

An Analysis of Banking Sector Growth: Evidence from Pakistan



By

IFTIKHAR AHMAD

PIDE2020FMPHILBE01

Supervisor

Dr. Farhat Mahmood

Co-Supervisor

Dr. Tariq Majeed

School of Economics

Pakistan Institute of Development Economics

Islamabad

(2022)



Pakistan Institute of Development Economics
P.O. Box 1091, Islamabad, Pakistan

CERTIFICATE

This is to certify that this thesis entitled: “An Analysis of Banking Sector Growth: Evidence from Pakistan” submitted by Mr. Iftikhar Ahmad. is accepted in its present form by the School of Economics, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree in Master of Philosophy in Business Economics.

Supervisor:

Dr. Farhat Mahmood

Signature:

Co-supervisor:

Dr. Muhammad Tariq Majeed,

Signature:

External Examiner:

Dr. Adnan Haider

Signature:

Head,

PIDE School of Economics: Dr. Shujaat Farooq

Signature:

Author's Declaration

I Iftikhar Ahmad S/o Muhammad Riaz hereby state that my MPhil thesis titled “An Analysis of banking sector Growth: Evidence from Pakistan” is my own work and has not been submitted previously by me for taking any degree from Pakistan Institute of Development Economics or anywhere else in the country/world.

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Date: _____

Signature of Student

Iftikhar Ahmad

Dedication

I would like to dedicate this thesis to my family, colleagues and teachers who have been a great help during the last two years. Their cooperation is the only reason that I have been able to complete this thesis.

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I would like to acknowledge the support of my teachers specially Dr. Farhat Mahmood who provided me the opportunity and guidance to choose the research topic of my interest. Her guidance and the space provided by her is the only reason that I have been able to apply my mind independently in this study.

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ABSTRACT

The objective of this research study is to investigate the relationship between growth and size through the validation of Gibrat's law. A sample of 17 commercial banks of Pakistan used for the period 2005-2020. The estimation method used is that of quantile regression for panel data; the results suggest that small banks grow faster than their larger counterparts do. The results show that size and growth have non-linear inverted U-shaped relationship. Furthermore, GMM method of estimation has been used as robustness check. Finally, it has been found that growth of Pakistani banks is not independent of banks size and so does not match to a random process. Similarly, macroeconomic indicators have their influence on the growth of the banks.

Key words: Commercial banks; Pakistan; Gibrat's law; Growth; Size

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List of Abbreviations

ATM=Automatic teller Machine

BG=Bank Growth

BS=Bank size

CPR=capital Ratio

CPI=consumer price index

EFF=Efficiency

EXR=Exchange Rate.

FBR= Federal Board of revenue

GDP=Gross domestic Product

GMM=Generalized method of moment

IMF=International Monetary Facilitator

INF=Inflation

INN=Innovation

LIQ= Liquidity Ratio

LPE=Law of proportionate Effect

NPL=Non-performing Loans

OECD= Organization for economic co-operation and development

OLS=Ordinary least square

POS=Point of sale

Pro=Profit

SBP=State bank of Pakistan

SME=Small medium enterprises

SPR=Spread Rate

TV= Television

USA=United States America

CHAPTER 01

1.1.Introduction

Since the inception of 21st century, all over the world the financial sector has undergone through major structural changes due to the factors of deregulation, technological changes, and the international financial crisis. Consequently, there has been observed an increase in the size of the banking entities (Fernholz & Koch, 2016).The financial services industry¹ provides economic opportunities to all other sectors of any economy. Due to tremendous transformation in the financial services industry during last two decades there has been seen massive proliferation in the banking sector services as well. The shift from traditional banking toward non-banking (Means Digital banking where the lack of traditional banking) is due to the greater concentration of banks and fundamental changes in banking activities (DeYoung & Torna, 2013). These changes were mainly motivated by technological disruptions, which ultimately led to the improvement in financial services delivery (Fernholz & Koch, 2016). Owing to upsurge in innovation and technology, the developing countries strengthened their banking regulations and had made competition in the banking sector more intense over time. These innovative and technological shifts may enhance the risk factor within financial intermediaries as well as within the banking system.

However, for the banking sector technology have greater importance that is based on computers and system building (Grubel, 1977). As mentioned earlier due to the technological developments² and deregulation³ of this sector, the addition of new financial services, e.g.

¹ The financial services industry comprises on Credit unions, the banking sector, insurance companies, etc

² e.g.ATM installation,branchless banking,Point of sale,Credit card payments and online account opening,e commerce trade.

wireless transfer of money, credit and debit card payment system, branchless banking, and mobile banking lead to massive increase in the size of the banking assets consistently on a year-to-year basis. The total assets of Pakistani banks in 2020 were Rs. 23.808 trillion while in 2005 the total assets were around Rs. 577.719 billions (Financial Stability Review 2020 - State Bank of Pakistan, 2020). This increase in size (i.e. total assets) of the banking sector led this sector towards concentration⁴. It has been investigated by (Goddard et al., 2004) that banks growth tends to improve with the increase of bank size. Likewise, there exist number of other factors that affect growth of the banks i.e. bank-specific and macroeconomic factors like Non performing loans ratio, liquidity ratio, capital ratio, innovation, Interest rate spread etc as well as inflation, exchange rate, and GDP ratio are the macroeconomic variables that may affect the growth and profitability of the banks.

Robert Gibrat's 1931 explained the relationship between size and growth of a firm i.e. called Gibrat's law of proportionate effect. This law states that the dynamic growth pattern of the firm depends upon its size. In other words, with the increase in the size of the firm, growth of the firm also increases by the proportion of the increase in size. Depending upon this law, a lot of literature like (Venet 2001; (Goddard 2002; 2014; 2016); Benito 2008; and Shezad et al., 2013) have explored this relationship between size and growth of the firms. However, only few studies have investigated the banking sector growth and size relationship specifically for the USA and European countries and that too with contradictory results. Therefore, to explore the growth behavior of the banking sector of Pakistan, this particular study is an attempt to analyze the

³ FRB access to the accounts ,payment transfer system ,credit allocation, Anti-money laundering regulation etc

⁴ Due to the increase in number of branches geographically competition in banking sector increase because all the banks offer same type of products and services with a slight difference of name and method to deal with the customers.

relationship between size and growth in the banking sector of Pakistan by applying Gibrat's Law.

1.2.Statement of problem:

In recent years, Pakistan has been one of the countries with the biggest changes in the banking sector. Globally banks invest heavily in technology-based banking products and services for good returns (Skilton & Capgemini, 2012). Whereas, in the case of Pakistan as highlighted by (Hussain, 2001) the financial institutions of Pakistan have not been able to play their role in the sustainable growth of Pakistan's economy. They remain unable to exploit their full potential in quality service delivery and inability to introduce more technology driven products e.g. digital payment system like, ATMs, Debit, credit cards, branchless banking and online payment system. However, during 2005 – 2020, many international banks by using regularization policies have reduced their assets while the domestic banks have geographically expanded throughout the country indicating more concentration but the growth level does not increase in line of its size. To optimize the advantages of technological improvement, regulatory, and other structural changes, the current study is an attempt to find the association between the size and growth pattern of the banking sector of Pakistan.

Moreover, considering the random behavior of growth of banks, conventionally the studies related to business growth have been analyzed from the empirical point of view under the postulates of Gibrat's law. This law predicts that the growth of a company is independent of its size at the beginning of the period examined, which means that all companies/banks have the same probability of growing in a specific period and in a given industry. This particular finding

vary country to country and industry to industry. Therefore, this particular study is an attempt to analyze this relationship in case of the banking sector of Pakistan.

1.3 Study significance

Financial services play an important role in the development of any country. The banking sector is considered the backbone of any country's economy and in Pakistan, its contribution to the National GDP was around 60% during the year 2020 which is much higher than the agriculture, textile, and cement sectors¹. Moreover, the financial sector is a source of financing not only for the industry but also for the government. The Pakistani banking sector faced changes² concerning technology and innovation from 2005 through 2020. Due to these changes' banks increased, their geographic reach as well as their assets increased on a year-to-year basis. These factors (both bank-specific and national factors) have affected the performance of this sector. Owing to these factors, banking competition increased day after day and became more concentrated. Against this backdrop, this study has checked the implication of Gibrat's law in the case of the Pakistani banking sector to find out that either the small banks grow faster or their larger counterparts with respect to their size. The findings will help the regulators of banking sector to formulate policies that will be beneficial to enhance the contribution of this sector in the economic growth of Pakistan.

1.4 . Research Problem:

Because of the improvement of technology and innovation, and de-regularization of the banking sector, the domestic banks expand geographically while international banks have reduced their operations in Pakistan. The banking sector of Pakistan becoming more concentrated day after day and the larger banks expanding their network. The larger banks have huge assets volume as

compared to the smaller banks. Whereas, the small banks have small size in terms of assets but in growth and profitability compete the larger banks. Based on these phenomena this study has explored the growth behavior of the banking sector of Pakistan.

1.5. Research Questions:

- 1- How does bank size affect bank growth taking into account the Gibrat's law or the law of proportionate effect?
- 2- How the bank-specific and macroeconomic variables affect the growth of Pakistani banks?

1.6. Research Objective:

The objective of this study is to analyze the relationship between size and growth through the validation of Gibrat's law for the banking sector of Pakistan during 2005-to 2020.

