>Prob(F-statistic)</b>	0.000000		

### Capital Adequacy

The obtained results revealed that, Capital Adequacy have significant effect on ROA. It is statistically remarkable at 1%, this variable positively linked to ROA. The value of positive 0.09 specifies that, by one percent improve in capital adequacy of banks the Return on Assets will increase by 0.09. Capital Adequacy is a division of Total Equity over Total Assets. Increase in Equity could be the result of increase in Net Income. This correlation result is similar with the findings of Bourke (1989), Goddard et al. (2004), and Pasiouras and Kosmidou (2007).

A bank with higher quality of capital should have positive improvement on its profitability as it is able to sustain losses without becoming insolvent and keep the leverage by means of the extra credit.

### **Asset Quality (AQ)**

The obtained results revealed that, Asset Quality has significant effect on ROA. It is statistically remarkable at 10%, this variable positively linked to ROA. The value of positive 0.02 specifies that, by one percent change in Asset Quality of banks the Return on Assets will increase by 0.02. Capital Adequacy is a division of Total reservation for bad loans over total loans. The observed result indicates the soundness of reserved amount to reduce the risk of bad loans and improving the profitability. This correlation result is similar with the findings of Kosmidou, Tanna & Pasiouras (2005).

### **Management Quality**

Management Quality is significant. This variable is statistically remarkable at 10%. It is negatively linked to ROA. But the coefficient value is almost equal to zero, which indicates that a percentage change of Management efficiency cannot have a reflect on Return on Assets.

### **Earning Ability**

It can be reported that Earning Ability can cause a significant change on ROA. The variable is statistically remarkable at 0% and is linked negatively with ROA as we expected. In this study earning ability represents expenses over Income. This result indicates that improved operating efficiency leads to higher profit on ROA. This finding stands in line with the results of Pasiouras and Kosmidou (2007), Ben Khediri and Ben-Khedhiri (2009) and Abdennour and Ben Khediri (2010).

### **Interest Rate**

Interest Rate as an econometric variable has significant change on ROA. Interest Rate is significant at 1% with positive sign. It means that Interest Rate has positive correlation with ROA. One percent of change in IR has positive effect on Net Income. This situation leads to improve the ROA of banks.

### **Dummy**

Dummy variable of year 2008, has significant change on ROA. Dummy is significant at 5%. The measurement of this relation is 0.001 and the sign is negative, which points out the fact that the crisis of year 2008 made ROA of Canadian banks decrease by 0.001.

### **Dummy1**

Dummy1 variable of year 2009 has significant change on ROA. Dummy1 is significant at 5%. It is negatively linked with ROA. The measurement of this relation is -0.002, which implies that the crisis of year 2009 made ROA of Canadian banks decrease by 0.002.

For verification of this model on autocorrelation, the Durbin-Watson's value showed that there is no autocorrelation problem. The value showed by Durbin- Watson stat is 2.18 in this regression analysis. In addition from the Prob. Value of F-statistic (0.00) it can be indicated that the whole model is statistically significant. Furthermore, the high results of R-square (0.9083) and Adjusted R-squared (0.8729). R-squared value indicates that how the data are fitted to the model. Base on all these data it can be stated that, this model is a good fitted model.

### **6.3.2 Results on Return on Equity (ROE)**

Next regression model is constructed for Return on Equity. According to the results on table 6.4, MQ, EA, IR, Dummy and Dummy1 are significant. CAR, AQ, LQD,

LSIZE and GDP are statistically insignificant and cannot express their relation with ROE.

Table 6.4: Regression Analysis for ROE

<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
<b>C</b>	0.380233	0.465412	0.816981	0.4183
<b>CAR</b>	-0.396687	0.440655	-0.900222	0.3729
<b>AQ</b>	0.483486	0.300186	1.610620	0.1144
<b>MQ</b>	-0.018743	0.007326	-2.558276	0.0140
<b>EA</b>	-1.669600	5.556453	-7.499316	0.0000
<b>LQD</b>	0.029576	0.064041	0.461838	0.6465
<b>LSIZE</b>	-0.005491	0.023409	-0.234579	0.8156
<b>IR</b>	0.948327	0.273527	3.467032	0.0012
<b>GDP</b>	0.105622	0.587745	0.179707	0.8582
<b>DUMMY</b>	-0.023067	0.013517	-1.706457	0.0950
<b>DUMMY1</b>	-0.043582	0.025055	-1.739438	0.0890

  

<b>Effects Specification</b>			
<b>Cross-section fixed (dummy variables)</b>			
<b>R-squared</b>	0.885457	Mean dependent var	0.144458
<b>Adjusted R-squared</b>	0.841201	S.D. dependent var	0.040554
<b>S.E. of regression</b>	0.016161	Akaike info criterion	-5.174780
<b>Sum squared resid</b>	0.011491	Schwarz criterion	-4.557224
<b>Log likelihood</b>	178.4182	Hannan-Quinn criter.	-4.932312
<b>F-statistic</b>	20.00786	Durbin-Watson stat	2.183779
<b>Prob(F-statistic)</b>	0.000000		

### Management Quality

Management Quality reported to have a significant change on Return on Equity. This variable is statistically remarkable at 5%. It is negatively linked to ROE. This

percentage implies that, the inefficiency of management in earning profitability in the Canadian banks.

