

# **The Banking Sector Determinants Role on Economic Development: Evidence from Jordan**

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## ABSTRACT

The thesis investigates the effect of bank related variables on the growth of gross domestic products of Jordan, namely bank size represented by the logarithmic form of total assets of banks, bank deposits represented by the percentage of bank deposits to total assets of the bank, non-performing loans represented by nonperforming loans to the total loans of the bank, and liquidity represented by the percentage of cash and balances in bank to total assets. The analysis was carried out by analyzing a panel consisting of 7 banks using annual data from 2008 to 2015. Different econometric techniques were used including correlation analysis, unit root test, redundant fixed effect analysis, regression analysis under fixed effect model, and granger causality. Results suggest that there are four main determinants of the gross domestic products of Jordan which are bank size, bank deposits, bank credit, and non-performing loans. Banks' board of directors should aim at increasing the size of the bank to increase bank credits, deposits and increase the gross domestic products of the country. Government officials should facilitate the strengthening of the banking sector by imposing rules in favor of banks by providing subsidies and tax deductions. Bank management should encourage individuals and companies to take loans in order to improve their businesses which will lead to more economic growth.

**Keywords:** Non-performing loans, gross domestic products, fixed effects, Granger causality.

## ÖZ

Bu çalışma, banka değişkenlerinin Ürdün'ün gayri safi yurtiçi hasıllarının büyümesi üzerindeki etkisini araştırmıştır. Banka büyüklüğü, temsil edilen banka mevduatları, bankanın toplam kredilerine karşılık takipteki kredilerle gösterilen donuk alacak kredileri ve bankadaki nakit ve bakiyelerin toplam aktiflere oranı ile oluşmaktadır. Analiz, 7 bankadan oluşan bir panelin, korelasyon analizi, birim kök testi, artmış sabit etki analizi, sabit etki modeli altında regresyon analizi ve granger nedensellik gibi farklı ekonometrik teknikler kullanılarak analiz edilerek gerçekleştirilmiştir. Sonuçlar, Ürdün'ün banka büyüklüğü, banka mevduatı, banka kredisi ve takipteki kredileri olan gayri safi yurtiçi hasıllarının dört ana belirleyicisi olduğunu göstermektedir. Bankaların yönetim kurulu, bankanın büyüklüğünü ve gayri safi yurtiçi hasıllarının büyümesi için banka kredilerini ve mevduatlarını artırmayı hedeflemelidir. Hükümet yetkilileri, sübvansiyonlar ve vergi indirimleri sağlayarak bankalar lehine kurallar uygulayarak bankacılık sektörünün güçlenmesini kolaylaştırmalıdır. Banka yönetimi, bireyleri ve şirketleri ekonomik büyümeye yol açması ve işlerini iyileştirmek için kredi almaya teşvik etmelidir.

**Anahtar kelimeler:** Donuk alacak kredileri, gayri safi yurtiçi hasılları, sabit etki analizi, Granger nedensellik.

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# Chapter 1

## INTRODUCTION

### 1.1 Background of the Study

Economic development is a goal that most countries seek in a comprehensive process as it touches all aspects of economic and social life. The development process needs to achieve preconditions as they exist to provide adequate financial resources to meet the needs of investment and production in most countries. In the case of developing countries, many are struggling to finance economic development because these countries seek to re-establish national economic structures and build a development strategy, which will consequently increase national income and generate new jobs thereby improving standard of living (Levine, 1997). One of the main conditions is the strengthening of the financial sector. In fact, the financial and banking sectors play a crucial part in financing the real economic growth and with a weak banking system in the country; the real economy will not grow as wanted. This argument was clear after the subprime mortgage crisis of 2008/2009 showed that banking sector development have a huge impact over macroeconomic stability. Empirical research showed a direct relationship between banking system development and economic growth (Joshi, 2016). There are two main mediums which banks influence economic growth. The first is through credit allocation (Schumpeter, 1934) and the second is through capital accumulation (Hicks, 1969). McKinnon (1973), Shaw (1973), and Goldsmith (1969) were pioneers in studying the association between economic

growth and financial improvement and a stray of literature on the issue followed these authors.

The importance of the banking sector to the economic growth is embodied in the intermediation role that the banks play by collecting deposits from creditors and granting loans to borrowers which helps in many aspects such as allocating resources to the correct investments, gathering initial capital for entrepreneurs and SMEs, funding the expansion of existing businesses in all sectors, and the ability to generate liquidity to individuals in need of it (Olokoyo, 2011).

The Jordanian central bank was created in 1964 and it is completely owned by the government and it is monitored by certain authorities with the assistance of centralized goals and regulations. It is responsible for the administration of interchange reserves, assisting in the establishment of certain monetary institutions and getting rid of certain economic problems,. The authorities actively use loans to stimulate the country's economic performance. Such stimulation can be through agricultural credit agencies, housing banks and industrial development banks. Equity was further provided in the form of public employee pension and security funds (Taha, 2013).

Essentially, banks have a critical function in advancing development within the economy. They carry out the role of gathering savings (units of surplus) and directing one's savings into units of the deficit. This may be achieved via its role in financing the various economic sectors and the improvement of economic performance. Therefore, this study's objective is to examine the impact of banking sector indicators on economic development in Jordan.

## **1.2 Aim of the Study**

This thesis aims to classify the impact of bank specific variables (bank size, bank loans, non-performing loans, bank credit and liquidity) on the gross domestic product (GDP) of Jordan for the period 2008-2015 in order to see the effect of the banking sector development on the economy as a whole and draw policy recommendations out of the empirical results.

The main contribution of this thesis is that it covers a gap in the literature because there is no study considering the variables included in this study to examine the economic growth of Jordan nor there is a study covering the same time range.

## **1.3 Research Method**

The thesis will consider a dataset consisting 7 Jordanian banks covering a period 8 years from 2008 to 2015. The study will examine the relationship among bank specific indicators (bank size, bank loans, non-performing loans, bank credit, and liquidity) on the gross domestic products (GDP) of Jordan. Classical linear regression model will be applied to examine whether there is any statistical significant impact on gross domestic products (GDP) of Jordan by the explanatory variables.