1.7. Organization of the study:

This study comprises on six chapters the first of all on the start on the thesis there is abstract of the study and first chapter about the introduction of the study and the second chapter related to the literature and theoretical background of the study. Furthermore, the third chapter is the methodology that explains the model and estimation tests and techniques, which I used for the analysis purpose. The post estimation test for the model estimation. What are the problem and tests we used to analyze the data set? Explained in detail in this chapter. Whereas, the fourth chapter is the result and discussion chapter where we explained the results and significance level of different variables on the dependent variable, similarly, the fifth chapter is the Qualitative work of the study where we describe about the interview based questionnaire findings align with

our model estimation results. Lastly, the sixth chapter about the conclusion key findings and policy recommendations for the regulator, management and Government,

CHAPTER 02

The first part of this chapter is comprised on different theories explaining the association of firm growth with its size such as the neoclassical economic theory of firm growth for its optimal size, Penrose's theory of firm growth and Morris's managerial theory while the second part of this chapter is based on the comparison of empirical literature of Gibrats Law.

2. Theoretical Literature Review:

2.1. New Classical Theory of the Firm:

According to this theory size does not matter when the firm reached at the maximum level of the profitability because by then firms don't focus on the size for profitability. (Coase, 1937) explained that firms gain the optimal level via trade-off among the coordination of authorities, the hierarchy of the firms and price established mechanism. This also depends only on the transaction cost, if the cost is relatively high then the firm's up steams and downstream in the shape of strategic assets. Similarly, (Kay, 2000), investigated that the predictions made by transaction cost mostly related to the firm growth by acquisition specifically towards vertical integration. Another variation explained by (Lucas Jr, 1978) is on the firm size i.e. the log-normal distribution of the firm size is based on the log-normal distribution of managerial talent. In this context, he also explained that large firms are large because these firms have talented managers, and they can solve difficult problems and accomplished their tasks within no time and this ultimately leads to a source of firm growth.

2.1.1. Penrose's theory of firm growth:

According to 1959 Penrose's theory of firm growth, growth is led by internal momentum generated by training, experience, and learning. Managers become more productive over time as they become familiar with their work. As managers gain experience, their administrative tasks require less attention and less energy and managerial resources are continually being released. As a result, these managers enhance the growth opportunities by using their talent and available resources, this happened in the sense of training the managers. (Slater, 1980) described that with the personal experience and training of the managers the firms' growth increases but lead to higher operating costs. Although 'economies of growth' provide incentives for firms to grow, the consequence of this is that the larger firms' grow slower than their counterparts. Another key concept in Penrose's theory of firm growth is that firms are composed of different technological and innovative resources that differed in nature. These resources can play a significant role to enhance the efficiency of work, durability and gaining a competitive advantage if they are valuable, rare, inimitable, and have no close substitute (Dierickx & Cool, 1989); (Eisenhardt & Martin, 2000). The indivisible, uniqueness and interdependency in nature of these resources can also add impetus to a firm's growth (Coad & Rao, 2008). In the fast-changing tools like cash payments, internet and social media and advancement in the technology., where these changes occur very rapidly in the shape of resources that might disrupt the growth of the firms in such circumstances, a firm's performance depends on how a firm utilize these resources and maximize the profit. This ability to utilize the resources in a better way is known as 'dynamic capabilities' (Eisenhardt & Martin, 2000). Penrose's theory in contrast to the neoclassical theory of the firms' growth described that the firms not only focus on the optimal size but also some other technological, innovative factors are also important.

2.1.2 Growth Maximization Theory:

Robin Morris 1964 in his book “The Economic theory of Managerial Capitalism” developed a dynamic growth model where he has described how a firm could maximize its share prices, assets value, and profit of the firm. The key factors of this theory is that the manager's interest linked with the utility of the size of the firm. Because by increasing the size of firms’ manager’s bounces, incentives and compensation also increase. Therefore, the size and growth of the firm are important factors attached to the manager's utility function and the financial performance of the firm. Later on, (Mueller, 1969) explained that above a certain level of growth managers do not work efficiently and do not give more attention to work because at a certain level of growth additional diversification has lower expected profitability (Mueller, 1969). Moreover, (Dickerson et al., 2000) described that acquisition hurts growth as compared to mergers.

Although there are various types of theories about firm growth and firm size interconnection, there is no unique standpoint on whether this relationship is positive, negative, or insignificant.

2.2. Empirical Literature

2.2.1. Gibrat’s Law on banking sector

Various factors are responsible for the development of the banking sector’s growth as indicated in the literature. The size and growth relationship which is studied by different researchers like Tschogl 1983; Wilson and Williams 2000; Venet 2001 ; Goddard 2014 ; Benito 2008 ; Shezad et al. 2013 and Fernholz and Hoch 2016 etc. These studies mainly conducted in developed countries like the USA and Europe on banking analysis and not in the emerging markets. The First study on banking analysis between size and growth was conducted by (Alhadeff et al.,

1964) from 1930-to 1960 stated that the large-sized banks grow slower than the average-sized banks. Using data of 200 commercial banks of USA the study found that the banks involved in mergers to become larger banks entities have faster growth pattern. After this, the study of (Rhoades & Yeats, 1974) examined the relationship between bank size and growth throughout 1960-1971 by using change in deposits of USA commercial banks. The study primarily used the sample of the 200 largest banks in the USA and found that large banks grow slower than smaller banks. The study also indicated that there has been a tendency toward deconsolidation in commercial banks during this period. Later on (Tschoegl, 1983) examined the size and growth behavior of the banking market in the world's largest banks and argued that not only the size of the banks affects the growth pattern of the banks but some other bank-specific and macroeconomic indicators also have an influence on the growth of the banks. In addition to this (Wilson & Williams, 2000) determined the size and growth relationship of banks from 1990 to 1996 and concluded that the size and growth vary from country to country and region to region. Similarly, to check whether Gibrat's law holds or not (Vennet, 2001) examined the OECD banking sector. For this purpose, he collected the data from 1985 to 1994 and divided it into two samples. The sample based on Gibrat's law of proportionate effect concluded that the period from 1985 to 1989 was the period characterized by size convergence proving that smaller entities of the banking sector expand more rapidly as compared to a larger entity. However, for the period from 1990 to 1994 he observed a reversed proportionate period of growth. He proposed that credit quality, banking efficiency, and operational activities increase the growth of the banking sector. Moreover, he also found that the most efficient banks grow faster compared to the others. Finally, capitalization and bank growth have a positive relationship in the banking sector as measured by the capital to asset ratio. In the consequences of this study, (Goddard et

al., 2004) stated that the banks that have a higher rate of capital assets ratio tend to grow slower and their growth depends on macroeconomic conditions. They used the GMM estimation technique by gathering the data from the European Union commercial banks for the period of 1990 to 2000. They explored that banks that have higher capital and liquidity ratio have lower profits than the other banks.

Likewise, in another study by (Ward & McKillop, 2005) tested the size and growth relationship of the credit unions. The study covered the period 1994 to 2000 and used total assets and number of credit unions as well as the total number of employees to measure the growth of credit unions. The study had three major findings, i.e. first, the small credit unions grow faster but with a non-linear relationship. Secondly, they found a random pattern of growth. In one period, the growth is above average and in another period, the growth is observed at a below-average rate. Thirdly, the variability of the growth rates is not significant of its size; smaller credit unions grow faster as compared to the larger ones.

The findings of the a study by (Choi, 2010) strongly supports Gibrat's Law in the US insurance and property market. Further, it also explained that the young firms grow faster during the sample period and economies of scope significantly has a positive impact on the firm's growth as well. Another study by (Shehzad et al., 2013) investigated the relationship between size, growth, and profitability of the banking sector using a dynamic panel model for more than 15,000 banks across 148 countries from 1988 to 2010 using a two-step GMM approach. In this data, all high-income OECD countries are included and the sample includes 116,000 observations. This study analyzed the size and growing relationship with the help of different financial indicators, i.e. total assets, equity, return on equity and assets, liquidity of balance sheet, inflation and GDP in their total analysis did not reject the fluctuation in growth and profitability. Nevertheless, in

high-income countries, the bigger bank grows slower with a higher profit than the smaller banks but the smaller banks grow faster with lower profitability. Finally, they concluded that the bank growth and profitability are independent of each other thereby accepting Gibrat's law.

Similarly, (del Mar Miralles-Quirós et al., 2017) determined the connection between the growth size of Brazilian Commercial Banks to test Gibrat's law. For this objective, they used the data set from the period 2002-to 2013. The main variables for analysis purpose used were the growth-as dependent variable while size, cost-effectiveness, capital structure, liquidity ratio, and off-balance-sheet assets as explanatory indicators. The quadratic regression method used to estimate the relationship. In addition, quantile regression methodology was used. The results determine that there exists a non-linear relationship between growth and size, smaller entities or smaller banks have a positive significant impact whereas larger banks with a greater volume of assets have expected negative growth in the Brazilian-banking sector.

Similarly, (Nkwor & Ikpor, 2019) examined the Gibrat's in the Nigerian life insurance industries by using the panel data and GMM estimation regression techniques. In this study data is collected from 24 life insurers groups of the Nigerian Life Insurance companies and divided them into the sub groups considering the period from 2007- to 2014. They collected the data on different variables like firm size, age, and sales employment, profitability ratio and established that Gibrat's law does not hold into the entire insurance industry of Nigeria over the period. The results also indicated that smaller life insurers grow faster as compare to the larger companies. However, the profitability of the company associated with the growth of the company and reinsurance did not depend upon the growth in Nigeria. In addition to the above literature, a study by (Kleemans & Thornton, 2021) found that when the banks become bigger the firms grow slowly because the borrower base grew more slowly. Under such type of situations, the

banks do not focus on increasing their profit or efficiency when work with the riskier borrowers. These results indicate that with the enlargement of the bank size, the bank performance becomes slower and because of this, it proves harmful for some firms.

