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**ESSAYS ON EFFICIENCY, PROFITABILITY, AND
STABILITY OF THE IRAQI BANKING INDUSTRY**

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ABSTRACT

ESSAYS ON EFFICIENCY, PROFITABILITY, AND STABILITY OF THE IRAQI BANKING INDUSTRY

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This thesis combines three empirical studies on Efficiency, Profitability, and Stability to evaluate the performance of the Iraqi banking sector for the period 2010-2020. The first essay estimates Iraqi commercial banks' cost-efficiency function and market power indicators. The empirical findings show a decrease in the price-cost efficiency index within the banking sector during the transitional era. Additionally, the Lerner index shows negative results, implying a fall in the market power of Iraqi banks. The second essay examines the effects of efficiency, risk, and competition on profitability. We employ a two-step Generalized System of Moments (GMM-SYM) estimator to analyze the correlation between variables. Specifically, it investigates the impact of varied levels of risk-taking, competition, and price-cost efficiency on bank profitability. The findings indicate that Iraqi banks with more cost efficiency exhibit higher returns on assets, while increased competition is associated with reduced profitability in the Iraqi banking sector. The third essay analyzes the relationship between risk, capital, and efficiency in the banking industry in Iraq. We examine the impact of banking regulation on the risky behavior of banks. Specifically, we focus on factors such as stringent capital requirements, the extent of influence exerted by regulatory authorities on risk, and the interaction between regulation and efficiency from 2010 to 2020. The 3SLS approach was used to evaluate the simultaneous impact of variables. The findings indicate an inverse correlation between capital requirements and risk behavior within the banking sector. Specifically, higher capitalization levels are associated with an elevated likelihood of banks being exposed to risks. This observation aligns with the concept of moral hazard. The findings also suggest that banks' efficiency impacts their capital and risk levels, as efficient enterprises are more inclined to take higher risks to offset their lower profits.

The discoveries presented in this dissertation are novel in the existing body of literature and hold significant ramifications for public policy. First, Iraqi policymakers should prioritize continuous asset quality improvement and strive to balance encouraging banking competition and maintaining a stable banking industry. Moreover, policymakers in Iraq must establish a suitable and all-encompassing financial environment to guarantee the effective and efficient

operation of banks while simultaneously pursuing the objectives of inclusivity and stability as part of their development strategy. Secondly, pushing for banking mergers is one of the strategies for commercial banks to confront the banks' credit monopolies. High concentrations of public banks and efforts to privatize them and shift their ownership from the public to the private sector complement financial reform. Financial system reform fosters competition among banks by granting them the autonomy to set interest rates and steer credit. Financial system reform is, however, not complete without privatization.

Keywords: Iraq, Banking efficiency, Banking Profitability, Banking Stability



ÖZ

IRAK BANKACILIK SEKTÖRÜNÜN VERİMLİLİĞİ, KÂRLİLİĞİ VE İSTIKRARI ÜZERİNE DENEMELER

BHA ALDAN ABDULSATTER FARAJ

Bu tez, 2010-2020 dönemi için Irak bankacılık sektörünün performansını değerlendirmek amacıyla verimlilik, kârlılık ve istikrar üzerine üç ampirik çalışmayı bir araya getirmektedir. İlk makale, Irak ticari bankalarının maliyet verimliliği fonksiyonunu ve piyasa gücü göstergelerini tahmin etmiştir. Ampirik bulgular, geçiş döneminde bankacılık sektöründe fiyat-maliyet verimliliği endeksinde bir düşüş olduğunu göstermiştir. Ayrıca, Lerner endeksi de olumsuz sonuçlar göstermiş ve Irak bankalarının piyasa gücünde bir düşüş olduğunu ortaya koymuştur.

İkinci makale, verimlilik, risk ve rekabetin kârlılık üzerindeki etkilerini incelemiştir. İki aşamalı Genelleştirilmiş Momentler Sistemi (GMM-SYM) tahmin edicisini kullanarak değişkenler arasındaki korelasyonu analiz edilmiştir. Özellikle farklı risk alma ve rekabet seviyeleriyle fiyat-maliyet verimliliğinin banka kârlılığı üzerindeki etkisi araştırılmıştır. Bulgular, maliyet açısından daha verimli olan Irak bankalarının daha yüksek varlık getirisi sağladığını, ancak artan rekabetin Irak bankacılık sektöründe kârlılığı azalttığını göstermektedir.

Üçüncü makale, Irak bankacılık endüstrisinde risk, sermaye ve verimlilik arasındaki ilişkiyi analiz etmeyi amaçlamaktadır. Bu kısımdaki çalışma bankacılık düzenlemelerinin bankaların riskli davranışları üzerindeki etkisine odaklanmıştır. Özellikle sıkı sermaye gereklilikleri, düzenleyici otoritelerin risk üzerindeki etkisi ve düzenleme ile verimlilik arasındaki etkileşim gibi faktörlere yoğunlaşmıştır. 2010-2020 dönemi için 3SLS yaklaşımı kullanılarak değişkenlerin eş zamanlı etkisi değerlendirilmiştir. Çalışmamızın bulguları, bankacılık sektöründe sermaye gereklilikleri ile riskli davranış arasında ters bir ilişki olduğunu göstermektedir. Özellikle, daha yüksek sermayelendirme seviyeleri, bankaların risklere maruz kalma olasılığını artırmaktadır. Bu gözlem, ahlaki tehlike kavramı ile uyumludur. Bulgular ayrıca bankaların verimliliğinin sermaye ve risk seviyeleri üzerinde etkisi olduğunu, verimli işletmelerin daha düşük kârlarını telafi etmek için daha yüksek riskler almaya meyilli olduğunu göstermektedir.

Bu tezde sunulan bulgular, mevcut literatürde yenidir ve kamu politikası açısından önemli sonuçlar doğurmaktadır. İlk olarak, Iraklı politika yapıcılar, varlık kalitesinin sürekli iyileştirilmesine öncelik vermeli ve bankacılık rekabetini teşvik etmek ile istikrarlı bir bankacılık sektörü sağlamak arasında bir denge kurmaya çalışmalıdır. Ayrıca, Irak'taki politika yapıcılar, kapsayıcılık ve istikrar hedeflerini kalkınma stratejilerinin bir parçası olarak takip ederken, bankaların etkin ve verimli bir şekilde çalışmasını sağlamak için uygun ve kapsamlı bir finansal ortam oluşturmmalıdır. İkinci olarak, ticari bankaların kredi tekelleriyle yüzleşmesi için bankaların birleşmelerini teşvik etmek stratejilerden biri olmalıdır. Kamu bankalarının yüksek yoğunluğu ve bunların özelleştirilmesine yönelik çabalar, finansal reformu tamamlayıcı bir niteliğe sahiptir. Çünkü finans sistemi reformu, bankalar arasında rekabeti teşvik eder ve faiz oranlarını belirleme ve krediyi yönlendirme konusunda onlara özerklik sağlayacaktır.

Anahtar Kelimeler: Iraq, Verimliliği, Kârliliği, İstikrari

PREFACE

This doctoral thesis is titled “Essays on Efficiency, Profitability, and Stability of the Iraqi Banking Industry.”

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TABLE OF CONTENTS

ABSTRACT	IVIV
ÖZ.....	VI
PREFACE.....	VIII
TABLE OF CONTENTS	IX
LIST OF TABLES	XIII
LIST OF FIGURES	XV
ABBREVIATIONS.....	XVI

CHAPTER ONE

INTRODUCTION

1.1 Motivation for the Study and the Research Background.....	1
1.2 Aims, Objectives, and Research Questions	5
1.3 Research Questions	6
1.4 Significance of The Study	7
1.5 Limitations of The Study	8
1.6 Theoretical Framework.....	9
1.6.1 Bank Efficiency	9
1.6.2 Bank Profitability.....	11
1.6.3 Bank Stability	15

CHAPTER TWO

The Banking System in Iraq Under Reform

2.1 Stages of Development.....	18
2.1.1 Phase I: Foreign Banking (1890-1934).....	18
2.1.2 Phase II: Iraqi National Banking Pashe (1935-1947)	18
2.1.3 Phase III: Establishment of the Central Bank and Foreign Banking (1947-1963)	19

2.1.4 Phase IV: Nationalization and Consolidation of Banks (1964-1990)....	20
2.1.5 Phase V: Private Sector Return Phase (1991-2003)	21
2.1.6 Phase VI: Reform and Financial Liberalization (2004-2016)	22
2.2 Structure of the Iraqi Banking System	24
2.2.1 Government banks:	24
2.2.2 Commercial banks:	24
2.2.3 Islamic Banks.....	26
2.3 Challenges Facing the Iraqi Banking Sector	26
2.4 Development Mechanisms of the Iraqi Banking Sector.....	28
2.5 A Review of The Iraqi Banking Sector	29
2.5.1 Banking Assets	29
2.5.2 Deposits	32
2.5.3 Capital.....	36
2.5.4 Cash Credit	39
2.5.5 The legal reserve of banks	42

CHAPTER THREE

Estimating Cost Efficiency Function & Market Power Indicators of Commercial Banks: An Empirical Study of Iraq

3.1 Introduction	45
3.2 An Overview of the Iraqi Economy in the Transition Phase.....	47
3.3 Literature Review	47
3.4 Market Power versus Efficiency.....	49
3.5 Efficiency: Concepts and Measurement.....	50
3.6 Efficiency Measurement.....	51
3.7 Non-Parametric Approaches.....	51
3.8 Data Envelopment Analysis	52
3.9 Methodology.....	52

3.10. Data and Variables.....	53
3.11 Results and Discussion	55
3.12 Market Power	56
3.13 Methodology and Data of Market Power	57
3.13.1 Lerner index	57
3.14 Results and Discussion	58
3.15 Conclusion	59

CHAPTER FOU

An empirical analysis of the impact of efficiency, risk-taking, and competition on profitability: An application in Iraq banking

4.1 Introduction	61
4.2 Literature Review	63
4.3 Data and methodology	65
4.3.1 Data	65
4.3.2 Methodology	65
4.3.2.1 Empirical framework	65
4.3.2.2 Definition of variables	66
4.3.2.2.1 Dependent variables.....	66
4.3.2.2.2 Independent Variables	68
4.3.2.2.3 Competition Measurement.....	68
4.3.2.2.4 Risk-taking indicators	69
4.3.2.2.5 Banking, industry and macroeconomic Factors.....	70
4.3.2.2.6 Estimation efficiency in the Iraqi banking industry.....	71
4.4 Empirical results and discussions	72
4.4.1 Empirical results	72
4.5 Robustness Check.....	77
4.6 Conclusion	79

CHAPTER FIVE

The nexus between Risk, Capital, and efficiency: evidence from an Iraqi banking sector

5.1 Regulatory Background	81
5.2 Main Hypotheses and Related Literature	83
5.3 Methodological Framework	87
5.3.1 Methodology	87
5.3.2 Data	88
5.3.3 Definition of Variables	88
5.3.4 Efficiency	88
5.3.5 Risk-taking Behavior	90
5.3.6 Bank Capital	90
5.3.7 Explanatory variables.....	91
5.3.8 Empirical Results	91
5.3.9 Descriptive Statistics.....	92
5.3.10 Results and Discussion	94
5.3.11 Risk -Capital results.....	94
5.3.12 Robustness Tests.....	99
5.4 Conclusion.....	101
CONCLUSION	103
REFERENCES	107
APPENDIX 1: List of banks	130
APPENDIX 2: Price-cost efficiency per year for all banks	131
Appendix 3: Lerner Index Data	136
APPENDIX 4: Date for the second article changed by sector	141
APPENDIX 5:Third article data after change by sector.....	142
Appendix 6: THIRD ARTICLE DATA AFTER CHANGE BY SECTOR.....	143

LIST OF TABLES

Table 2.1: Banks in the Iraqi Banking Sector.....	25
Table 2.2: Assets of the Iraqi Banking System for the Period 2010-2020 (Billion Dinars)	30
Table 2.3: Deposits of the Iraqi Banking Sector	33
Table 2.4: Capital of the Iraqi Banking Sector.....	36
Table 2.5: Cash Credit to the Banking Industry in Iraq for the Period 2010-2020 (Billions of Dinars)	40
Table 2.6: Reserve on deposits in public and private banks (2010-2020).....	43
Table 3. 1: Efficiency Method.....	51
Table 3. 2: Description of the study variables.....	54
Table 3. 3: Descriptive statistics of inputs and outputs.....	54
Table 3. 4: Cost efficiency Results for Iraqi Commercial Banks 2010-2020.....	55
Table 3. 5: Inputs and Outputs	57
Table 3. 6: Variables Descriptive Statistics	58
Table 3. 7: Lerner Index Results.....	59
Table 4. 1: Describe the Variables and Their Impact on Profitability in Banks.	66
Table 4. 2: Descriptive Statistics of Inputs and Output	72
Table 4. 3: Empirical Results (Cost Efficiency, Z-Core, And Lerner Adjusted as Competition Indicator)	73
Table 4. 4: Empirical Results (Cost Efficiency, Non-Performing Loans, and Lerner Adjusted as Competition Indicator)	75
Table 4. 5: Empirical Results (Cost Efficiency, Liquidity Risk, and Lerner Adjusted as Competition Indicator)	76
Table 4. 6: Empirical results regarding the impact of efficiency, competition (Boone), and risks taking	77
Table 4. 7: Empirical results (Cost efficiency, Z-Score HHI as competition indicator) ..	78
Table 5. 1: Description of the study variables.....	91
Table 5. 2: Descriptive Statistics	92
Table 5. 3: Three-Stage Least Squares Estimates of the Relationship Between Capital, Risk, and Technical Efficiency	95

Table 5. 4: Three-Stage Least Squares Estimates of the Relationship Between Capital, Risk (VROA, VORE), and Technical Efficiency in the Iraqi Banking Industry	97
Table 5. 5: Three-Stage Least Squares Estimate of the Relationship Between Capital, Risk, and Allocative Efficiency	98
Table 5. 6: Three-Stage Least Squares Estimates of the Relationship Between Capital, Risk, and Allocative Efficiency	99
Table 5. 7: Three-Stage Least Squares Estimates of the Relationship Between Capital, Risk, and Cost Efficiency	100
Table 5. 8: Three-Stage Least Squares Estimates of the Relationship Between Capital, Risk (VROA VROE), and Cost Efficiency	101



LIST OF FIGURES

Figure 2. 1: Assets of the Iraqi Banking Sector	31
Figure 2. 2: Assets of Government and Private Banks	32
Figure 2. 3: Deposits of Iraqi Banking Sector	35
Figure 2. 4: Deposits of Public and Private Iraqi Banks	35
Figure 2. 5: Capital of the Iraqi banking sector	39
Figure 2. 6: Capitals of Public and Private Banks in Iraq	39
Figure 2. 7: Cash Credit	41
Figure 2. 8: Cash Credit in Public and Private Iraqi Banking Sector	42
Figure 3. 1: Clustered columns chart for cost efficiency	56
Figure 3. 2: Lerner index	59
Figure 4. 1: Profitability in the Iraqi Banking Industry During the Period 2010-2020...	67
Figure 4. 2: Competition in the Iraqi banking industry	69
Figure 4. 3: Risk in the Iraqi Industry Banking	70
Figure 5. 1: Risk Indicators in Iraqi Banking Industry 2010-2020	93
Figure 5. 2: Indicators of efficiency in the Iraqi Banking Industry.....	93
Figure 5. 3: Capital in the Iraqi Banking Industry	94

ABBREVIATIONS

2SLS	:Two-Stage Least Squares
3SLS	:Three-Stage Least Squares Method
AE	:Allocative Efficiency
Bloan	:Loan-Loss Provision as a Fraction to Total Loans
BMH	:Bad Management Hypothesis
Boone	:Boone Index
C3	:Concentration
CAPT	:Book Value of Capital to Total Assets
CBI	:Central Bank of Iraq
CDs	:Certificates of Deposit
CE	:Cost Efficiency
CEE	:Central and Eastern European
CRS	:Constant Returns to Scale
DEA	:Data Envelope Analysis
ESH	:Efficiency Structure Hypothesis
GDPG	:Real GDP Growth
GMM-SYM	:Two-Step Generalized Method of Moments
HHI	:Herfindahl-Hirschman Index
IDH	:Institutional Difference Hypothesis
INF	:Inflation
IRS	:Interest Rate Spread
Liquidity	:Loan-to-Assets Ratio
LIX	:Lerner Index
LIXX	:Adj-Lerner Index
LRIS	:Liquidity Risk
MENA	:Middle East and North Africa
MHH	:Moral Hazard Hypothesis
NIM	:Net Interest Margin
PTE	:Pure Technical Efficiency
RMP	:Market Power Hypothesis
ROA	:Return on Assets
ROE	:Return on Equity

RSMD	:Stock Market Development
SCP	:Structure-Conduct-Performance
SFA	:Stochastic Frontier Model
Size	:Logarithm of Total Assets
TE	:Technical Efficiency
VORE	:Standard Deviation Of ROE
VROA	:Standard Deviation Of ROA
VSR	:Variable Return to Scale
Z-Score	:Bank Soundness



CHAPTER ONE

INTRODUCTION

1.1 Motivation for the Study and the Research Background

The financial system is central to both domestic and global economic systems. Its importance stems from its multiple links with real economic factors and its ability to lubricate the market mechanism to propel development. It provides the financial resources required by institutions and markets and transforms savings into investments (Levine, 1997). Despite its importance, financial systems in many countries of the world, particularly developing countries, have suffered from a policy of fiscal repression characterized by widespread government intervention through restrictions on the functioning of the banking business, such as ceilings on interest rates, allocation of credit, and restriction of foreign capital, the result of which has been financial distortions. This has made the financial industry a source of systemic imbalances and economic crises. In the 1970s, many countries sought to fundamentally reform their financial systems with guidance from the World Bank and the International Monetary Fund (IMF). One of the most prominent reforms was financial liberalization, which comprised financial and exchange rate liberalization. The purpose of financial liberalization was to give banks and financial institutions full independence to manage their financial activities by removing the various restrictions and controls that defined the transition to a market economy. A key component of this was allowing credit to be determined by the interaction of demand and supply of funds. They also included the liberalization of interest rates, the abandonment of the credit framework policy, the reduction of the mandatory reserve rate, and the opening of banking space to the national and foreign private sectors (Ahmed, 2009), as well as the trend towards adopting indirect monetary policy instruments.

Financial liberalization has resulted in a rise in capital flows, both in the short and long term. However, it has not been immune to negative consequences. Despite numerous positive effects, the most significant drawbacks have been manifested through crises that have affected multiple economies. It is now widely recognized that financial liberalization has increased fiscal fragility in developing countries, making them vulnerable to financial and cyclical currency crises. These relate to local banking and related crises and currency crises resulting from more open capital accounts (Demirgüç-Kunt and Detragiache, 1998). Financial liberalization is a dynamic and multifaceted process whose impact on financial institutions depends on implementation mechanisms and the political and economic environment. This dynamic

process cast doubt on the financial systems of developing countries based on their strength and integrity through the emergence of asymmetries in transitions to an open economy from one country to another as a result of their lack of adequate regulatory frameworks and institutions that limit regulatory control, excessive risk management, and speculative behavior within the financial sector. This could lead to asset bubbles, excessive borrowing, and financial instability.

This shifting environment is misleading the banking industry in particular and the financial sector in general during the transitional phase, which has serious consequences for the bank's profitability. Literature provides evidence of differences in resources, experience, and objectives between the different sizes of banks and the kinds of ownership. The differences in loan control may significantly impact bank administrations' lending decisions. Banks may invest in risky, fluid loans with liquid, non-risk, and demand-friendly deposits. In addition to the factors mentioned, other elements such as regulatory requirements, market competition, and technological progress also play important roles in shaping the bank's profitability during transitions. Regulatory changes can affect bank operating costs and revenue flows, affecting their overall profitability. Moreover, increased competition in the banking sector, especially from new entrants and non-bank financial institutions, can pressure banks to innovate and improve their operations to remain competitive. Furthermore, technological progress, such as the emergence of digital banking services and financial technology solutions, can create opportunities and challenges for traditional banks, affecting their profitability. Therefore, a comprehensive analysis considering all these factors is necessary to understand the complexities of banks' profitability in transition economies.

Numerous research studies indicate the outstanding performance of banks during transitional periods. For example, Bonin et al. (2005) examined data from 1996 to 2000 to gain insights into the impact of various ownership structures, particularly when a foreign entity has a significant stake, on the operational effectiveness of banks in eleven transitioning nations. The dataset they utilized consisted of 225 banks. The study revealed that the efficiency of banks is not necessarily improved by privatization alone, as government-owned banks were found to be equally efficient as local private banks. Foreign-owned banks, particularly those with strategic foreign ownership, have been recognized for their superior cost efficiency and exceptional service offerings compared to other banks. The research also suggested that government-owned banks that were not privatized demonstrated lower efficiency in delivering

services. This supports the notion that more successful banks are typically prioritized for privatization in these transition economies.

Seabright et al. (2005) evaluated the public financial accounts and performance of 515 banks in 16 transition economies between 1994 and 1999. They were assessed to find out if banks' lending practices and probability distribution demonstrated actions associated with excessive risk-taking. It was found that the performance of banks varied greatly depending on the reform environment and competitive conditions in which they operate. Financial institutions having significant market shares tend to incur greater expenses and generate lower profits from deposits. There has been notable progress in banking and related enterprise reforms. However, banks are currently enjoying comfortable margins on loans and seem to be offering competitive margins on deposits but are still experiencing overall negative returns on equity. On the other hand, in cases where significant changes have not been made, banks have been experiencing substantial losses on loans that have primarily impacted the depositors.

Psillaki and Mamatzakis (2017) studied the effects of structural changes and financial regulations on the cost-effectiveness of the banking industries in ten countries in Central and Eastern Europe (CEE) between 2004 and 2009. According to empirical data, the application of structural changes in the labor and business markets has a positive impact on bank performance. From the public interest standpoint, the results show that banking credit regulation improves cost-effectiveness. In addition, Delis et al. (2011) analyzed the effect of rules on the rate of increase in productivity in the banking industry among economies undergoing transition. The researchers examined the impact of regulations on the efficiency and effectiveness of banks in various nations and how this subsequently affects their productivity growth. The study's findings offer evidence of the correlation between regulations and the rate of productivity growth in the banking sector in transition economies. Djalilov and Piesse (2019) conducted an in-depth analysis of the correlation between banking regulations and efficiency in 21 banks for the period 2002-2014, experiencing economic transitions, such as the shift from a centrally planned economy to a market economy. One possible area of research could be the examination of various regulatory frameworks and their effects on the efficiency and performance of banks in times of economic fluctuations. Based on the findings, it can be observed that banks in transitional countries exhibited lower efficiency levels during the crisis period (2007-2009). However, there was a noticeable improvement in their efficiency during the post-crisis period (2010-2014).

Fang et al. (2014) examined the ever-changing nature of institutional reforms in transition economies and examined the impact of these reforms on banks' risk. The results indicate that there was a significant relationship between the progress of banking reforms and the impact of legal and governance reforms on banks' risks. Mitigating asset risks primarily leads to improving financial stability among banks. In addition, banks tend to experience lower volatility in return on assets and lower non-performing loans after institutional reforms.

Arab countries, like others, were affected by the changes resulting from liberal financial policies and implemented economic reform programs. Several studies analyzed financial performance in Arab countries during the periods of financial liberalization. In addition, Naceur and Omran (2011) examined the effects of institutional development, financial concentration, and bank regulations on the margin and profitability of commercial banks in a variety of Middle East and North Africa (MENA) nations. The findings showed that a few key attributes of banks, like capitalization and credit risk, are critical factors that affect net interest margin, overall profitability, and cost-effectiveness. Regarding how the performance of banks is affected by financial development and macroeconomic indicators, Nouaili et al. (2015) investigated the factors that influence the performance of banks in Tunisia during the period following financial reform. The empirical findings indicate a positive correlation between bank performance, capitalization, and privatization. Conversely, there is a negative correlation between bank performance and bank size, concentration, and efficiency index. Bitar et al. (2016) investigated banking performance and risks in the Middle East and North Africa region. The results indicate that compliance with Basel capital requirements enhances banks' protection from risks and improves efficiency and profitability. Also, there is a positive relationship between bank size and capital requirements. Moreover, efficiency in bank management may help in overcoming financial crises. The results in the general literature do not give conclusive results about the relationship between the financial performance of banks and internal and external determinants. This may be attributed to the specificity of economics and the mechanisms for implementing the financial liberalization policy.

Financial deregulation has profoundly reshaped the banking industry, enhancing banks' opportunities and challenges as they navigate a more competitive and dynamic environment. Therefore, effective risk management, regulatory compliance, efficiency, and strategic adaptation have become essential for banks to thrive in the post-deregulation era.

Efficiency has become a crucial determinant for banks aiming to sustain competitiveness and profitability in the face of growing competition. To boost efficiency and cost-effectiveness, it is crucial to streamline operations, optimize resource allocation, and leverage technology (Menicucci and Paolucci, 2016). Maintaining stability is also paramount in light of heightened market volatility and systemic concerns. Financial institutions are required to enhance their risk management frameworks to accurately detect, evaluate, and reduce risks, hence ensuring the maintenance of financial stability and resilience (Liang, 2013; Kaluge, 2020). In Arab countries, including Iraq, these challenges are particularly pronounced. Arab banks must navigate unique economic, political, and regulatory landscapes, which require tailored approaches to efficiency, stability, and profitability. The removal of financial restrictions has brought about a fundamental change in the operational and competitive landscape of banks in Arab countries. Banks in Iraq, as part of this broader Arab context, face similar challenges and opportunities. They may successfully adapt to the changing financial landscape in the post-deregulation era by focusing on efficiency, stability, and profitability, which eventually make them strong and profitable institutions. The relationship between efficiency, stability, and profitability in Arab banking sectors has become the subject of increasing research interest, as researchers are trying to explore the impact of improvements in efficiency, such as simplifying operations and improving resource allocation, as well as technological advancement on stability or profitability in Arab banks (Lemonakis et al., 2015; Mateev et al., 2022). However, we did not find much research that explores how efficiency initiatives impact the overall stability of Iraqi banks or within the framework of the relationship between profitability and efficiency (Alber, 2017; Faraj, 2021; Yunus, 2022).

1.2 Aims, Objectives, and Research Questions

This thesis aims to bridge the gap in the empirical literature by focusing on the banking sector in Iraq during the financial liberalization period from 2010 to 2020. Despite the expansion of banking activities during this period, Iraqi commercial banks faced significant obstacles, primarily due to political turmoil and the weak procedures for transitioning to a market economy, in addition to the increased concentration resulting from public banks' control over the credit sector. These challenges constrained the banks' ability to expand credit activities and contribute to economic development. Existing empirical literature has predominantly focused on efficiency, market power (competition), profitability, and banking stability in developed and some developing countries. However, studies specifically addressing the Iraqi

banking sector are limited and often lack comprehensiveness. Moreover, many studies overlook the importance of stability and risks in influencing the banking sector's financial performance. Therefore, this thesis seeks to measure and analyze the Iraqi banking sector's efficiency, profitability, and stability from 2010 to 2020. It comprises three articles dedicated to exploring efficiency, profitability, and stability during the period of financial liberalization and the transition of the Iraqi economy toward market mechanisms. Through these articles, the thesis aims to comprehensively understand the Iraqi banking sector's performance and its implications for the country's economic development amidst financial liberalization. The thesis has the following objectives.