The next chapter of the thesis reviews previous studies related to banking sector's development relation with economic growth. Data sources and research methodology are presented in chapter 3. Chapter 4 discusses the empirical findings of this study and lastly conclusion and policy implications are presented in chapter 5.

## Chapter 2

### LITERATURE REVIEW

In this section, the review of past literature on effects of banking sector on gross domestic product in the case of Jordan is presented. In this study, we estimate GDP as a measure of economic growth. In order to help in better understanding the topic, the influence of the variables on economic growth is discussed and the variables of interest include sizes (asset), bank loans, non-performing, bank credit and liquidity.

#### **2.1 Bank Size and Economic Growth**

The association among the size of a bank and economic development can be traced from the impact and/or relationship between the bank size and their level of profitability. The banking sector over the years has experienced significant restructuring. For instance, since the early 1980s, there is a sharp decrease in the number of commercial banks, whereas the asset size of banks has tremendously increased in all community banks. In addition, between the periods 2000-2014, the number of commercial banks with assets less than 100 million US\$ declined by more than 3,000 of all community banks. However, the banks' assets increased over this period, while most of the growth is associated with commercial banks with more than \$10 billion in assets based (Baily and Montalbano, 2015).

Over the rapid bank consolidation which affects their asset base, quite number of researchers have raised concerns that such bank mergers could reduce credit availability of the commercial banks to businesses, since it has to do with the asset

size of commercial banks to grant credits to small businesses see Berger and Udell (1995, 1996), Peek and Rosengren (1998), Keeton (1995, 1996). According to Weston and Strahan (1996) there are more to this consolidation. They are of the opinion that several elements may be included in the recognition that large commercial banks, partially created by assets and acquisitions, may not respond to the needs of small businesses, thus this in one way or the other affect the level of growth in the economy. Small businesses are known to be the engine of growth, as they provide jobs and meet immediate consumer's needs.

According to Peek and Rosengren (1998) there is a noticeable relationship between the bank size and the amount of credit given to either small or large business firms which can help in economic growth. For instance, during the bank consolidation, large firm loans have grown more than the small business loans (Peek and Rosengren, 1998). On the other hand, small business credit has also increased more at small commercial banks than at large commercial banks. While a bank's portfolio shares of small business loans have been negatively associated with the bank size as measured by such banks total assets. However, no previous study provides a convincing reason behind the direct relationship between bank assets size and the decline in small or large business credit, and how this relationship will have an impact on economic growth in general.

## **2.2 Non-Performing Loans and Economic Growth**

The term non-performing loans (NPL) can best be described as renege credits which the commercial banks are not able to benefit from (Bhattarai, 2016). Credits often fall especially when interest due on such loans are not being paid within 90 days. However, this may differ pending on the particular countries and economic players. These renege loans make the commercial banks in order to take particular measures to be able to securitize and recoup them within the high-quality way they might. Bank loans are usually non-performing whilst the given loans are difficult to be recovered at a specific scheduled loan repayment period (Fell, Moldovan, and O'Brien, 2017). It is paramount to note that, increasing NPLs adversely impact both the banking and economic sectors. Once the negative effects of these NPLs are permitted, it become difficult to subdue and thus, drag on new banking or financial crises. This in one way or another leads to a chaos within the country. NPLs increases interest rates for commercial bank credits, which negatively impact on banks profitability level, hence an increase in cost inflation (Helhel, 2015).

In the 1990s, Jayaratne and Strahan (1996) in their empirical analysis using panel dataset for 50 states in the United States between the periods 1972-1992, confirmed an existing association among raising bank's lending quality and economic development. Similarly, Demirgüç-Kunt and Detragiache (1998) in their panel study, investigated pre- and post-crisis macroeconomic variables in a cross-country analysis for 36 countries. Their empirical results shows that a raise in NPLs will cause a 4 percent reduction in economic development. Keeton (1999) on the other hand, examined the impact of increase in loan volume on debt restoration using the vector auto regression model (VECM), for the periods of 1982-1996. Empirical findings

show that, amplification of credit value is positively correlated with declining assets in the United States.

Furthermore, Ahamad and Rehman (2016) examined a serious issue by developing the relationship between the non-performing loans and economic growth. The data of economic indicators (GDP Growth, Interest Rates and Inflation) and non-performing loans was taken for the time span of 1998-2010 on annually basis. They concluded that there is a negative relationship between the GDP and non-performing loans but there is a positive relationship between the interest rate and non-performing loans. Salas and Saurina (2002) in their quest to investigate factors that influences the NPLs of banking sectors in the case of Spain, reported that real per capita GDP growth, market power, bank size and loan expansion are major factors that influence NPLs. Nkusu (2011) examined nonperforming loans and macro financial vulnerabilities in advanced economies. For examining this he took the data of NPL, GDP growth, unemployment, change in the house price index and, changes in the equity price index, inflation, the nominal effective exchange rate for the time span of 12 years (1998 to 2009) for 26 developed economies. By applying the panel VAR model, he concluded that there is a significant negative relationship between the non-performing loans and macroeconomic performance. Fofack (2005) use panel data methodology to identify potential relationships between real interest rates, real exchange rates, net interest earnings, economic growth, and NPLs to sub-Saharan African countries. Podpiera and Weill (2008) in a similar manner, investigated the relationship between NPLs and cost-effectiveness of Czech Republic banking sector, for a period of 1994-2005. Empirical results show strong evidence in support of mismanagement hypothesis, which necessitates that the regulatory authorities in this region should pay more attention to managerial performance to ensure stability of the



financial sector and by so doing, reducing the NPLs. In addition, Cifter, Yilmazer and Cifter (2009) in their analysis with the use of neural network (NN) techniques based on decomposition were of the opinion that industrial production that can affect economic growth has a late impact on the level of NPLs in the financial sector of Turkey.