2.2.2 Growth and size contrasting Gibrat's Law on Manufacturing Sector:

(Cefis et al., 2002) examined that the firm's size and growth are not dependent on each other and because of this the small firms grow faster as compared to the larger firms. Moreover, there was a systematic difference in the firm growth and firm size. In addition to this, they also stated that the firm's growth does not depend upon the size of the firm rather it depends upon other features of the firm. Similarly, (Sleuwaegen & Goedhuys, 2002) stated that firms' size has a negative relationship with growth. They pointed out that if the efficiency of the firm remains consistent regarding age and size then it influences a positive effect on the growth. However, their study on western economies points out that while presenting a comparison to the growth process of the firms as small firms grow relatively slower while larger firms grow comparatively faster in co'tedvoir Region. For this purpose, the data was obtained from 1995 –to 1996. This was a survey based data under the framework of the World Bank project. In this data set, 185 manufacturing firms were included. The firm's specific indicators of sales, employment, and other structural variables remain understudied. Whereas, the probit estimation model is used to estimate the relationship.

After this, (Lotti et al., 2003) found the relationship between young, small firms by contrasting Gibrat's law. (2003) for this objective, they obtained the data from the Italian Institute of social security from Jan 1987 to Jan 1993. Growth is placed as the explained variable and size of the firm, age, capital structure, and local labor market conditions as explanatory variables. They

estimate the data with the quantile regression model. Whereas, their results were as, during the first year after the establishment of the firm five out of six units growth not correlated to the size of the firm. However, as the firms become older Gibrat's law exists making a U Shaped pattern of Growth. Moreover, the results suggested that LPE is acceptable when the firms once cross the minimum size and age thresholds have reached. Later on, (Chen & Lu, 2003) stated that in the food, electronics and textile industry Gibrat's law does not hold and there is no relationship between these firm sizes and growth. They provide the evidence on secondary data collected from 1988 to 1999 from Taiwan and in this panel data set 258 firms were included. However, keeping the size as dependent while net sales and net fixed assets as independent variables they conclude these results as discussed above.

Moreover, (Audretsch et al., 2004) to check the size and growth relationship, a survey comprises of nearly 60 studies and sales were taken as a measurement unit of firms size between 1987 and 1991. Besides this, the firm's data is segregated on the base of the size of the firm. Consequently, they adapted (Mansfield, 1956) approach and stated that those newly born businesses accounted for one-half of the industry value of the shipment being large. It was a big data collected from the Dutch hospitality industry. According to the findings the growth rate depends on size they studied, the Dutch hospitality industry and concluded that 11 out of 15 have a significant positive relationship with the growth and size.

Another study analyzed the Gibrat's law across the regions and calculated the evidence from Spain during the period 1990 to 2001 by using Hackman's methodology for estimation of 1073 manufacturing firms in which only 751 of them survived for the whole twelve-year period. The results of this study rejected the law of proportionate effect for the most developed Spanish regions. The results indicate that small firms grow faster than larger firms. These results also

showed that innovative activities in both the process and product have a strong positive impact on the survival of the firms. The innovation, efficiency of processes, and products have a positive impact on growth. (Nico et al., 2005) investigated through the empirical study the firm survival and the law of proportionate effect in the Greek during the period of 2001-2004. This study provided the views about the validity of Gibrat's law that larger firms normally grow and survive in the market than smaller firms. Therefore, to this advantage, these firms survive in the market and will grow. Whereas, the size and growth relationship with the surviving firms is negatively associated with each other and these reviews reject the Law of proportionate in the Greek market.

(Oliveira & Fortunato, 2006) analyzed Gibrat's low volatility by using the ordinary least square method on 28,8757 Swedish limited liability firms from 1998 to 2004 explaining that small firms exhibited higher growth than the larger firms and rejected the Gibrat's law. Furthermore, (Petrunia, 2008) investigated Gibrat's law's validity in the Canadian retail and manufacturing industry. For this, the impetus is the collected data from 1984-to 1996 on the bases of employment change. This data comprises annual employment and balance sheet information incorporated on employer enterprises within Canada. In addition to this, the equality of variance test was used for measurement. The results of this empirical study indicated that Gibrat's law is not valid for both the manufacturing and retail sector in the Canadian market in the sample period. The growth depends on age and selection and not on the firm size. Similarly, (Lotti et al., 2009) described whether the firm growth rate depends upon its size or not. For the evaluation purpose, they collected the balanced panel data set of a total of 2935 firms over 15 years. This data were based on firm-specific variables and collected from the firm annual reports that were sent to the regulators. This data covered the period from 1990 to 2004. The total net assets,

turnover ratio, and employment of the firms measured the firm size. However, to investigate this relationship a dynamic approach was used to test Gibrat's law. The main conclusion of this study was presented with the help of an analysis of the Danish firms. This depicts that, the large firms seemed to have a significantly positive effect with continuous higher growth than the smaller firms. So, in all the important industries related firms provide significant positive interconnection between the size and growth. (Fotopoulos & Giotopoulos, 2010) examined on the law in the Greek manufacturing industry by contrasting the law of proportionate effect and found that the Gibrat's law rejected on small micro and young firms. It also explained that there exist an inverse relationship between size and growth. In contrast to this, in medium, large and old firms the LPE exists. The size depends on these firms for growth. For the empirical analysis, they collect the data from the period 1995-2001 and estimated with the help of Chesher's (1979). (Teruel-Carrizosa, 2010) estimation described, the law of proportionate effect and learning process. In this study four different questions were discussed such as what is the evidence that small size firms' growth can affect? The second question is about the learning perspective. Third, one is about, how LPE differently affects the manufacturing and the service industry? Fourth, is it about the SMEs affecting the speed of convergence? Moreover, In this study the author, analyzed the sample of the Spanish firms to answer these questions and evaluate Gibrat's law using the unbalanced panel data between 1994 and 2002 from 139922 firms belonging to the manufacturing and services industry of Spain. The size was taken as the explained indicator and the previous year's size and age of the firm data as independent variables. Using the hausman test the result showed that SMEs grow faster than the larger firms do. Furthermore, with the passage of time firms grows faster but they grow less when the firms become old i.e. making U shaped Curve. They also concluded that the small manufacturing firms grow faster

compared to the small service provider firms. More they find out that small firm tends to grow faster than larger firms.

In 2012 (Daunfeldt et al., 2012) described the validity of Gibrat's law in the Sweden retailing sector. For this purpose, they obtained the data from 1998 to 2004 containing those firms that were surviving limited liability firms in Sweden during the study period. They took revenue, profits number of employees, and some other firm-specific variables to study the relationship. The findings of this research article concluded with the help of ordinary least square mentioned was the acceptance of the Gibrat's law for large firms as well as small firms.

The study of (Moreno et al., 2014) described the relation between firm growth and volatility. They investigated this relationship to check the entrepreneurial and environmental historical impact on growth and firms of small size. They used for this purpose the questionnaire-based survey of 433 Spanish small firms. They gathered qualitative as well as quantitative information. They used the quantitative data for the period of 2004 to 2007. The estimation techniques they used to analyze the data by four different types of models. The authors found that some of the predictors of the firms influence volatility specifically volatility based on environmental hostility. Similarly, growth also influences firms' volatility. Finally, they stated that growth and firm size have strong interaction of firms' growth. In another study by (Nassar et al., 2014) found the validity of Gibrat's law in the service sector of Jordan. Whereas, to prove the significance of the law of proportionate effect they used the transition matrix from 2009-to 2013. They collected the data from the department of statistics of Jordan using sales as a measurement of size. They concluded that the service sector rejects Gibrat's law which means that larger firms grow slower than the smaller ones. Likewise, a firm's size and growth are not dependent on each other in the service sector of Jordan.

(Ivandić, 2015) explained the impact of ownership using Gibrat's law by collecting data from the hotel industry in Croatia. The sample period under study was 1998 to 2008. The results showed that the smaller hotels in Croatia did show faster and continuous growth whereas the larger hotels as slower than smaller hotels. However, their findings provided the predictions about the privately owned and public owned hotels, they state that the privately owned firms retained the customers well as compared to the state-owned firms. Likewise, (Harkati & Mohamad, 2016) studied the validity of Gibrat's law in the Malaysian firms with the liquidity constraints. They used for analysis purposes the GMM estimator on the panel data of 210 Malaysian firms from 2005 to 2014 and concluded the results that the Gibrat's law was invalid in the context of liquidity constraints and had no role in explaining the firm growth and size. However, age has a positive effect on a Firm's Growth. On the other hand in a study of (Megaravalli & Sampagnaro, 2017) found the validity of Gibrat's law from a panel of selected Indian firms in 2017. The period covered was from 2010 to 2014. This study dealt with the specific question of whether Gibrat's law holds on a selected panel or not? The second question is how the firm's age, liquidity, and working capital ratio affected on firm's growth. For this purpose, Amith Vikram and co. used different models of panel data set estimated by unit root test and Quantile regression methods. The consequences of this estimation the result predicts that the firm's age positively affects growth and significantly negative effect on non-high growth firms. Likewise, working capital and liquidity ratio positively affect the growth. In this study, Gibrat's law was conclusively rejected for the selected manufacturing industry, however, predict that the LPE is not valid for the functioning of the manufacturing industry. In addition, the study by Dena Dail Breece investigates the firm's growth and size relationship concerning Gibrat's law. For this purpose, the evidence collected based on the panel data set from the period 1991-2015 consisted

of 82 surviving US public companies in the industrial economic sector. By using the GMM, they found that the firm growth did not dependent on firm size. Gibrat's law does not hold but innovation and development have a positive impact on the firm growth and ROA and profitability hurt the firm growth as well as leverage, and agency cost. (Harkati et al., 2018) in an article argued about the Malaysian ACE market in 2018 and the time frame covered was from 2008 to 2014. The firms that are not registered in 2008 were excluded from the data panel and a total of 84 firms were involved in this study. The variables taken to estimate the relationships were age, size and cash flows. The estimation method used for this purpose was transformational. The findings of this paper suggested that Gibrat's law could not be accepted by Malaysian ACE market firms as large firms grow faster than smaller ones.