- Critically review the literature on cost efficiency, competition, and estimation methods, focusing on their importance in economic transformation.
- Develop econometric models tailored to the reality of the Iraqi economy and use various models to analyze the relationships between variables.
- Review the impact of competition, efficiency, and risk on the profitability of Iraqi banks.
- Create econometric models that account for both internal and external factors to determine the factors that influence profitability.
- Discuss the economic effects of efficiency and competition in the banking sector.
- Examine the effects of compliance with Basel III decisions on the financial market's strength and banks' stability.

1.3 Research Questions

The thesis seeks to answer the following research questions.

- What is the level of cost-price efficiency in Iraqi banks?
- Do banks that achieve high-efficiency levels have a competitive advantage and sustainability in the Iraqi banking market?
- Will increased competition limit the profitability of banks?
- Can a balance between achieving high profitability and ensuring banking stability be struck?
- What is the impact of capital regulation on banking stability?
- Will market power and increased competition pose obstacles to banking stability?

- Is there a systematic discrepancy in the impact of regulation and oversight processes on banks' market share?
- What are the other potential determinants of banks' market share in the Iraqi banking market?
- What mechanisms should bank administrations and policymakers follow to enhance the efficiency of banks?

These objectives and research questions provide a comprehensive framework for analyzing various aspects of the Iraqi banking sector's performance, efficiency, profitability, and stability during the period of financial liberalization.

1.4 Significance of The Study

The significance of this study lies in its comprehensive analysis of the Iraqi banking sector from various angles, including efficiency, profitability, and stability. Some of the significances of this work are:

- **Pioneering Study:** This research is the first comprehensive study of the Iraqi banking sector, addressing multiple aspects simultaneously, such as efficiency, profitability, and stability. By doing so, it fills a significant gap in the existing literature and provides valuable insights into the performance of Iraqi banks.
- **Competition Assessment:** The study includes measuring the Lerner competition index, which allows for evaluating the level of competition within the Iraqi banking market. This analysis is crucial for understanding market dynamics and the competitiveness of Iraqi banks.
- **Cost Efficiency Analysis:** By measuring the cost-efficiency function of commercial banks over the period 2010-2020, the study provides insights into the efficiency of resource allocation and operational processes within Iraqi banks. Understanding cost efficiency is vital for improving overall banking performance and resource utilization.
- **Basel III Impact:** The research analyzes the performance of Iraqi banks in response to Basel III decisions, providing valuable insights into how regulatory changes impact banking operations and stability. This analysis is essential for assessing the resilience of Iraqi banks to regulatory reforms and international standards.

- **Stability Measurement:** The study calculates the stability index (Z-Score) for Iraqi commercial banks throughout the study period. Assessing stability is critical for understanding the resilience of the banking sector to financial shocks and external pressures, thereby informing policy decisions aimed at enhancing financial stability.
- **Relationship Analysis:** By examining the relationship between capital regulation, competition, and stability, the study sheds light on the interconnectedness of these factors and their implications for the overall health of the banking sector. This analysis is essential for policymakers seeking to strike a balance between regulatory requirements, market competition, and financial stability.
- This study contributes valuable insights into the performance, efficiency, and stability of the Iraqi banking sector, providing policymakers, regulators, and industry stakeholders with essential information for decision-making and strategic planning.

1.5 Limitations of The Study

Researchers typically face limitations that limit the validity and generalizations of their research. The main limitation of our study is its generalizability due to data availability. We obtained data that would help us shed light on the Iraqi banking sector, both at the state and private levels. However, due to difficulties in obtaining data for Iraqi government banks, which represent the largest link in the Iraqi banking sector, they were excluded from the study.

We encourage other researchers to build on our work and address these limitations. In particular, we hope that future studies will be produced that provide a more comprehensive and nuanced analysis of the Iraqi banking sector. By addressing data challenges and expanding the scope of analysis, researchers can contribute to a deeper understanding of the dynamics, challenges, and opportunities within the Iraqi banking industry. Collaboration and innovative methods will be key to overcoming these obstacles and expanding knowledge in this important area of study.

Regarding future research directions, future studies should aim to address data challenges, include state-owned banks, and extend the time frame to allow for a more comprehensive analysis of the sector. Collaboration between researchers and innovative methodologies will be critical to overcome these limitations and advance knowledge in this important area of study.

1.6 Theoretical Framework

1.6.1 Bank Efficiency

Economists in the 1930s argued that the failure of firms was a form of inefficiency in regulation. Firm leadership did not prioritize reducing costs, and the absence of competition pressures made it possible for them to operate within uncontrolled and high-cost (Hicks, 1935). The notion of efficiency as a universal measure of performance across many industries began to evolve in the early writings of Edgeworth (1881) and Pareto (1909). This notion is the representation of rationality employed in endeavors to regulate a dynamic circumstance by aligning it with a predetermined perception of how it should be (Alexander, 2009).

Efficiency, according to Farrell (1957), originated within a theory of production that was rooted in microeconomic frameworks. It is the association between the average cost of producing each unit and the number of units being produced. It can be divided into two distinct components: Technical Efficiency (TE) and Allocative Efficiency (AE). Farrell's initial concepts were demonstrated by input-oriented metrics, assuming constant returns to scale. This measure focuses on determining the extent to which input quantities can be proportionally decreased without affecting the output quantities produced. The second category is known as X-efficiency, which was initially proposed by Leibenstein (1975) and it displays departures from the cost-efficient frontier, which shows the lowest production cost for a specific amount of output. Therefore, if a company can generate its maximum output with the least amount of labor, capital, and technology, it can be considered technically efficient. The ideal input and output conditions for a fixed product are referred to as allocative efficiency. Three techniques were adopted by Berger and Humphrey (1992) to determine banks' outputs. These are the asset approach, the cost approach, and the value-added approach. The asset approach is a method used to determine banks' outputs. The cost and value-added approaches are within the framework of multiple strategies that act as drivers of efficiency.

In recent years, measuring and analyzing efficiency in banks has become crucial in dealing with the complex and dynamic landscape of the modern banking industry. It enables banks to optimize resource utilization, enhance competitiveness, meet regulatory requirements, improve profitability, meet customer expectations, and create long-term shareholder value. Several research papers have focused on analyzing the efficiency of the banking industry. In the context of the relationship between efficiency and profitability, other authors have relied on efficiency

and its relationship with competition (Albaity et al., 2019; Le et al., 2020; Matabaro, 2019). In addition, other studies have used efficiency in its relationship with risk and competition (Goetz, 2018; Tan and Floros, 2018; Fang et al., 2019; Tan et al., 2021). Moreover, some other studies have used efficiency in relation to risk and performance within the framework of banking regulation (Bitar et al., 2018; Lotto, 2018; Dias, 2021).

According to Berger and Humphrey (1997), efficiency can enable banks to generate the maximum output using the minimum input, which helps in the sustainability of these banks in achieving their basic goals of achieving economies of scope and scale through deposits and loans.

Berger and Humphrey (1997) analyze the potential factors that account for variations in efficiency within the US banking industry between 1990 and 1995. The researchers analyze three distinct indicators of economic efficiency: cost efficiency, standard profit efficiency, and alternate profit efficiency. The findings suggest that there was no substantial change in the profit frontier throughout the study period.

Farrell (1957) suggested two precise measures of efficiency: the input-oriented measure and the output-oriented measure. The input-oriented measure uses a common scalar to scale the inputs of inefficient units. Also, it maintains a constant observed output while projecting the point radially to the frontier. Conversely, the output-oriented measure uses a common scalar to scale the outputs of inefficient units. In addition, it maintains constant observed inputs while projecting the point radially to the frontier. The defined measures are for a frontier function with constant returns to scale. Figure 1.1 shows the various Farrell efficiency measurements. Regarding the frontier within a non-parametric framework, it can be represented as a piecewise linear function (Kittelsen and Førsund, 1992). The starting point is the act of observing $p^0 = (y^0, x^0)$ that is not efficient in relation to the VSR frontier. The reference, E_1 , the point on the frontier for the input-oriented measure is the point where the maximum amount of input is used to produce a given output level.

The reference point on the frontier for the input-oriented measure E_1 , in relation to the VRS frontier, is denoted as $p_1^{VSR} = (y^0, x_1^{VRS})$, and the reference point on the frontier for the output-oriented measure E_1 , relative to the VRS frontier is denoted as $p_2^{VRS} = (y_2^{VRS}, x_0)$. $p_1^{CRS} = (y^0, x_1^{CRS})$ and $p_2^{CRS} = (y_2^{CRS}, x_0)$. This frontier shows constant returns to scale (CRS). The

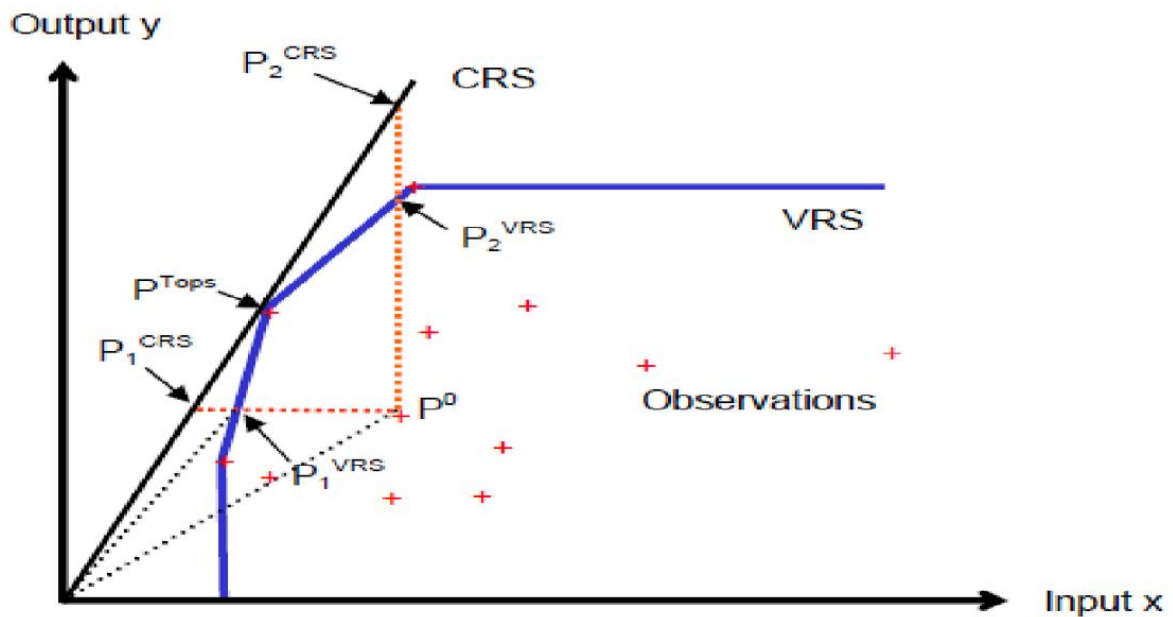


Figure 1.1: The Various Farrell Efficiency Measurements

reference points on the frontier are the designated markers or landmarks used to establish and demarcate the boundaries or limits of a particular area.

1.6.2 Bank Profitability

The theoretical framework of bank profitability includes various factors that influence a bank's ability to generate profits. It involves analyzing the interaction between internal and external variables that impact a bank's financial performance. Some key components of this theoretical framework are interest rate spread, loan portfolio quality, cost efficiency, asset quality, capital adequacy, risk management practices, and technology and innovation. By considering these factors within the theoretical framework of bank profitability, researchers and practitioners can gain insights into the drivers of bank profitability and develop strategies to optimize financial performance while reducing risk.

The interest rate differential (IRS) is a crucial metric that impacts a bank's profitability. It represents the difference between the interest earned on loans and the interest paid on deposits. A larger spread usually indicates higher profitability for banks as they benefit from the difference between interest earned and interest expense. The relationship between interest rates and bank profitability is generally positive. When interest rates rise, banks often experience higher profitability due to a wider interest spread. This is because banks can charge higher interest rates on loans while keeping deposit rates relatively stable, thereby increasing their profit margins. Conversely, if interest rates fall, the interest margin may decrease, potentially reducing the bank's profitability. Studies such as the one conducted by Khan and Sattar (2014)

have highlighted the positive correlation between interest rates and bank profitability. Their research suggests that as interest rates increase, banks can generate higher profits by leveraging the larger spread between the interest rates offered to customers and the returns obtained from investments. However, while interest rate spread is important for bank profitability, it is not the sole determinant. Loan portfolio quality also plays a significant role in shaping a bank's profitability. A high-quality loan portfolio, characterized by low levels of nonperforming loans and credit risk, is essential for sustainable profitability. Indeed, Ugoani (2016) emphasizes the critical role of loan portfolio quality in shaping the profitability of banks. A high-quality loan portfolio, characterized by low levels of nonperforming loans and credit risk, is essential for banks to sustain profitability and ensure long-term stability.

Banks must implement effective risk management practices to maintain a high-quality loan portfolio. The aim is to assess and monitor credit risks associated with lending, to identify potential problem loans at an early stage, and to take appropriate measures. By proactively managing credit risk, banks can minimize the likelihood of loan defaults and limit potential losses. Additionally, regulatory compliance is critical to maintaining the quality of the loan portfolio. Banks must comply with regulatory standards and guidelines set by regulators to ensure sound lending practices and risk mitigation. By complying with regulations, banks can avoid legal and regulatory penalties while promoting transparency and accountability in lending. In addition to risk management and regulatory compliance, proactive measures are required to maintain asset quality and improve loan portfolio performance. Banks can employ strategies such as comprehensive credit checks, portfolio diversification, and offering tailored financial solutions to meet the specific needs of consumers. By using these preventive procedures, banks can ensure the quality and profitability of their loan portfolios by identifying and managing potential credit risks before they develop into significant problems. Financial institutions can reduce their operating costs by implementing cost-cutting measures, eliminating inefficiencies, and optimizing processes. This increases both the cost-to-income ratio and the cost-to-income ratio, ultimately leading to improved profitability. Additionally, it is important to allocate resources wisely to revenue-generating activities to optimize the use of all available resources, including infrastructure, technology, and human capital. Banks can increase their productivity and results by implementing strategic initiatives without incurring additional costs. This efficient use of resources increases profitability and optimizes operational performance. A bank's profitability depends on cost efficiency as it reduces costs, increases competitiveness, optimizes resource use, strengthens risk management, facilitates investment in expansion

initiatives, and increases shareholder value. By prioritizing cost efficiency as a strategic imperative, banks can improve financial performance and achieve sustainable profitability in a dynamic and competitive banking environment, cost efficiency initiatives focus on identifying and eliminating unnecessary expenses in various areas of banking operations (Olson and Zoubi, 2011). Capital adequacy, risk management practices, and technology and innovation are crucial determinants of bank profitability. Adequate capitalization enhances financial resilience and investor confidence, leading to higher profitability (Allen and Carletti, 2013; Berger et al., 1995). Effective risk management frameworks help banks identify and mitigate various risks, minimizing losses and preserving asset quality. Moreover, technology and innovation enable banks to streamline operations, reduce costs, and offer innovative products and services, thereby driving competitiveness and profitability in the dynamic banking landscape (Tarullo, 2009).

Various indicators are adopted to measure profitability, which mainly include return on assets (ROA), return on equity (ROE), and net interest margin (NIM).

The return on assets (ROA) is a crucial measure used to evaluate a company's profitability in proportion to its entire asset portfolio. It provides valuable insights for decision-makers, investors, and analysts into the financial health of an organization and its efficiency in generating profits from its asset base. Comparing a company's ROA with industry benchmarks is essential for contextualizing its performance. Through the process of benchmarking against comparable organizations in the same industry, decision-makers can gain a more precise understanding of the company's asset utilization efficiency in relation to its competitors. ROA serves as a valuable tool for investors evaluating potential investment opportunities. A higher ROA relative to industry averages may indicate a more profitable and efficiently managed company, making it an attractive investment prospect. Conversely, a lower ROA may signal potential inefficiencies or challenges within the company's operations. Return on assets is determined by dividing a company's net income by its total assets. The ratio signifies the efficiency with which a corporation utilizes its assets to make profits. A greater return on assets signifies that a corporation is more proficient in utilizing its assets to generate revenues (Jewell and Mankin, 2011).

ROE, also known as Return on Equity, is a financial metric that quantifies a company's profitability in relation to the amount of money invested by its shareholders. The calculation involves dividing the net income by the shareholders' equity. Return on equity (ROE) is a metric

that quantifies the profitability of a company in relation to the amount of money invested by shareholders. Return on equity (ROE) is quantified as a percentage and serves as a pivotal measure employed by investors, analysts, and management to assess a company's financial performance and effectiveness in utilizing the funds provided by shareholders. A higher return on equity (ROE) is typically seen as advantageous since it signifies that the company is earning greater profits for each unit of shareholders' stock. Nevertheless, it is crucial to analyze the Return on Equity (ROE) within the framework of the company's specific industry, scale, and stage of development. (Traub, 2001). A high ROE may signal strong profitability, but it could also result from financial leverage or aggressive risk-taking, which may not be sustainable in the long term. Conversely, a low ROE may indicate inefficiency or conservative financial management. ROE is often analyzed alongside other financial metrics and compared with industry benchmarks to assess a company's relative performance and identify areas for improvement. Additionally, trends in ROE over time can provide insights into the company's growth trajectory and management effectiveness.

Return on equity (ROE) is a financial performance indicator that calculates the ratio of net income to shareholders' equity. ROE, or return on equity, is a measure of a company's profitability that is calculated by dividing its net income by its shareholders' equity. Shareholders' equity is the difference between a company's assets and its debts. We classify the return on equity as a measure of the company's profitability and its ability to achieve profits. Its high value is an indication of the company's efficiency. One could blame the return on equity for not accurately portraying the company's true image. Perhaps the company is highly leveraged and risky and shows an improvement in return on equity. Therefore, it is important to provide a more balanced view of the company without relying on a unique indicator to evaluate performance. Net interest margin (NIM) is a measurement that compares the net interest income that a financial company generates from credit products such as loans and mortgages with the interest it pays to holders of savings accounts and certificates of deposit (CDs).

Expressed as a percentage, the NIM is a profitability indicator that approximates the long-term probability of a bank or Investment Company's prosperity. This metric helps potential investors decide whether or not to invest in a particular financial services company by providing insight into the profitability of their interest income versus their interest expense. The interest income from the loans is greater than this metric. A negative value is an indicator that the bank

did not make optimal investment decisions, as the interest expenses are higher than the interest arising from loans (Ichsani and Suhardi, 2015).

1.6.3 Bank Stability

The series of financial crises, including events like the global financial crisis of 2008 and the Asian financial crisis of 1997, have highlighted the significant economic contractions and disturbances that can occur within the financial system. These crises are often characterized by large-scale banking failures, asset price collapses, and economic stagnation (Thomas, 2011). They have had profound and far-reaching implications for economies worldwide. In response to these crises, economists and policymakers have recognized the importance of deepening understanding of the underlying factors and dynamics that contribute to the emergence of risks and their spread throughout the financial system, this necessitates examining various aspects of bank behavior, including lending practices, risk management strategies, regulatory compliance, and market interactions. Through comprehensive analysis of the relationship between bank behavior and risk, policymakers aim to identify weaknesses in the financial system and implement measures to mitigate risks effectively, this may involve strengthening regulatory frameworks, improving oversight and supervision mechanisms, enhancing transparency and accountability within financial institutions, and bolstering resilience to external shocks. By addressing these issues, policymakers seek to promote stability and resilience in the financial system, reducing the likelihood and severity of future crises.

The theoretical literature on banks' risk tolerance includes various models and frameworks that aim to explain the factors that influence banks' propensity to take risks. These models and frameworks provide insights into the complex interplay of factors that shape banks' risk-taking behavior, including internal organizational dynamics, market conditions, the regulatory environment, and broader economic factors. One prominent theoretical approach is agency theory, which posits that banks' risk tolerance is influenced by the alignment of interests between different stakeholders, such as shareholders, managers, and regulators. According to agency theory, conflicts of interest may arise between these stakeholders, leading to divergent risk preferences and behaviors (Jensen and Meckling, 2019). Capital adequacy theory offers a different view, suggesting that banks' risk tolerance is shaped by their capital levels. Banks with higher levels of capital are better equipped to absorb losses and are, therefore, more likely to take higher levels of risk. Conversely, banks with lower levels of capital may exhibit more conservative risk-taking behavior to protect against potential bankruptcy (Modigliani and

Miller, 1958). Furthermore, signaling theory provides another perspective, emphasizing the role that information asymmetry plays in shaping banks' risk-taking behavior. According to signaling theory, banks may use various signals, such as dividend policies, to convey information about their risk tolerance to investors and regulators; by sending credible signals about their risk management capabilities, banks can influence market perceptions of their risk and their ability to access capital. (Sharpe, 1990). Additionally, behavioral finance models highlight the role of psychological biases and heuristics in shaping banks' risk behavior. These models suggest that banks' risk tolerance may be influenced by factors such as overconfidence, loss aversion, and herd behavior, which can lead to deviations from rational decision-making (Barberis and Thaler, 2005).

The theoretical literature on banks' risk tolerance includes various models and frameworks that explain the factors influencing banks' risk-taking propensity. This body of research plays a crucial role in understanding the underlying mechanisms that drive risk behavior in banking and informing regulatory and policy decisions aimed at managing and mitigating these risks. Several key themes emerge from this literature; one prominent research focus is the impact of capital regulation and risk management practices on banks' risk-taking behavior. Models in this framework examine how regulatory capital requirements and risk-weighted asset calculations influence banks' risk-taking incentives and decisions. According to Adrian (2017), the lack of accurate assessment and effective oversight of risks, combined with regulatory shortcomings, was the convergence of factors that ultimately caused the global financial crisis in 2008. The crisis highlighted the importance of strong risk management strategies and effective regulatory oversight for maintaining the financial system.

The conventional Z-Score metric is commonly employed as a risk indicator that reflects the likelihood of a bank being insolvent. Bank bankruptcy refers to the scenario when a bank's losses, which are negative profits, are greater than its equity. This definition is often used for these purposes (Boyd and Graham, 1986). The traditional Z-Score is commonly used as a risk indicator and is an indicator of financial solvency and when banks approach risk levels that may later lead to bankruptcy (Fiordelisi and Mare, 2014).

Notably, the Z-Score is frequently used in conjunction with other proxies for bank risk, including the probability of default, non-performing loan ratio, distance to default, and standard deviation of ROA/ROE, to measure bank risk. (Chiaramonte et al., 2016; Siddika and Haron,

2020). The z-score measure is a more complete indicator of bank risk than other accounting-based risk measures since it accounts for variations in return and bank capital levels.

Banks, usually seen as the foundation of the financial system, have been greatly affected by financial deregulation. As a result of deregulation and the removal of barriers to entry, banks have experienced increased competition from local and international participants. As a result, there has been a surge in merger and restructuring activities in the banking industry as institutions seek to enhance their competitive position. Moreover, the process of financial liberalization has allowed banks to expand their product range and grow their sources of income. As a result, many financial institutions have ventured into new sectors such as investment banking, wealth management, and insurance.

To enhance the efficiency and safety of these systems, the Basel I Committee was established in 1988, followed by Basel II, which removed one of the most important aspects of Basel I, the external classification of risks, which was considered by many to be fundamental, then came Basel III, in an attempt to avert the imminent collapse of the global banking system, raising capital requirements and adding new guarantees, including new requirements to increase reserves during periods of credit expansion and ease them during periods of decline. These requirements, although not mandatory, have been adopted in many countries and have a fundamental impact on the fundamentals of banking supervision and capital regulation, based on three pillars: strengthening capital requirements, improving supervisory practices, and improving market discipline.

CHAPTER TWO

THE BANKING SYSTEM IN IRAQ UNDER REFORM

2.1 Stages of Development

Over 2000 years ago, the Babylonians undertook many activities that could qualify as banking activities. These included granting credit, collecting interest, and accepting deposits. The Babylonians in the ninth century BC also used credit methods similar to payment bonds and bank checks (Bromberg, 1942). To give a clear picture of the reality and nature of the banking sector in Iraq, it is necessary to trace the various stages that this sector has gone through since its founding until the present time, as it has gone through six stages, each stage having its time frame and distinctive characteristics.

2.1.1 Phase I: Foreign Banking (1890-1934)

This stage marked the beginning of the formation of the banking industry in Iraq. Baghdad was the first city in Iraq to have seen the establishment of foreign banks. In 1890, the first British bank, the Ottoman bank, was founded. A branch of the British Eastern Bank was opened in Baghdad in 1912 and the Iranian Shahinshahi Bank in 1918 (Basha, 2009), knowing that the Bank had been replaced by the British Bank for the Middle East in 1953 and that the banks had been holding a monopoly on commercial banking in Iraq for a year (1935). During this phase, foreign bank branches and services were concentrated in major cities. The focus was on providing short-term credit to the commercial sector to maximize profits and encourage imports from Britain, while the industrial and agricultural sectors were neglected and denied access to banking services and the financing necessary for their development. This phase was marked by the promulgation of the Iraqi Currency Act No. 44 (1931), which established a currency commission based in London (Symes, 2014).

2.1.2 Phase II: Iraqi National Banking Pashe (1935-1947)

This stage was characterized by the issuance of Law No. 51 of 1935, which was the first act in Iraq's modern history that the state established the Agricultural Industrial Bank, which represented the true beginning of Iraq's National banking activity. Due to the duality of specializations and lack of capital, the bank was initially unable to carry out its specialized activities. It was, therefore, divided into two banks, the Agricultural Bank and the Industrial Bank, following Laws No. 12 and 18 of 1940, which began operating in 1947. Despite the

issuance of several banking legislation such as the Banking Control Law. Banks No. 61 of 1947, and with the emergence of the 1938 law at this stage, the effectiveness of the law remained limited in light of the dominance of foreign banks that carried out their activities according to their interests and in the interest of foreign economic and political interests. Therefore, it can be said that the activities and tasks of national banks and their management methods have been delayed. Because of the dominance of foreign banks, it was impossible to achieve a qualitative shift in banking work in Iraq that is compatible with the country. The period of domination and closure of foreign banks and overall commercial banking activity in Iraq continued until the end of 1941, when the first national commercial bank was established in an Arab State financed by national capital and national administration. The policy of the Ministry of Finance was to establish the Rafidain Bank under Act No. 33 of 1941, with a paid capital of 50,000 dinars (Arab Banking Union, 2009).