In recent years, Gilchrist and Zakrajsek (2012) investigated the relationship between US bank lending and credit supply conditions, using monthly frequency data over a from January 1952 to April 2010. In order to achieve their study objectives, they employed vector autoregressive (VAR) model to carry out empirical estimations and they employed variables such as manufacturing production index, business loans, consumer loans, bond premiums, unemployment rate, nominal federal interest rate, inflation and a 10-years nominal treasury income. In addition, they measure interruptions within financial markets through the rise in bond premium and they stated procedures banks apply when encountering monetary crunches in order to reduce their level of credits and outright rejection of loan applications. It is known that cyclical reduction in business credits after a delay is a major characteristic as a result of the financial sector fluctuations. Jakubik and Reininger (2013) in their study on the banking sector operations in European countries found out one major variable that influences non-performing ratios of banks. The study reported a significant negative estimated correlation coefficient between economic development and NPL ratios. Furthermore, Mimir (2016) in his analysis, investigated the banking sector in the United States over the periods 1987-2010 and the variables employed include bank loans, deposits and financial variables (basically assets). One important empirical finding of this study is that shocks affect not only financial variables but also macro variables. Similarly, Erdogdu (2015) in his analysis to test the association

between the bank's balance sheets and NPLs stated that banking profitability is often related with the public debt crisis. Financial institutions have had an urge to carry on operating under the push of credit risk and that of NPLs ratios, since there is evidence of increasing trend between these variables.

### **2.3 Bank Credits and Economic Growth**

There is an inclusive literature on the association between bank credits and economic growth. This subject has been widely researched for developing and developed economies, while the origin of this theory can be traced to the work of Schumpeter (1911). According to Schumpeterian, the significant contribution the bank credit plays in economic growth can never be overemphasized. Bank credit can be described as the total amount of funds or credits that is made available by banks to firms, individuals, businesses, and/or government. Bank credits are obtained by individuals either for investment or consumption purposes. On the other hand, firms and/or business organizations obtain bank loans to either raise their working capital or purchase/invest in plant and machinery. According to Timsina (2014), government obtain bank loans for finance both recurrent and capital expenditure purposes. In a nutshell, bank credits are mostly used to finance individual consumption, industrial production and government expenditure. These in one way or another further enhances the level of economic growth of an economy.

On the other hand, economic growth may stimulate bank credit expansion via certain economic needs for a better and sound financial service. For instance, according to Khanna and Arora (2009) the establishment of economic reforms in India, specifically economic reforms in the banking sector, stimulated and enhanced profitability as well as increased the efficiency level of the commercial banks.

However, this leads to reduction in bank loans available to the less developed states within the region. This current study also seeks to test the association between bank credits and economic growth in the case of Jordan.

There is an extant empirical literature on the relationship between bank credit and economic growth, such as Hassan et al. (2011), Mukhopadhyay and Pradhan (2011), Levine et al. (2000), Gregorio and Guidotti (1995), Rajan and Zingales (1998), Das and Maiti (1998), King and Levine (1993) and Mckinnon (1973). Pradhan (2010) on his work on the relationship between bank credit and economic growth was of the opinion that an increase in the banking sector credit and/or financial development stimulates an increase in the level of economic growth. While on the other hand, empirical studies of Chakraborty (2010), Pradhan (2010), Hassan et al (2011); and Herwadkar and Ghosh (2013) on the subject concluded that the level of economic growth of an economy stimulates and enhances the level of banking sector credit and/or financial development. Furthermore, some empirical studies on causality relationship between bank credit and economic growth, such as the study of Bangake and Eggoh (2011), Hassan et al. (2011) and Pradhan (2011), Calderón and Liu (2003), Yousif (2002), Blackburn and Hung (1998) and Demetriades and Hussein (1996), reported a bidirectional causality link between the banking sector credit and economic growth.

King and Levine (1993) in their study reported that financial services have a statistical significant relationship with the level productivities, hence economic growth. In their analysis, they employed four (4) financial development indicators, such as domestic credit, ratio of current debt to gross domestic product, ratio of claims on non-financial private sector to domestic credit and gross claims on the

private sector to gross domestic product. Their empirical results indicated that the sampled four (4) financial development indicators are statistically significant, positive and robustly related to economic growth.

Furthermore, Wai and Wai (1980) using annual frequency dataset for a panel study over the periods 1951-1977 for 13 developing countries found that financial indicators such as real stock of domestic credit and bank credit provide a better explanation to the cause of changes in economic growth than real investment variables employed for 11 countries out of the 13 developing countries sampled. Meanwhile, Fritz (1984) investigated the dynamic causal relationship that exists between economic growth and financial intermediation in the case of Philippines, via the conventional Granger (1969) causality testing approach. Empirical results show that financial intermediation causes economic growth, most especially at an early stage of economic growth, whereas the direction of dynamic causation is reversed at the later stage. Similarly, Gupta (1986) in his work found that the financial intermediation variables have a positive statistical significant relationship with India's economic growth level, using ordinary least square (OLS) regression estimates.

In the same vein, using Granger causality approach, Tang (2001) found a unidirectional causality running from bank credit to economic growth in the case of India, with no cointegration between variables sampled. However, Tang (2003) revisited his 2001 study, and found a long-run association between bank credit and real GDP per capita, after including export as an additional variable. Similarly, Tang and Faoziah (2001) using several financial development ratios, such as the capital adequacy ratio, deposit composition, liquidity and the volume of loan, found a long-

run relationship between the financial development ratios of commercial banks and real per capita GDP in the case of Malaysia. In addition, they also found that the financial ratios are useful predictors of economic growth in the sampled country.

## **2.4 Liquidity and Economic Growth**

Available empirical literature agreed that bank liquidity stimulates economic growth process in the several economies of the world, be it developed, emerging and developing economies. Commercial banks provide credit to firms and businesses that are mobilized by these institutions to facilitate their business or private operations or even production activities. Thus, it will be empirically correct to assume that the increase in the level of bank liquidity would result in a corresponding increase in the level of economic growth of such an economy. Commercial banks are basically the custodians of liquid assets in any economy and at such, it is paramount for them to be equipped with effective and efficient management practices in order for them to remain liquid enough. This should be in place in order to meet up with depositor's demand and by extension the economy liquidity as a whole. Ability to do this would provide support for all the financial dealings for such an economy and by so doing gain depositors confidence (Badun, 2009).