Recently, (Arouri et al., 2018) presented a research note with an explanation of whether or not Gibrat's law holds in the urban social economy enterprise. For this objective they collected the data for the period 2007 to 2012 from organizational survey. Their finding rejected the Gibrat's law over the urban social economy enterprise. The largest firms seem into crisis than the smaller firms. Likewise in another study of Hassan et al.2018 determined the relationship between firm size and growth concerning Gibrat's Law in Tunisia. Their predictions rejected Gibrat's law. They suggested that the smaller and young firms grow faster compared to the large and mature firms. This was a quantitative study based on the period of 1996-2010 of registered firms in Tunisian. The estimation technique used by them was the Quantile regression on the model including variables of employment growth rate as an explained variable while employment and sales were taken as the independent variables.

The study of(Bianco et al., 2018) focused on the manufacturing industry from the period from 1950 to 2010 by taking into account some indicators like firm growth size and age of the firm

and using the estimation technique as a quantile regression on the obtained sample of data. The findings of the paper revealed that the size affected the growth even if the firms are high performing or at low-level performance. However, at the median age has no impact on the growth of the firms. However, the study concluded that in the manufacturing sector small firms foster as fast as compared the larger firms. This evidence provides support for the theoretical prospects for Gibrat's law in the United States. Later on, (Hedija & Fiala, 2019) investigated the Slovakian firms that hold Gibrat's law or not. For this purpose, they obtained the data that is panel set from the period 2009-to 2016. More than 40,000 Slovakian firms consisted in this period. They employed the slaw for the measurement of a firm's size using traditional ordinary least square regression and quantile regression. Their findings rejected the LPE on the aggregate level and for the size of the firm at individual level. They pointed out that the interconnection between firm size and growth varies depending on the firm size. they also stated that the size of the firm should be considered in firm growth analysis. In (Hedija & Fiala, 2019) described the Nigerian firm sector to examine the relationship between the size and growth of firms. The dynamic panel data of 63 non-financial firms listed on the stock exchange of Nigeria were used as a sample size, investigate by the GMM estimation of the negative relationship between the firm growth and size, supported that the smaller firms, and reject the larger firms in the sense of the growth. The collected data covered the period from 2012 to 2016. Whereas, (Nkwor & Ikpor, 2019) study tested the link between the profitability and size of the firm. However, for this purpose, they collected the panel data set of 30,000 firms and divided the firms into different quantiles to remove the robustness issue. The time frame of the data set was from 2007 to 2012. To find out the results from this data they used the OLS estimation method using ROE as the size of the firms, total assets, the number of employees and profitability ratio are taken as a control

variables. The results of the estimation indicated that the law of proportionate effect has no relation to the size and profitability of the firms whereas the small firms grow faster as compared to the larger firms. (Nkwor & Ikpor, 2019).

Very recently (Aydogan & Donduran, 2019) examined Gibrat's law using panel data set of one million firms in turkey from 2005 to 2016 by applying fixed and random effect models and also using the likelihood method for analysis purposes. The variables taken into account were sales, employment and age. They find out those Turkish firms did not grow in proportionate to the growth, and smaller firms grew faster as compared to the larger firms. Similarly, (Simbaña-Taipe et al., 2019) explored the relationship between firms' growth, size and age. For this purpose, they obtained the data set that initially includes 10196 observations on 1971 firms over the period 1990-1995. This was unbalanced panel data set because many firms entered and exited during the prescribed period. To prove this relationship, they used two different methods. Evan and hall used the first method and the second was used by Dunne et al.1989. First, data divided into two sample groups. One sample group based on all the firms and the second on non-failing firms. The other milestones of this study were, that they used non-parametric approaches to summarize the age and size variation in growth and exit rate. These two estimation techniques were the standard regression model and Kernal Regression estimator techniques. Moreover, the indicator age and size also sampling as. Five age classes made are less than 5 years, 6 to 10 years, 11 to 25 years, 26 to 50 years, and more than 50 years. In addition to this firm size is measured by the members of employees working there. This variable of size was also sampled into five classes less than 20 employees to 21-50 employees, 51-200 employees, firms with 201 to 500 employees, and more than 500 employees respectively. Based on the result compiled, the outcomes are these.1. Firm age and firm size rate on the failure of firm decline.2. Age also hurts

a firm growth rate when the firm moves toward the failing phase. They observed zero impact of age and size during this study. Hence, the results indicate a negative relationship between the size and growth of the surviving firms. (Yadav et al., 2020) examined the growth and size relationship under the framework of Gibrat's law. They collect the data of 12,001 nonfinancial firms from 1995 to 2012, which are listed and active in 12 Asian developing countries. By collecting the unbalanced panel data set of the firm's total assets, net sales and some other firms' specific variables such as equity return, leverage, and liquidity ratio along with some macroeconomic variables like GDP growth and two financial indicators they found out that Gibrat's law for the Asian firms is not applicable. Furthermore, the law of proportionate effect was also rejected across the small enterprises. They highlighted that small firms grow faster as compared to the larger firms in Asian developing countries. The firm-specific indicator which is the leverage of the firm has a significant negative impact on the firm growth and some other factors which are GDP and liquidity ratio were found to be significantly positive with the growth of the firm. (Li et al., 2021) examined Gibrat's law by using the data set of USA firms registered in the stock market in the United States from 1963 to 2018. For the analysis purpose, they used dependent indicators for measurement of the growth, which are firm age, equity and assets. To estimate the data, they used Fama-Macbeth cross-sectional regression and Fama-French three factor-loading models. The concluded remarks of their study were that the size effect on the growth and it decreased as the young firms grow into the larger ones or become older. Whereas, the growth decreases with the size increases. This study also rejected the gibrat's law in the United state Firms. (Bojnec & Fertő, 2020) studied Gibrat's law on the Growth of Agricultural farms in Hungary and Slovenian on a comparison basis. Their findings suggested that the law of proportionate effect is not valid for the Hungarian Farms but has a less impact on

the Slovenian farms. Furthermore, the farms run individually grow faster as compared to the larger farms. Reckoning to this, Pal boring states the relationship of firms' age on the highly skilled workers working in these firms. He found out that newborn startups or firms have a higher proportionate effect on highly skilled workers. This means that startups also influence the skills of the workers so for the estimation purpose he used a sample of panel data set for 2000-16 from Norwegian firms and used GMM methods to estimate. A total of 1544016, observations were included in his study. Moreover, Javier et al. 2020, in their study on a sample collected from the Spanish firms from the period 2003-to 2013, investigated by using the GMM that size, age and growth have no positive relationship with each other. The variables used in this panel data set are size and age taken as independent variables on the other hand dependent variables was growth.

2.2.3 Literature on Service Sector growth by applying the Gibrat's law

The business has two roots one is manufacturing and the other is a service provider. Like education, health, communication means, and hospitality sectors are all considered service-providing institutions. (Oliveira & Fortunato, 2008) probed the dynamics of growth of firms taking the evidence from the service sector. The purpose of this study was to investigate either Gibrat's law is valid for the service industry or not. An unbalanced panel of data was used for the period 1995 to 2001 collected from the smallest firms of the Portuguese service. The growth was the explained variable and independent variables were liquidity, employment growth rate and leverage and used the GMM estimation method to analyze the data. Their findings suggested that the Gibrat's law rejected the services provided by firms. Furthermore, the growth is mainly observed by the firm size and firm age. Additionally, (Lotti et al., 2009) defended the law of proportionate effect in the long run supported their work by collecting the data of communication

cells in the Radio and TV industry from 1987 to 1994 from Italy and all the firms consisting in this sample which were active at the initial stage. They were used for the estimation purpose of the Probit model and maximum likelihood method. The results of this study revealed that small firms grow faster compared to larger firms. Similarly, (Gao et al., 2016) examined through the panel data set obtained from 14 merchants firms registered on Taobao.com and analyses this sample through the GMM estimators technique in 2015. They studied the size and growth relationship dynamics of online stores on china's taobao.com. Specifically, their study focused on customer-to-customer interaction in the online marketplace. Their findings predicted the validity of Gibrat's law in the online market. Furthermore, their findings point out here that the small stores grow faster as compared to the larger ones. Later on, (Simbaña-Taipe et al., 2019) by taking a sample of 17,082 Ecuadorian companies from the service sector for the period 2010- to 2015 estimated the panel data by using quantile regression. The objective of their research was to find the relationship between the size and growth of the firms with the help of Gibrat's law. They also used some other variables on the growth like age, capital structure and indebts as the explanatory variables and growth taken as the dependent variable. The size measured in the form of sales and the number of employees working in these firms. Furthermore, they also used some other variables like efficiency, innovation, profitability, liquidity, and total assets and liability to measure the growth of the firms. Finally, they concluded that small companies grow faster than larger ones. The results showed that the firm size did not affect the growth of the Ecuadorian region.