This indicates, on the one hand, an improvement in the economic situation of Iraq, on the other hand, the availability of highly qualified scientific personnel capable of carrying out the tasks of bank management, and, on the other hand, the country's exemption from the banking dependence of foreign States.

2.1.3 Phase III: Establishment of the Central Bank and Foreign Banking (1947-1963)

This stage was marked by the promulgation of Act No. 43 of 1947, establishing the National Bank of Iraq, with a capital of 5 million dinars, half of which was paid at the time of the formation of the Bank and the rest of which was a guaranteed reserve by the Iraqi Treasury. The first of its actions was to study the practical and legislative shortcomings accompanying the Banking Control Act No. 61 of 1938. It was abolished and replaced by Act No. 34 of 1950. The National Bank Act No. 43 of 1947 was repealed and replaced by Act No. 72 of 1956, which changed the name of the National Bank to the Central Bank of Iraq. It is one of the first central banks established in the Middle East, including all Arab States. The most important of the new changes contained in Act No. 72 of 1974, as compared with Act No. 43 of 1947, are as follows:

1. It is preferable to establish the procedures that the Bank may follow in its role as the country's central bank.
2. Provide for forming an Advisory Board comprising representatives of commercial banks operating in Iraq to study banking matters in general and make recommendations

to the Bank's Board of Directors rather than representing commercial banks on the Bank's Board of Directors.

3. The capital of the bank and the company increased from 5 million dinars to 15 million dinars.
4. Increase the reserve from 2.5 million to twice the bank. The capital is 30 million dinars.

Arab banks were active during this phase. The United Lebanese Bank was established in 1953. Another Arab Bank, the Arab Bank, was established in Baghdad in 1954 as the first branch of the Palestinian Arab Bank. (1957). During this phase, some foreign banks were robbed by the Commercial Agencies Act No. 23 (1960). The first bank to sweat was the Bank of Intra, which became the United Iraqi Bank. It founded a joint stock company in 1961 with a share of 60 percent of its capital, followed by the Ottoman Bank, called Iraqi Credit Bank. The Iraqi contribution was also 60% in 1963 (Symes, 2014).

2.1.4 Phase IV: Nationalization and Consolidation of Banks (1964-1990)

In 1964, the Iraqi government took the initiative to expand the public sector by abolishing private commercial, industrial, and banking activities following the enactment of Law No. 100 of 1964, which nationalized all civilian and foreign banks. The purpose of nationalizing the banks under the previous law was to radically change the composition of Iraq's banking system and eliminate the influence of foreign capital. The same law also included the establishment of a public banking institution to manage national commercial banks and Rafidain Bank, strengthening the state's economic ties with banking businesses, and regulating and controlling the credit operations of banks, which includes a policy of fiscal tightening which adopted caps and credit schemes to meet the bank financing needs of various sectors. The general banking institution was affiliated with the Central Bank when it was founded. Still, at the end of 1965, the institution was separated from the Central Bank and became affiliated with the Ministry of Finance. According to Law No. 100 of 1964, commercial banks were divided into four groups before their abolition in 1970 (Thuwaini, 2010):

1. The Rafidain Bank Group comprises Rafidain Bank, Rashid Bank, and the Eastern Bank.
2. The Baghdad Bank Group comprises the Baghdad Bank and the Arab Bank.
3. The Iraqi Credit Bank Group comprises the Bank of Credit and the Bank of Lebanon.

4. Iraqi Commercial Bank Group: The Commercial Bank, the British Bank for the Middle East, and the Pakistan National Bank.

Bank mergers continued within these four groups, and in 1965, the Rasheed Bank Group began merging with the Rafidain Bank to replace the Rasheed Bank Group. The structure of the commercial banking system was also reorganized, and the Bank of Baghdad and Credit Bank groups were merged into the Commercial Bank in 1970 and were replaced by the Commercial Bank of Iraq. In the same year the General Corporation for Banks was abolished, and its responsibilities were transferred to the Ministry of Finance, the Central Bank, and the Rafidain Bank in accordance with Law No. 78 of 1970. In 1974, Law No. 67 was issued for the Iraqi Council of Ministers, commercial law was issued and the bank was merged with Rafidain Bank (Arab Banking Union, 2009). The aim of reorganizing the commercial banking system, which was the integration of banks, was to strengthen it, increase its efficiency, expand its credit and financial services, and review the credit policy to ensure its consistency with the state's financial requirements and the National development plan. There is no doubt that many benefits have been achieved as a result, most important of which is increasing financial resources, increasing lending capacity, saving administrative costs, human and technical resources, and facilitating oversight of banking operations by the Central Bank of Iraq. The milestone at the end of this phase of transformation was the nationalization, integration, and reorganization of the private banking sector, which was the establishment of Al-Rashid Bank in 1988 under Law No. 52 as the second state-owned commercial bank after the Rafidain Bank (Sabar, 2014).

2.1.5 Phase V: Private Sector Return Phase (1991-2003)

One of the most significant economic trends during the embargo period was to strengthen and strengthen the role of the banking system and enable it to play its full role. Act No. 12 of 1991 amending the Central Bank of Iraq Act No. 64 of 1976, allowed the establishment of private and mixed banks to operate competitively alongside existing government banks. The first private commercial bank, the Baghdad Bank, was established in 1992. The Baghdad Stock Exchange was also established in the same year (Bank of Baghdad, 2020).

The promulgation of Law No. 12 of 1991 was met with economic and financial support and opposition. Proponents focused on the fact that the creation of private banks would increase banking competition and attract private savings. The resistance to the idea of establishing private banks is that they cannot compete with government banks; Private banks, due to their

modest financial resources, will have the primary objective of making profits at the expense of liquidity and security. this may have a negative impact on the performance of the Bank's activities; and they can increase the supply of cash, contributing to rising inflation limits, especially as the economic lockdown begins(Thuwaini, 2010).

This phase was characterized by several features:

1. The granting of establishment permits to private banks in the form of shareholders with a nominal and paid-up capital of at least 15 million dinars, while the Company Law defines the contribution of a natural or legal moral person as no more than 5% of the nominal capital of such financial institutions. By the end of 2002, a total of 16 private banks with a total capital of more than 7 billion Iraqi dinars had been founded.
2. Adopting the principle of universal banking for state and private banks.
3. Efforts to reorganize the branches of state-owned banks, namely Rafidain and Rashid, by consolidating their branches located in nearby geographical locations in exchange for opening new branches in unbanked areas. As a result of this development, the number of branches of these banks increased from 178 in 1992 to 344 at the end of the year (2000).

2.1.6 Phase VI: Reform and Financial Liberalization (2004-2016)

After the collapse of the Iraqi economy in April 2003, the banking system became obsolete in its administrative, financial and service aspects. Iraqi banks enjoyed little international trust and played a minor role in the country's economic and development activities worldwide due to wars, economic blockades and the disconnection of Iraq and its economic activities from advances in all intellectual, scientific and material fields. This gave rise to the need to reconsider the status of the banking system in Iraq, the laws that regulate its work, improve its performance, activate its role in economic and development activity and strengthen its international relations. In 2004, the Central Bank of Iraq enacted Law No. 56, which granted the Central Bank complete independence from the government in its operations, as set out in the second paragraph of Article 2. The above law, together with Article 26 of the same law, insulates the Central Bank of Iraq from fiscal pressure and allows it to lend directly to the state treasury. This leads to a lack of expansion of the money supply. The adoption of Iraq's Commercial Banking Law No. 94 of 2004 marked a significant milestone in the creation of a financial system that meets international standards. The Iraqi Trade Bank, founded in November 2003 with capital of \$100 million from the

Iraq Development Fund, is one of the most renowned banks of this time. This bank aims to help Iraq restore its international creditworthiness and improve its network of financial relations, a response to the isolation that the country suffered in the last decade of the 20th century due to the measures imposed (Al-Shakri and Hussein, 2013). One of the features of this stage is an attempt to resume and develop the work of government and private banks, as well as begin to support capital adequacy. This stage includes an attempt to resume and develop the work of government and private banks, begin to support the capital adequacy standard in Iraqi banks by international requirements and restart the Baghdad Stock Exchange, which has resumed its operations under the name of the Iraq Stock Exchange. Here's a summary of the procedures: (Shamri, 2012):

1. Set an existing minimum bank capital of at least 250 billion dinars or 50 million US dollars and the equivalent in Iraqi dinars, i.e. H. 30% of the capital of domestic banks as working capital of foreign bank branches.
2. To allow foreign banks to open branches and offices in Iraq and to participate in the capital of Iraqi banks, regardless of shares and without restrictions, in order to promote competition for the development of banking work in accordance with paragraph 6 of the Banking Law No. 94 of December 19, 1994. (2004).
3. Reducing the proportion of legal reserves from 42% to 25%, of which 5% is in cash in the bank's safes and 20% in the Central Bank of Iraq.
4. Liberalization of interest rates.
5. The establishment of a foreign exchange auction which has contributed to improving and stabilizing the exchange rate of the Iraqi dinar.
6. Establishment of an electronic Iraqi payment system.
7. The issuance of a new Iraqi currency has contributed to stabilizing the monetary situation and increasing confidence in the Iraqi dinar.
8. The banks themselves are trying to expand their services, introduce modern technologies into their work, train their employees outside Iraq, and open more bank branches. This has contributed to the modernization of banking to meet the directions of the Iraqi economy.
9. In 2016, all banks were required to apply the Basel Convention standards, such as: a- The minimum liquidity coverage ratio (80 percent) is maintained and increased annually (10 percent) until it reaches 100 percent at the beginning of the year (2019) and banks

that fail to do so are subject to fines. b- Stable net financing of at least 100 percent. If this is not achieved, fines will be imposed.

2.2 Structure of the Iraqi Banking System

The effectiveness of the role played by the banking sector in stimulating economic activity is affected, positively or negatively, by the structural structure of this sector and the degree of its organization. Therefore, an introductory overview will be given about the structure of the Iraqi banking system at present, as it consists of:

2.2.1 Government banks:

The banking system in Iraq includes seven state-owned banks, including an Islamic bank. The headquarters of these banks are in Baghdad, with branches spread across most governorates. These banks are divided into specialized and non-specialized banks. Specialized banks mean that they finance certain sectors of the economy by providing banking services that serve a specific type of economic activity, in accordance with the decisions made for their creation. These banks are characterized by certain characteristics, including They are non-deposit banks; that is, they do not rely on individual deposits to finance their activities but on their capital and the bonds they issue, as well as the loans they often make.

They have relatively long durations, and profit is not their primary goal, but the goal is to achieve economic and social development (Abdel-Baqi, 2016). The Iraqi banking system includes three specialized banks: the Agricultural Bank, founded in 1935; the Industrial Bank, founded in 1946; and the Real Estate Bank, founded in 1948. As for non-specialized banks, whose work covers all sectors, Al-Rafidain Bank is the first non-specialized government bank, founded in (1941), then Al-Rasheed Bank, founded in (1988), and the Iraqi Trade Bank, which was founded in (2004) and ended with the Iraqi Trade Bank. Al-Nahrain Islamic Bank, which was established in 2015 to coincide with the adoption of the Islamic Banking Law No. 43 of 2015 (Annual Report on Financial Stability in Iraq, 2015) .

2.2.2 Commercial banks:

Commercial banks are an important center in all economic and financial systems. Due to its positive role in implementing economic development plans through the accumulation of savings and their subsequent distribution across various sectors of the economy, as well as the increasing role of Iraqi commercial banks, especially after the year (2003) and the subsequent

opening of the Iraqi economy to global financial markets. The role of these banks is clearly understood as a tool for controlling the demand and supply of money, as well as a means of implementing economic development plans by providing loans to investors and owners of private projects. Iraqi commercial banks operate in accordance with Banking Law No. (94) Of (2004) and Central Bank Law No. (56) Of the year (2004) as amended, in addition to the Companies Law No. (21) and (22) of the year (1997), the Money Laundering Law No. (93) Of the year (2004) and the Investment Law No. (13) Of the year (2006) and accounting under Iraqi rule. No. (10), issued by the Accounting and Auditing Standards Board, follows the unified accounting system for banks and insurance companies for recording financial statements and preparing financial statements, relies on mechanization in accounting work, and uses the system of general banks for banking work (Jedjaoui and Mohammed, 2014). The number of local commercial banks reached (24) by the end of the year (2016), including seven banks in which foreign capital participated, after the implementation of Law No. (94) of (2004), which allowed foreign banks and private individuals to capital from Iraqi banks and, in fact, seven jobs have been created since 2005; these investments aimed to further develop the participating banks through the introduction of modern technologies and advanced software to improve the performance of the financial system, improving the performance of banks and increasing their financial leverage. Table 2.1 shows the banks involved in the Iraqi banking sector.

Table 2.1: Banks in the Iraqi Banking Sector

Number	Bank	Foreign Participation	Proportion Of Foreign Participation	Date Of Foreign Participation
1	Commercial Bank of Iraq	Ahli United Bank	54.70%	2005
		International Finance Corporation	9.90%	
2	Dar Al Salam Bank	H.S.B.C	52%	—
3	AL-Ahly Bank ¹	The Capital Bank of Jordan	78%	2005
4	Baghdad Bank	United Gulf Bank	0.31%	2005
		Burgan Bank	51.80%	
5	Al-Mansour Investment Bank	International Bank of Qatar	50.70%	2005

6	Iraqi Credit Bank	National Bank of Kuwait	84.30%	2006
		International Finance Corporation	6.70%	
7	Regional Cooperation Bank	Agricultural Bank of Iran	63.40%	2007
		Bank of Economy Novin	23.60%	

Source: Annual Report on Financial Stability in Iraq (2015), Central Bank of Iraq, Statistics and Research Service, Financial Market Research Section, p. 32.

2.2.3 Islamic Banks

These banks are among the financial institutions that play a prominent role in the economies of Islamic countries, and their philosophy focuses on not trading on interest. They accept bank deposits like traditional banks but do not use interest rates to compensate depositors. Rather, they replace them with a share of the profits and invest these deposits in investment areas permitted by Islamic law and through legitimate means Iraq's banking sector includes (19) Islamic banks, including one state-owned, namely Al-Nahrain Islamic Bank, established in 2015 with a paid-up capital of (50) billion dinars and (15) Banks owned by the private sector, in addition to three foreign Islamic banks, noting that the first Islamic bank established in Iraq was the Iraqi Bank for Investment and Development in 1993.

2.3 Challenges Facing the Iraqi Banking Sector

Although the Central Bank of Iraq has made efforts to support the Iraqi banking sector, it still faces numerous limitations and deficiencies that hinder its development and alignment with Arab and global banking systems. These shortcomings also affect its ability to support economic growth and financial stability. This framework highlights numerous obstacles and issues related to the Iraqi financial sector:

- (1) Lack of banking awareness: Banking awareness is important to enhance banking activity through knowledge of banking tools and methods and expanding the customer base. What is more important for the banking sector in Iraq is the low level of banking awareness. This is a result of several objective factors related to banks on the one hand and society on the other hand. Regarding banking factors, they are related to the work of banks, the quality of providing banking services, and the role of the media in

spreading banking habits and keeping the public informed. As for the factors related to society, some people do not deal with traditional commercial banks, because they deal with interests prohibited by Islamic law. In addition to that, some individuals in the Iraqi banking sector do not have the competence and ability to protect the funds deposited in banks due to bank robberies (Jabbar, 2015).

- (2) Weak economic stability and security: The security situation in Iraq continues to impede the growth of the banking industry. Banks are unable to function in an unstable security environment, particularly in light of the significant shock to the Iraqi economy in mid-2014. Three governorates in Iraq (Ninawa, Anbar, and Salah al-Din) are under the authority of armed terrorist groups (Daish), who are responsible for stealing bank assets and their seized branches. They seized 121 branches of commercial banks, including 84 branches of state-owned banks and 37 branches of private banks. The total stolen cash amounted to around 900 billion Iraqi dinars, including that of the Iraqi Central Bank branch in Mosul (Abdelnabi, 2018). In addition, economic stability and the integrity of economic policies play an important role in the development of the banking sector.
- (3) Inadequate legislative structure: The banking activity is subject to a large number of controls, with regulators playing a significant role in the supervision of the banking sector; because of its important role. The main objective of these controls is to guarantee bank funds and the rights of those dealing with these institutions, the most significant of which is to require banks to maintain a proportion of their reserves against deposits with the Central Bank of Iraq. The inadequacy of the legislative structure can prevent the spread of financial corruption in the banking sector, money-laundering operations consisting of the consolidation and investment of funds of illicit origin to banks through bank complicity by facilitating them and the employment of illicit funds by lending with the security of funds deposited, the use of the loan for the acquisition of certain assets, or the purchase of commercial financial institutions with a project activity (Jabbar, 2015).
- (4) Low bank density. This concept reflects the scope of banking services in the economy. Bank density can be measured by the number of branches per 10,000 inhabitants based on the ratio of the number of bank branches to the number of inhabitants. According to the Central Bank's Financial Stability Report (2016), Iraq's banking sector suffers from this low density. This report shows that bank density is still limited to one branch per 35,000 inhabitants, while this ratio is 6 banks per 10,000 inhabitants in developed

countries and perhaps one bank per 10,000 inhabitants in some Arab states such as Lebanon (Annual Report on Financial Stability in Iraq, 2016). This concerns, on the one hand, the low quality of the services provided by banks and, on the other hand, the less efficient performance of these banks, which affects the ability to meet customer needs as quickly as possible.

- (5) Weak disclosure and controls: Bank statements vary in coverage and accuracy from bank to bank, and the Iraqi banking sector lacks required minimum disclosure by banks. This makes it difficult to compare domestic and international banks, or even local banks themselves.
- (6) Government banks suffer from tedious and unprofitable work, such as paying pensions to pensioners, as well as the lax administrative structure of a large number of banks, especially the government, and the lack of expertise, professional staff and efficient management (Deheim, 2016).
- (7) The poor contribution of institutions supporting the banking system, such as the Iraqi Stock Exchange, insurance companies, financial transfer companies, securities brokering and purchase companies, the mail supply fund, and the pension fund.

2.4 Development Mechanisms of the Iraqi Banking Sector

To improve the reality of Iraq's banking sector, the reform mechanism must be comprehensive and integrated, starting with a new structure for the banking sector, a shift towards inclusive banks, and the expansion of commercial banking capitalism. Furthermore, banking density needs to be increased to provide such services to the public. On the other hand, the banking system should attract savings through high interest rates and incentive incentives, the most important of which are (Bikker and Gerritsen, 2018):

1. Reconstruction and rehabilitation of the banking services industry: Through the provision of financial and banking services through Iraqi private banks, such as: Such activities lead to a decrease in their relative share in deposits in total bank liabilities, an increase in the share of marketable liabilities in total bank liabilities as a result of higher banking activity in non-credit business, resulting in a decrease in the share of loans and an increase in the share of other relative assets.
2. Transition to inclusive banks: By pursuing a diversification strategy for banking services at the level of diversity of sources of financing (long-term borrowing and

issuance of tradable certificates) and at the level of diversity of uses and various banking functions, loans must be diversified, holding banking companies must be established, any conversion of bank debt into securities deposits should be encouraged, various and new investment activities such as backstopping, investment banking, financing of privatization activities, foreign exchange trading, obtaining advanced degrees in finance, depth of securities issuance activity and the establishment of investment funds.

3. Application of the Basel Committee's decisions on reserves and capital: To protect against banking risks related to the liquidity and sound financial condition of banks, reserves and capital for Iraqi commercial banks should be supported. Therefore, the capital adequacy criteria as a global standard, particularly in the version of the so-called Basel II decisions, with which the Basel Committee aims to frame them in a new, comprehensive capital adequacy framework, should be brought into focus over regulatory objectives to ensure that the integrity of the financial security system continues to be improved.
4. Bank integration: This process has become a global phenomenon affecting all global banks. Therefore, Iraqi banks need to take this step as it has many benefits, including achieving economies of scale (increasing banks' assets and building their capital base), expanding their banking activities, and improving profitability. Many banks, such as Algerian banks, have reached their potential for success through the integration process.

2.5 A Review of The Iraqi Banking Sector

In order to provide a comprehensive overview of the reality of the Iraqi banking sector during the study period, in this part we examine the main aspects of the performance of the Iraqi banking sector from 2010 to 2020 by analyzing the main financial and banking indicators.

2.5.1 Banking Assets

Assets play a crucial role in banking operations and are a mainstay of financial stability. Assets enable banks to effectively manage liquidity, maintain capital adequacy, mitigate risks, facilitate credit intermediation, meet regulatory requirements, and provide market confidence. Effective asset management is critical to maintaining the long-term strength, stability, and viability of banks and the entire financial system. Table 2.2 shows the development of total bank assets in Iraq for the period (2010-2010).

Table 2.2: Assets of the Iraqi Banking System for the Period 2010-2020 (Billion Dinars)

Year	Assets of government banks	Assets of private banks	Total assets
2010	353118	10374	363492
2011	131221	12582	143803
2012	173293	18062	191355
2013	185069	21485	206554
2014	204547	22274	226821
2015	200537	22461	222998
2016	197604	23758	221362
2017	131354	24567	155921
2018	95061	28109	123170
2019	104874	28379	133253
2020	108839	29038	138642

Source: Annual Statistical Bulletin (2010-2020), CBI, General Directorate of Statistics and Research, various issues.

From Table 2.2, it can be seen that the total assets of the Iraqi banking system decreased to (143,803) billion dinars in 2011. Based on the year 2010, which corresponds to (363,492) billion dinars, which is a percentage of about 0.604 banks accounted for the largest share of this decline. State banks whose total assets decreased by (62.83%) compared to an increase in assets of private banks by (21.28%); They attribute this to the decline in assets of Al-Rafidain and Al-Rasheed banks from (302,375) billion dinars and (28,428) billion dinars, respectively, to (86,196) billion dinars for Al-Rafidain Bank (17,866) billion Dinar for Al-Rasheed Bank for the year (2011) (Annual Statistical Bulliten, 2011). After revaluing their assets, the cancellation entries for the international part, which represent the difference between creditor and debtor, were implemented in accordance with the recommendations of the International Monetary Fund and the World Bank in the restructuring of Rafidain and Rasheed banks (Annual Report on Financial Stability in Iraq, 2011).

Then the total assets in the years 2012-2014 increased to 226,821 billion dinars in year (2014), but soon fell in years (2015) and (2016), so the total assets of the Iraqi bank sector reached in year 2016 to 221,362 billion dinars, despite the continuous increase in private banking assets. However, this decline was due to a decline in the total assets of government banks, particularly given the deteriorating security situation and the control of armed terrorist groups over three governorates, as well as the looting of bank branches there. Due to these circumstances, the total number of bank branches decreased from 1034 branches in year 2014 to 866 branches in year 2016. This had a negative impact on the Iraqi banking sector's total assets as well as the financial crisis that the Iraqi economy faced. Due to the decline in oil prices in international markets, the decline in assets of the Iraqi banking sector plays an important role. The increase in private bank assets is a good indicator reflecting improved competition between private and state-owned banks. Despite the circumstances that Iraq experienced in 2020 in light of the Corona epidemic crisis and its global, regional and local impacts, the assets of the banking sector developed and recorded an increase, reaching more than 138 trillion dinars in 2020 with a growth rate of 4.13% during the year 2019, whose total assets amounted to 133 trillion dinars due to the increase in the value of banks' assets in foreign currency, as it increased from 22.4 trillion dinars in 2019 to 26.7 trillion dinars in 2020. This increase was due to the difference in the exchange rate of the Iraqi dinar against the US dollar. Figure 2.1 shows the banking sector's assets, both government and private. It is noted that the level of concentration in the state banking sector is high compared to the private sector and that the total assets are concentrated in the state sector.

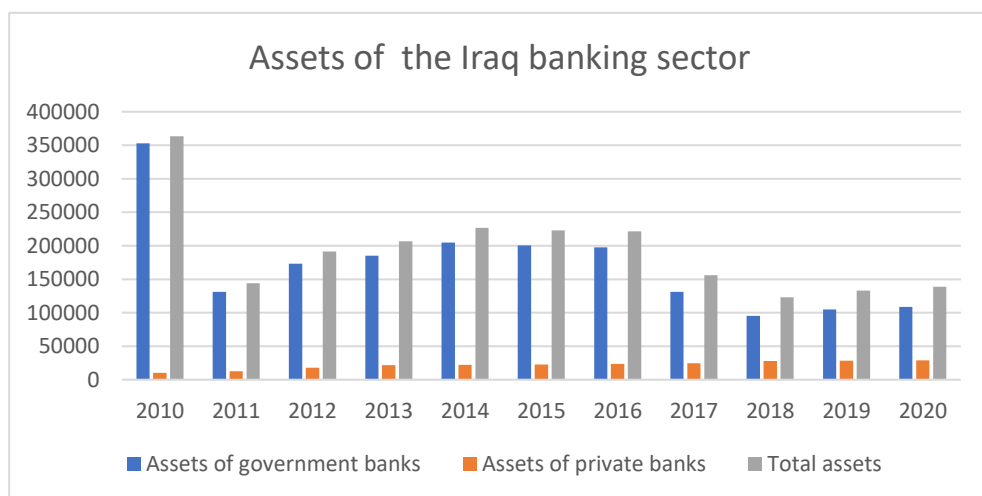


Figure 2. 1: Assets of the Iraqi Banking Sector

Figure 2.2 displays the assets of both government and private banks in Iraq from 2010 to 2020. The assets of government banks reached their peak in 2010, had a decline in 2011, followed by a modest increase, another decline, and ultimately reached their lowest point in 2018. By considering the assets of private banks, we observe that their levels reached a point of convergence within the timeframe of 2010-2018.