It is significant to note that the position of bank liquidity in any economy cannot be overemphasized. Liquidity enhances the speed with which economic progresses and economic activities are executed or implemented. The bank liquid assets help the firms or business organizations to provide finance for their financial or cash transactions through a loan or credit obtained from commercial banks (Elliott, 2014). The amount of profitability affecting the creditor, that is the bank charging interest, on the loaned credits and its debtor, coupled with the other attendant growth

multiplier affects the loaned funds on such economy (Ojiegbe, Oladele, and Makwe, 2016).

Since, the growth multiplier affects bank liquidity on the economy as a whole is encompassing, it is therefore not surprising, that when such bank liquidity fails, which might be due to unfavorable outcomes in the banking sector, this failure, would make the entire economy freeze such as the world witnessed in 2008 global economic and financial crises (Buch, and Goldberg, 2015). The global economic and financial crises showcased the depletion of banking sector liquid assets, which was felt by individual businesses, private firms, and governments all over the world. This led to among others, economic phenomena such as, high level of unemployment level, coupled with the retrenchment of existing workforce, reduction in public spending, low level of economic and business production activities, hence, slow or low level of economic growth (Yanamandra, 2014).

In addition, Zhu and Pollin (2004) have shown that the study results of Levine-Zervos (1998) are not robust to alternative specifications which presented cross-country econometric evidence, in a sample of 47 countries that stock market liquidity contributed a significant positive influence to GDP growth between 1976-93. The results are not robust to alternative specifications because of the incomplete manner in which they control outliers in their data. And they have shown that when one properly controls outliers, stock market liquidity no longer exerts any statistically observable influence on GDP growth. Oboh (2005) argued that, an extension of bank credit for the promotion of economic activities is the major relationship that the banking sector has with the real sector of the any economy. Through this means, the banking sector acts like a catalyst and contributes immensely to the level of

economic growth. This is inline with the study of Ekundayo (1994) where he reported that the Nigerian banking sector has been playing a leading role in the growth and development process of the Nigerian economy. This is as a result of efficient and effective mobilization of funds for the growth and development of the economy. It is significant that, the various sectors of any economy be it financial, health, education and oil among others, must as a matter of fact, perform optimally, if any meaningful economic and financial objective and wellbeing of such a nation alongside with its citizenry must be achieved (Uremadu, and Duru-Uremadu, 2018). National growth and sustainable development of any economy can only be achieved, when economic and financial activities are carried out credibly without prejudice. It is only then and there that the necessities of life and national objectives, through raising individual wellbeing can be achieved. In order for sound economic growth and encompassing development to be achieved, more financial resources need to be committed into various sectors of the economy in the form of credit, since no specific and meaningful economic growth can be achieved without the provision of credits (Bascom, 2016).

## Chapter 3

### DATA AND RESEARCH METHODOLOGY

#### 3.1 Data and Variables

The thesis employs panel data methodology to examine the impact and role of banking sector indicators on economic growth in the case of Jordan. It intends to examine the relationship between banking sector indicators, such as bank size, non-performing loans, bank credit and liquidity on economic growth. In order to achieve the objective, panel-based methodology over the periods of 8 years is used, precisely, between the periods 2008-2015 for 7 banks in Jordan. In addition, to investigate this study, based on data availability seven banks were chosen from Jordan as it is shown in table (1) below.

Table 1: Commercial Banks in Jordan 2008-2015

#	Name
1	Bank of Jordan
2	Capital Bank
3	Housing Bank for Trade and Finance
4	Invest Bank
5	Jordan Ahli Bank
6	Jordan Commercial Bank
7	Jordan Kuwait Bank

Source: Central Bank of Jordan



Data for real gross domestic product (GDP) is used as a proxy for economic growth and it is obtained from the World Development Indicators database (online), while banking sector indicators (the explanatory variables) mentioned earlier are sourced from Jordan Kuwait bank website. In addition, banks chosen are based on the availability of data. Variables description is detailed in Table (2).

Table 2: Summary of the Variables

<b>Variable</b>	<b>Proxy</b>	<b>Abbreviation</b>	<b>Source</b>
<b>Dependent variable</b>			
<b>Gross Domestic Products</b>	Logarithmic form of GDP	GDP	World Bank
<b>Independent variables</b>			
<b>Bank Size</b>	Logarithmic form of Total Assets of Banks	AS	Jordan Kuwait bank website
<b>Bank Credit</b>	Credit facilities / Total Assets	BC	Jordan Kuwait bank website
<b>Liquidity</b>	Cash and balances in banks / Total assets	LIQ	Jordan Kuwait bank website
<b>Non-performing Loans</b>	Non-Performing Loans / Gross Loans	NPL	Jordan Kuwait bank website
<b>Bank Deposits</b>	Bank deposits / Total Assets	BD	Jordan Kuwait bank website

### 3.1.1 Descriptive Analysis

Descriptive analysis is the analysis that converts variables into values that are easy to understand and interpret. The values include mean, median, maximum value, minimum value, and standard deviation. Table 3 shows the results of descriptive analysis. It can be seen in table 3 that all the values are indicating that there is no bias in the sample. Non-performing loans has the mean of 0.2% which means that in

average, there is around 0.2% of the total loans which are non performing. This big number can be interpreted by the fact that there is an outlier in the sample which can be seen in the maximum value which is 6.7%. The mean for bank credit is 0.48% which means that the banks offer credit which is around 0.48% of the total assets. The deposits of the banks have the average of 0.075% of the value of total assets.