Recently,(Balthrop, 2021) studied Gibrat's law on the trucking industry. This paper illustrated that the size of the firm is well imprecise with Zipf distribution estimation. Such as estimation linked with the random growth process that is independent of the firm size. For this objective,

they applied the models of Gabix and siache et al (2010) for the trucking industry analysis. They used data obtained from the Federal Motor carrier safety administration of 2016. They observed the random growth pattern with the size of the industry and concluded that Gibrat's law holds in the trucking industry. Finally, they stated that the size and growth interlinked with each other. Consequently, (Stancu et al., 2021) explored the evidence of Gibrat's law's validity on firm growth in the Romanian health sector. They used the panel data set of 545 Romanian firms operating in the Health sector. This empirical literature on selected indicators estimated was panel quantile regression. The findings of the study showed a negative relationship between a firm's growth and size. Moreover, the size matter for those firms, which are on the stage of upper growth not for the smaller ones but the smaller firms grow faster.

By considering the empirical and theoretical literature, it might be concluded that the size and growth of the bank's relationship differ from region to region and country to country. A few studies accepted Gibrat's law whereas most of the studies rejected the this law. To, check this relationship between the size and growth there are different methods and techniques. All these studies vary from one to another and some report mixed results. Besides this, the size and growth relationship by contrasting Gibrat's law checked on firms, cities, manufacturing industries, and to some extent the banking industries in the USA and Europe but in Pakistan, there exist no study for the banking sector analysis.

Table 1 : Summary of Literature Review.

Author	Countries	Year of study period	Results	Relationship of size and growth
Alhasdeff and Alhadeff (1964)	USA	1930-1960	Rejection ⁵	Negative
Rhoades and Yeat(1974)	USA	1960-1971	Rejection	Negative
Yeats et al.(1975)	USA	1960-1970	Rejection	Negative
Tchoegl(1975)	USA	1960	Rejection	Negative
Wilson and Willams(2000)	Europe	1990-1996	Mix ⁶	Negative for Italy and Null for France
Vennet (2001)	OECD	1985-1994	Rejection	Negative
Goddard et al.(2002)	USA	1990	Rejection	Positive
Ward and McKillop(2005)	UK	1994-2000	Rejection	Positive and Negative
Benito(2008)	Spain	1960-2006	Mix	Negative
Shehzad et al.(2013)	OECD	1998-2010	Rejection	Positive (non-OECD) Negative OECD
Goddard et al.(2014)	USA	1994-2010	Rejection	Positive ⁷
Fenholz and Hoch (2016)	USA	1960-2014	Rejection	Positive
Merilianen (2016)	Europe	2004-2013	Rejection	Positive
Goddard et al.(2016)	USA	1994-2012	Rejection	Positive
M.M.Miralles- Quiros et al. (2017)	Brazile	2002-2013	Rejection	Positive

Source: Author's interpretation based on literature

⁵ Size and growth relationship between the banks is negative and gibrat's law rejected.

⁶ There are mixed results in this study in some countries Gibrat's law accepted whereas rejected.

⁷ Size and growth relationship is positive between the banking sector.

CHAPTER 03

RESEARCH METHODOLOGY

3.1. Research Strategy:

The growth and size association of the banks were previously analyzed with different estimation techniques like the ordinary least square method (OLS), the fixed effect method (FE), and the generalized method of movement (GMM) based on the nature of data. Previous literature shows that excess financial regulation and deregulation altered the growth pattern so there may be non-linear relation exist between the growth and size of the banks. So, for this purpose to express the relationship between these two variables (Koenker & Basset, 1978) proposed a Quantile regression model which is expressed in the following equation.

$$y_{i,t} = x'_{i,t}\beta\theta + \mu_{i,t} \quad \text{Being} \quad x'_{i,t}\beta\theta = \text{Quant}\theta(y_{i,t}|x_{i,t}) \dots\dots\dots\text{Eq.1}$$

Equation 1 has been taken from the study of (del Mar Miralles-Quirós et al., 2017)

In the above equation y_{it} is represented as the dependent variable X_{it} in the vector of independent variables, whereas β is the parameter of the estimators and μ_{it} is expressed as the error term while θ is indicated as the quantile condition of “*Quant*”. In this context, this study has employed quantile regression that leads to quintile regression. The Goddard model of 2004 has been used which is as follows

$$Greci,t = \beta_0 + \beta_1 TA_{i,(t-1)} + \sum_{i=2}^n \beta_k VC_{i,(t-1)} + \mu_{i,t} \dots\dots\dots\text{Eq.2}$$

$Greci,t,t$ Represented the bank growth i in year t with the difference of growth in **two** consecutive years whereas $TA_{i,(t-1)}$ represents the bank size with lag value and $Bkvc_{i,(t-1)}$

presents the vector of all other independent variables with lag values. Similarly, μ_{it} represents the error term. All the variables understudied given in table below.

3.2. Data collection:

For the analysis purpose, This study has used the secondary data for the period from 2005 to 2020. Moreover, Banks' annual financial reports and SBP published data used for bank-specific and macroeconomic indicators.

3.3. Sampling:

The sample size consists of 17 commercial banks (excluding Islamic banks) that are listed on the stock exchange of Pakistan and the data is available on the State bank of the Pakistan website and the bank websites. The total number of observations are 272 for sixteen years' data (2005-2020).

3.4. Econometric Model

In the context of the literature review, there are different methods used to analyze the relationship between the growth and the size of the banks (e.g. OLS, Quantile regression, and GMM estimation). This study has used the estimation method of (del Mar Miralles-Quirós et al., 2017). They have used quantile regression, which is the extension of the linear regression, and after this; they follow the GMM estimation method to analyze the data. The proposed model of this study is as follows

$$\begin{aligned}
 BG_{i,t} = & \alpha_0 + \beta_1 (BS)_{i,t} + \beta_2 (BSS)_{i,t} + \beta_3 (NPL)_{i,t} + \beta_4 (LR)_{i,t} + \beta_5 (CR)_{i,t} + \beta_6 (SRD)_{i,t} \\
 & + \beta_7 (INF)_{i,t} + \beta_8 (EXR)_{i,t} + \beta_9 (AGE)_{i,t} + \beta_{10} (GDP)_{i,t} + \beta_{11} (PRO)_{i,t} + \beta_{12} (EFF)_{i,t} + \\
 & \beta_{13} (INN)_{i,t} + \varepsilon_{i,t} \dots\dots\dots (Eq.1)
 \end{aligned}$$

Table 2 : Description of Variables

Variables	Description	Notation
Bank Growth	Two consecutive periods difference of the bank size variable	BG
Bank Size	Natural log of total assets	BS
Bank Size Square	Square of logarithmic value of total assets	BSS
NPL ratio	The ratio of the number of nonperforming loans to the total amount of outstanding loans	NPL
Liquidity ratio	The ratio of advances to deposits	LR
Capital ratio	The ratio of a bank's capital to its assets	Cr
Spread	Difference between the deposit rate and advances rate	Srd
Inflation	Annual Consumer Price index	INF
Exchange rate	Real exchange rate	EXR
Age	Year of establishment date	AGE
GDP	Real annual GDP rate	GDP
Profit	Net income	II
Efficiency	The ratio of total expenses to total income	EFF
Innovation	Total number of ATMs	INN

The measurement of all variables given in Table 3 has been explained in given table no 4.

Table 3 : Dependent and independent variables

Variables	Proxies
Dependent variable	
Bank Growth (BG)	Difference of two consecutive years total assets with Natural log.
Independent Variables	
Bank Size(BS)	Total number of assets millions(Rs.)
Bank size square(BSS)	Square of log value values of total assets
Non-performing loans(NPL)	Outstanding loans /total advances
Capital Ratio(CPR)	Capital / total assets
Liquidity ratio(liq)	Advances to deposit ratio
Efficiency	Cost to income ratio
Innovation(INN)	Total number of ATMs
Profitability (<i>PRO</i>)	Total profit in millions rupees after tax
Age(AGE)	Number of years from the date of establishment
GDP	Real GDP of the country yearly
Inflation(INF)	Consumer price index
Exchange rate (EXR)	Real exchange rate with respect to the dollar
Interest rate Spread (SPR)	Difference between lending and deposit rate of return

3.5. Dependent Variable

3.5.1. Bank growth (BG)

The bank growth has been measured by taking a logarithm of the difference of total assets between two consecutive years. Whereas, growth is explained by the size of the bank which is the total asset of any financial institution. The study of (del Mar Miralles-Quirós et al., 2017) has indicated that size and growth have a non-linear relationship with each other representing inverted 'U' shaped curve.

3.5.2 Explanatory Variables

3.5.3. Bank size (BS)

The accumulated outcome of the bank growth depends upon the bank size. Mainly the results obtained and the previous literature on the banking sector on size and growth measurements concerning the Gibrat's law has showed that there exists a significant relationship between size and growth of banks but this relationship moves from positive to negative and then insignificant in first, second and third quantile respectively. There are three assumptions of Gibrat's law

- i) Greater the size of the banks in terms of assets increases the level of the growth of the banks.
- ii) Fluctuations in Growth of the banks depends upon the size pattern.
- iii) The growth of banks, it remains consecutive in respective two periods and then deviates towards non-linearity or random walk.(Shehzad et al., 2010)

3.5.4. Non-Performing loans (NPL)

Non-performing loans affect banks' performance. Proxy of the NPL ratio used in this thesis is based on the outstanding loans divided by total loans. However, an increase in the NPL ratio predicts a lower performance of the bank and the bank runs towards a default situation or mergers. Its means that when the size of the NPL increases then its effect should be negative on the growth (Vennet, 2001).