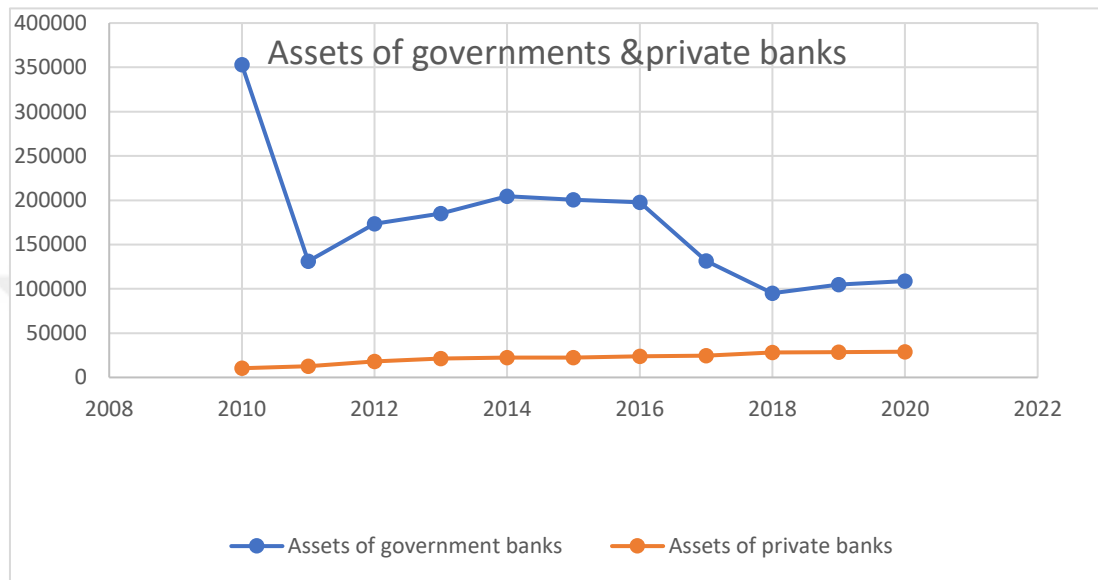


Figure 2. 2: Assets of Government and Private Banks

2.5.2 Deposits

Deposits are the cornerstone and foundation for banks' stability within a complex network of financial transactions. Deposits are banks' main source of financing, providing them with basic capital to support lending activities and investment projects. This flow of funds provides the banks with the liquidity necessary to meet the requests for immediate withdrawal from depositors. With the delicate balance of liquidity management, deposits provide a reliable pool of resources that banks can easily access, ensuring the proper conduct of day-to-day operations and protecting against liquidity crises. Therefore, these banks are keen to develop them by developing savings awareness in society and not complicating dealing procedures in depositing or withdrawing funds. Table 2.3 shows the deposits in the Iraqi banking system (2010-2020). We find that the volume of deposits is constantly fluctuated throughout the study period, but what is noted is the decrease in the percentage of change in private bank deposits compared to government bank deposits, especially after the year (2010), as well as the decrease in their percentage to the total banking sector deposits after private bank deposits constituted its percentage (32.88%) of total bank deposits decreased significantly in the year 2010 and for

subsequent years, and this is due to three reasons (Annual Report on Financial Stability in Iraq, 2010):

1. Government banks' efforts to attract savings deposits.
2. The Ministry of Finance's decision to withdraw deposits belonging to the public sector from private banks and deposit them in government banks.
3. Reducing the legal reserve ratio of all banks at the Central Bank to 15%.
 - The decrease in total banking sector deposits for the years (2015) and (2016) by (13.13%) and (3.02%), respectively, is due to several reasons:
(Annual Report on Financial Stability in Iraq, 2016)
 - Allocate additional funds towards counterterrorism efforts and assist individuals who have been displaced or are migrants. As a result of the dominance of armed terrorist organizations in the governorates of Nineveh, Anbar, and Salah al-Din.

Table 2.3: Deposits of the Iraqi Banking Sector

Year	State Bank Deposits	Private Bank Deposits	Total deposits
2010	42461	5486	47947
2011	49802	6348	56150
2012	53382	8623	62005
2013	58891	9964	68855
2014	64376	9697	74073
2015	55231	9113	64344
2016	53806	8592	62398
2017	58492	8556	67048
2018	66095	10798	76893
2019	71383	10723	82106
2020	74221	10702	84923

Note: The unit is one billion Iraqi dinars, Source: Annual Statistical Bulletin (2010-2020)

- The decrease in oil prices led to austerity measures, resulting in reduced government spending. A decline in the percentage of government deposits in banks, which account for over 60% of total bank deposits, mirrored this decrease

in government expenditures. Specifically, government deposits decreased from 49.4 trillion dinars in 2014 to 38 trillion dinars in 2016.

- An increase in depositors' withdrawals and an increase in the number of immigrants abroad.
- The bank's number of branches has decreased to 840. This was due to the merger or closure of many bank branches in some governorates as a result of the deteriorating security situation, which had a clear impact on credit as a result of the decline in cash supply from 72.692 billion. The debt decreased from 72.692 billion dinars in 2014 to 65.435 billion dinars in 2015 (Annual Statistical Bulletin, 2016).
- The Central Bank's dollar sales for domestic and foreign economic objectives declined from 54.4 billion dollars in 2014 to 44.3 billion dollars in 2015 and were further reduced to 33.5 billion dollars in 2016. (Annual Statistical Bulletin, 2016,).

According to the table, the volume of deposits in the banking industry increased from 67 trillion dinars in 2017 to 76.89 trillion dinars in 2018, a growth rate of 14.76%. The general improvement in economic conditions in 2018 contributed to the increase in bank deposits, as evidenced by the rise in both government and private deposits. Government deposits, which constituted 64% of total bank deposits in 2018, increased from 40.95 trillion dinars in 2017 to 49.52 trillion dinars in 2018, with a growth rate of 20.93%. Private sector deposits, which constituted 36% of total bank deposits in 2018, also increased from 26.09 trillion dinars in 2017 to 27.36 trillion dinars in 2018, a growth rate of 4.87%. The average per capita GDP also increased from 6.10 million dinars in 2017 to 6.60 million dinars in 2018 (Annual Report on Financial Stability in Iraq, 2018). As can be seen from Table (2.3) there is a decrease in the percentage of private bank deposits compared to the percentage of government bank deposits. The reason for this is due to the weak confidence of customers in private commercial banks, as a result of some of these banks being exposed to bankruptcy or being subjected to theft. This led to customers' deposits going to government banks, which, according to their view, are banks backed and guaranteed by the government, and the possibility of government banks being exposed to actual bankruptcy is something that cannot happen. Also, the decline in individuals' incomes has a role in the decline in their deposits in banks, especially since the Iraqi economy living in a state of austerity.

Figure 2.3 shows the deposits in the Iraqi banking sector. We find that public banks hold the largest volume of deposits compared to private banks, which is an indicator of the weakness of private banks to attract those deposits as a result of the instability of the private banking sector in Iraq.

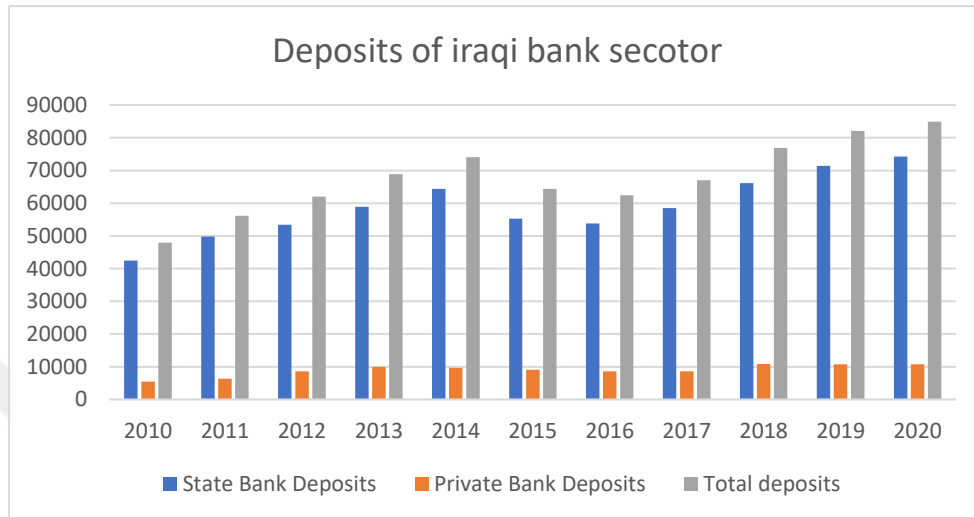


Figure 2. 3: Deposits of Iraqi Banking Sector

Figure 2.4 shows Deposits in public and private banks from 2010-2020. We can note that deposits in public banks recorded the lowest value in 2010, then they increased, then they quickly decreased again after 2014. Then it decreased again, reaching its highest value in 2020.

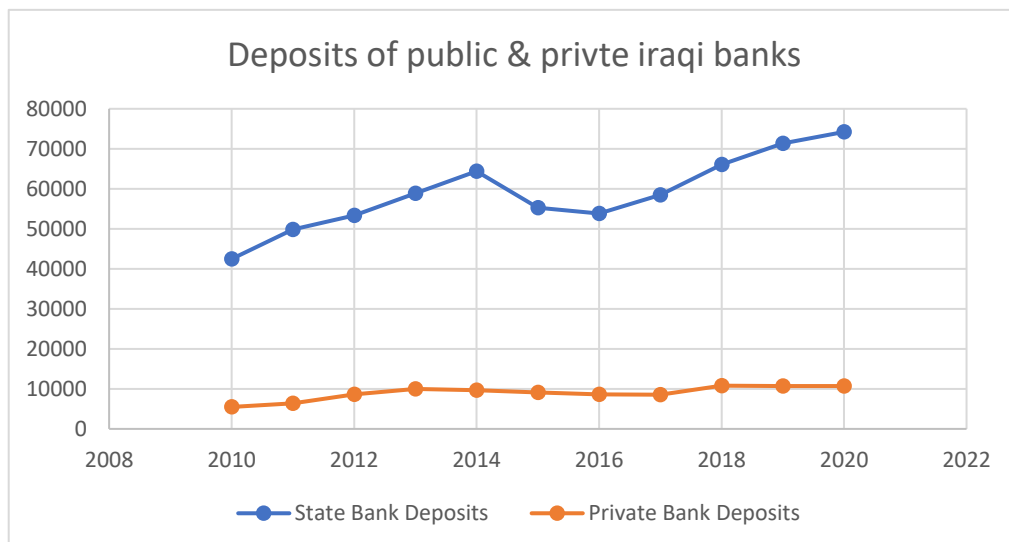


Figure 2. 4: Deposits of Public and Private Iraqi Banks

By moving to deposits in private banks, we find no significant change as they maintained similar levels throughout the entire study period, and this is an indication of the weakness of the marketing policy of those banks to attract customers or an indication of the lack of confidence in managing deposits in private banks compared to public banks.

2.5.3 Capital

Capital is an essential element in banking operations by providing a basis for financial solvency, risk management, and regulatory compliance, in addition to its importance for protecting depositors' funds. Rather, it is considered a necessity for banks to fulfill their role as financial intermediaries, support economic activity, and maintain confidence in the banking system. In addition, capital is the basic cover for absorbing expected losses and risks to which banks are exposed as a result of uncertainties. It also provides the necessary funds to start investing through the funds paid by the founders and shareholders. Table 2.4 shows capital in the Iraqi banking sector for the period (2010-2020).

Table 2.4: Capital of the Iraqi Banking Sector

Year	Capital of Public Banks	Capital of Private Banks	Total Capital
2010	603	2311	2914
2011	654	3441	4095
2012	1253	4654	5908
2013	1353	6242	7595
2014	1501	7604	9105
2015	2251	7921	10172
2016	2301	9525	11826
2017	3376	11097	14473
2018	3401	11749	15150
2019	3501	11999	15500
2020	4297	12630	16927

Source: Annual Statistical Bulletin (2010-2020), Central Bank of Iraq, General Directorate of Statistics and Research, various issues.

Table 2.4 shows that the total capital in the Iraqi banking sector is constantly increasing throughout the study period. Capital increased from 4095 billion dinars in the year (2011) to

(5908) billion dinars in the year (2012), at a rate of (44.2%). For the year (2011), the largest percentage of this increase was the result of the increase in the percentage of capital of government banks, as the percentage of increase reached (91.59%) over the year (2011); Due to the increase in the capital of three government banks, namely the Agricultural Cooperative Bank by (50) billion dinars, the Industrial Bank by (50) billion dinars, and the Iraqi Trade Bank by (500) billion dinars, the total increase to (600) billion dinars, compared to the increase in capital ratio. Private banks by (35.25%), and this growth in banking sector capital was achieved as a result of several factors (Annual Report on Financial Stability in Iraq, 2012):

- 1- Banks raising their capital in response to the directives of the Central Bank of Iraq, which raised the minimum capital to (250) billion dinars, provided that this is done within three years, starting from (6/30/2010) until (6/30/2013). This increase represents the first pillar of the Basel II Agreement.
- 2- The number of new banks approved by the Central Bank of Iraq during the year (2011) increased to five banks: (Parisien Bank, Development Bank, Lebanese Credit Bank, Lebanese French Bank, and Mediterranean Bank).
- 3- Banks' desire to expand their business to obtain the highest possible rating.
- 4- Banks achieved profits that reflected positively on the rights of their shareholders.
- 5- Creating large banking units capable of competing in a market economy, providing great and distinguished banking services, as well as financing large economic projects.

The increase in the capital of the Iraqi Trade Bank in the year (2015) amounted to (750) billion dinars and the establishment of the Al-Nahrain Islamic State Bank had a clear impact on the increase in the capital of the banking system from (9105) billion dinars in the year (2014) to (10172) billion dinars in the year (2015), and the percentage of increase in the capital of government banks was (49.96%) compared to the year (2014). The increase in the capital of private banks also had an impact in the increase in total banking capital, especially those listed in the Iraq Stock Exchange, so that the capital of each bank in it reached (250 billion dinars on the one hand, and the entry of four new private banks into the banking sector on the other hand.

Increasing capital achieves positive results for banks' activities, as follows (Annual Report on Financial Stability in Iraq, 2015):

- Enabling banks to expand credit and investment operations, which are linked to the size of their capital in accordance with the provisions of Articles (30) and (33) of the Banking Law No. (94) of (2004) in force.
- Giving banks with large capitals a better rating according to the CAMELS system, including the authority to purchase a larger amount of dollars sold in the foreign currency buying and selling window; To meet its requirements and customers, it is attributed to its capital, since the capital paragraph is one of the main components of this system.
- Enabling Iraqi banks to increase their bank expansion reserves, which they use to open more branches and banking offices, improve banking density, provide more services to customers, and introduce modern technologies into their work.
- Increasing the ability of Iraqi banks to establish equal banking relationships with Arab and foreign banks.

Despite the high growth rates in the capital of the Iraqi banking system and the role this growth plays in enhancing financial and banking stability; it increases financial leverage, enhances the ability of banks to face risks, ensures the safety and durability of banks, and provides protection for depositors. However, these growth rates are considered small within the scope of the economic development process in Iraq. Large development projects require large loans and cash facilities, to enter the Iraqi market to contribute effectively to the rebuilding and reconstruction of the Iraqi economy. It is also noted that the ratio of capital for the banking sector as a whole to gross domestic product is a low ratio throughout the study period, despite its relative improvement during the years (2015) and (2016). Still, the contribution of banking capital remains small compared to the size of the needs of development projects necessary for the Iraqi economy. It is also low compared to the ratio of capital of the banking sector in the Kingdom of Saudi Arabia to the gross domestic product, which amounted to (12%) in the year (2016) (Saudi Arabian Monetary Foundation, 2017), while in the Hashemite Kingdom of Jordan, it was (26%) in Year (2016) (Central Bank of Jordan, 2016).

Figure 2.5 shows the Capital of the Iraqi banking sector, we find The capital of private banks increased in a large proportion to public banks, and we attribute this to the significant expansion in the number of private banks, as it reached seventy banks in 2020 compared to the number of public banks, which numbered five banks.

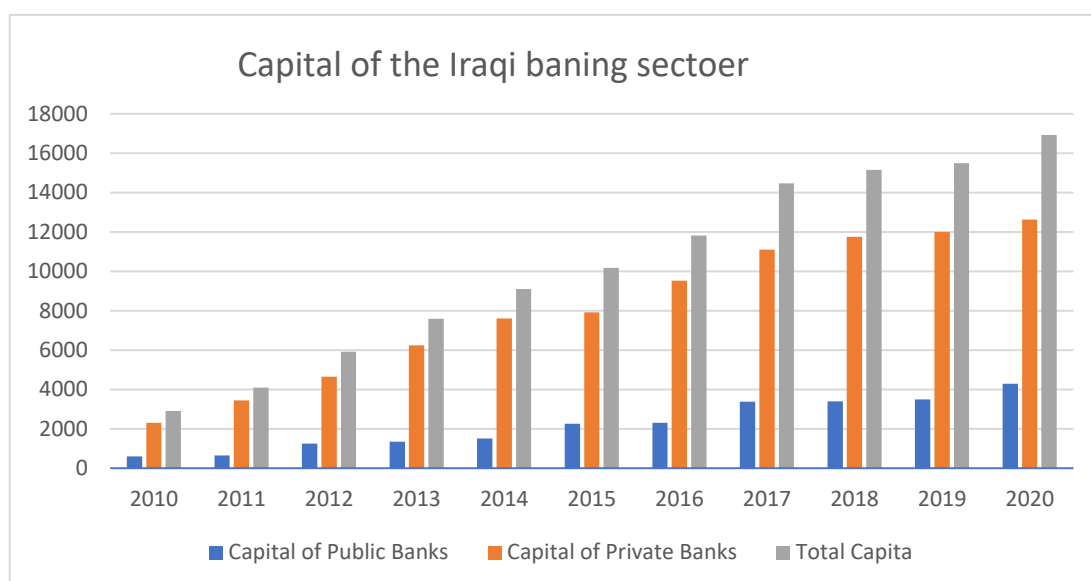


Figure 2. 5: Capital of the Iraqi banking sector

Figure 2.6 shows the growth of capital in public and private banks in Iraq. We find that the capital of private banks increased significantly during the study period to reach the highest value in 2020. While the capital of public banks is growing, but not at the level of private banks.

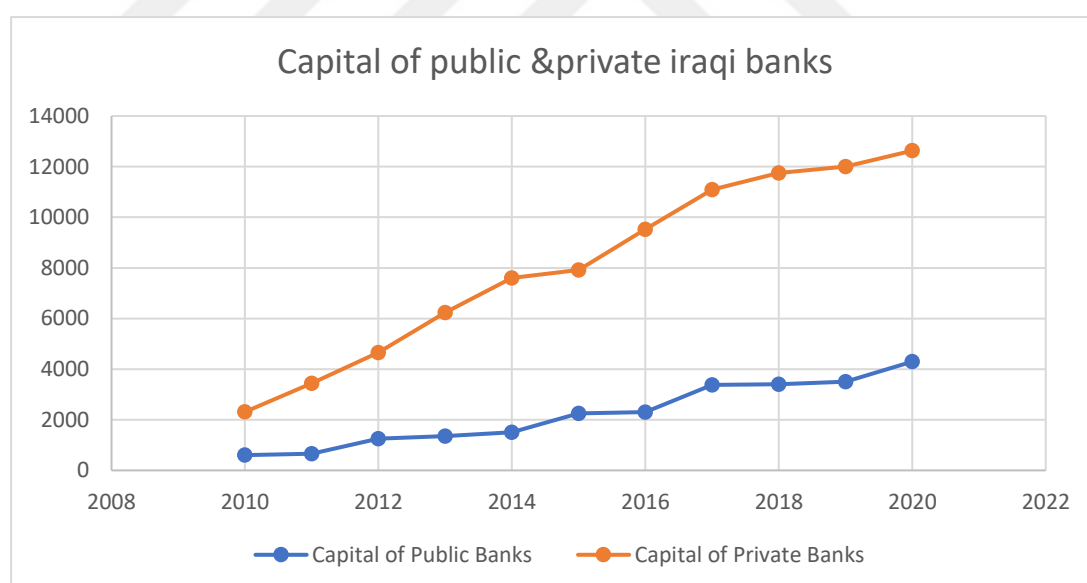


Figure 2. 6: Capitals of Public and Private Banks in Iraq

2.5.4 Cash Credit

Cash credit to commercial banks is an important indicator of banking stability because it stimulates economic growth indicators and financing projects. Table 2.5 shows developments in cash credit to the Iraqi banking system for the period (2010-2020).

**Table 2.5: Cash Credit to the Banking Industry in Iraq for the Period 2010-2020
(Billions of Dinars)**

Year	Cash credit in public banks	Cash credit in private banks	Total cash credit
2010	8837	2884	11721
2011	16568	3776	20344
2012	23340	5098	28438
2013	23387	6565	29952
2014	26878	7245	34123
2015	29077	7675	36752
2016	29850	7330	37180
2017	30833	7118	37951
2018	31148	7338	38486
2019	34252	7800	42052
2020	41852	7964	49816

Source: Annual Statistical Bulletin (2010-2020), Central Bank of Iraq, General Directorate of Statistics and Research, various issues.

The results of Table 2.5 show an increase in cash credit levels throughout the period until it reached (49,816) billion dinars in the year (2020), and this reflects the impact of the decisions of the Central Bank of Iraq in expanding the levels of credit scope. Still, these levels were within the percentage. The Central Bank of Iraq sets a standard rate of 75 percent. The purpose of this percentage is to ensure that banks maintain enough liquidity to handle customer withdrawals and conduct financial operations.

- The above analysis shows that despite the large capital owned by the Iraqi banking sector, as shown in Table 2.5 of this study, the percentage of cash credit granted by this sector is still low, and the Central Bank explained this as follows:
- Weak credit rating of borrowers, who are the category that is predominately affected by moral hazard.

- Challenges in assessing the adequacy of guarantees when granting credit. This issue arises from the influence of inflationary expectations, or what are commonly referred to as market risks.
- Many banks, particularly private ones, lack the necessary solvency to expand their credit activity due to the majority of short-term deposits they hold.

Based on the data presented in Figure (2.7), the levels of cash credit in private banks appear to be lower compared to public banks. This discrepancy suggests that private banks exercise a higher degree of caution when extending credit to borrowers. Private Banks may adopt more conservative lending practices, such as stricter eligibility criteria or lower credit limits, to mitigate risks associated with loan defaults. The lower levels of cash credit in private banks could also indicate a preference for quality over quantity in lending decisions. Private banks may prioritize maintaining asset quality and minimizing non-performing loans, even if it means sacrificing some potential lending Volume. Additionally, the cautious approach to cash credit observed in private banks may reflect their focus on long-term sustainability and risk management.

By exercising prudence in lending practices, private banks aim to protect their financial stability and reputation, safeguarding the interests of depositors and shareholders.

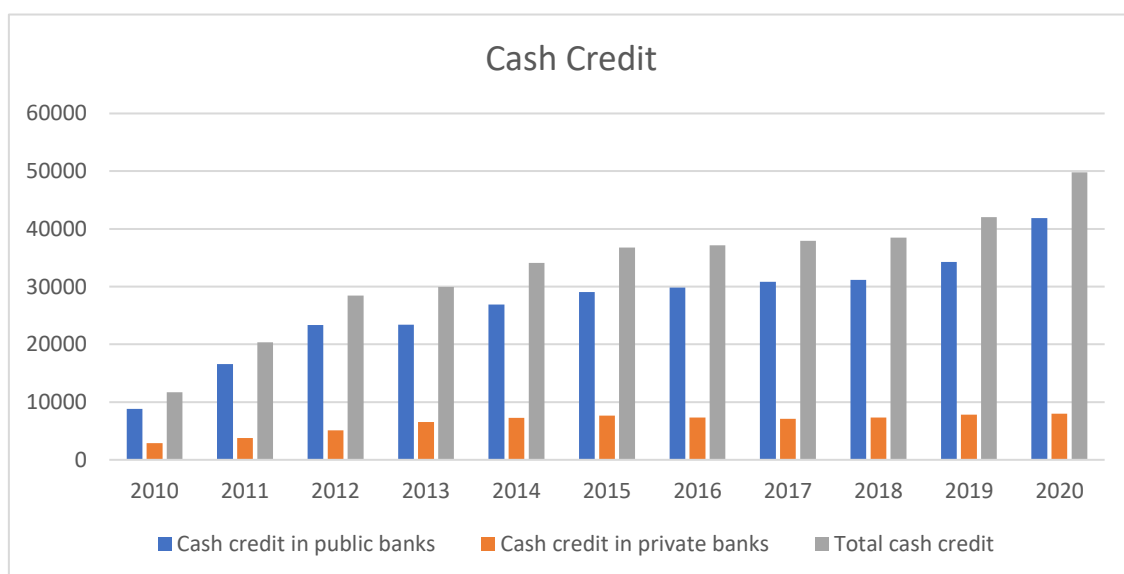


Figure 2. 7: Cash Credit

Figure 2.8 displays the cash credit of private and public banks in Iraq for the period 2010-2020.

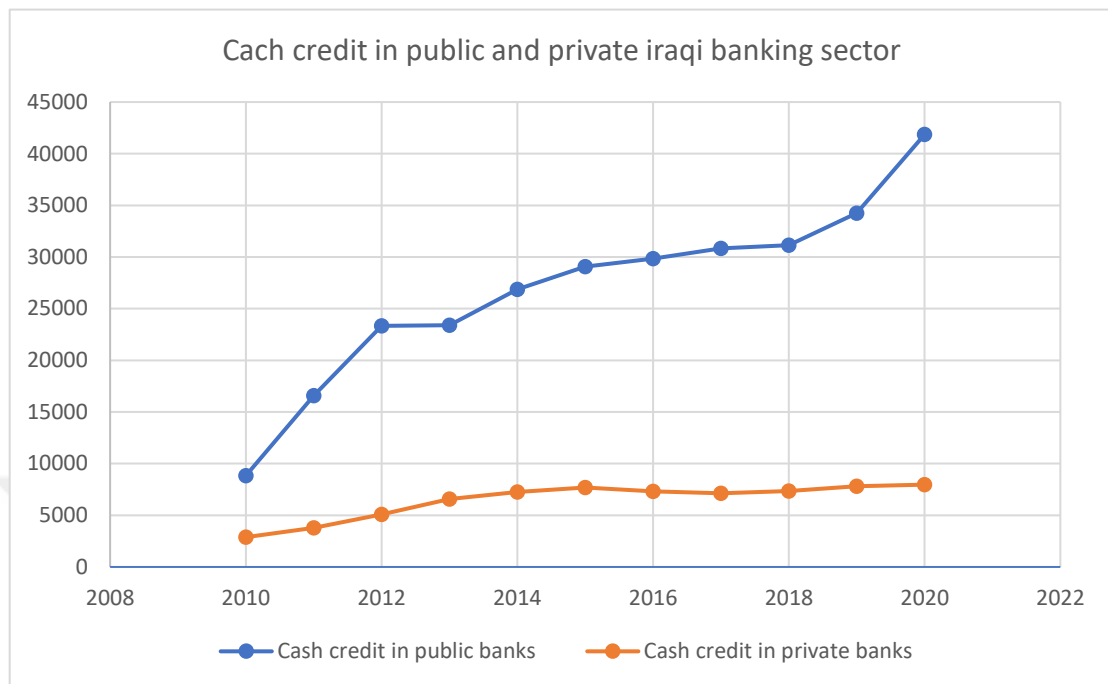


Figure 2. 8: Cash Credit in Public and Private Iraqi Banking Sector

We find that private banks maintained low levels of credit throughout the period, while the figure shows a significant increase in monetary credit provided by public banks. This reflects the difference in the strategic policies of private and public banks. The banks' increase in cash credit indicates a set of strategic, regulatory, competitive, and economic factors that affect lending behavior within the Iraqi banking industry.