### **Earning Ability**

It can be reported that Earning Ability can cause a significant change on ROE. The variable is statistically remarkable at 0%. It is negatively linked with ROE as we expected. In this study Earning Ability represents expenses over Income. This result indicates that improved operating efficiency leads to higher ROE. This finding stands in line with the results of Pasiouras and Kosmidou (2007), Ben Khediri and Ben-Khedhiri (2009) and Abdennour and Ben Khediri (2010).

### **Interest rate**

The only econometric variable which causes significant change on ROE is Interest Rate. It is significant at 1% and is positively linked with ROE. The measurement of this connection has positive sign, which implied that, one percent of change in IR has positive effect on Net Income. This situation has led to the ROE of banks improve.

For verification of this model on autocorrelation, the Durbin-Watson's value revealed that there is no autocorrelation problem on this model. The value showed by Durbin- Watson stat is equal to 2.18. In addition from the Prob. Value of F-statistic (0.00) approve the statistically significance of the entire model. Furthermore, the high results of R-square (0.8854) and Adjusted R-squared (0.8412). The 88.54% value of R-squared indicated the data are close to fitted with the model. Base on all these data it can be stated that, this model is a good fitted model.

## **Chapter 7**

### **CONCLUSION**

Canadian banking system has been well-known around the world for years. Even during the US sub-prime crisis the financial press and members of the international financial institutions stated that the Canadian banks managed to withstand the ravage of the crisis. In this study we analyze the performance of the Canadian banking sector to find if they were afflicted by the financial contagion from the crisis or not.

This study tried to investigate the connection among the principals of bank's profitability (dependent variables) and the elements influencing them (independent variables). For this purpose, the period of 2006 to 2013 has been chosen which embraces the global credit crunch of years 2008-2009. The number of selected banks is 8, which are the main and the biggest banks in Canada. In general, there are about 64 observations. Most of data were collected from Canadian Bankers Association and the rest of them from Stream Data.

As previously described, there are two types of independent variables: Internal and external. The Internals are the Camel ratios parameters plus the Bank Size, besides them we have two dummy variables (Dummy and Dummy1) which are indicates two years of credit crisis (2008-2009). The externals are the macroeconomic factors; we consider Interest Rate and Growth Domestic Products as external variable in this

study. The dependent variables which are indicate the profitability factors of banks are Return on Assets (ROA) and Return on Equity (ROE).

To figure out the different determinants of the profitability in Canadian banks and finding whether they were profitable during credit crisis, the study passed tree main steps.

By use of EVIEWS and LLC, IOS and M-W designs, the dependent and independent variables were evaluated by Unit Root. The obtained results indicate that, all the used variables in this analysis are stationary and trustable for using in regression model.

The next step was correlation matrix. By Use of EVIEWS the variables were tested to find if there are any multicolleniarity problems between them. The correlation shows there are no multicolleniarity problem between the dependent and independent variables, as well as independent variables themselves. There are some positive and negative strong correlations between variables, however not that significant to affect the analysis's results.

The final step was regression analysis, we used fixed effect model in EVIEWS for the analysis. We examine the Autocorrelation and Heteroscedasticity, after that base on the empirical results we can find the connection between the independent and dependent variables of the model. In terms of ROA, Capital Adequacy, Asset Quality, Management Quality, Earning Ability and Interest rate played an important role on the efficiency of banks. The Earning Ability and Interest Rate also have a substantial role on improving ROE. Whereas, the Management Quality factor makes the ROE decreasing. By considering DUMMY variable for year 2008 and



DUMMY1 variable for 2009, it can be stated that the credit crunch had an unfavorable effect on profitability factors of Canadian banks. The Negative effect of credit crisis got even doubled for the year 2009.

Evaluation of the obtained results in this study revealed that, against the assertion of most financial press and financial articles the performance of the Canadian banks was affected by the crisis contagion during years 2008 and 2009. In addition, the analysis of banks' performance during the studied years indicates that the Canadian banks are well capitalized in terms of investigating the shareholder's equity on banks' asset and operating efficiently in providing profitability from their assets. The risk level of banks can be reduced in Canada by considering a reasonable reservation of liquidity. Regarding economic variables, Interest Rate is the only indicator that has impact on profitability factors. It is positively correlated with both ROA and ROE indicators in the Canadian banking system. Whereas, there are an essential performance weakness during the studied years. The managements were unable to cover the operating expenses by their equity's income. This incapability has led the Canadian financial system to perform unsuccessfully during credit crunch years.

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