Table 3: Descriptive Statistics

<b>Variables</b>	<b>Mean</b>	<b>Median</b>	<b>Max</b>	<b>Min</b>	<b>Std. Dev.</b>
<b>AS</b>	3.417	3.460	4.050	2.950	0.310
<b>BC</b>	0.480	0.490	0.600	0.360	0.066
<b>BD</b>	0.075	0.060	0.170	0.010	0.042
<b>GDP</b>	10.437	10.400	10.500	10.400	0.048
<b>LIQ</b>	0.233	0.220	0.370	0.140	0.053
<b>NPL</b>	0.206	0.090	6.730	0.010	0.888

### 3.2 Methodology

The classical linear regression model has a number of assumptions that should hold in order for the results to be BLUE (best linear unbiased estimations). One of the assumptions is that there is no multicollinearity between the independent variables. This assumption will be examined by applying correlation analysis. The variables should be stationary. In order to choose the most suitable methodology to the present sample, unit root test should be applied to see if the data is stationary or not. If the data is stationary, redundant fixed effects test is applied to the data to see if the fixed effects model is suitable for analysis or not. After applying redundant fixed effects test and choosing the most appropriate model, ordinary least square regression is run to find the coefficients of the determinants of gross domestic products of Jordan. Afterwards, Granger causality test is applied in order to find the direction of the relationship between the independent variables and the dependent

variable (Gujarati, 2009).

### **3.2.1 Correlation Analysis**

In order to investigate the existence of multicollinearity between the independent variables and to see the initial relationship between the dependent variable and independent variables, correlation analysis should be developed. The correlation matrix shows the relationship or dependency of explanatory variables and dependent variable. Multicollinearity is present when there is high correlation between independent variables which makes it very hard to isolate the effect of each independent variable alone on the dependent variable and in turn this makes the interpretation of the coefficients of explanatory variables misleading. Kennedy (2008) established a threshold that amounts to 0.8 and stated that any pairwise correlation that is around 0.8 or higher would indicate the existence of high multicollinearity between the independent variables in question.

### **3.2.2 Panel Unit Root Tests**

In order to achieve stated research objectives, this study make use of panel unit root testing approach in order to examine the stationarity properties of the variables under observation. Based on the classical linear regression model (CLRM), it is proposed that stationarity properties of any time series and/or panel-based variables must be ascertained in order to confirm stability of the variables over the coverage period for sound policy estimation and avoidance of making spurious conclusions (Gujarati, 2003).

The stationarity properties of the panel series could be examined, by employing contemporary panel-based unit root testing techniques in econometrics analysis. The panel-based unit root employed for this study is first generation panel, which is the conventional panel unit root testing approach (Levin, Lin and Chu (LLC)). In order

to get a brief insight into this conventional unit root testing approach, the panel unit root testing technique is explained below.

Levin, Lin and Chu, hence LLC (2002), panel unit root testing approach is built on the assumption that there are common unit root processes across cross-sections. However, these panel-based unit root testing approaches discussed above are specified under the null hypothesis of a unit root. Failure to reject the null hypothesis indicates that a series has unit root and on the other hand, when the assumption of a unit root is rejected, then it is assumed that the series is stationary as this is specified under alternative hypothesis of unit root testing. The null and alternative hypothesis of LLC is indicated below:

H0: The variable has unit root

H1: The variable does not have unit root

Therefore, the stationarity properties of a panel series cannot be confirmed at its level form. The acceptance of the null hypothesis assumes non-stationary while rejection assumes stationary of series and this can be examined either at a level form, first or at second difference respectively. In a situation, where panel series stationary properties are confirmed at its level form, the conclusion is that variables are naturally cointegrated and assumed to be integrated of order zero, i.e.  $I(0)$ . In addition, when required to estimate stationarity at first difference, if variable stationary properties are confirmed at first difference, then it is concluded that variables are integrated of order one, i.e.  $I(1)$ . Lastly, failure to confirm the stationarity property of a variable at first difference subjects such a variable to second difference. In a situation, where variables become stationary at second difference, such variables are said to be integrated at second order, i.e.  $I(2)$ .

Although, this is not usually encouraged in empirical analysis, most especially when faced with a small sample size problem. There is tendency of losing vital information from the data by taken second difference of the data (Choi, 2001).

### **3.2.3 Redundant Fixed Effects Test**

In this stage, the question is to identify whether fixed or random effects model is more suitable to analyze our data. The fixed effect model has the assumption that the intercept and residuals of the cross sections in question are not correlated and that the properties of each cross section is separated from each other. The fixed effects model suggests that there is a one-time invariant intercept for all cross sections. However, random effects model allows for individual effects between the cross sections. It is expected that the fixed effects model is more suitable for the dataset because all the cross sections are from one country and have the same aim with approximately the same size. The answer to this question is by applying redundant fixed effects test (likelihood ratio) which indicates if the fixed effects model is appropriate or not.

Redundant fixed effects test has the following null and alternative hypothesis:

$H_0$ : Fixed effect model is not appropriate to apply to the analysis

$H_1$ : Fixed effect model is appropriate to apply to the analysis

when rejecting the null hypothesis; the test indicates that the fixed effects model is the most suitable.

### **3.3 Model Specification**

The thesis assumes that banking sector indicators contribute to the level of economic growth GDP, which is the dependent variable. The intension is to examine the impact these banking sector indicators have on economic growth. In order to achieve this empirically, the implicit and explicit panel functional relationship between the variables of interest under observation are specified below:

$$GDP_{i,t} = f(AS_{i,t}, BD_{i,t}, NPL_{i,t}, BC_{i,t}, LIQ_{i,t}) \quad (1)$$

$$GDP_{i,t} = \alpha + \beta_1 AS_{i,t} + \beta_2 BD_{i,t} + \beta_3 NPL_{i,t} + \beta_4 BC_{i,t} + \beta_5 LIQ_{i,t} + \varepsilon_{i,t} \quad (2)$$

Where, equation (2) subscripts is  $i = 1, 2, \dots, N$  and  $t = 1, 2, \dots, T$  and they represents different Jordan banks sampled over the sample periods.  $\alpha$  represent bank-specific fixed-effect,  $\beta_1, \dots, \beta_4$  is the slope coefficients of the banking sector indicators parameters, while  $\varepsilon_{i,t}$  represent the disturbance term.<sup>1</sup> In equation (2), the slope coefficients are expected as follows:  $\beta_1 > 0$ ,  $\beta_2 < 0$ ,  $\beta_3 > 0$ , and  $\beta_4 > 0$  respectively.