2.5.5 The legal reserve of banks

The legal reserve of banks, also known as reserve requirements or reserve ratios, refers to the minimum proportion of a bank's deposits that it is legally mandated to hold in reserve. These reserves are typically maintained in the form of cash or deposits with the central bank and are set by regulatory authorities or central banks as part of their oversight of the banking system. The legal reserve of banks plays a critical role in ensuring the stability and soundness of the banking system, facilitating monetary policy implementation, and controlling the pace of credit expansion. By requiring banks to hold reserves, regulators and central banks can help mitigate risks, maintain financial stability, and promote the effective functioning of the economy. The legal reserve is imposed as a percentage of all bank deposits with private commercial banks and deposited with the Central Bank of Iraq at a rate of (25%), (20%) of

which is on all deposits and (5%) on the cash balance in the bank's vaults. The legal reserves are for foreign currency deposits, in the same previous proportions and the above method of retention. The legal reserve ratio on government deposits is (75%). Table 2.6 represents the development of the legal reserve for the period (2010-2020).

Table 2.6: Reserve on deposits in public and private banks (2010-2020).

year	Reserve on deposits in public banks	Reserve on deposits in private banks	Total legal reserve
2010	4935	2221	7156
2011	5201	2614	7815
2012	5717	2907	8624
2013	6130	3496	9626
2014	7045	3532	10577
2015	6234	3157	9391
2016	5804	2903	8707
2017	5857	648	6505
2018	9211	1197	10408
2019	8420	1159	9579
2020	8130	1062	9192

Annual Economic Report (2010-2020), Central Bank of Iraq, General Directorate of Statistics and Research, various issues.

Table 2.6 shows the continuous increase in the legal reserve (2010-2014). After it was 7156 billion dinars in 2010, it increased to 10577 billion dinars in 2014, an increase of 9.87% for 2013). One of the reasons that led to this increase is the continuous and noticeable increase in the volume of deposits in the banking sector, especially the government, where the percentage increase in total deposits reached (7.578%) for the year (2014) compared to last year (2013) (see Table 2-3 of this study). Still, it did not take long until the total reserves decreased for the years 2015 and 2016 and reached (9,391) and (8,707) billion dinars, respectively, in line with the directions of monetary policy and its high flexibility in supporting them. Economic

Development, and to support the liquidity of the banking system terms of providing liquidity, it was decided to release (5%) of the legal reserve ratio of (15%) to banks that are facing problems for two reasons: The first: to confront the withdrawals of their customers, and the second: to finance small and medium enterprises for banks that are facing problems. Starting in April 2016, the total reserve decreased by 7.28%, while the government's reserves decreased and deposits decreased by 6.89%, and private deposits decreased by 8.04% for the year 2016. This decrease is due to allowing banks to invest no more than 50% of 15% of the legal reserve in purchasing treasury transfers of the Republic of Iraq. To finance the general budget deficit, which rose from 10,267 billion dinars in 2015 to 12,658 billion dinars in 2016(Annual Statistical Bulletin, 2016). In addition to the decrease in total deposits in the Iraqi banking system, which recorded a decrease in (2016) and by (3.02%) for the year (2015), after which the reserve continued to fluctuate up and down until it recorded in the year (2020) a value of (9192) billion dinars.

CHAPTER THREE

ESTIMATING COST EFFICIENCY FUNCTION & MARKET POWER

INDICATORS OF COMMERCIAL BANKS: AN EMPIRICAL STUDY OF IRAQ

3.1 Introduction

The banking sector is essential to the financial system, serving as a catalyst for economic growth in both developed and developing economies. Economic transitions highlight the significance of the banking sector as countries strive to establish integrated economic systems that support robust production through efficient financial frameworks. In the process of transitioning to a market economy, it is common for governments and central banks to implement various policies aimed at facilitating the shift of the financial and banking sectors from centralized control to a market-driven framework. For example, they liberalize interest rates, transfer specific functions to commercial banks, restructure and privatize underperforming government banks, and support the private banking sector by enacting laws and regulations that improve its operational efficiency. (Fries and Taci, 2005).

Chick (1993) A time frame has been set for the expected development steps in the transition to a market economy. Initially, the primary medium for payment transactions is cash, while deposits contribute to the accumulation of savings, not to transaction balances. In the subsequent phase, financial institutions focus on increasing customer trust, consolidating their position, and thus ensuring that their liabilities are recognized as payment instruments. The third phase involves developing the interbank credit system, improving the availability of financing, and promoting economic activity. The growth process was assessed. The fourth phase represents a critical juncture in the functioning of the central bank as it assumes full responsibility for enhancing confidence in the banking system, particularly through the provision of credit facilities as a last resort. In the fifth phase, banks move to a new phase of liability management aimed at restoring public confidence in the effectiveness of deposit-linked transactions as well as fluctuations in cash transactions. This shift leads to improvements in payment processing mechanisms for banking services, including electronic processing of payments such as debit and credit cards, direct debits, and others. This leads to effective deposit-based transactions, increasing the flow of money within the economy(Dow et al., 2008).

The efficiency and effectiveness of the banking system are inherently social goals, as they aim to reduce average transaction costs and improve social welfare. During transition phases,

it becomes increasingly important to ensure a gradual and seamless transition to a market economy (Shah et al., 2023). During the transition period, the characteristics of the economies and implementation mechanisms can either promote or hinder the rapid transition to market economies in all of these economies, including the Iraqi economy. These changes did not stop at the Iraqi banking sector, as the expansion of the Iraqi private banking sector was fueled by financial liberalization measures in the post-2004 period.

The literature on cost efficiency and competition has evolved significantly in developed countries. However, developing countries, particularly in the Middle East region, are deficient in these studies.

This research aims to address the lack of research on the financial performance trends of the Iraqi banking sector during the economic transition period from 2010 to 2020. The significance of this study is the simultaneous estimation of cost-price efficiency and the Lerner competitiveness index. Cost-price efficiency is a crucial factor in understanding the behavior and trends of bank performance in the context of the increasing intensity of competition between commercial banks in times of transition to a market economy.

Most of the existing literature focuses on cost efficiency and market power in advanced economies, while there is a lack of research on transition economies, particularly those in the Middle East. This paper makes numerous contributions to the empirical banking literature. The first research study assesses the cost-effectiveness of the Iraqi financial sector during the Iraqi economy's transition period. Assess the strength of the Iraq banking market by calculating the Lerner Banking Competition Index for 2010-2020. Third, assist in determining the optimal economic size and cost efficiency levels for Iraqi private banks to maximize profits. This study aims to determine whether Iraqi banks achieve the highest possible levels of technical efficiency and cost-effectiveness. Do market mechanisms govern the operations of banks in Iraq? The learner index is used in the present study to evaluate the efficiency estimates for answering these queries.

The remainder of the paper is structured as follows. The methodology is presented in the third section, the results and discussion are presented in the fourth section, and the conclusion is reserved for the fifth section. The second section provides an overview of the Iraqi economy in the transition phase and a literature review.

3.2 An Overview of the Iraqi Economy in the Transition Phase

Iraq views 2003 as a pivotal year, initiating the transition to a market economy and marking a significant turning point in both its political and economic developments. In 2003, the government implemented the Banking Law to ensure the new structure adhered to international standards. The 2004 legislation established the Central Bank of Iraq as an independent institution. The Iraqi individual continues to favor currency storage, as only 23% of adult individuals maintain bank accounts, a low figure in comparison to neighboring countries, according to World Bank data. Iraq has 74 financial institutions; however, their collective contribution to the national GDP in 2021 was a mere 1.94%. Despite having 904 branches across the nation, the economic hubs of Baghdad and Basra house the majority of these banks, accounting for 37.1% and 9.3% of the total, respectively. The number of commercial bank branches per 100,000 adults in 2020 was 5.63, as reported by the World Bank. This figure is significantly lower than that of neighboring countries, such as Turkey (16.1), Iran (31.1), and Kuwait (13.6). State banks own 87% of the total deposits, 84% of cash-paid credit, and 78.6% of the banking sector's assets. The government's assurance of an extensive branch network, currently accounting for 45.5% of the total number of bank branches in Iraq, may explain this. Nevertheless, they account for only 9% of the total number of banks in the country (i.e., the banks themselves, not the affiliates). Iraqis lack confidence in their financial institutions and do not consider them to be safe locations to store their money. This is due to a variety of reasons, including the scarcity and fragility of its services, which are not appealing to entrepreneurs and companies. High interest rates, significant payment guarantees, stringent collateral requirements, and a lack of market penetration further impede the sector's expansion. Furthermore, the Iraqi individual believed that by concealing his cash in his residence, he could ensure its security and availability during times of crisis and necessity, as a result of the numerous disasters that the Iraqis experienced.

3.3 Literature Review

In the context of the development of emerging economies, the institutional difference hypothesis (IDH) examines the influence of institutional differences between developing and established countries on the support of products, capital, and markets, as well as the impact of their loss (Julian and Ofori-Dankwa, 2013). Therefore, when analyzing the efficiency of the banking sector in periods of economic transition, it is necessary to take into account the economic environment that determines the paths and mechanisms of the transition from the

planned economy to the market economy, as well as the limitations and stages of restructuring the productive sectors, in particular the Banking sector, vary from country to country. The success of the procedures in this country does not necessarily mean that they will be successful in another country. (Djalilov and Piesse, 2019).

Over the past decade, many studies have dealt with banking efficiency, especially for those countries that have witnessed the transition towards a liberal economy. They have dealt with different dimensions of the factors affecting efficiency during periods of transition. The theoretical basis includes two types of factors that affect banking efficiency (internal factors and external factors). Internal factors include ownership, productivity, and bank size, while external factors include economy and technology (Zhao, 2019).

Kasman (2005) used the stochastic frontier model (SFA) to determine the cost efficacy and economies of scale in numerous Eastern European countries during the transition period. The findings indicated that the impact of new environmental changes on banking efficacy varied. Small and medium-sized banks exhibited economies of scale, whereas large banks did not. Fries and Taci (2005) illuminated the post-communist transition, by conducting an assessment of the cost efficiency of 289 institutions in 15 Eastern European countries. The study's findings indicated that the banks with the highest proportion of immigrants experienced reduced costs and that the impact of cost reduction and banking reform was not consistent. Spulbăr and Nițoi (2014) estimated the impact of financial crises on the efficiency of institutions during transition periods. by employing a sample of 481 commercial banks from 16 middle-income countries, including three developing regions, between 2005 and 2011. The results showed that banks with a prudent strategy and lower risks have higher cost efficiency.

Djalilov and Piesse (2016) assessed the effectiveness of banking and its limitations in transition periods using a sample of 319 banks from 21 transition countries over the period 2002-2014. The research found a contradiction in the impact of regulations on bank effectiveness during transition periods and provided important evidence that transition periods affect bank performance in different ways due to the different financial sector infrastructures and the ability of emerging economies to adapt to the transition mechanism influence way.

Many previous studies dealt with the cost efficiency of banks during the transitional period (Kasman and Yildirim, 2006; Asaftei and Kumbhakar, 2008; Anwar, 2019; Blankson et al., 2022). Some studies analyzed the relationship between cost efficiency and Loans in banks

(Berger and DeYoung, 1997; Rossi et al., 2005; Fukuyama and Weber, 2008; Karim et al., 2010; Shamshur and Weill, 2019). While other studies dealt with the impact of co-ownership on the efficiency of banks in different countries (Jemric and Vujcic, 2002; Hasan and Marton, 2003; Havrylchyk, 2006; Kyj and Isik, 2008). Other literature included the relationship between Mergers & Acquisitions and efficiency (Akhavain et al., 1997; Cuesta et al., 2002; Singh, 2009; Singh and Das, 2018; Borodin et al., 2020). Commercial banks focus primarily on measuring cost efficiency with the aim of maximizing profit, in contrast to the goals set by central banks that focus on financial stability (Goncharov et al., 2023). Therefore, we find many literatures that have addressed the importance of cost efficiency and its relationship with other variables. Some studies analyzed the relationship between cost efficiency and Loans in banks (Berger and DeYoung, 1997; Rossi et al., 2005; Fukuyama and Weber, 2008; Karim et al., 2010; Shamshur and Weill, 2019). While other studies dealt with the impact of co-ownership on the efficiency of banks in different countries (Jemric and Vujcic, 2002; Hasan and Marton, 2003; Havrylchyk, 2006; Kyj and Isik, 2008). Other literature included the relationship between Mergers & Acquisitions and efficiency (Akhavain et al., 1997; Cuesta et al., 2002; Singh, 2009; Singh and Das, 2018; Borodin et al., 2020). Previous studies dealt with the cost efficiency of banks during the transitional period (Kasman and Yildirim, 2006; Asaftei and Kumbhakar, 2008; Anwar, 2019; Blankson et al., 2022). In the next section we include only some studies that measured cost efficiency.

3.4 Market Power versus Efficiency

The relationship between concentration and profitability in banks has been examined in studies of industrial organizations to determine whether the market structure and its characteristics have a direct impact on banks' performance and ability to set prices higher than those of competitors, such as B. lower deposit interest rates and higher loan limits (Gilbert, 1984). Based on the Structure-Conduct-Performance (SCP) hypothesis, there is a direct relationship between market power and profitability, as competition allows firms in more concentrated markets to set prices that are less advantageous to customers (Bain, 1965). The profits made by companies are a sign of increasing market concentration. In other words, the sustainable traditional SCP model does not mean that a higher percentage of profits come from the increased efficiency of companies. (Edwards et al., 2006). According to the market power hypothesis that depends on the relevant theory (RMP), companies with large market shares exercise pricing advantages and desire a higher level of profits than those achieved from

competition, in addition to the existence of evidence and a positive relationship between concentration and profits (Vennet, 2002).

Efficiency studies of the banking system have become increasingly important, particularly in the last two decades, due to the estimation of relative efficiency and volume savings, which depend on the nature of technological advancement (Amel et al., 2004). The importance of studies on the efficiency of banking systems has increased significantly over the last 20 years. It evolved into an assessment of relative efficiency and volume savings depending on the direction of technological advancement. Different strategies were used to implement the accounting metrics (cost-income ratio, return on equity, and return on assets). Efficiency was assessed in two ways, in response to the interaction between market prices and the level of competition, by examining the bank's profitability or cost structure and taking one of two viewpoints (profit maximization or cost reduction). (Berger and Humphrey, 1997). The process of measuring cost-effectiveness allows the bank to confirm that it has implemented optimal behaviors and prevent deviations that could perpetuate inefficiency (Berger et al., 1993).

3.5 Efficiency: Concepts and Measurement

It was first formulated in the early works of (Edgeworth, 1881). From a practical point of view, the basis for measuring efficiency and productivity at the micro level begins with (Farrell, 1957). His contribution is highlighted by a new insight into two issues (defining efficiency and productivity) and (calculating benchmark technology and measures of efficiency) (Fiorentino et al., 2006).

The definition of banking efficiency is the extent to which banks manage to use their resources (inputs) to produce products (outputs) to achieve their objectives (Kumbhakar and Lovell, 2005). Within the general framework, efficiency is generally assessed from two perspectives: technical efficiency and allocative efficiency. Technical efficiency is the degree to which a given set of inputs is used to produce the desired output. A company is considered technically efficient if it generates the greatest possible output with the least possible inputs, including labor, capital, and technology. The optimal conditions for input and output under a fixed product are called allocative efficiency.

Banks strive to allocate inputs and outputs in such a way that they are sure to either increase profits or reduce costs. To achieve economic efficiency (costs, sales, profits) within the framework of the two efficiency concepts, banks strive to minimize costs and maximize income

and profits by allocating inputs and outputs. (Berger and Humphrey, 1997). While the nature of the methodologies for determining the efficiency of banks is distinct, in general, it includes two main methods (production and mediation) (Sathye, 2003). In the next part, we will explain some measurement methodologies.

3.6 Efficiency Measurement

The two primary approaches to efficiency measurement that are most frequently used in the literature are non-parametric approaches modeled using linear programming techniques and parametric statistical methods based on parametric methods. Stochastic Frontier Analysis (SFA) for the parametric approach and data envelope analysis (DEA) for the non-parametric approach have both been used in banking studies. The two approaches differ in how they handle random errors and functional form assumptions. (Fiorentino et al., 2006). Blankson et al. (2022) employed data envelopment analysis (DEA) in addition to the efficiency determinants to measure and assess the cost-effectiveness and technical efficiency of a sample of Ghanaian banks for the years 2008–2019. The findings of the study demonstrated an empirical decline in both average technical and cost efficiency throughout the investigation. Additionally, the size of the bank and the rate at which GDP plus inflation is growing are the primary determinants of cost efficiency.

Table 3. 1: Efficiency Method

Deterministic methods		Stochastic methods	
Ordinary least squares	(OLS)	Stochastic frontier analysis	(SFA)
Corrected ordinary least squares	(COLS)	Thick Frontier Analysis	(TFA)
Modified ordinary least square	(MOLS)	Distribution free analysis	(DFA)

3.7 Non-Parametric Approaches

The nonparametric approach is divided into two categories and is based on linear programming analysis. Data Envelope Analysis (DEA) and Free Disposal Hull (FDH). Data Envelopment Analysis (DEA) appeared in the literature by Charnes et al. (1978) paraphrasing what has been suggested by Farrell (1957) single-output, single-input radial measure of technical efficiency to the multiple-output, multiple-input case. Many followed this as a study (Seiford and Thrall, 1990; Charnes et al., 1997; Ray, 2004). The DEA calibrates the Technical Proficiency (TE) level which consists of a set of effective Pareto decision-making units (DMUs) in every case and these Pareto-efficient banks situated on the efficient frontier (An et al., 2021).

3.8 Data Envelopment Analysis

Data Envelope Analysis (DEA) is introduced by Charnes et al. (1978) as a technique for measuring efficiency units (DMU) by comparing them with the most efficient units. This method makes it easier to obtain a relative measure of performance. The basic model assumes input orientation and continuous scale conservation. This model uses the notation (CCR). As shown by linear programming, each decision unit (DMU) can determine the envelope area. By assuming that companies behave in ways that maximize profits while reducing costs, the CCR model's methodology focuses on the technical side of production. The simplicity of this model stems from its assumption of a constant return to scale. This assumption is valid when every unit or bank operates on an ideal scale, but we find that there isn't a perfect work environment when we examine the environment around banks. A model extension for determining variable returns to scale (VRS) was proposed as a result of these presumptions and constraints. Compared to CRTS technology, VRS technology more thoroughly encloses data. (Banker et al., 1984). It results in higher technical efficiency scores than CRTS Efficiency scores. In the following section, we will introduce the DEA technique and the concept of efficiency. Then, we will go over the data, variables, and methodology.

3.9 Methodology

Cost efficiency is categorized as a form of economic efficiency that reflects the potential of banks to reduce the costs associated with certain services or to increase the services for a given cost. (Kumbhakar and Lovell, 2005). There are numerous differences between cost efficiency and technical efficiency, including the inclusion of input prices and the approach to managing banks that produce multiple outputs. Data envelopment analysis (DEA) serves as a tool for evaluating the efficiency of resource allocation. Under the premise that Iraqi banks aim to minimize costs, this study focuses on input-oriented efficiency. Following Charnes et al. 1978), cost-effectiveness measures how close the bank is to adopting best practices to get a lower cost.

Suppose we have N banks that depend on XI inputs represented by a vector, we denote the inputs WI and the outputs YI , and the model is represented by linear programming as follows:

$$\text{Minimize}_{\gamma_i, xi^*} \quad wxi^* \quad (1)$$

$$\text{Subject to} \quad -y_i + Y\gamma \geq 0 \quad (2)$$

$$xi^* - X\gamma \geq 0 \quad (3)$$

$$NI\gamma = 1 \quad (4)$$

$$\gamma \geq 0, i = 1, \dots, N$$

x_i^* refer to Cost Reduction Vector for Input Quantities of First and Second Bank, $i = 1, \dots, N$, γ is an $N \times 1$ constant vector. Cost efficiency can be calculated by comparing the ratio of minimum cost to actual cost, which is between zero and one.

The cost efficiency of DMU_0 can be defined as

$$CE = \frac{w_i x_i^*}{w_i x_i} \quad (5)$$

In this function, the vector x_i^* is the vector referred to as bank output production can we represent it as follows $x_i^* = (x_1^*, \dots, x_n^*) \in R_+^n$ and x_i is the vector referred to as bank input represented as follows, $x_i = (x_1, \dots, x_n) \in R_+^n$ while $w_i = (w_1, \dots, w_n) \in R_+^n$ is the price of input. The distance between the actual cost of banks and the cost limits of best practices measures cost efficiency. The level of efficiency is between 0 and 1. The degree of homogeneity for inputs is 1, while the degree of homogeneity for outputs is 0. In other words, wasting all the inputs will lead to doubling the cost and cutting cost efficiency in half, and if all input prices are doubled, there will be no impact on cost efficiency. The level of cost efficiency depends on the input change prices.

3.10. Data and Variables

This study examines data from 20 Iraqi economic institutions from 2010 to 2020, depending on data accessibility. The lack of data led to the exclusion of government institutions and certain private banks. The study sample consists of balanced data obtained from the annual reports of the Iraq Stock Exchange, the profit and loss accounts, and the balance sheets of banks. To evaluate the cost efficiency of banks, we apply the intermediation approach. Consequently, it can be characterized that banks predominantly act as intermediaries between savers and x. Economic efficiency represents what banks can achieve by reducing the cost of certain outcomes or maximizing outcomes at a certain cost. Cost efficiency is classified as a type of economic efficiency. (Kumbhakar and Lovell, 2005). The numerous distinctions between cost and technical efficiency include the adoption of input pricing and the method of interacting with banks that have multiple outputs. Data envelope analysis is useful for determining allocation efficiency (DEA). This is due to our presumption that Iraqi banks want to cut expenses. As a result, in this study, we consider the efficiency-oriented to inputs. Following Charnes et al.

(1978), Cost-effectiveness measures how close the bank is to adopting best practices to get a lower cost.

According to Ahn and Le (2014), the intermediation approach gains the widest application in DEA-based studies, followed by the production approach, while the value-added approach and the user cost approach are still of limited use. The number of applications of the intermediation approach overwhelmingly dominates that of the production approach for studies of banking institutions, while at the branch level, the production approach is a little more widely applied than the intermediation approach.

To determine the inputs and outputs for cost efficiency, we use an Input-oriented by adopting a Data Envelopment Analysis (DEA) model in line with the literature (Adjei-Frimpong et al., 2014). Three categories of inputs and outputs are identified, and variables are chosen for calculating the cost efficiency of Iraqi banks, as in Table 3.2.

Table 3. 2: Description of the study variables

Variable	Description
Inputs	
Deposits	Customers deposits
Labor	Personnel expenses of bank staff such as salaries, wages, and benefits
Assets	total fixed assets
Input prices	
Price of deposits	Interest expenses divided by total deposits
Price of labor	Personnel expenses divided by the total assets
Price of capital	Capital-related expenses (operating expenses - personnel expenses) divided by total fixed assets
Outputs	
Loans	Total customers' loans
Other earning assets	Banks' investments in different types of securities (e.g. government securities, bonds, Treasury bill and equity investment)

Table 3. 3: Descriptive statistics of inputs and outputs

	Observations	Mean	Maximum	Minimum	Std. Dev.
Loans	215	136544.20	537759.0	12352.0	111800.2
Other earning assets	215	61252.53	698695.0	106.0000	111730.8
Deposits	215	286507.10	1491599.	975.0000	272887.1
Labor	215	4689.14	16833.00	497.0000	3295.835

Price of capital	215	0.18	5.956185	0.008933	0.483230
Price of deposits	215	0.01	0.085009	0.000432	0.015944
Price of labor	215	0.62	0.708696	0.552118	0.031844

Notes: All variables are measured in millions of Iraqi dinars, Price of capital, Price of deposits, and Price of labor measured in percent.

3.11 Results and Discussion

Cost efficiency is measured within the range of 0 and 1. As the number is closer to 1, this is an indication of the least efficiency of the bank, while closer to 0 indicates an increase in the cost efficiency of the bank. In this study, we measure the cost efficiency of 20 Iraqi banks for the period 2010-2020. Table 4 displays the results of Cost Efficiency (CE) which shows that the degree of cost efficiency of Iraqi scheduled commercial banks was 0.2608 in 2010 while the Technical Efficiency (TE) degree was 0.4811 in a similar year. Furthermore, Allocative efficiency (AE) is 0.54065 in 2010. The rates of price efficiency, technological efficiency, and allocation efficiency are close to the scores of the year 2010. It is noted that the average cost efficiency of banks remained stable and at good levels, even considering the geopolitical crises in Iraq during the year 2014 and the year 2019-20 during the Covid crisis.

Table 3. 4: Cost efficiency Results for Iraqi Commercial Banks 2010-2020

Year	CE	TE	AE
2010	0.2608	0.4811	0.5406
2011	0.2462	0.3940	0.5872
2012	0.2703	0.4594	0.5567
2013	0.3696	0.5153	0.6501
2014	0.2818	0.5273	0.5186
2015	0.299	0.4691	0.5803
2016	0.3003	0.4471	0.6041
2017	0.2748	0.4652	0.5491
2018	0.1992	0.3825	0.5286
2019	0.2444	0.3878	0.5914
2020	0.2227	0.3758	0.5411

Values for cost efficiency (CE), technical efficiency (TE), and allocative efficiency (AE)

A clustered columns chart for cost efficiency is presented in Figure 3.1 to Compare the value of cross-categories of cost efficiency from 2010 -2020. Allocation efficiency showed the highest level in 2013. However, technical efficiency was highest in 2014. Moreover, cost efficiency gave very similar results during the study period.

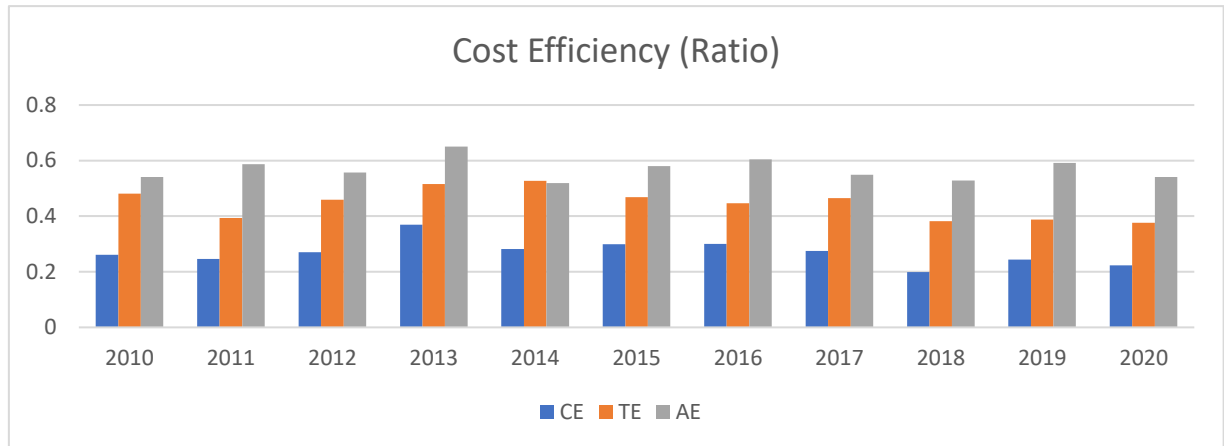


Figure 3. 1: Clustered columns chart for cost efficiency

3.12 Market Power

Measuring and analyzing the market influence of banks has been and continues to be an important topic in the economic literature. The argument is that the effectiveness of markets will increase as market competition increases. Alternatively, some argue that there is a positive relationship between market power and interest rates. Consequently, customers will face difficulties in repaying their loans, which will lead to a greater number of negative impacts. Consequently, competition will bring more benefits to both banks and customers. (Coccorese, 2014). Literature has provided numerous studies on the strength of the market, and many indicators have been used by empirical and theoretical interests such as the Lerner index (Lerner, 1934), Four-firm (or k-firm) concentration ratio (Saving, 1970), and Herfindahl-Hirschman index (Cowling and Waterson, 1976).