3.5.5. Liquidity ratio and capital ratio (LR and CR)

These indicators taken as the control variable in the model. Liquidity and capital ratios both describe the behavior of the banking sector. Excess capital ratio and liquidity explain the conservative operation of an entity. Its means that the firm is not taking any advantage of the investment opportunities and some other idle resources. Therefore, it affects the profitability and growth pattern. However, it proves that higher these ratios improve the soundness of the banks. (del Mar Miralles-Quirós et al., 2017)

3.5.6. Efficiency (EFF)

This variable measures the cost divided by income ratio i.e. how much the managers' work effectively regarding their work output. Additionally, when the cost increases as compared to the net income then the profitability of the banks also declines and it has a negative impact on growth of bank. When the size of the bank expands in terms of assets the efficiency level becomes lower and growth is affected (Shehzad et al., 2010).

3.5.7. Innovation (INN)

Innovation plays a vital role in the expansion of the bank networks. For instance, in the development of the information technology and digitalization of the financial system banks expanded their size. The proxy of innovation used in this study is the total number of ATMs installed by the banks during 2005-2020. The greater number of ATMs improve the quality and soundness of the bank (Tahir, 2018).

3.5.8. Profitability of the bank (PRO)

Income generated through the own resources of the bank is determined by the profitability of the firm. The greater profitability of a bank has a positive impact on the growth of the banks (Mananda, 2017).

3.5.9. Age

The age represents the life span of banks individually from the establishment date. It comprises the total number of the years since the banks have come into existence (Sakyi et al., 2014). Its effect may be positive or negative on the performance of the banks. Positive impact reveals that older banks gained experience as compared to the new ones and improves performance of the banks. The reason behind this the old organizations learned by trial and error. Whereas the newly formed organizations earn from their ability of skills and on the base of knowledge as well as from new technology may gain, more profit (Sakyi et al., 2014).

3.5.10. Real Gross Domestic Products :(GDP)

Gross domestic products express the overall condition of the economy. The literature have measured the links between economic growth and the economy and revealed that it may be a positive relationship as well as may be negative between these two variables (Huang & Yeung, 2018).

3.5.11. Inflation (INF)

For the measurement of macroeconomic stability, the inflation indicator has used computed by the annual consumer price index. The relationship between bank performance and inflation was firstly introduced by (Revell, 1979) with the statement that with the rise in inflation rate the performance of the banks decline. Inflation provides help to the financial institutions in determining the interest rate. The various studies existed regarding the inflation rate and the performance of the banks (Hadriche, 2015).

3.5.12. Spread (SPRD)

The term spread is, derived from the difference between lending and investment rate of interest and deposit rate offered by the banks to their customers. This indicator describes the overall intermediary position of the bank margin. Higher the spread ratio is an indication of increase in bank growth. If the margin declines, the profitability and growth of the banks will also decline (Vennet, 2001).

3.6. Methodology:

As a standard procedure normality of data and multi-collinearity have been checked after the specification of the model.. To check the multi-collinearity between the variables the VIF test and correlation matrix have been used. The coefficient of the variables equals to 0.10 or greater is a reflection of the existence of severe multi-collinearity problem. However, there is no serious relationship between variables in the data empirically but there should be multi-collinearity and strong correlation between the bank size and growth of the bank because the total assets of bank generate both of these variables. So there might be a problem of endo-genity in the data.(del Mar Miralles-Quirós et al., 2017)

Another assumption of the linear model regression is to test the heteroscedasticity. According to this assumption the variance of the distribution error term ($\epsilon\epsilon$) is constant. If error term is not constant, then it referred to as there is the problem of heteroscedasticity in the data set. If the hetero exists in the data then OLS becomes biased. Therefore, for the deduction of hetero Wald test has been used for it and there was no problem of hetero has been found in data.

3.7. Quantile regression:

For the examination of linear and non-linear relationship between bank growth and size variables the quantile regression proposed by the (Koenker, 2001) has been applied. It is impossible to contrast Gibrat's law without the Quadratics regression methodology. It explains the relationship is either linear between the growth and size of the banks or non-linear. Therefore, for this purpose the data has been segregated into three quantiles. The First quantile is 25% second in on 50% and third one is based on 75% weightage.

After quantile regression the GMM estimation model has been applied. Nevertheless, for this purpose firstly it has been checked either the data set has any type of endogeneity or not so, we checked it and found out that there is no any type of endogeneity in the data set empirically. For this purpose, we use the Sargan and Wald test to find out the endogeneity in variables but at the end, we concluded that there is no endogenous variables in the data set and all variables are exogenous.

Empirically H_0 : rejects the endogeneity issue but theoretically, there exists this issue so we further move towards the GMM estimation method, because this test provides us clearer picture of data. We do not use any instrumental variable in this method of movement but a simple GMM runs and get the result.

However, theoretically the collinearity exists in the data set and endogeneity problem also found out theoretically. Therefore, to address the said problem the GMM estimation model employed as suggested by Goddard et al 2002.

3.8. Generalized Method of Movement:

To address the above-mentioned problems this study employs the two-step system GMM. The study employs the balance panel estimation with instruments and this technique is very suitable for situation like small firms and large firm and facilitates to avoid the loss of degree of freedom. From analysis of literature on the determinants of banking performance, it is observed that the growth of banks are very persistent or unfluctuating and there exists endogeneity between the size taking and growth. But regardless to this there is no endogeneity in the present data set. Due to this the data estimated without Instrument and GMM estimation technique used.. In literature, it is found that some studies employ the difference GMM in which the lag values of regresses were

introduced as instrumental variables. Later on, it was demonstrated by Blundell & Bond (1998) that difference GMM gives biased result in case of small and large firms data in unbalanced and balanced data set. Thus in such a situation it is advised to prefer system GMM on difference GMM. Thus, considering the above-mentioned drawbacks of difference GMM; the system GMM is preferred in this study. The advantage of system GMM is also that it is efficient and robust to autocorrelation and heteroscedasticity.

CHAPTER 04

RESULTS AND DISCUSSION.

4.1. Descriptive Statistics:

The Table 5. provides the information related to the variables summary statistics including the means of the variables, standard deviations minimum and maximum value of the variables included in this table.

Table 4 : . Descriptive Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max	Skew.	Kurt.
BG ⁸	253	0.154	0.122	-0.234	0.926	1.651	11.521
BS ⁹	270	26.523	1.224	22.825	28.979	-0.511	2.867
NPL ¹⁰	270	0.11	0.069	-0.020	0.500	1.747	8.98
EFF ¹¹	255	0.774	2.905	0.240	46.78	15.668	248.588
LIQ ¹²	270	0.575	0.15	0.160	00.95	00.005	2.518
PRO ¹³	252	118.544	72.162	1.00	243.00	0.008	1.783
INN ¹⁴	270	556.574	530.779	0.180	2157	1.070	3.180
SRD ¹⁵	271	0.049	0.013	.0311	0.070	-.0223	1.591
CPR ¹⁶	271	0.673	2.847	0.011	19.78	5.424	31.079
AGE	271	35.694	23.949	4.000	81.000	0.483	1.693
EXR ¹⁷	271	105.946	31.083	61.504	169.071	0.588	2.845
GDP ¹⁸	271	3.689	1.729	-0.470	5.560	-1.088	3.355
INF ¹⁹	271	8.668	4.718	0.070	20.86	0.610	3.605

⁸ Bank Growth (Logarithm of two consecutive years)

⁹ Bank size (Log of total assets in millions Rs.)

¹⁰ Non-performing loans(Ratio)

¹¹ Efficiency (Ratio)

¹² Liquidity (Ratio)

¹³ Profit (profit in millions Rs. taking log values)

¹⁴ Innovation (Total number of ATMs)

¹⁵ Interest rate spread (Ratio)

¹⁶ Capital ratio

¹⁷ Exchange rate (Pak rupees value in dollars)

¹⁸ Gross domestic product (ratio)

¹⁹ Inflation (ratio)

This table comprises the indicators related to this study of bank-specific and macroeconomic indicators. The total number of observations is 272 of 17 commercial banks, which are included in this study. The bank growth (BG) has an average mean of 0.154 and a standard deviation of 0.12, with the minimum and maximum values being -0.234 and 0.926, respectively. Additionally, the skewness of the bank growth is 1.651, which is greater than zero, which tells about the right tale distribution of the data and data is lack of symmetry. Whereas, the Kurtosis of the BG in descriptive statistics is 11.521 that describes the peakdness of the data and this is the platy-karstic distribution of the data.

On the other hand, (BS) is an explanatory variable in the data with an average 26.523 whereas, minimum and maximum value of the Bank size is 22.825 and 28.979 respectively as well as the degree of dispersion regarding standard deviation is 1.224. So on the skewness is -0.511 represents the bell-shaped distribution of the bank size variable data. Similarly, the kurtosis of the data set is 2.867 less than three tells that it is the platy-karstic distribution of the data set.

The profit (PRO) taken into millions PRs has an average mean of 118.877, the minimum value of the profit is 1 and the maximum value is 243 in a total of 252 observations and the skewed value of this indicator data set is .008 which tells us the data is positive and right tale distribution occur in this data set. Beside to this, when we look into the column of Kurtosis with the value 1.783 that explains the platy-karstic distribution and the data is normal.

Furthermore, the other variable in the data set is innovation (INN) has a total number of observations of 270 mean value is 556.574 and the degree of dispersion of the variable is 530.799 the maximum and the minimum value of the data is a 2157 and 0.180. Whereas, the data is right tale distributed according to the skewed and platy-karstic according to the value of kurtosis.