Prior expectations are discussed as follow: In order to achieve this study objective, it is expected that, parameter estimate ( $\beta_1$ ) bank size is expected to be greater than zero, i.e. ( $\beta_1 > 0$ ). That is, a positive relationship between bank size and economic growth is expected, and vice versa. As the bank size or asset size increase and become larger, it is expected to contribute more to the level of output by employing more human and material resources, thus, increase in the level of economic growth, and vice versa.

The parameter estimate ( $\beta_2$ ) is also expected to be less than zero, i.e.  $\beta_2 < 0$ . This is due to the fact that, increasing in the level of non-performing loan is expected to negatively impact on the level of economic growth. As loans becoming non-performing, this would affect the level of investment in such economy or within the banking sector. Thus, reduction in the level of investment affects employment levels, hence, output and economic growth, and vice versa.

In addition, the parameter estimates for bank credit ( $\beta_3$ ) is also expected to be greater than zero, i.e.  $\beta_3 > 0$ . Bank credit is expected to be positively related with the level of

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<sup>1</sup> For the definition of the variables employed, refer to section 3.1.

economic growth in the case of Jordan. It is assumed that as the level of bank credit given to potential investor, individual, businesses or government increases, there should be a positive spillover impact on the level of economic growth, and vice versa. Therefore, increase in bank credit is expected to stimulate economic growth by increasing the level of investment and production in Jordan.

Finally, the slope coefficient ( $\beta_4$ ) that represent bank liquidity is expected to be greater than zero i.e.  $\beta_4 > 0$ . Bank liquidity is also assumed to be positively related with the level of economic growth in the case of Jordan. This thesis assume that, as banking sector becomes more liquid, more funds will be available to mobilize for investment and productive ventures by individuals, firms and/or government. Thus, the level of banking sector liquidity is expected have a positive spillover effect on the level of economic growth, and vice versa. The major empirical question of the thesis is the existence of the level relationship in equation (2) and the impact of these banking sector indicators on economic growth in the case of Jordan.

### **3.4 Panel Granger Causality Testing**

To test the direction of the relationship between the dependent and independent variables and also between independent variables themselves, Granger-causality method is used and thus the estimation of the following equations to see the relationship

$$Y_{it} = \beta(X_{i,t-lag}) + \varepsilon_{it} \quad (3)$$

Where the script I denotes the cross-sections across the 7 banks used, t represents the time dimension, X represent independent variables, Y represent the dependent variable,  $\beta$  represents the coefficient, and  $\varepsilon_{it}$  represents the residuals. The GDP is the proxy for economic growth and since the pairwise effect of each relationship is

being studied, the equations from 1 to 10 represents these pairwise granger causality models. If the coefficient  $\beta$  is significant, there is causality from X to Y (Dumitrescu and Hurlin, 2012).



## Chapter 4

### EMPIRICAL RESULTS

#### 4.1 Correlation

In the correlation analysis our aim is to detect the multicollinearity problem which arises when the correlation coefficient value between two variables is greater than 80% and to examine if independent variable affects the gross domestic product (GDP) as a measure of economic growth which is the dependent variable. The correlation coefficient can take the value ranging from -1 to +1. Each value has its own interpretation, if the coefficient is between the range of 0 to 0.5 it means that there is a positive weak to moderate relationship between the two variables, where from 0.5 and above suggests that the relationship is positively strong between the two variables. On the other hand, when the coefficient of the correlation between the two variables amounts to the value from 0 to -0.5, there is a weak to moderate negative relationship between the variables and if the coefficient amounts to -0.5 and lower the relationship becomes strongly negative. The value 0 of the coefficient means that there is no relationship between the variables. If the coefficient amounts to 1, it means that a positive linear relationship exists between the two variables while a -1 coefficient means that a negative linear relationship exists between the variables.

According to table 4, it can be seen that there is a negative and positive correlation among the variables. Finally, to have a multicollinearity problem, there must be high

correlation of at least 80% of the independent variables Kennedy (2003). Since the correlations among the variables are all less than 80%, it is concluded that there is no multicollenarity issue among the variables.

Table 4: Correlation Matrix

	GDP	AS	BC	BD	NPL	LIQ
GDP	1.000000					
AS	0.166374	1.000000				
BC	-0.130646	-0.591441	1.000000			
BD	-0.108567	0.265762	-0.071678	1.000000		
NPL	0.165870	-0.006466	-0.245543	-0.083324	1.000000	
LIQ	-0.273615	0.569698	-0.536930	0.236457	-0.040493	1.000000

There is positive correlation between GDP and AS ratio by 0.166 and it means if GDP increases, the AS of Jordanian banks will increase as well. There is negative correlation among GDP and BC by -0.130 meaning if the GDP rise the credits of Jordanian banks will decrease. There is also a negative correlation between GDP and BD by -0.108 which means if GDP increases, the deposits of Jordanian banks will decline. Also there is a positive correlation between GDP and NPL by 0.165 meaning that if GDP increases NPL of Jordanian banks will increase as well. Finally, there is negative correlation between GDP and LIQ ratio by -0.273 which means that if GDP increases, the liquidity of Jordanian banks will decrease.

## **4.2 Panel Unit Root Test**

To check the integration level of the data to determine the best methodological approach to analyze the data, LLC unit root test was applied on the data. The test has the null hypothesis of that the variable has a unit root and in turn not stationary. Three models of the test were tested which are with trend and intercept, with intercept, and without trend or intercept. The results are reported in table 5 below.