The Lerner Index is a measure of market power widely used in economic literature. A discussion began historically and theoretically through studies (Amoroso, 1930; Lerner, 1934; Giocoli, 2012) and followed by (Elzinga and Mills, 2011; Giocoli, 2012; Shaffer and Spierdijk, 2017). Subsequently, many studies on banks adopted the Lerner index to measure the power of the market and the index of competition as (Hainz et al., 2013; Clerides et al., 2015; Feng and Wang, 2018; Biswas, 2019; Hirata and Ojima, 2020; Memanova and Mylonidis, 2020; Saif-Alyousfi et al., 2020). Lerner index is a measure by which the gap between price and cost is

monotonically related to consumer welfare losses from the market power of specific cost and demand functions.

The Lerner Index, measured as $(P - MC)/P$, is often used to measure a company's power in the marketplace.

3.13 Methodology and Data of Market Power

3.13.1 Lerner index

To measure the divergence of the industry from the competition, Lerner proposed an index to measure the market power. The value of the Lerner index ranges from zero to one. It takes a value of zero where $P = MC$, which indicates that there is no pricing power for the company. A Lerner index that is closer to one denotes a bigger price markup above marginal costs, and thus, the company has more market power (Turk Ariss, 2010). A Lerner index = 0 often denotes perfect competition, whereas a Lerner index = 1 denotes a monopoly. A higher Lerner index indicates less competition because it is an inverse measure of it (Pruteanu-Podpiera et al., 2007).

In our study, we will follow up on some previous literature to measure the power of the industry index (Clerides et al., 2015; Tan and Floros, 2018; Rakshit and Bardhan, 2022). The LI calculation to Measurement of bank competition (banking industry power) can be written as follows:

$$Lerner\ index_{it} = \frac{p_{i,t} - mc_{i,t}}{p_{i,t}}, i = 1, \dots, N, T = 1, \dots, N \quad (6)$$

Where $p_{i,t}$ denotes the output prices set by the bank i at time t and $MC_{i,t}$ represents the marginal cost of the bank i at the time t . The bank's marginal cost cannot be observed directly; the total cost is determined first, and then the marginal cost. The following table shows the inputs and outputs. Table 3.5 shows the inputs and outputs.

Table 3. 5: Inputs and Outputs

Price	the ratio of total revenues to total earning assets total revenues = interest income + non-interest operating income + equity-accounted profit/loss operating income
marginal cost	the estimation of a translog production function at the bank level for each bank, including bank and time-fixed effects
C_{it}	denotes the total operating costs
Q_{it}	defines the amount of total assets
c^{labor}	The price of labor is constructed as the ratio of personnel expenses over total assets

c^{fixed}	The price of fixed assets is computed as the ratio of other operating expenses to total assets.
c^{fund}	The price of funding is defined as the ratio of total interest expenses to the total amount of deposits, money market, and short-term funding

$$\ln C_{it} = \alpha_i + \delta_t + \alpha_1 \ln Q_{it} + \alpha_2 (\ln Q_{it})^2 + \sum_{j=1}^3 \beta_j \ln c_{it}^j + \sum_{j=1}^3 \sum_{k=1}^3 \ln c_{it}^j \cdot \ln c_{it}^k + \sum_{j=1}^3 \gamma_j \ln c_{it}^j \cdot \ln Q_{it}$$

the input prices indicate the price of fixed assets c^{fixed} , the price of labor (c^{labor}), and the price of funding c^{fund}

The marginal cost is computed as follows:

$$MC = \frac{TC}{Q} [\alpha_1 + \alpha_2 \ln Q + \sum_{i=1}^3 \gamma_i \ln w_j] \quad (8)$$

3.14 Results and Discussion

In this section, we report the results from the Market Power Index (Lerner, 1934) for a sample of 20 Iraqi banks for the period 2010-2010. The following table shows some descriptive statistics for the study sample.

Table 3. 6: Variables Descriptive Statistics

Variables	Mean	Maximum	Minimum	Std. Dev.
PRICE	0.0542	0.1615	0.0020	0.0304
Q	5.7201	6.2642	4.8740	0.2521
TC	19951.3	115524	2115	15547.0
c^{labor}	0.0163	0.0850	0.0030	0.01594
c^{fixed}	0.0206	0.1277	0.0004	0.01505
c^{fund}	0.0078	0.0239	0.0018	0.00333
Observations	215	215	215	215

All variables are measured in percent, TC is measured millions of Iraqi dinars

At first glance, the results do not reveal any discernible trend in the development of the Lerner index. The competition index, which is a measure of the market power of the financial sector in Iraq, is subject to fluctuations. Occasionally, it experiences perfect competition, while at other times, it increases. This is a clear indication that no bank can fully influence competitive trends in the Iraqi banking sector. Additionally, it suggests that there is potential for banks with a stronger presence in the industry to enter the market. The following Table 3.7 shows the results of the Lerner index to measure the power of the Iraqi banking market.

Table 3. 7: Lerner Index Results

Years	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Lerner	0.304	0.365	0.470	0.473	0.372	0.400	0.445	0.406	0.377	0.293	0.360

Clustered columns chart for market power, used to Compare the value of cross categories of market power 2010 -2020. The results of the market power index show that there is no concentration in the market and that the market competition indexes range between 0.30 and 0.45, which shows that the market is competitive and price elasticity is greater than 1. From 2010-2017, there was a slight increase in the value of learner index which means that there is a slight decrease in competition. But in 2019, the competition was high as the learner index's value dropped from 0.30. In general, the results of the study give the impression that the mechanisms of competition or monopoly did not control the direction of the Iraqi banking sector.

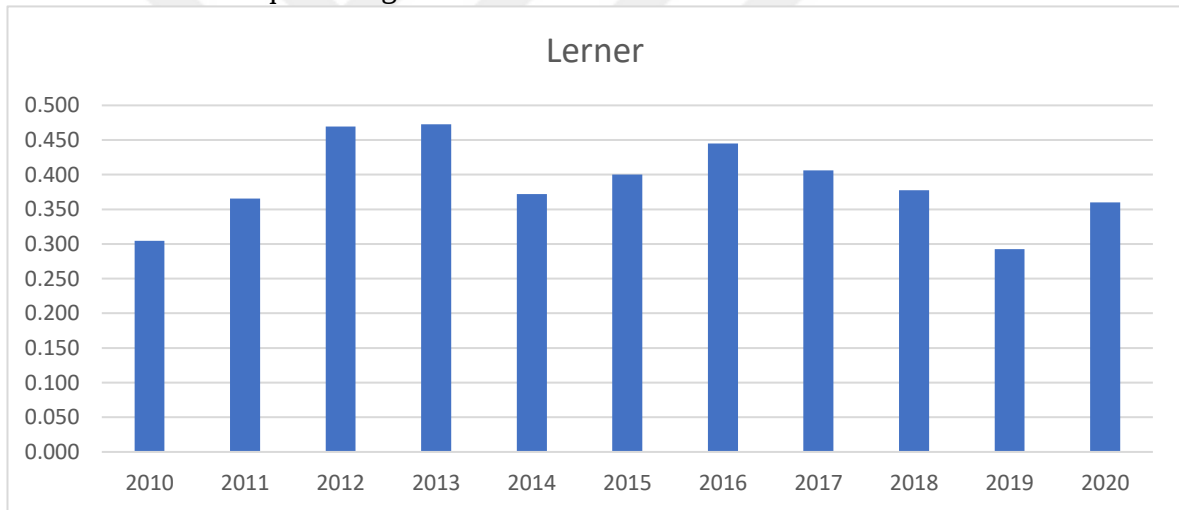


Figure 3. 2: Lerner index

3.15 Conclusion

Cost-effectiveness is essential to the banking sector because it boosts profitability, increases customer value, manages risks, ensures regulatory compliance, encourages innovation, and adds value to shareholders. It is an essential component of sustainable banking operations and helps banks maintain their competitiveness in a constantly changing financial environment. Therefore, this study analyzes cost efficiency, price, and market power in the period of economic transition in Iraq. The study relied on the annual data of 20 Iraqi commercial banks for the period 2010–2020. Measuring the cost-effectiveness and market power of the banking sector during transition periods requires verification of environmental impacts.

Degrees of efficiency vary according to environmental influences. The study's findings revealed that Iraqi banks have a high degree of cost efficiency. The Lerner index to measure the power of behavior showed varying results from year to year, and this is an indication of financial instability in the Iraqi banking sector. The learner index shows that banks are more competitive and stable in 2019 and 2020. A previous study also suggests that Islamic banks are more stable in times of crisis than conventional banks (Miah and Sharmeen, 2015). The empirically achieved results give indications of the importance of financial stability in enhancing the efficiency of the financial sector, especially the banking sector. In addition, they indicate the inevitability of gradual transitional economies to reach optimal markets. This study recommends policy policymakers and those interested in developing the financial sector the importance of the banking sector adopting beneficial mechanisms to achieve a balance between return and continuous development. We also believe it is important to continue studies on the banking sector's efficiency and to establish a database that serves decision-makers and investors. This research also directs policymakers to invest in digital technologies and the self-service of customers to operate at a low cost. The present study is limited to banks in Iraq, and cost efficiency is measured through the market power index. In the future, researchers can extend this study to other Middle East regions by using panel data and can compare and contrast the banking sector efficiency of Middle East countries.

CHAPTER FOUR
AN EMPIRICAL ANALYSIS OF THE IMPACT OF EFFICIENCY, RISK-TAKING,
AND COMPETITION ON PROFITABILITY: AN APPLICATION IN IRAQ
BANKING

4.1 Introduction

Over the past three decades, the financial system has witnessed many important changes in deregulation, financial globalization, and the development of financial innovation mechanisms. Many developing countries, such as East Asian and Latin American countries, in the 1970s and 1980s implemented ambitious financial and economic liberalization programs and, within the framework of structural adjustment programmers, implemented numerous agreements in the financial sector. The results of reform efforts have varied, influenced by many factors such as the design of reform programs, the nature and strength of the economy, and the surrounding environmental factors that negatively and positively affect these programs (Iqbal, 2001). The Arab countries were not far from economic reform programs. However, the response to these programs seemed to vary from one country to another, accelerating in some countries and slowing down in others, while Iraq was far from these programs, influenced by the prevailing political ideology in the country and the economic restrictions it suffered from during the 1990s. After 2003, Iraq began to catch the wave of liberalization and financial globalization, moving towards a market economy. Banking activity expanded significantly, as the number of banks in Iraq reached 74 banks distributed among the sectors. Public and private sectors, despite the horizontal expansion of the number of private commercial banks, government banks still own 78.6% of the assets of the banking sector, control 84% of credit paid in cash, and own 87% of total deposits. The majority of banks in Iraq are owned by the private sector, representing 90.5% (67 out of 74 banks) of the total number of banks. Private sector-owned banks own the vast majority of the banking sector's capital, at 75.4%, due to their large number and their commitment to the directives of the Central Bank, with a capital of no less than 250 billion Iraqi dinars. However, these banks are largely overshadowed by state banks, accounting for only 13% of total deposits, 16% of credit paid in cash, and 21.4% of banking sector assets. This may be due to the insufficient infrastructure of private commercial banks to stimulate the development process and transition to an advanced banking system.

According to the Structure, Conduct, And Performance (SCP) hypothesis, the degree of concentration has an impact on the degree of competition between firms, as a more concentrated market structure is supposed to lead to a lower level of competition. Highly concentrated companies collude with each other to obtain the highest level of profits, which represents the difference in interest rates between deposits received and loans provided to customers. Similar to the SCP, the Relative Market Power hypothesis (RMP) proposed by (Rhoades, 1983) focuses on the role of market share in profits and prices because the larger the size of the bank, the more it can differentiate products and obtain more profits. The other framework from the literature explains the relationship between bank performance and concentration through the efficiency gate. Compared to the SCP hypothesis. The Efficiency Structure Hypothesis (ESH) proposed by (Demsetz, 1973) assumes that high efficiency replaces competition to achieve higher profitability. Highly efficient companies look to reduce costs to increase their profits which leads to an increase in their market share.

In our study, we will look at three important issues in the Iraqi banking sector. First: We will study the effect of efficiency on profitability within the framework of the efficiency structure hypothesis (ESH), which indicates that banks that are more efficient than their competitors can increase their market share and thus increase their profits. In light of this, we will test the following hypothesis: There is a positive relationship between efficiency and profitability in Iraqi banks. Second: Evaluating the impact of competition and many levels of risks on banking performance and banks' profitability during the study period. Third: Evaluating the impact of competition on banks' profitability by investigating the SCP hypotheses.

Our paper contributes to the empirical banking literature in the following three ways:

- 1- This study evaluates the combined effects of competition, efficiency, and risk-taking on profitability in the Iraqi banking sector for the period 2010-2020 using multiple types of competition and risk indicators.
- 2- The present study employs multiple risk indicators, such as Bank soundness, Credit Risk, and liquidity risks within a competitive environment in the transition phase of the economy. In addition, we use several variables that represent the banking industry and the macroeconomics. It is expected that the results will provide a clearer vision for policymakers and supervisory and regulatory regulations makers. We test the

hypotheses of two theories (the efficiency structure hypothesis (ESH) and Structure, Conduct, and Performance (SCP)).

Our results show that increased competition reduces profit levels in Iraqi banks. Price efficiency plays an important role in raising the level of banking performance, which motivates banks to make optimal use of resources and thus increase the level of profits. We also found that Z-Score, which represents financial health, is associated with a positive relationship with profitability, while we did not find a significant impact of banking industry variables on banks' profitability. The current paper is organized as follows: Section (4.3) Reviews related literature; section (4.4) presents the methodology used and relevant data; section (4.5) presents and discusses empirical results, followed by Section (4.6) reports and discussions, section (4.7) reporting and discussion of additional robustness check, Finally: Section (4.8) conclusion of the paper

4.2 Literature Review

Bank profitability has been extensively studied in the literature in many developed and developing countries. It is usually represented as a function of internal and external determinants. External factors relate to the environment in which these banks operate, such as economic and political conditions and the legal frameworks that regulate the work of these banks, while internal factors are those related to management, strategy, performance, and risks (Jigeer and Koroleva, 2023).Aydemir and Ovenc (2016) provides evidence of important implications for policymakers and banking institutions, the crucial role of monetary policy in creating financial and monetary stability, and its importance in shaping bank profitability.

The characteristics and objective of each study play a role in proposing explanatory variables. Therefore, we find a discrepancy between these studies and their results depending on their objectives. As a result of the transformations that resulted from recurring global crises, the literature began to show more interest in effective methods for developing the banking sectors. We find many studies to investigate the impact of efficiency on banks' profitability within the framework of its determinants (Bitar et al., 2018; Djalilov and Piesse, 2016; Dsouza et al., 2022; Francis, 2013; Menicucci and Paolucci, 2016). We find other studies that have investigated the impact of efficiency and competition as part of the determinants of bank profitability (Le et al., 2020; Rahman et al., 2015; Yuanita, 2019). However, the importance of risks and their impact on banks' performance and profitability has been addressed in other

studies (Angori et al., 2019; Fang et al., 2019; Moudud-Ul-Huq, 2020; Tan et al., 2017). Despite the large number of studies on profitability in many economies, as indicated above, we find that the transitional economies were characterized by a paucity of studies that dealt with the profitability of banks during that period (Ali and Puah, 2019; Derbali, 2021; Havranek and Irsova, 2013; Jiang et al., 2013).

The literature has tested profitability in the Iraqi banking sector to a limited extent. Jadah et al (2020) examined the internal and external elements that affect bank profitability in Iraq (bank-specific features) and external (macroeconomic factors and government variables). Unbalanced panel data from 18 Iraqi banks over 13 years, from 2005 to 2017. The empirical results show that internal factors such as the size of the bank and shareholders' equity positively impact the profitability of banks. At the same time, the study presented evidence of the inverse relationship between profitability, inflation, interest rates, unemployment, and political instability. Empirical results vary depending on the data used and study periods. The empirical findings of the studies exhibited variability, yet it is important to acknowledge that there are certain similarities among these findings. Initially, a bank's profitability is often assessed based on a combination of internal and external factors. Secondly, it is assessed using metrics such as return on average assets (ROA), return on equity (ROE), and net interest margin (NIM), (Rakshit and Bardhan, 2022; Sufian and Habibullah, 2009; Tan, 2016).

Ghafar et al. (2021) A multiple linear regression model was used to study the determinants of profitability for a sample of Iraqi commercial banks from 2009 to 2018. The results showed experimentally that the liquidity ratio, financial leverage ratio, and retained profits, in addition to the bank's size, have a positive impact on the bank's profitability. Taha and Top (2022) found that bank size, liquidity ratio, and bank age, in addition to gross domestic product and inflation rate, have a varying effect on the performance of banks.

Noor and Al-Dulaimi (2022) Analyzed the influence of CAMELS criteria, including capital adequacy, asset quality, management, earnings, liquidity, and sensitivity, on the return on equity in commercial banks in Iraq. The findings indicate a favorable correlation between return on equity and capital adequacy, asset quality, management, earnings, liquidity, and sensitivity, within the Iraqi banking sector. The results showed that factors such as bank size, liquidity, capitalization, credit risk, efficiency, diversification, concentration, inflation, and GDP significantly impact bank profitability.

4.3 Data and methodology

4.3.1 Data

To study the impact of cost efficiency, competition, and risk-taking on the profitability of Iraqi banks, a sample of panel data was selected from 20 Iraqi commercial banks for the period between 2010 and 2020. Governmental banks and some commercial banks were excluded due to the lack of their data. Data for banks are collected from the banks' annual statistical bulletins. In Iraq and the database of the Iraqi Stock Market, data related to banking industry variables and macroeconomic variables were obtained through global development indicators data (WDI).

4.3.2 Methodology

4.3.2.1 Empirical framework

When measuring the determinants of bank profitability using panel data, we will face many challenges; the unobserved heterogeneity of cross-section (banks) may be a result of differences in corporate governance in Iraq, converse causality, endogeneity bias: Banks with greater profitability can increase equity compared to those with less profitability. We tackle these issues together by employing the dynamic panel data (DPD) model(Arellano and Bover, 1995). The DPD model shows several advantages: First, it is suitable for short panel data with large N and small T. Second: This technique is ideal for linear equations with a dynamically dependent variable with several controlling variables. Our study will employ a one-step Generalized Method of Moments (GMM-SYM) system. We express the specifications of our empirical model as follows:

$$\pi_{it} = \alpha_0 + \delta\pi_{it-1} + \sum_{i=1}^i \beta_i x_{it} + \sum_{j=1}^j \beta_j d_{jt} + \sum_{s=1}^s \beta_s m_{it} + v_{it} + u_{it} \quad (4.1)$$

i representation of the bank t denotes o year , α_0 it is the constant term π it is an indicator of bank profitability π_{it-1} shows first-period lag of profitability x_{it} refer to the specific determinants of profitability, d_{jt} Refer to the industry-specific determinants of banks profitability m_{it} macroeconomic determinants v_{it} and u_{it} are unobserved bank-specific effects and stochastic error term, respectively, β_i , β_j and β_s are the vector parameters to be estimated.

4.3.2.2 Definition of variables

4.3.2.2.1 Dependent variables

Following up on the previous literature (Bouzgarrou et al., 2018; Djalilov and Piesse, 2016; Martins et al., 2019), we use three different indicators to represent the profitability of banks. First, it is the return on assets (ROA) and the return on equity (ROE), in addition to the net interest margin (NIM). Return on Assets (ROA) embodies the bank's ability to generate profit by using the financing sources at its disposal. ROE Shows the rate of return the bank achieves using the investors' money. NIM demonstrates the difference between the interest a bank receives on loans and the interest it pays on deposits. Table 4.1 shows the variables adopted in our study.

Table 4. 1: Describe the Variables and Their Impact on Profitability in Banks.

Depended Variable	Notation	Measurement	Source
PROFIT			
return on assets	ROA	Net income/total assts	Annual Reports
return on equity (ROE)	ROE	Net income/shareholders' equity	Annual Reports
net interest margin (NIM)	NIM	(Investment Income – Interest Expenses) / Average Earning Assets	Annual Reports
Measurement of bank competition			
	LIX	Lerner Index	Calculated by the author
	LIXX	Adj-Lerner Index	Calculated by the author
	Boone	Boone index	Calculated by the author
Efficiency			
Cost efficiency	CE	Cost efficiency	Calculated by the author
allocative efficiency	ALE	allocative efficiency	Calculated by the author
technological efficiency	TE	scale efficiency	Calculated by the author
Risk-taking indicators			
Bank soundness	Z-SCORE	Ratio between a bank's return on assets plus equity capital/total assets	Calculated by the author
Credit Risk	NPL	Loan-loss provision as a fraction to total loans	Annual report
Liquidity Risk	LRIS	Ratio between a bank's loan / banks deposit	Calculated by the author
Bank-specific variables			
Size	Size	Natural logarithm of total assets	Annual report
Loan to total assets	Liquidity	Ratio of loan to total assets	Annual report

Capital	CAPT	Book value of capital to total assets	Annual report
Labor	Labor	The ratio of gross total revenue to the number of employees	Annual report
Industry-specific variables			
Concentration	C3	The ratio of large three banks in terms of total assets to the total assets	WDI
Stock market development	RSMD	Ratio of stock market capitalization over GDP	WDI
Macroeconomic variables			
Real GDP growth	GDPG	Year-on-year logarithmic change on real GDP	WDI
inflation	INF	Year-on-year logarithmic change on Consumer Price Index	WDI

Figure 4.1 shows Profitability indicators in the Iraqi banking industry from 2010-2020. We find that ROE, which represents the return on equity index in the Iraqi Stock Exchange, rose to (9.64) at its highest level in the year 2012 and then declined dramatically to reach the lowest level in the year 2018 with a value of (0.6), (ROA) shows the least change during the study period, as it appears from the figure that it was in the year 2012 with a value of (3.586) While the minimum value was (0.27) in 2018. (NIM) shows more stability during the study period as it appears from the figure that it was in the year 2012 with a value of (1.9), While the minimum value was (0.40) in 2020.

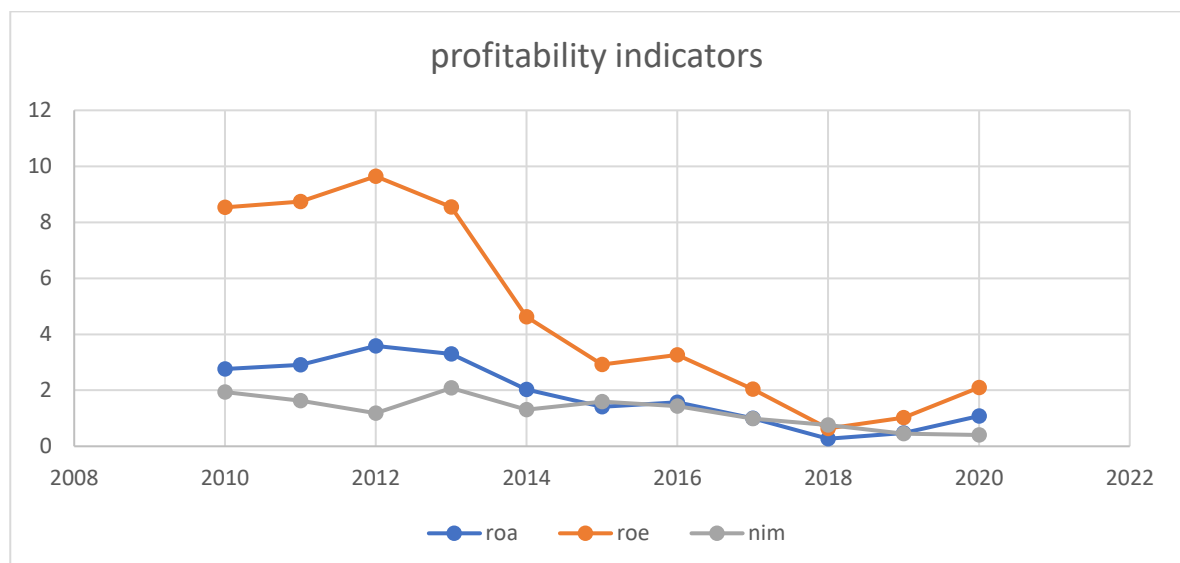


Figure 4. 1: Profitability in the Iraqi Banking Industry During the Period 2010-2020

4.3.2.2.2 Independent Variables

Several research on financial and non-financial firms have utilized the natural logarithm of total assets to measure the firm size proxy (Ali et al., 2015; Bashir et al., 2021; Dang et al., 2018; Hall and Weiss, 1967; Mitchell et al., 1995; Sheikh et al., 2013). According to empirical research, the size of a bank significantly affects its profitability (Aladwan, 2015; Anggari and Dana, 2020; Regehr and Sengupta, 2016). The empirical results showed variation in the effect of bank size on profitability. Rowe reported bank size is positively correlated with profitability, While Gyamerah and Amoah (2015) and (Tran and Phan, 2020) gave evidence negative relation between bank size and profitability. Additionally, the effects of banking diversity on profitability vary (Gischer and Jüttner, 2001; Nisar et al., 2018; Rakshit and Bardhan, 2022).

4.3.2.2.3 Competition Measurement

Market power is a representation of the bank's ability to set prices by comparison to marginal cost (Lerner, 1934). The Lerner indicator provides data on competitive levels and to determine market power, which can be written as in the following formula.

$$L = \frac{P-MC}{P} \quad (4.2)$$

Where P is a representation of the average price or income of the bank (the ratio of total revenues to total earning assets), MC is a representation of marginal cost (the estimate of a translog production function for each bank, taking into account bank and temporal fixed effects).

Koetter et al. (2012) and Rakshit and Bardhan (2022) Contended that the conventional method presupposes that banks are completely efficient. Given this assumption, Lerner will exhibit bias since certain banks can exploit price opportunities resulting from their market dominance to mitigate the assumption of banks being efficient. To mitigate the presumption of banks' absolute efficiency. For this investigation For this investigation, I employed the adjusted Lerner index. Following the investigation of the previous research papers (Clerides et al., 2015; Rakshit and Bardhan, 2022; Tan and Floros, 2018; Williams, 2012).