Whereas, the variable representing in the data of non-performing loans (NPL) has 270 observations from the period 2005 to 2020 and the average value of this variable data set is 0.11 maximum value is 0.5 minimum value of NPL is in negative (Because some banks have a lower risky situation and very less non-performing portfolio) that is (0.02). In addition, the standard distribution of this data set is 0.069 skewed value of this data variable is 1.747 right tale or positive tale distribution and the Kurtosis value represents that this data is not a platy-kurtosis distributed.

Efficiency (EFF) has an average value of 0.774 with a standard deviation of 2.905 maximum value of the data set is 46.78 and the minimum value of the data set is 0.24 here is a great variation in the data. Whereas, it is positive tale distribution and Leptokurtic concerning the value of the kurtosis.

Similarly, the average value of liquidity (LIQ) is 0.575 out of 270 observations. The degree of dispersion of this data set is 0.15. This shows that there is less variation in the data. Besides this, the minimum value of this data set is 0.16 and maxima 0.95 whereas, skewness expresses that it is right tale distribution and platy-kurtosis according to the value that is 2.518.

The exchange rate (EXR) was taken as a control variable from 2005 to 2020 with the total observations of the data set is 271 with an average mean value is 105.946. The standard deviation of this data set is 31.083 and the minimum value in this data is 61.504 so the highest value of the data set is 169.071. The skewness of this data set is 0.588, representing that it is not a bell-shaped distribution and has a right tale distribution. In addition, the kurtosis value of this set is 2.845, which is less than 3 and tells us that the data set is platy-kurtic.

Gross domestic product (GDP) as a macroeconomic indicator included in the model. The statistical description of the data tells us that this data set has an average value of 3.689, with 1.729, standard deviation skewed value is (1.088), that shows that it is left tale distributed and kurtosis value is 3.355 expresses that it is leptokurtic distribution. The maximum value of the data set is 5.56 as well as the minimum value is (0.47).

The major macro-economic indicator is inflation (INF) included in the data set for 2005 to 2020 with a total number of observations of 271, an average value of the data set is 8.668, and the standard deviation of the data is 4.718 that shows the less variation in the data set. Therefore, the minimum value is 0.07. Therefore, the maximum value of the data set is 20.86. The kurtosis value of this data set explains that this data set is leptokurtic with the skewed value of 0.67, and the right tale is distributed.

The average spread (SRD) rate is 0.049 whereas the minimum value of this data set is 0.07 as well as it is platy-kurtic and left tale distributed according to the value of skewed that is (0.223). Similarly, the standard deviation of this data is 0.013.

While, the variable age (AGE) has a maximum value 81 years and minimum value is zero means that one bank incorporated in 2005 established here in Pakistan was in his initial stage.

Capital ratio (CPR) is a control variable of the bank-specific determinants an average value of this data set is 0.673 and the standard deviation of the data is 2.847. Kurtosis value is more than three describes that it is the leptokurtic distribution of data. As well, as with the skewed value of 5.424 is more than 0 and positive so it is the right tale distribution.

4.2. Correlation Matrix

Table 6. Describes the correlation between the variables. If any value is greater than or equal to the value of 0.80 then we considered that there is a serious correlation in the data set. However, there is no value that is greater than or equal to this value. Therefore, correlation problem does not exist in the data set. This based on the diagnostic test related to correlation between the variables. If the variables correlate to each other than the model standard errors and model specification errors rises. Therefore, to avoid from any ambiguity correlation matrix provides help in further regression. Therefore , the below table represents that all the variables except the innovation and profitability are correlated with the bank size that is independent variables in the data set. Both the variables gives the value of above .80 percent and slightly close to the .80 that is 78 percent so according to the statistic rule there exists a strong correlation in data set between these two variables. All the variables and data set is normally distributed but there is correlation between innovation and profit variables.

Table 5 : Correlation Matric

VARIAB	BG	BS	NPL	EFF	(LIQ)	(PRO)	(INN)	(SRD)	(CPR)	(AEG)	(EXR)	(GDP)	(INF)
LES													
BG	1.000												
BS	-0.310	1.000											
NPL	-0.144	-0.018	1.000										
EFF	0.154	-0.431	0.149	1.000									
LIQ	-0.057	-0.235	0.032	0.005	1.000								
PRO	-0.262	0.827	-0.049	-0.547	-0.227	1.000							
INN	-0.232	0.793	0.100	-0.209	-0.329	0.692	1.000						
SRD	0.233	-0.500	0.133	-0.071	0.166	-0.256	-0.234	1.000					
CPR	-0.045	0.255	0.154	-0.020	-0.052	0.190	0.199	-0.142	1.000				
AGE	-0.321	0.690	0.100	-0.519	-0.199	0.649	0.689	-0.121	0.211	1.000			
EXR	-0.246	0.479	-0.120	0.088	-0.129	0.239	0.229	-0.872	0.108	0.122	1.000		
GDP	0.206	-0.068	0.093	-0.089	-0.133	0.018	-0.051	0.205	0.020	-0.026	-0.436	1.000	
INF	-0.032	-0.230	0.071	0.093	0.094	-0.152	-0.072	0.352	-0.078	-0.151	-0.044	-0.530	1.000

Quantile regression *Table.7* represents the growth and size relationship in the banking sector. It explains the linear or no-linear relationship between the size and growth.

Table 6 : Linear contrast of Gibrat's Law: Results for the per quantile

Variables	1 st Quantile at _25%	2 nd Quantile at _50%	3 rd Quantile at _75%
BS	0.024 (0.21)	-0.007 (0.729)	-0.025 (0.291)
NPL	-0.415 (0.005)***	-0.496 (0.001)***	-0.56 (0.002)***
EFF	0.03 (0.616)	0.051 (0.051)	0.049 (0.508)
LIQ	-0.139 (.012)**	-0.145 (0.011)**	-0.06 (0.388)
PRO	0.001 (0.215)	0.004 (0.755)	0.0001 (0.84)
INN	0.003 (0.833)	0.005 (0.871)	0.0003 (0.375)
SRD	2.452 (0.083)*	2.554 (0.081)*	3.17 (0.076)*
CPR	0.004 (0.155)	0.004 (0.118)	0.004 (0.271)
AGE	-0.001 (0.011)**	-0.001 (0.02)**	-0.002 (0.021)***
EXR	0.003 (.844)	0.0001 (0.735)	0.001 (0.219)
GDP	-0.001 (0.877)	0.002 (0.848)	0.015 (0.112)
INF	-0.004 (0.098)*	-0.003 (0.266)	-0.002 (0.613)
CONSTANT	-0.419 (0.387)	0.388 (0.538)	0.664 (0.277)

*** $p < .01$, ** $p < .05$, * $p < .1$

4.3. The results of quantile regression:

Quantile regression shows the relationship between size and growth. As Gibrat's law stated that when the size increases the growth also increases. However, we regress the data set into three Quantiles following the study of (del Mar Miralles-Quirós et al., 2017). The quantile regression represents the concrete analysis of size and growth comparing. In the First quantile, the bank size is insignificant with respect to the “ p ” statistic and have a positive relationship with the growth. Whereas, in the 2nd quantile it is insignificant but negative growth as well as at 75% or in the 3rd quantile it is insignificant and negative that shows that the size and growth relationship is non-linear in nature. When the banks remain small it has a positive impact on growth, and when the bank size becomes larger, its impact becomes negative. Therefore, this impact from positive to negative represents the inverted U shaped relationship between the size and growth. These results are align with the study of (del Mar Miralles-Quirós et al., 2017). Here the quantile regression is for the purpose of bank growth and size relationship. Because this regression tells us, the relationship is linear or non-linear.

Table 7 : Estimation Results

BG	GMM Results
BS	-0.173 (0.651)
BSS	0.003 (0.656)
NPL	-0.348 (0.014)**
EFF	0.002 (0.971)
LIQ	-0.093 (0.104)
PRO	0.0001 (0.234)
INN	0.0004 (0.779)
CPR	0.002 (0.374)
AGE	-0.001 (0.003)***
EXR	0.0004 (0.474)
GDP	0.007 (0.155)
INF	0.003 (0.095)*
SPR	2.835 (0.015)**
CONSTANT	2.386 (0.628)

*** $p < .01$, ** $p < .05$, * $p < .1$

4.4. GMM results description:

Based on theoretical literature for better assessment and accurate results the generalized method of movement applied on data set. By using GMM estimation, we get the robust and efficient estimation results from this data set.

Table 8, shows that if bank size increases by one percent then the growth becomes slow down. It shows that Gibrat's law rejects in the banking sector of Pakistan. The other variable Non-performing loan is the significant at 1% that explains that if the NPL ratio increase by one unit then the growth of the banks decreases by 35%. Additionally, efficiency is the other bank specific variable, if the efficiency increases by one percent then the growth of bank decreases by nine percent. Therefore, it improves that efficiency determinant has positive impact on growth. The proxy of this variable used as cost/income ratio so if the value of the cost minimum it definitely have a positive impact on growth and vice versa)

The other bank specific variables are Liquidity and capital ratio that explains behavior of the bank. Liquidity is the proxy of advances to deposit ratio if the advances increases by 1% then the growth of the banks decreases by 10%. Therefore its means that up to certain level, the advances are the favorable for the bank growth, but if we exceed a certain limit of the advances then it will be harmful for growth of the banks.

However, the capital ratio has a positive impact on growth but this growth is as if the Capital ratio increases by One percent then growth of bank increases by two percent.

Whereas the other variable related to the innovation and total number of ATM's installed by banks are taken as proxy of the innovation shows positive growth but very lower margin its

means that the innovation have a positive but nominal effect on the growth with time on time bases.