As seen in the table 5, most of the models suggest that the variables are all stationary and also in the variable AS both models with trend and intercept and with intercept show that the variable is not stationary, which is the same case for BC, BD, and NPL. GDP's trend model rejected that the variable is not stationary at 1% level of significance. LIQ variable turned out to be stationary across all three models of LLC with rejection of the null hypothesis at 1% level of significance. In general, the conclusion is that all the variables included in this study are stationary and are integrated of level 0.

With this conclusion, regression analysis can be performed with confidence that the results will not be spurious.

Table 5: Panel Unit Root Test Results

<b>Variables</b>	<b>Model</b>	<b>LLC (Level)</b>
<b>GDP</b>	Trend	-4.397*
	Intercept and Trend	-0.440
	None	2.715
<b>AS</b>	Trend	-5.156*
	Intercept and Trend	-2.947*
	None	4.166
<b>BC</b>	Trend	-4.153*
	Intercept and Trend	-4.497*
	None	-0.032
<b>BD</b>	Trend	-4.175*
	Intercept and Trend	-1.631**
	None	-1.230
<b>NPL</b>	Trend	-3.265*
	Intercept and Trend	-2.899*
	None	-1.886
<b>LIQ</b>	Trend	-6.130*
	Intercept and Trend	-4.968*
	None	-3.056*

\* and \*\* denote rejection of the null hypothesis at the 1 percent, 5 percent and 10 percent levels respectively.

### 4.3 Redundant Fixed Effects Test

After applying the unit root test and assuring that the data is stationary at level, ordinary least square is applied to estimate the coefficients of the variables and identify the relationship between the independent and dependent variables. But first, it is important to investigate the appropriate model to apply on the regression and to see if the fixed effects model is suitable for our analysis. The test is applied on the

regression in order to investigate this issue. The null hypothesis for redundant fixed effects test is that fixed effects model is not appropriate. The results for redundant fixed effects test reported in Table 6 suggest that the null hypothesis will be rejected at 1% level of significance which means that fixed effects model is the suitable model to apply to the used dataset.

Table 6: Redundant Fixed Effects Tests Results

Effects Test	Statistic	Prob.
Cross-section F	6.984911	0.0000
Cross-section Chi-square	37.469845	0.0000

#### 4.4 Regression Results

After applying the ordinary least square with fixed effects model, the results can be seen in Table 7 below. The results indicate that around 63% of the variations in the dependent variable are explained by the variations in the independent variables according to R square. The model seems to be best fitted as the F- statistics show that the null hypothesis of the model is not best fitted and it is rejected at 1% level of significance. As for the variables, we can see that all the variables are significant at 1% level of significance except for non-performing loans and liquidity variables which are not significant at 5%. The size of the bank is crucial as it is significant at 1% and the coefficient indicates that there is a positive relationship between gross domestic products of Jordan and the bank size. When the bank size increases by 1%, the gross domestic products increase by 0.55%. This result is in line with Chesini, Giaretta, & Paltrinieri (2017) findings. As for bank credit, the coefficient is significant with a value of 0.205 which means that if bank credit increased by 1%, GDP will increase by 0.2%. This result is consistent with the findings Hassan et al. (2011), Christopoulos and Pradhan (2010), Levine et al. (2000), Rajan and Zingales

(1998), Das and Maiti (1998), Gregorio and Guidotti (1995), King and Levine (1993) and Mckinnon (1973). Bank deposit's coefficient is significant at 1% level of significance and it shows that if the bank deposits increased by 1%, the GDP of Jordan will decrease by 0.379%.

Table 7: Regression Results Under Fixed Effects

Variable	Coefficient	Std. Error	Prob. Value
C	8.510*	0.233	0.0000
AS	0.551*	0.069	0.0000
BD	-0.379*	0.113	0.0017
BC	0.205*	0.051	0.0002
NPL	0.003	0.001	0.0985
LIQ	-0.125	0.121	0.3083
R Square	0.629		
F-statistics	6.804*		0.0000
Durbin Watson	1.478		

\*, \*\* indicates significance at 1%, 5%, and 10% respectively

#### 4.5 Autocorrelation Test

The aim of this test is to investigate whether there is an autocorrelation problem in the data or not, using the Durbin Watson value (d). Autocorrelation shows whether there is a high correlation among the linear regression and error term. The Durbin-Watson statistics value (d) is 1.49 and it is close to 1.50, therefore it indicates that there is no autocorrelation problem.

## 4.6 Normality Test

In this test, the distribution of the error terms is focused on. The distribution of error terms should be normal and Jarque-Bera test is designed to check the normality of the residuals.

As shown in the chart below, Jarque-Bera prob. value is 0.375 which is non-significant even at 10%. The null hypothesis for this test declares that the distribution is normal. Since, the probability of the test is significant, the null hypothesis is rejected meaning that the distribution of residuals is not normal. Based on the model, it can conclude that since the p-value of Jarque-Bera is not significant which is more than 10%, the null hypothesis cannot be rejected, meaning that the distribution of residuals is normal.