The adjusted Lerner index ($L_{adjusted}$) is expressed in the following way:

$$L_{Adjusted} = \frac{PT_{it}+TC_{it}-MC_{it}*TO_{it}}{PT_{it}+TC_{it}} \quad (4.3)$$

‘i’ and ‘t’ are representations of bank and year, PT is an expression of profit before tax, (TC) is a representation of the total operating cost while (MC) refers to marginal cost, and (TC) is the total cost.

- **Boone index**

The current study adopts, in addition to the adjusted Lerner index, the Boone index, to measure competition (Boone, 2008). The Boone index is consistent with the arguments of the performance hypothesis developed by Demsetz (1973). The hypothesis suggested that efficiency positively affects performance, while competition has an inverse relationship with performance. Performance can be measured through profit or market share.

The more negative sign indicates a stronger impact. The Boone indicator can be represented as:

$$\ln (\pi_i = \alpha_i + (mc_{ik}) \quad (4.4)$$

Where π_i is the profit of the i bank at time t . MC is the marginal cost for the i bank at the time t

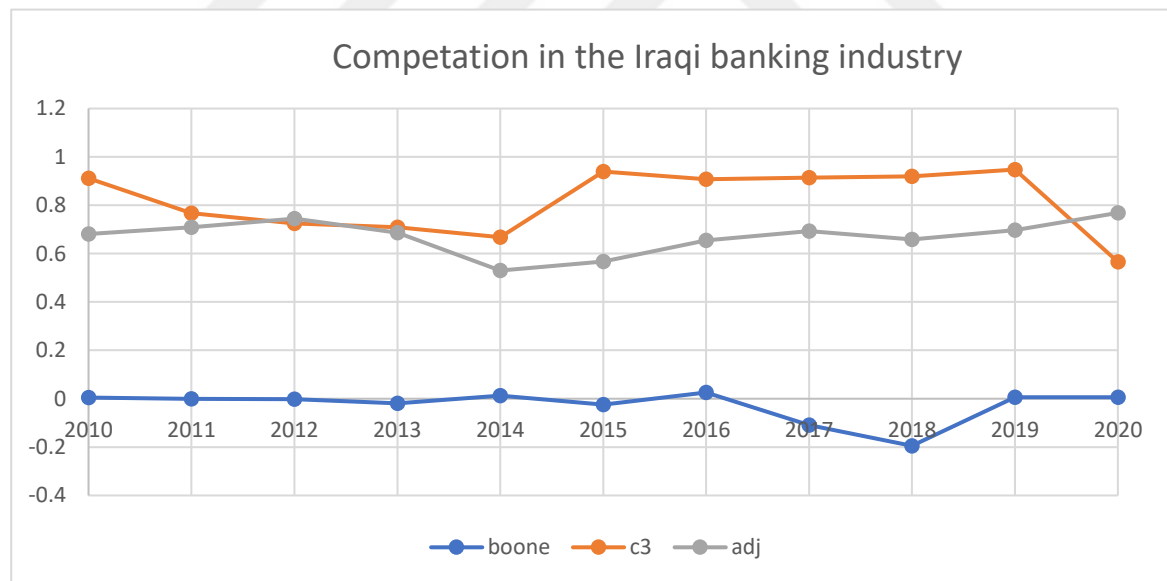


Figure 4. 2: Competition in the Iraqi banking industry

4.3.2.2.4 Risk-taking indicators

We use several risk indicators, including insolvency, liquidity risk, and credit risk. We use the ratio of non-performing loans to total loans to calculate credit risk in order to gauge the degree of risk-taking in Iraq's banking industry. Higher non-performing loan levels indicate a higher credit risk for banks (Maggi and Guida, 2011). Liquidity risk is defined as the ratio of

loans to deposits, its representation of the bank's inability to satisfy its short-term financial obligations without suffering significant losses (Acerbi and Scandolo, 2008). To assess banking bank soundness (stability), we adopted the Z-score index following (Laeven and Levine, 2009; Lepetit et al., 2008; Li et al., 2022). The Z score is calculated as follows:

$$Z_{Scorei} = \frac{ROA_{it} - \frac{EQ_i}{TA_i}}{\sigma ROA} \quad (4.5)$$

ROA_{it} Represent to Return on assets of the bank i in year t , $\frac{EQ_i}{TA_i}$ Represent to Ratio of total equity to total assets of the bank i in year t and σROA represent the Standard deviation of each bank's ROA calculated based on three years. Athanasoglou et al. (2008) point that bank profitability initially favorably correlates with size until it starts to diminish with growth for institutional and bureaucratic reasons.

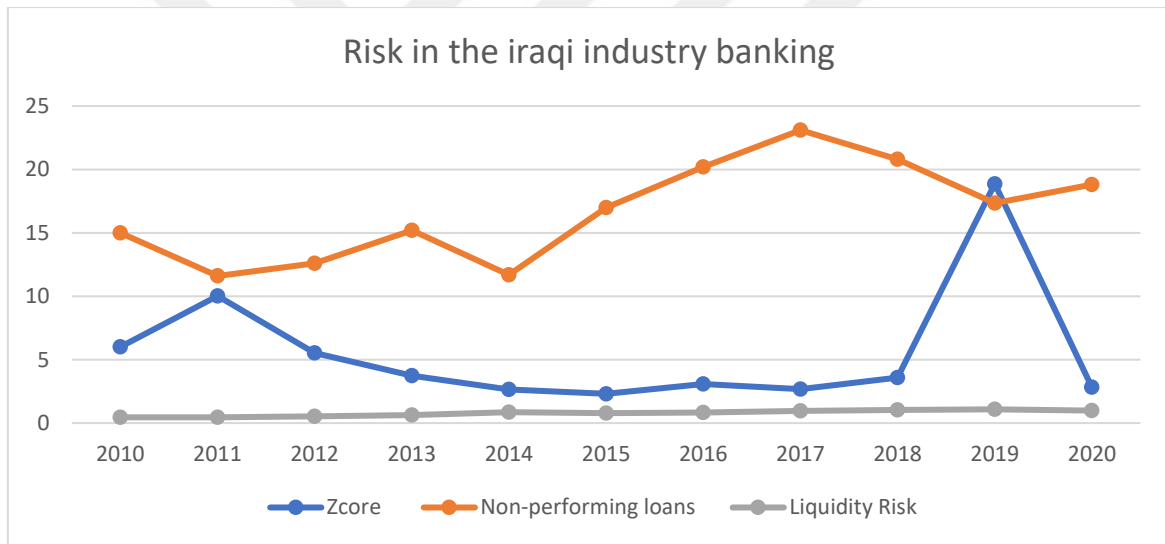


Figure 4. 3: Risk in the Iraqi Industry Banking

4.3.2.2.5 Banking, industry and macroeconomic Factors

Four variables associated with the bank will be utilized to conduct a thorough examination of the banking sector. These variables will serve as indicators of internal characteristics, encompassing bank size, diversification, capitalization, and labor productivity (ACARAVCI and ÇALIM, 2013; Sufian and Chong, 2008).

The size of the bank is typically used to measure possible economies of scale or their absence in the banking industry. This factor regulates variations in costs and products and changes risk depending on the size of the financial organization. If there are considerable

economies of scale, the first element may result in a positive association between size and bank profitability (Akhavain et al., 1997; Martins et al., 2019; Regehr and Sengupta, 2016). The second variable refers to banking diversification measured by calculating the ratio of non-interest income to total revenue (Rakshit and Bardhan, 2022; Tan and Floros, 2012). In addition, we represented bank capitalization by comparing the equity to total assets ratio. Capitalization and bank profitability are anticipated to be positively correlated because banks with enough capital are more inclined to practice cautious lending. According to one argument, banks with larger capital may avoid the risks associated with hazardous lending, and the interest income generated by the loans increases bank profitability. The gross revenue ratio to total employees is a proxy for labor productivity. Increased labor productivity improves bank management, boosts bank profitability, and promotes bank efficiency (Lozano-Vivas et al., 2002; Nguyen, 2018).

Concentration in the banking sector: The proportion of an economy's assets held by the largest three banks. Two primary theories explain the link between market concentration and bank efficiency. According to the structure-conduct-performance theory, banks often grow their market power and restrict competition in increasingly concentrated markets, which are characterized by high-power but less efficient enterprises (Altunbaş et al., 2001). According to the efficient structure theory, markets with greater concentrations are characterized by stronger companies and larger levels of market power since banks with superior cost efficiency would eventually beat rival banks and take control of the market (Goldberg and Rai, 1996; Nguyen, 2018).

4.3.2.2.6 Estimation efficiency in the Iraqi banking industry

We estimate a number of efficiencies using the DEA method. This method's main benefit is its versatility in handling different inputs and outputs. It is especially useful because it allows efficiency to grow or decrease based on size and output levels by factoring returns to scale into the efficiency calculation. The primary justification for using DEA over SFA is that the former performs especially well with small samples. Moreover, DEA does not require knowledge of any functional form of limits and can handle inputs and outputs that are many and expressed in different units of measurement (Charnes et al., 1997). The measured efficiency metrics have straightforward meanings. The technical efficiency measure provides the percentage decrease in input utilization that might have been made if the company had operated on the efficient

frontier. If no inputs were wasted, the technical efficiency may be broken down into a proportionate decrease in input utilization (Al Shamsi et al., 2009).

In our study, we employ three measures of efficiency: cost efficiency (CE), allocative efficiency (AE), and technological efficiency (TE)

The summary statistics of inputs and output variables are presented in Table 4.2.

Table 4. 2: Descriptive Statistics of Inputs and Output

	Observations	Mean	Maximum	Minimum	Std. Dev.
Loans	215	136544.20	537759.00	12352.0	111800.20
Other earning assets	215	61252.53	698695.00	106.00	111730.80
Deposits	215	286507.10	1491599.00	975.00	272887.10
Labor	215	4689.14	16833.00	497.0000	3295.83
Price of capital	215	0.18	5.95	0.018	0.48
Price of deposits	215	0.01	0.08	0.01	0.016
Price of labor	215	0.62	0.70	0.55	0.03

Notes: All variables are measured in millions of Iraqi dinars, Price of capital, Price of deposits and Price of labor measured in percent.

4.4 Empirical results and discussions

4.4.1 Empirical results

The empirical results shown in Table 4.3 investigate the impact of competition, efficiency, and risk-taking on the profitability of commercial banks in Iraq. We use the Lerner and Boone indexes to evaluate competition, cost efficiency, bank soundness (Z-Score), bank-specific variables like size, liquidity, and capital, and industry-specific variables like RSMD. We also include the growth rate and inflation as variables to represent macroeconomics. Our analysis includes three dependent variables: return on assets (ROA), return on equity (ROE), and net interest margin (NIM). To evaluate an instrument's validity across all specifications, the Hansen test is utilized. We have estimated models without overidentifying restrictions, as indicated by the p-value for the Hansen test. Furthermore, the existence of first-order autocorrelation is accepted by the p-values for AR(1). A second-order autocorrelation was rejected due to non-significant p-values. In order to enhance the results, we adopted Jochmans and Verardi (2020) tests for serial correlation of Arbitrary shape in linear panel model errors. Shortboards are intended for this test; we use the Portmanteau test to rule out any within-group correlation other

than what the group-specific effect has already caused. The method works with models that have endogenous, exogenous, or predetermined regressors and allows for heteroskedasticity.

The coefficients for the lagged dependent variables (ROA) and (NIM) are significant, indicating the model's dynamic characteristics. δ take values (0.472) and (0.291) When profitability is measured by (ROA) and (NIM) respectively. This indicates that the mechanism for moving away from the competitive structure in Iraqi banking is not significant. Moving on to the explanatory variables. We find that the size of banks is not an obstacle to the expansion of banks' profitability. The Adjusted Lerner Index gives significant positive signals for the ROA and ROE, which is an indicator of the negative impact of competition on the profitability of Iraqi commercial banks, this is consistent with the assumptions of the structure-behavior-performance hypothesis (SCP) and consistent with Rakshit and Bardhan (2022) and Tan (2016). We find that there is a positive significant relationship between risk-taking (Z-score) and the profitability of Iraqi banks. This means a higher risk will push banks to increase the interest rates charged on loans. The results of price cost efficiency indicate its positive impact on the return on assets. This is consistent with the framework proposed by the efficiency structure hypothesis (ESH), which assumes that banks that are more efficient than their competitors can increase their market share and compensate for the decrease in their size, and as a result, their profits will increase. This result is consistent with Fang et al. (2019). We find that economic growth is related to a positive significant relationship with return on assets, which indicates that higher growth rates will lead to higher profitability.

Table 4. 3: Empirical Results (Cost Efficiency, Z-Core, And Lerner Adjusted as Competition Indicator)

	(1)	(2)	(3)
	ROA	ROE	NIM
L.ROA	.472***		
	(.084)		
L.ROE		-.37	
		(.452)	
L.NIM			.291**
			(.125)
Bank Size	-.229	4.588	.752
	(.69)	(7.238)	(1.586)
Lerner Adjusted	9.62***	42.525***	-1.874
	(.32)	(9.077)	(1.156)
Z-Score Bank	.179***	1.133***	.234***
	(.014)	(.297)	(.021)
CE	4.921***	27.981***	-9.858***
	(1.277)	(6.738)	(.694)

Labor	-.001**	-.001	0.0001
	(0)	(.005)	(.001)
Capital	-.047	.023	-0.300
	(.167)	(.208)	(.267)
Diversification	.002	-.011**	.001
	(.003)	(.005)	(.002)
Liquidity	-.036	4.864	-1.596*
	(1.166)	(5.049)	(.863)
RMSD	-.036	-.918	.051
	(.061)	(.708)	(.125)
Inflation	.033	.072	-.04
	(.032)	(.163)	(.045)
GDPG	.102***	.281*	.057***
	(.012)	(.148)	(.012)
Constant	-9.094**	-32.727	-.262
	(4.502)	(0.0001)	(0.0001)
<i>Sargan – Hansen test</i> ¹	P= 0.1301	P=0.1301	P= 0.5830
<i>AR(1)</i> ²	P=0.0059	P= 0.0743	P= 0.1779
<i>AR(2)</i> ³	P= 0.1992	P= 0.2655	P= 0.4471
<i>Jochmans portmanteau test</i> ⁴	P= 0.4570	P= 0.4639	P= 0.4024
Observations	197	200	200
Standard errors are in parentheses: *** $p < .01$, ** $p < .05$, * $p < .1$			
1 Sargan-Hansen test of the overidentifying restrictions			
2 Arellano-Bond test for autocorrelation of the first-differenced residuals, H0: no autocorrelation of order 1			
3 Arellano-Bond test for autocorrelation of the second -differenced residuals, H0: no autocorrelation of order 2			
4 Jochmans portmanteau test, H0: no autocorrelation of any order			

Table 4.4 presents the empirical findings regarding the impact of competition, price cost efficiency, and risk-taking (non-performing loans) on profitability. The results indicate that the size of the bank has a negative and statistically significant effect on Return on Assets (ROA). In contrast, no effect is observed on Return on Equity (ROE) and Net Interest Margin (NIM). The Adjusted Lerner Index shows a positive and significant effect on both ROA and ROE. Additionally, the cost-price efficiency of the banks demonstrates a positive and significant impact on ROA and ROE. This suggests that price-cost efficiency plays a crucial role in determining banks' profitability compared to other indicators. These findings are in line with (Tan, 2016) and (Tan et al., 2017).

We find the negative impact of non-performing loans on NIM. These results are consistent with Akter and Roy (2017) and Liyana and Indrayani (2020). Price cost efficiency has a positive

impact on ROA and ROE, and the volume of liquidity and bank diversification are significant and negative on ROA.

Table 4. 4: Empirical Results (Cost Efficiency, Non-Performing Loans, and Lerner Adjusted as Competition Indicator)

	(1)	(2)	(3)
	ROA	ROE	NIM
L.ROA	.652***		
	(.046)		
L.ROE		.13***	
		(.019)	
L.NIM			-.293***
			(.054)
Bank Size	-3.047**	-.743	-.364
	(1.407)	(3.906)	(1.953)
Lerner Adjusted	6.368***	26.87***	2.683
	(.804)	(8.689)	(2.083)
NPL	-.004	-.003	-.026**
	(.007)	(.039)	(.012)
CE	7.226***	21.607***	-2.096
	(1.549)	(3.391)	(1.952)
Labor	-.002***	-.003	-.003*
	(0.001)	(.002)	(.002)
Capital	.006	-.028	-.567
	(.219)	(.248)	(.368)
Diversification	.005	0.001	0.001
	(.006)	(.018)	(.008)
Liquidity	-5.102*	-.363	-.043
	(3.07)	(8.171)	(2.203)
RMSD	.091***	.027	.062
	(.029)	(.492)	(.057)
Inflation	-.034	-.001	-.104
	(.039)	(.144)	(.066)
GDPG	.11***	.552***	.068***
	(.006)	(.116)	(.018)
Constant	15.569	2.978e+11	3.259
	(10.187)	(0)	(13.217)
<i>Sargan – Hansen test</i> ¹	P=0.5830	P= 0.1719	P=0.3556
<i>AR(1)</i> ²	P=0.1779	P=0.1294	P=0.5118
<i>AR(2)</i> ³	P= 0.4471	P= 0.4777	P=0.4631
<i>Jochmans portmanteau test</i> ⁴	P= 0.4024	P=	P=0.3109
Observations	197	200	200
Standard errors are in parentheses: *** $p < .01$, ** $p < .05$, * $p < .1$			
1 Sargan-Hansen test of the overidentifying restrictions			
2 Arellano-Bond test for autocorrelation of the first-differenced residuals, H0: no autocorrelation of order 1			
3 Arellano-Bond test for autocorrelation of the second-differenced residuals, H0: no autocorrelation of order 2			
4 Jochmans portmanteau test, H0: no autocorrelation of any order			

Table 4.5 shows the results of the impact of competition, price cost efficiency, and risk-taking (Liquidity Risk). The results did not differ far from those of the previous two models. We find that there is a significant positive effect of price cost efficiency on the ROA and ROE. We find that there is a significant positive effect of market capitalization on the ROA, which is consistent with (Shair et al., 2019).

Table 4. 5: Empirical Results (Cost Efficiency, Liquidity Risk, and Lerner Adjusted as Competition Indicator)

	(1)	(2)	(3)
	ROA	ROE	NIM
L.ROA	.677***		
	(.042)		
L.ROE		.517***	
		(.045)	
L.NIM			.056***
			(.021)
Bank Size	-1.363*	-.935	-2.133***
	(.719)	(.607)	(.589)
Lerner Adjusted	7.368***	24.594***	-2.525***
	(.78)	(.929)	(.789)
Liquidity Risk	.038	-.06	-.238
	(.119)	(.09)	(.247)
CE	5.269***	21.767***	-3.424**
	(.704)	(1.071)	(1.38)
Labor	-.001	-.002	0.001
	(.001)	(.001)	(0.001)
Capital	-.018	-.034	-.007
	(.054)	(.099)	(.083)
Diversification	.001	.002	-.002
	(.002)	(.003)	(.002)
Liquidity	-1.75	-1.067	-1.431**
	(1.168)	(1.615)	(.722)
RMSD	.081***	.081	.123**
	(.019)	(.09)	(.048)
Inflation	0.001	.009	-.005
	(.019)	(.018)	(.039)
GDPG	.117***	.545***	.107***
	(.007)	(.024)	(.007)
Constant	2.649	-14.778***	17.748***
	(3.842)	(3.711)	(3.35)
<i>Sargan – Hansen test</i> ¹	P=0.5830	P= 0.66	P=0.0671
<i>Jochmans portmanteau test</i> ⁴	P= 0.4024	P=0.4408	P=0.4442
Observations	197	200	200
Standard errors are in parentheses: *** $p < .01$, ** $p < .05$, * $p < .1$			
1 Sargan-Hansen test of the overidentifying restrictions			
2 Arellano-Bond test for autocorrelation of the first-differenced residuals, H0: no autocorrelation of order 1			
3 Arellano-Bond test for autocorrelation of the second-differenced residuals, H0: no autocorrelation of order 2			
4 Jochmans portmanteau test, H0: no autocorrelation of any order			

4.5 Robustness Check

To confirm the accuracy of our results, we conducted additional tests. To illustrate competition in the banking sector in Iraq, we use the Boone index. Table of Report No. (4.6) shows the results on the effects of risk appetite (Z-score), competition (Boone), and efficiency in the Iraqi banking sector. According to our findings, Boone has a statistically significant positive impact on ROE and a negative impact on NIM. ROA, ROE, and NIM are significantly positively influenced by the cost-price efficiency of banks, which indicates the importance of cost-price efficiency in determining banks' profitability compared to other indicators. The Z-score significantly and positively impacts ROE, NIM, and ROA. According to our observation, the size of the bank serves as an indicator of the presence of a negative impact on the profitability ratios and thus indicates the absence of a significant size effect.

Table 4. 6: Empirical results regarding the impact of efficiency, competition (Boone), and risks taking

	(1)	(2)	(3)
	ROA	ROE	NIM
L.ROA	-.083***		
	(.025)		
L.ROE		.017	
		(.014)	
L.NIM			-.268***
			(.021)
Bank Size	4.756***	27.537***	-3.893***
	(.684)	(.876)	(.763)
Boone	1.604	26.687***	-5.447***
	(1.323)	(1.62)	(.954)
Z-Score	.136***	.168***	.058***
	(.022)	(.064)	(.012)
CE	.891**	12.55***	-2.167***
	(.447)	(.324)	(.256)
Labor	.004***	-.009***	.006***
	(.001)	(.002)	(.002)
Capital	-.586***	-.219	-.101
	(.127)	(.229)	(.068)
Diversification	-.011**	-.198***	.013***
	(.004)	(.006)	(.002)
Liquidity	-9.526***	-14.237***	7.971
	(2.008)	(2.562)	(5.011)
RMSD	-.08*	.286***	-.108**
	(.042)	(.109)	(.042)
Inflation	.207***	1.006***	.091***
	(.06)	(.08)	(.026)
GDPG	.12***	.36***	.019***
	(.009)	(.016)	(.005)
Constant	-20.811***	-150.505***	15.745***

	(3.845)	(5.832)	(5.629)
<i>Sargan – Hansen test</i> ¹	P= 0.1301	P= 0.1301	P=0.5830
<i>AR(1)</i> ²	P= 0.0041	P=0.0249	P=0.3781
<i>AR(2)</i> ³	P= 0.487	P= 0.316	P= 0.3039
<i>Jochmans portmanteau test</i> ⁴	P= 0.4575	P= 0.4610	P=0. 0.4052
Observations	197	200	200
<i>Standard errors are in parentheses: *** p<.01, ** p<.05, * p<.1</i>			
<i>1 Sargan-Hansen test of the overidentifying restrictions</i>			
<i>2 Arellano-Bond test for autocorrelation of the first-differenced residuals, H0: no autocorrelation of order 1</i>			
<i>3 Arellano-Bond test for autocorrelation of the second-differenced residuals, H0: no autocorrelation of order 2</i>			
<i>4Jochmans portmanteau test, H0: no autocorrelation of any order</i>			

We conducted several additional validation tests to verify the robustness of the results. We use C3 with the HHI index as an indicator to evaluate competition in the Iraqi banking sector, and we also adopt Z-Score to indicate banking safety in the banking sector. Table (4.7) shows the results of employing the HHI index to capture competition alongside CR3. We discover that HHI significantly and positively affects profitability. It implies that banks impose greater lending costs due to increased market concentration. high rates of interest. Similarly, excessive market concentration in deposits hurts bank profitability. Banks are looking into alternative ways to raise money and pay higher interest rates because there is less opportunity to mobilize depositor cash in the confined deposit market. We find that CR3 has a positive and significant effect on bank profitability. This data backs up the SCP hypothesis, which states that increased concentration translates into higher profitability since banks tend to collude in a concentrated financial sector. These results are consistent with Rakshit and Bardhan (2022).

Table 4. 7: Empirical results (Cost efficiency, Z-Score HHI as competition indicator)

	(1)	(2)	(3)
	ROA	ROE	NIM
L.ROA	-.158***		
	(.021)		
L.ROE		-.199***	
		(.014)	
L.NIM			-.267***
			(.015)
SIZE	5.142***	35.472***	-5.934***
	(.6)	(1.032)	(.878)
HHI	.001***	.003***	.0000585
	(0.00002)	(.001)	(.0001795)
C3	-.027***	-.315***	.02

	(.005)	(.039)	(.013)
Z Core	.091***	-.213	.057
	(.023)	(.158)	(.061)
CE	.111	3.411***	-2.111***
	(.395)	(.995)	(.187)
Labor	.004***	-.005**	.005**
	(.001)	(.002)	(.002)
Capital	-.605***	-.497	.032
	(.163)	(.38)	(.076)
Diversification	.004	-.081***	.01***
	(.005)	(.017)	(.001)
liquidity	-11.471***	-23.89***	1.286
	(2.07)	(2.402)	(4.374)
Rsm d	.023	.427*	.028
	(.044)	(.242)	(.048)
Inflation	.188***	.498***	.082
	(.051)	(.105)	(.066)
GDPG	.111***	.503***	-.005
	(.007)	(.015)	(.004)
_cons	-20.092***	-162.433***	31.132***
	(4.103)	(7.553)	(6.549)
<i>Sargan – Hansen test</i> ¹	P= 0.8929	P=0.8929	P= 0.8929
<i>AR(1)</i> ²	P= 0.0012	P=0.0005	P= 0.8197
<i>AR(2)</i> ³	P= 0.2259	P= 0.0916	P=0.4258
<i>Jochmans portmanteau test</i> ⁴	P=0.4573	P= 0.4758	P= 0.2724
Observations	197	200	200
Pseudo R²	.z	.z	.z
<i>Standard errors are in parentheses</i>			
*** $p < .01$, ** $p < .05$, * $p < .1$			

4.6 Conclusion

This article examines the impact of price-cost efficiency, competition, and risks on profitability in the context of studying the financial performance of Iraqi commercial banks for the period 2010–2020. Using several variables, we examine the determinants of bank profitability. We use many alternative indicators that represent profitability: ROA, ROE, and NIM. In addition to macroeconomic variables, we also use many bank and banking industry-specific variables. We estimate the results of several empirical models by applying the generalized method of moments (one-stage system, GMM). Our results provide important evidence that the Iraqi banking industry operates in a competitive environment. We provided the estimated values of the Adj-Lerner index and Boone, along with evidence of the impact of competition on bank profitability. Regarding competition, increased competition can indeed put pressure on profitability, as it often leads to narrower profit margins. In a competitive market, banks may face pressure to lower interest rates on loans or increase interest rates on deposits to

attract customers. This can reduce the spread between lending and borrowing rates, leading to lower profitability. Additionally, competition can drive banks to invest in new technologies or expand services, which may increase costs and further impact profitability. So, an increasing level of competition will reduce banks' profitability. Regarding the influence of price-cost efficiency on the profitability of the banking sector, the results provided strong evidence that high-cost efficiency will lead to high profitability. We check the robustness of the results using the C3 concentration index, the HHI competition index, and the ZCORE bank stability index. We found a positive relationship between the financial soundness of the Iraqi banking sector, the efficiency and stability of banks. In this study, we offer evidence that aligns with the EHS hypotheses, suggesting that enhancing efficiency can lead to increased profitability. Regardless of the size of the bank, highly efficient companies strive to reduce costs to increase profits, which in turn leads to greater profitability. From the results of the study, many important conclusions can be drawn for financial policy, on the one hand, to ensure financial stability and the continued profitability of Iraqi banks.