The other control variable is bank age when the bank age increases by one unit year then the growth of the banks slower down with the passage of time its means that older banks growth slower as compared to the new banks. The results of the analysis about AGE show that during study period the smallest companies were growing faster than the larger ones, though with a more variable growth rate pattern. They shared a relatively low death rate from takeover with the largest companies, while medium sized companies were most vulnerable to takeover. We also found that younger companies, for a given size, grew faster than old companies did during 2005-2020. Therefore, the negative results are consistent with a number of recent developments in the analysis of firm growth emphasizing evolutionary and learning effects, and with the existence of threshold sizes above which the Law of Proportionate Effect holds but below which small firms grow faster and justify the study of (Dunne, P., & Hughes, A. (1994).

The economic variables have a great importance on the performance of the banks. If exchange rate increases by one unit then the growth of the banks also increases but this growth remain slower. Whereas as the real GDP has a much importance in the economy of any country. Therefore, its improve by over data set either the growth increases by one point then growth of the banks also increases by 7 %. Similarly, the inflation has a negative and significant impact on the bank growth.

(Goddard et al 2004) the model explains that if the inflation increases by the one unit then the growth of the banks become slower down up to three percent. Its means that with the rise of the consumer price the banks deposit decline and then lending ability of banks affected in such scenario.

The other most important bank specific variables are the profit and the spread rate if the profit of the banks increases by the one unit then the growth increases with positive rate. Furthermore, spread rate also has a positive relationship with the growth of the banks that shows the significant relationship between the growth and the spread rate. Either the growth of banks increases very fast if the spread rate increases by one percent. All the variables have there on impact on the growth of the bank. These results are robust and reliable. The given model explained as a whole. Additionally, model is correct and not over identified observed in the test By Arellano and Bond generalized method of movement.

For the quantile regression, it observed that there is non-linear relationship between the size and bank growth. There exists a positive to negative relationship between the sizes of the banks with growth from 1st quantile to the 3rd quantile illustrated in the tables in quantile estimation in result section. GMM, proposed by Blundell, bond (1998), and explained that this estimation method removed the biasedness in the data set and provide accurate results. Other advantage of GMM that it is efficient and robust to autocorrelation and heteroscedasticity.

CHAPTER 05

QUALITATIVE ANALYSIS

This chapter finds out the either our empirical results or questions which we are trying to find out the results are align with the theoretical concepts of the market. On the bases of these questions and answers and the empirical results we will provide the policy makers help in the financial sector development in the better and outmost way. Therefore, for this purpose we prepared a questionnaire and distributed it online. Around 23,participants contributed in this survey and answered the questions.

The first questions is about the main variable either the size of the banks impact on the growth of the banks according to Gibrat's law. If the size increases then growth also increases with the same proportion this law also called the law of proportionate effect. 80%, respondents are agreed upon this that with the increase in size the growth of the banks increases due to the expansion of network. Whereas, one more question that is align with this question is that either small banks grow faster than the larger banks 90% participants are agreed on this statement that the small banks grow faster as compared to the larger bank. These findings are align with the empirical results that in the Pakistan region, small banks grow faster than the larger ones and rejects the Gibrat's law. They states with the reason that because small banks works with pace and speed therefore their growth faster than the larger.

The next question is about the liquidity ratio. About 40% respondents stated that if the liquidity increases then the growth of the banks decline. Whereas 60% participants alter the statement. However, our empirical results also explains about the decline growth if the liquidity (means

advancing) ratio increases so the above 40% answer is align with our findings it will be helpful for the policy makers to set a policy regarding the advances to deposit ratio for better growth and profitability.

Additionally, the other question is about the bank size and growth relationship is linear or non-linear. 60% participants are disagree with this statement that bank size and growth has a non-linear relationship. Whereas, 40% most experienced and qualified staff of bank relies that the bank size and growth has a non-linear relationship in Pakistani banking sector. So, later statement is align with our empirical findings.

On the other hand, we asked the question about the efficiency and growth relationship. There are mix views about the efficient management. Some participants realized that training and experienced increase the efficiency of the workers work done. Beside to this some people argues about that, if there is a good leadership and team players in the team having better interpersonal skills those improves the efficiency of the work and it has a positive impact on the growth of the banks.

Furthermore, the spread rate that is the bank specific and control variable in this model. 70% participants of study indicates that if the spread rate increases then the growth increases because of the spread increases. Remaining 30% participants have alternatives views about that if the spread increases then growth of the bank decrease. Finally, my empirical results align with the majority views and improves that if spread rate increases then the growth of the bank increases speedily.

Some other questions of my study are about the macro-indicators for instance Inflation, 20% participants said that there is no relationship between the bank growth and inflation rate. 40%

respondents are in favor of negative relationship with the bank growth. They said that if the inflation increases then the bank growth decreases. The remaining 40% comments that if the inflation increases then the bank growth also increases. The empirical out comes of this study are if the inflation increase then the growth of the banks effect negatively and have a severe impact on the financial sector growth.

The other macroeconomic indicator that is the most one is the exchange rate. The views of the respondents about the exchange rate are 12 participants out of 23 comments that exchange rate and bank growth have no serious relationship. While the 11 respondents said there is a strong relationship between the bank size and the growth. Our study findings insignificant and positive relationship with the growth.

Above all mentioned views collected by the senior management in the banking sector of the Pakistan. From the qualitative point of view there is need to train and educate the management and policy makers. These all opinions rejects the Gibrat's law on some extent whereas accepted by some participants in general. Theoretical Gibrat's law varies from region to region as in the chapter of the literature views summary shows. In addition, mostly studies related to empirical findings of the Size and growth relationship with contrast to Gibrat's law. Therefore, various findings are against the law and a few accept it.

CHAPTER 6

CONCLUSION AND POLICY RECOMMENDATIONS:

6.1 Conclusion:

It has been observed that previous empirical evidences on the size and growth of the banking sector not thoroughly studied by contrasting Gibrat's law. It was the first study in Pakistan where we contrast the LPE in the banking sector of Pakistan. Our study period starts from 2005 to 2020. This is the era of modern banking sector (like internet, mobile phone banking POS, ATM etc) and expansion of the financial sector. This duration also faced a financial sector recession and Covid-19 situation.

In this context, this study has aimed to analyze the growth and size relationship during this period keeping the some bank specific and Macro-economic indicators as control variables by contrasting Gibrat's law. In this period the main regulations of the banking sector took place in Pakistani financial sector.

This study analyze the growth and size with two dimensions. First dimension of this study is Quantile regression that explains that size and growth of the banks has a strong non-linear relationship. This specific model construction and non-linear relationship provides the roots to establish the policies for the financial sector of the Pakistan. Then after this we analyze that the size of the banks influence the negatively on the growth of the banks. It also reveals that the smaller banks has positive growth and size relationship whereas the medium sized banks growth becomes slow down with respect to the size of the banks.

Similarly, larger the banks the size and growth relationship becomes slow down. However, over finding indicates that smaller banks grow faster as compared to the larger banks. Therefore, our study rejects the Gibrat's law. These finding specifically relevant for the financial entities that in the near future there growth becomes slow down.

6.2. Key findings:

Our findings indicates that growth of the banking sector of Pakistan not persistent and larger banks grow slower than the smaller banks that confirms the (Goddard 2004 a,b) findings. Whereas the profit of the banks persistent and have a positive impact on growth of banks. Similarly, efficiency and other bank specific indicators also affect growth of the banks but every indicator has its own reliability.

6.2.1. Macroeconomic Indicators and Bank Growth

Furthermore, some macroeconomic variables like GDP and exchange rates both have a positive impact on growth of the banks. Contrary to this, the inflation has a negative impact on the financial sector performance. Because with the increase in the consumer price index the saving capacity of the public reduced. Therefore, the deposit are the main fruit of banks where the banks generates their income. Empirical Findings of this study confirms the findings of (Vennet, 2001)

6.3. Policy recommendation

The empirical results and qualitative work suggests the certain policy recommendations for the regulators, senior management and financial institutions as well as for the ministry of finance. First, the non-linear relationship between the growth and size of the banks provides clear

indication about the larger banks growth slowed down with the passage of time and small banks grow faster. Therefore, the regulators should revive the regulations that more and more new banks should enter into the market.

Secondly, the management of the commercial banks and financial institutions improves the efficiency level of work done minimize the volume of non-performing loans and liquidity should be up-to certain extent. The institutions should expand the branch network by keeping in mind the expansion of the bank size slower the growth rate. The higher management should improve the qualification by training and by improving the skills of the team leaders.

Thirdly, Consumer price index and real gross domestic production effects the growth of the banking sector. So, the government should take precautionary measures to minimize the inflation level by doing this, the deposit of the financial institution will rise and banks earn more profit by improving the growth rate.

6.4. Recommendations:

The financial sector development links with the capital market development. This research based on the development of the financial model considering all the indicators that effect on the banking sector growth. There is a lot of gap on the financial sector development the future research would be conducted on the Digital market expansion and role in the financial sector growth of the digital market by contrasting Gibrat's law.

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APPENDIX

Table 8 : Advantages and Disadvantages of Bank Size

Bank size	Advantages	Disadvantages
Large bank	More assets, more employees, huge profit, lending to the big firms, a huge number of customers and big network, etc.	Lower efficiency, complex hierarchy, more chances of fraudulent activities and management conflicts, etc.
Small Banks	Efficient working environment, fully controlled management, lower chances of fraudulent activities, etc.	The lower number of branches, low assets value, less number of employees and lower number of customers, etc.
Medium banks	Compete in the market in every aspect of the product.	No clear disadvantage.

Author's own Elaboration