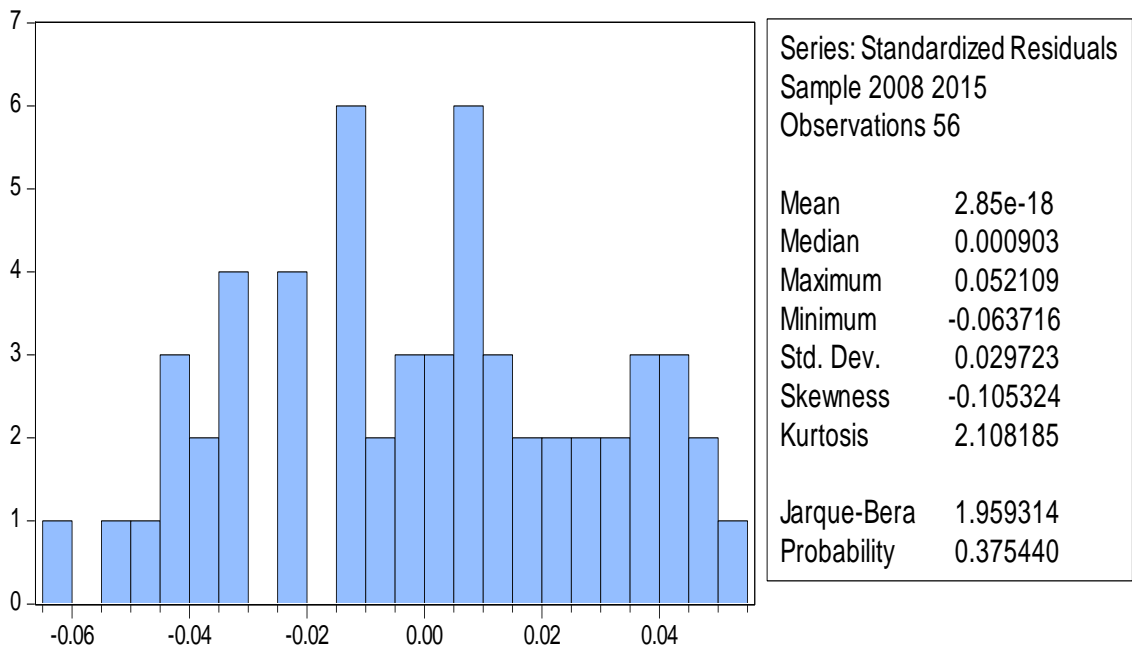


Figure 1: Normality Test Results.

## 4.7 Granger Causality Test

Granger causality test shows the direction of the relationship between the variables either dependent or independent. The test results are indicated below in Table 8. The results show that only two relationships are significant at the level of significance of 10% and 5% respectively which are that bank size does not cause bank credit and that bank size does not cause liquidity.

Table 8: Granger Causality Test Results

	<b>F-Statistic</b>	<b>Prob.</b>
AS → GDP	0.381	0.6855
GDP → AS	1.537	0.2283
BC → GDP	0.209	0.8117
GDP → BC	0.092	0.9123
BD → GDP	0.773	0.4689
GDP → BD	0.991	0.3807
NPL → GDP	0.003	0.9962
GDP → NPL	0.287	0.7515
LIQ → GDP	1.046	0.3612
GDP → LIQ	1.967	0.1542
BC → AS	0.170	0.8438
AS → BC	2.853***	0.0704
BD → AS	0.084	0.9195
AS → BD	1.507	0.2348
NPL → AS	0.895	0.4171
AS → NPL	1.472	0.2424
LIQ → AS	0.561	0.5751
AS → LIQ	4.050**	0.0257
BD → BC	0.962	0.3911
BC → BD	0.963	0.3908
NPL → BC	0.839	0.4399
BC → NPL	1.956	0.1557
LIQ → BC	0.370	0.6928
BC → LIQ	0.848	0.4361
NPL → BD	2.446	0.1005
BD → NPL	1.005	0.3757
LIQ → BD	0.219	0.8038
BD → LIQ	0.163	0.8497
LIQ → NPL	0.853	0.4341
NPL → LIQ	1.223	0.3057

\*, \*\*, \*\*\* indicates significance at 1%, 5%, and 10% respectively



It is discovered that there are two unidirectional causal relationships going from bank size towards both bank credit and bank deposits and it can be explained that the size of the bank attracts more credit and affects the liquidity of the bank which is reasonable as larger banks attracts more depositors which leads to the bank having more liquidity and more power to give credit.

## Chapter 5

### CONCLUDING REMARKS

The thesis investigates the effect of bank related variables on the growth of gross domestic products of Jordan, namely bank size represented by the logarithmic form of total assets of banks, bank deposits represented by the percentage of bank deposits to total assets of the bank, non-performing loans represented by nonperforming loans to the total loans of the bank, and liquidity represented by the percentage of cash and balances in bank to total assets. The analysis was carried out by analyzing a panel consisting of 7 banks using annual data from 2008 to 2015 using different econometric techniques. Firstly, the data was introduced and the main characteristics of the data were explored through descriptive statistics. Then, correlation matrix was calculated in order to see the initial direction of the relationship between the dependent and independent variables and to test for any multicollinearity between the independent variables. In addition, the classical linear normal regression model assumptions were checked to make sure that the results were best linear unbiased estimation (BLUE) through checking normality, multicollinearity and autocorrelation. Afterwards, the redundant fixed effects tests were applied to figure out which effects model is more suitable for the analysis. After assuring that fixed effects model is the most appropriate for our analysis, the classical linear regression model under fixed effects was applied on our suggested model.

Results suggest that there are three main determinants of the gross domestic products of Jordan which are bank size, bank deposits and bank credit. The results show that bank size has a positive relationship with the growth in GDP in Jordan. This results are reasonable and shows that there is an indirect relationship between the bank size and the growth in GDP. As bank size increase, the profitability of the bank might increase, which leads to the strengthening of the banking sector which in turn leads to the increase in gross domestic products growth. Bank credit was found to have a positive relationship with the growth of GDP which can be explained by that the increase in the bank credit meaning that individuals and companies are getting more access to funds which leads to the development of the real economy which in turn increases the growth of GDP. Bank deposits was found to have a negative relationship with the growth of GDP which can be explained by the poor decisions of banks' management to allocate the funds that the banks have towards negative NPV projects which explains the negative relationship. Moreover, granger causality test found that there are two unidirectional causal relationships going from bank size towards both bank credit and bank deposits which is reasonable as when the size of the bank increase, people will trust the bank and deposit more money which will lead to the availability of cash in the bank and the increase of bank credit.

These results have many important implications for government officials, investors, and banks board of directors. Banks' board of directors should aim on increasing the size of the bank to increase both bank credits and deposits and to increase the gross domestic products of the country. The banking sector in Jordan should be expanded to provide credit facilities to all economic sectors. The central bank of Jordan has to raise the awareness of its customers to increase the amount of bank deposits. Because it is the main source of bank deposits. Bank management should encourage

individuals and companies to take loans in order to improve their businesses which will lead to more economic growth. Bank management should take into account credit risk by monitoring the nonperforming loans ratio and screening the profiles of borrowers before granting them the loan.

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