First, financial and monetary policymakers should take the necessary measures to regulate the work of the banking sector to create a competitive environment that contributes to enhancing financial and monetary stability. Second: Improving loan monitoring and management procedures will lower credit risk and boost profits for commercial banks in Iraq. Third: Commercial banks should make optimal use of available funds and contribute to strengthening the confidence of the Iraqi citizens in the banking sector.

CHAPTER FIVE

THE NEXUS BETWEEN RISK, CAPITAL, AND EFFICIENCY: EVIDENCE FROM AN IRAQI BANKING SECTOR

5.1 Regulatory Background

The global banking industry has witnessed continuous dynamic transformations over the last two decades due to environmental factors, technological development, deregulation, and financial and economic globalization. These factors have led to an increase in the intensity of competition and concentration in the banking sector, which prompted policymakers and those interested to intensify discussions about the banking environment and its role in making this sector more efficient and stable (Hellmann et al., 2000). Regions have implemented precautionary solutions throughout successive financial crises that help increase regulation and enhance capital adequacy standards. Launched in 1988, the first Basel Accord underwent reconsideration at the end of the twentieth century, prompting the Basel Committee to issue the Basel II Accord, followed by Basel III after the 2008 crisis exposed the fragility of many banks' financial conditions. Between 2013 and 2019, the agreement's implementation accelerated, and the banking sectors worldwide adapted to its requirements. However, the successive crises revealed the weakness of regulatory standards as a unique tool to ensure financial stability in the financial and banking sectors. Therefore, a deeper understanding of the factors determining banking performance and an understanding of the mechanisms of risk behavior in the banking sector is required. The nature and dynamics of banking operations also make them directly connected to the sectoral and public environment represented by macroeconomic variables (Koopman and Székely, 2009). The crises have shown that banks without inefficient capital management may be more vulnerable to financial and economic shocks. The repercussions of the financial crises have revealed a weak regulatory framework as a unique tool to ensure financial stability for the financial and banking sectors, as they have not prevented banks from being exposed to high levels of risk, which calls for a greater understanding of the determinants of risk in the banking sector.

The succession of financial crises has made it necessary for economists and policymakers to have a comprehensive and in-depth understanding of the links between financial systems and banking behavior in order to reduce risks. The repercussions that followed the financial crises also revealed the weakness of the regulatory framework as a unique tool to ensure the financial

stability of the financial and banking sector, as these controls did not prevent banks from being exposed to high levels of risks, which calls for the need for a greater understanding of the determinants of risks in the banking sector, and the nature and dynamism of banking operations. It puts it in direct contact with the sectoral and general environment represented by macroeconomic variables. Crises have shown that banks that lack efficiency in risk and capital management may be more vulnerable to financial and economic shocks. Over the years, efficiency has been one of the most prominent topics on the research agenda, and the reasons behind the increase in this research are attributed to the increasing changes in the operational regulatory environment, which prompts banks to search for the best solutions to control costs and increase revenues (Chortareas et al., 2013). Efficiency can allow banks to make decisions regarding the optimal marketing mix that can use the least inputs to obtain the best outputs.

The financial crises of the late 2000s had a profound impact on the global banking sector, prompting a reassessment of the relationships between efficiency, risk, and capital. These crises have highlighted the interconnected nature of these elements, stressed the importance of understanding their dynamics in maintaining financial and economic stability, and prompted policymakers to take numerous measures to maintain financial and economic stability. Banking operations and stable financial performance depend on interconnection and creating a balance between its basic components such as efficiency, risk management, and adequacy of capital, as efficiency represents the optimal allocation of available resources and management of costs so that banks can achieve financial returns that help them achieve banking sustainability.

The succession of financial crises made it imperative for economists and policymakers to have a comprehensive and in-depth understanding of the links between financial systems and banking behavior to reduce risks. The repercussions that followed the financial crises revealed the weakness of the regulatory framework as a unique tool to ensure the financial stability of the financial and banking sectors, as these regulations did not prevent banks from being exposed to high levels of risk, which necessitates the need for a greater understanding of the determinants of risks in the banking sector.

Financial globalization and digital and technological transformation have encouraged financial institutions to offer innovative financial products in an attempt to meet the increasing requirements of stakeholders. These developments have been accompanied by high levels of risk, which has necessitated the concerned authorities to establish global regulatory frameworks for capital adequacy and reducing risk levels.

Diversity in modeling techniques and measures of bank capital, such as required capital level, equity ratio, required capital as a percentage of deposits and loans, and, more recently, a ratio based on risk-weighted assets, are employed by the theoretical literature on bank risk behavior related to capital regulation (Mateev et al., 2022).

The Basel Committee is setting some goals to increase supervision of the international banking sector, the most important of which is encouraging competition between banks internationally and discipline within the same regulatory standards.

Capital regulation is an effective hedge tool to mitigate the risk of bank failure. Its importance emerged during the global financial crisis as a means of mitigating the risks associated with budget imbalances (Saeed et al., 2020). Commercial banks are supervised and regulated by independent bodies that require them to comply with controls that reduce the level of risk.

5.2 Main Hypotheses and Related Literature

Various theoretical hypotheses are provided to examine the relationship between risks and capital adjustment ratios. According to the regulatory hypothesis, the actions of the regulatory and supervisory authorities play an essential role in the continuity of banks' work. Regulators urge banks to increase their capital according to the state of active markets and according to the level of market risks and to confront fluctuations in credit markets and the number of risks resulting from that volatility. One method for examining the impact of bank capital requirements is to think of banks primarily as asset portfolio managers. From this perspective, the foremost consequence of any regulations regarding capital requirements - specifically, capital requirements that establish a link between a bank or, in an uncertain environment, which a bank expects may potentially become limiting under specific circumstances is to change the leverage ratio (assets-capital) of the bank's portfolio. From the vantage point of portfolio selection, the result would alter the makeup of the optimal asset portfolio. The analysis of the portfolio's impacts on capital was conducted by considering the contributions of Kahane (1977), and Koehn And Santomero (1980). Kim and Santomero (1988) pointed out the importance of focusing on capital requirements to avoid risks resulting from the mispricing of deposits. The Moral Hazard Hypothesis suggested by Jeitschko and Jeung (2005) assumes a negative relationship between capital and risk that bank managers with lower levels of capital prefer to bear more risks as a result of low efficiency and capital adequacy (Anginer and Demirguc-Kunt,

2014). Studies conducted by Bougatef and Mgadmi (2016) and Abbas et al. (2021) supported the assumptions of the Moral Hazard Hypothesis by giving evidence of an inverse relationship between the capital buffer ratio and risk-based capital ratio.

The “Bad Management Hypothesis,” studied by Berger and DeYoung (1997) and Williams (2004) states that low-efficiency banks that are unable to effectively control operating expenses incur higher costs than high-efficiency banks, which subsequently leads to an increase in the risks to which banks are exposed.

Moreover, the Bad Luck Hypothesis proposed by Berger and DeYoung (1997) refers to the negative relationship between risk and capital. According to this hypothesis, the external environment has a role in increasing risks, such as financial shocks, as the bank management cannot control them, so the costs of adapting to these crises increase, which leads to an adverse effect on efficiency, so it decreases (Tan and Floros, 2013; Kolia and Papadopoulos, 2020). On the contrary, we find the Cost Skimming Hypothesis assumes a positive relationship between risk and efficiency. This hypothesis indicates that banks may appear more efficient in the short term as a result of not spending any resources to monitor credit risks, especially non-performing loans, but the situation changes in the medium and long term as a result of administrative behavior and its impact on the quality of loans (Fiordelisi and Mare, 2014; Nguyen and Nghiem, 2015; Kolia et al., 2020).

The sharp division in theories does not provide decisive conclusions for regulating capital and its importance in the stability of the work of banks, as higher gains as a result of risk may be offset by a negative side of capital loss, which stimulates the alignment of incentives for bank owners and depositors, which leads to creating a balance between better lending levels and risks (Dias, 2021).

Numerous empirical studies have examined whether high capital requirements lead to increased or reduced risk (Stolz et al., 2003; Barth et al., 2004; Demirguc-Kunt et al., 2011; Camara et al., 2013; Vallascas and Hagendorff, 2013; Baker and Wurgler, 2015; Dias, 2021).

based on a Federal Reserve Bank of San Francisco study, "there is a positive relationship between capital and risks" (Laeven and Levine, 2009). This was also the result of another study by the Basel Committee on Banking Supervision "Higher capital levels are associated with lower probabilities of bank failure". Moreover, Mahdi and Abbes (2018) found that a positive reciprocal relationship was found between capital and risk.

For instance, Jacques and Nigro, (1997); Stolz et al. (2003); Siddika and Haron, (2020) gave evidence that capital regulation was useful in reducing risk in banks with low capital levels compared to those with high capital, in other words, risks are positively associated with changes in capital. Van Roy (2005) and Camara et al. (2010) suggested that banks that do not have sufficient capital are likely to take greater risks, regardless of the type of capital they use to enhance their standards. This behavior suggests that these banks may be engaged in risky strategies in the hope of recovering from financial difficulties.

In contrast to the previous two opinions, another part of the studies suggests that risk-based capital requirements have a slight impact on the risk behavior of banks (Allen and Rai, 1996; Barth et al., 2005; DeYoung et al., 2008). However, the results of empirical studies do not seem conclusively decisive about how strict head requirements can be triggered by bank incentives to take risks.

Zhang et al. (2008) examined the relationship between capital and risk strategies in Chinese commercial banks. Empirical evidence suggests that banks whose capital is below the minimum requirement are legally obliged to increase their capitalization. This is done to minimize the risk-to-total assets ratio and improve the capital ratio to ensure optimal decision-making. In addition, the regulator can change banks' risk tolerance and discourage them from taking unwarranted risks by raising minimum regulatory requirements.

Jokipii and Milne (2011) analyzed a sample of American banks and discovered a direct relationship between the amount of capital held and the propensity to engage in risky actions. Banks with high capital adequacy ratios showed a direct relationship between capital and risk appetite, whereas banks with low capital adequacy ratios showed an inverse correlation between capital and risk appetite.

Ashraf et al. (2016) used a panel dataset comprising 21 commercial banks listed in Pakistan for the period 2005–2012. The results suggest that commercial banks have taken measures to reduce the risk associated with their asset portfolios to comply with strict risk-based capital requirements. Furthermore, the results suggest that all banks, regardless of whether their risk-based capital ratios are below or above regulatory limits, have implemented strategies to reduce portfolio risk in response to the stringent risk-based capital requirements.

Ding and Sickles (2019) examined how the capital adequacy requirement affects their capital adequacy and risk-taking practices, taking into account the ongoing operations and

dynamics of commercial banks. Using panel data from banks in the United States from 2001 to 2016, the study found that increased capital requirements lead to a reduction in banks' investment in risk-weighted assets. However, it also leads to an increase in the stock of non-performing loans, highlighting the unintended consequences of increased capital requirements for credit risks.

Ashraf et al. (2020) examine the influence of capital regulation on bank risk and the moderating effect of deposit insurance in this context in both stable and crises. Research suggests that strict capital regulations reduce the likelihood of bank failure risk during typical economic growth periods, regardless of the presence of explicit deposit insurance. Strict capital regulations before the crisis reduce the likelihood of bank failure during the crisis.

Some of the literature does not ignore the importance of efficiency when examining the relationship between bank risk behavior and capital regulation, based on theories. The initial instance can be ascribed to Kwan and Eisenbeis (1997) and Jeitschko and Jeung (2005) demonstrated the positive relationship between bank inefficiency and insufficient capital.

Altunbas et al. (2007) investigated the temporal relationship between capital, risk, and bank efficiency in the European commercial banking sector. The results suggest a direct relationship between inefficiency and capital and an inverse relationship between inefficiency and bank risk-taking.

Deelchand and Padgett (2009) examine Japanese cooperative banks and use a simultaneous equation model to evaluate the correlation between risk, capital, and efficiency. The results make it clear that cooperative banks with larger equity capital tend to have a higher willingness to take risks. Conversely, cooperative banks with lower capital also show a willingness to take risks despite their larger size and at the same time are less efficient.

Fiordelisi et al. (2011) conducted a thorough analysis of how efficiency affects bank risk and examined the potential influence of bank capital on this relationship in a variety of commercial banks in the European Union. Based on the results, there appears to be a pattern whereby an increase in bank capital is preceded by a decrease in bank efficiency, whether in terms of costs or earnings. It is also observed that improvements in cost efficiency tend to accompany increases in bank capital.

Tan and Floros (2013) analyzed the relationship between bank efficiency/productivity, capital, and risk in the Chinese commercial banking sector. There is a clear and strong

relationship between risk and efficiency in the Chinese banking sector, which is supported by empirical evidence. Nevertheless, there is a clear and significant negative relationship between risk and capitalization level.

Subsequently, numerous researches were conducted, obtaining different results indicating the correlation between capital and risk and efficiency (Hu and Yu, 2015; Lemonakis et al., 2015; Zheng et al., 2017; Moudud-Ul-Huq, 2020; Miah and Sharmeen, 2015; Boamah et al., 2023; Alsharif, 2021). Results do not provide a consensus on the relationship between risk, capital, and efficiency, for example Alsharif (2021) found that higher levels of capital and efficiency will lead to reduced insolvency and credit risk, while Sarkar et al. (2019) investigates risk, capital, and efficiency in Indian banking by analyzing various relationships between distinct ownership kinds. Empirical results have provided conflicting data on the correlation between low efficiency and increased credit risk in public banks, and a favorable association between efficiency and risk in international banks. Cevikcan and Tas (2022) consider the efficiency, risk, and capitalization of Turkish securities enterprises. A positive incentive and capital e correlation was shown between risk incentive and efficiency, as well as between risk.

Several techniques have been adopted to investigate the relationship between risk, capital, and efficiency. The method of generalized moments (GMM) adopted by Fiordelisi et al. (2011), Dong et al. (2017), Zheng et al. (2017), Ding and Sickles (2019), SUR as an alternative methodology employed by Altunbas et al. (2007), Ding and Sickles (2019), Saeed et al. (2020). Moreover, two-stage least squares (2SLS) and three-stage least squares (3SLS) methods were employed by Deelchand and Padgett (2009), Tahir and Mongid (2013), Tan and Floros (2013), Hu and Yu (2015), Alsharif (2021), Cevikcan and Tas (2022).

5.3 Methodological Framework

5.3.1 Methodology

The modeling framework used to examine the relationship between capital, efficiency, and risk depends on the methodology used by Mongid et al. (2012), Tan and Floros (2013), Kolia et al. (2020), Bashir et al. (2021). We consider the previous literature and hypotheses together and use the proposed three-stage least squares estimation (3SLS) suggested by Zellner and Theil (1962). The 3SLS approach provides consistent estimates by combining the concepts of 2SLS and SUR methods to increase sampling efficiency. The 3SLS approach takes into account the

presence of endogeneity and cross-correlation between error terms (Gallant, 1977). We can represent the equations as follows:

$$Risk_{it} = \alpha_0 + \alpha_1 EFl_{it} + \alpha_2 Cap_{it} + \alpha_3 Bank_{it} + \alpha_4 SECT_{it} + \alpha_5 Mac_{it} + v_i$$

$$Cap_{it} = \beta_0 + \beta_1 EFl_{it} + \beta_2 Risk_{it} + \beta_3 Bank_{it} + \beta_4 SECT_{it} + \beta_5 Mac_{it} + v_i$$

$$EFl_{it} = \gamma_0 + \gamma_1 cap_{it} + \gamma_2 Risk_{it} + \gamma_3 Bank_{it} + \gamma_4 SECT_{it} + \gamma_5 Mac_{it} + v_i$$

Where *i* represents the cross-section of the sample (banks), while *t* refers to time. Bank risk-taking is proxied by (Z-Score,) . Capital regulation is proxied by the equity to total assets ratio. Efficiency Calculated by data envelopment analysis (DEA) and represented by technical efficiency and Cost efficiency, Bank SECT and MAC are representations of banking, industry, and macroeconomics, respectively. v_{it} is the random error term.

5.3.2 Data

In our study, we employ panel data for a sample of Iraqi commercial banks, including 220 observations covering the period between 2010 and 2020. Public banks and some commercial banks were excluded for lack of data availability. Data were obtained from the annual bank reports and Central Bank of Iraq bulletins (CBI), while macroeconomic variables were obtained from the World Development Indicators (WDI) data. The table (5.1) shows the variables adopted in our study.

5.3.3 Definition of Variables

To examine the relationship between efficiency, risk and capital, we first define the study variables.

5.3.4 Efficiency

We use Data Envelopment Analysis (DEA) to estimate efficiency. DEA is a non-parametric method for evaluating the relative efficiency of decision-making units (DMUs) considering multiple inputs and outputs. The first model was developed by Charnes et al. created. (1978), known as model CCR, this model assumes that the optimal level of efficiency depends on the minimum production input to produce a given output and that farm size does not have a significant impact on efficiency as long as all DMUs operate in the optimal range. Banker et al. (1984) developed the CCR model by relaxing the constant returns to scale (CRS) assumption and produced the “BCC” model. The model was used to evaluate the efficiency of DUM, which

is characterized by variable returns to scale (VRS). This assumption can be used to measure pure technical efficiency (PTE). Basically, efficiency was defined as the ratio of output to input. Given the diverse production scenarios, there must be multiple outputs and inputs. Therefore, calculating the most realistic efficiency requires weighting the inputs and outputs. Technical efficiency can be defined as:

$$\text{Technical efficiency} = \frac{\text{Weighted sum of outputs}}{\text{Weighted sum of inputs}}$$

The CCR model can be expressed as follows:

$$\begin{aligned} & \min_{\theta, \delta} \theta, \\ & \text{subject to} \\ & -y_i + Y\delta \geq 0, \\ & \theta x_i - X\delta \geq 0, \\ & \delta \geq 0 \end{aligned}$$

where θ is a scalar and δ is an $N \times 1$ vector of constants, Y represents the data of all N banks, x_i are individual inputs, and y_i the outputs for the i th bank, the value of θ acquired will be the efficiency grade of the DMU. It will satisfy $\theta \leq 1$, where a value of 1 denotes a frontier point and hence a technically efficient DMU. It is easy to calculate VRS by adding the convexity constraint to the equation, and it appears as follows:

$$\begin{aligned} & \min_{\theta, \delta} \theta, \\ & \text{subject to} \\ & -y_i + Y\delta \geq 0, \\ & \theta x_i - X\delta \geq 0, \\ & N1\delta = 1 \\ & \delta \geq 0 \end{aligned}$$

Where $N1$ represents an $N \times 1$ vector of ones, compared to a conical CRS hull, this method creates a convex hull of cross plots that more completely encloses the data points.

5.3.5 Risk-taking Behavior

In our study, we use several indicators to represent risk behavior (bank credit risk, bank soundness, and liquidity risk). We measure the bank's credit risk as a representation of credit quality by measuring loan loss provisioning as part of total loans as a follow-up to Shrieves and Dahl (1992), Kwan and Eisenbeis (1997), Tan and Floros (2013), and Dias (2021). The Z-score is another metric we use to quantify bank risk since it is an indicator of financial solvency that has been adopted in a large number of studies (Laeven and Levine, 2009; Tan and Floros, 2013; Mohsni and Otchere, 2018; Dias, 2021). The Z score is calculated as follows:

$$Z_{Scorei} = \frac{ROA_{it} - \frac{EQ_i}{TA_i}}{\sigma ROA} \quad (5.1)$$

ROA_{it} Represent the Return on assets of the bank i in year t , $\frac{EQ_i}{TA_i}$ Represent to Ratio of total equity to total assets of the bank i in year t and σROA represent to Standard deviation of the ROA for each bank calculated based on three years (Athanasoglou et al., 2008). Liquidity Risk

5.3.6 Bank Capital

Theoretical frameworks make inconsistent predictions about the relationship between capital and bank risk. Some studies show that the negative effects of capital restriction create an environment that is not ideal for banks' operations, which reduces banks' ability to deal with unstable environmental influences and is reflected in banks' financial performance (Deelchand and Padgett, 2009; Behr et al., 2010). On the other hand, restricting capital may be linked to both efficiency and risk. Banks with better capitalization may face less risk, which is linked to the higher efficiency of these institutions (Sarkar et al., 2019). The two primary ideas of bank capital that are most frequently utilized in the literature are funds generated by issuing shares and retained earnings. Real capital is sometimes referred to as physical capital and regulatory capital. In our study and follow-up (Shrieves and Dahl, 1992; Tan and Floros, 2013; Nguyen and Nghiem, 2015) The ratio of equity to total assets will be used as an indicator of capital representation in the Iraqi banking sector.

5.3.7 Explanatory variables

Table 5. 1: Description of the study variables

Variables	Notation	Definition
Risk	Z-Score	The ratio between a bank's return on assets plus equity capital/total assets
	Bloan	Loan-loss provision as a fraction of total loans
	VROA	The standard deviation of ROA
	VORE	The standard deviation of ROE
Efficiency	TE	Technical Efficiency
	AE	Allocative Efficiency
	CE	Cost Efficiency
Capital	Capital	Book value of capital to total assets
Bank-specific variables		
Profitability	ROA	Return on assets
	Size	logarithm of total assets
	Liquidity	Loan-to-assets ratio
Indicators for banking industry		
	C3	The ratio of total assets of the three largest banks to the overall total assets.
	RMSD	Ratio of stock market capitalization over GDP
Macroeconomics variables		
	GDPG	Annual percentage growth in real GDP
	IMF	Consumer Price Index

Data Sources: Data collected from the Central Bank of Iraq (CBI), World Bank Development Indicators (WDI), and annual bank reports.

5.3.8 Empirical Results

Table 5.2 shows descriptive statistics for the study variables. The mean Z-score is 5.572, which represents the ability to pay. This indicates that Iraqi banks are operating at an acceptable level of security and are far from the specter of bankruptcy. By moving to the maximum and minimum values, we can show that the minimum value is not far from the mean. Regarding VROA, the mean is 1.096, which represents the average volatility of return on assets; If we turn

to the mean of VROE, which is 2.904 and represents the fluctuation of stock returns, we find that the standard deviation is 2.139, the minimum is 0.092 and the maximum is 13.013, which is an indicator of the fluctuation of the bank's stock returns due to the Fluctuation in their financial performance during the study period. The mean of non-performing loans is 16,668, which is an indication of banks' undisciplined policy of checking the suitability of bank loan applicants. In terms of technical efficiency, banks required a percentage of inputs (0.446) to produce their outputs. In contrast to the most efficient banks, the banks' mean allocation efficiency shows that they used only 0.568 percent of their available resources. Furthermore, a mean cost efficiency of 0.27 indicates that banks can achieve higher cost efficiency.

5.3.9 Descriptive Statistics

Table 5. 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Z-score	220	5.572	4.734	2.308	18.868
VROA	220	1.096	0.719	0.099	3.224
VROE	220	2.904	2.139	.092	13.013
Bloan	220	16.668	25.63	0.001	100
TE	220	0.446	0.286	0.020	1
AE	220	0.568	0.192	0.167	1
CE	220	0.27	0.043	0.199	0.37
Capital	219	0.545	0.694	0.06	9.921
ROA	216	1.875	1.881	-3.76	8.35
Size	220	5.714	0.258	4.874	6.264
C3	220	81.594	12.706	56.598	94.759
RMSD	220	4.598	1.465	2.313	6.956
Inflation	220	1.818	2.16	-0.2	6.1
GDPG	220	4.475	6.834	-11.324	13.936

If we look at the risk indicators in the Iraqi banking sector for the period 2010-2022, we find that the number of non-performing loans (NPLs) started at a level close to 15 in 2010 and fell to a level close to 10 in 2011 and then some values fluctuated until reaching their highest value in 2017, which was influenced by the geopolitical climate in Iraq. As for the Z-score, it represents the level of financial solvency in the banking sector. The solvency level was at a level close to 5 in 2010, then rose to a level of 10 in 2011, and then fell to the lowest value in 2015. The value was an indicator of the difficulties that banks faced as a result of geopolitical events in the country. It then rose to a value close to 18 in 2019, reflecting banks' ability to overcome obstacles in the first phase.

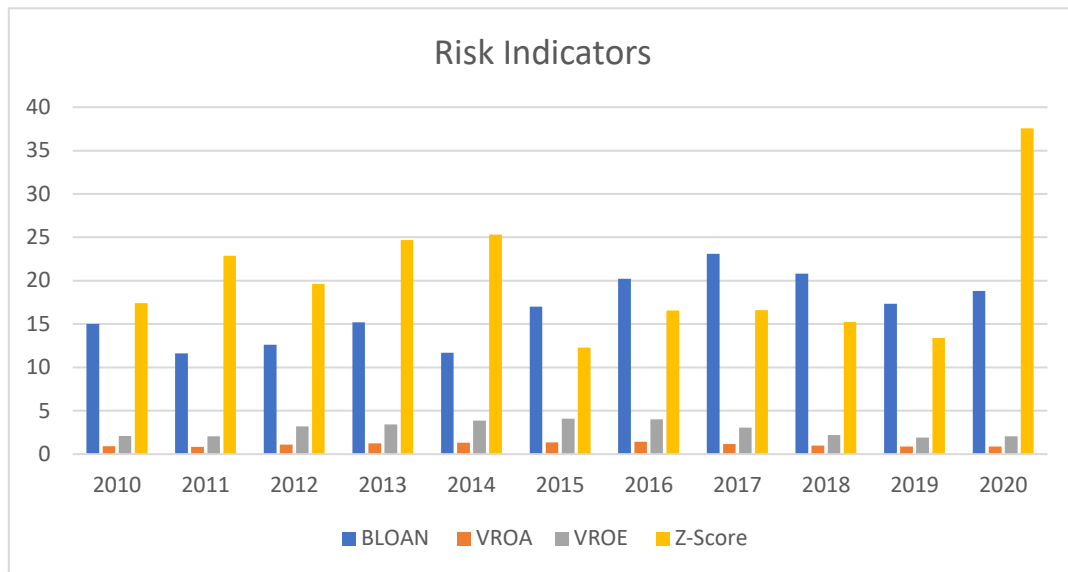


Figure 5. 1: Risk Indicators in Iraqi Banking Industry 2010-2020

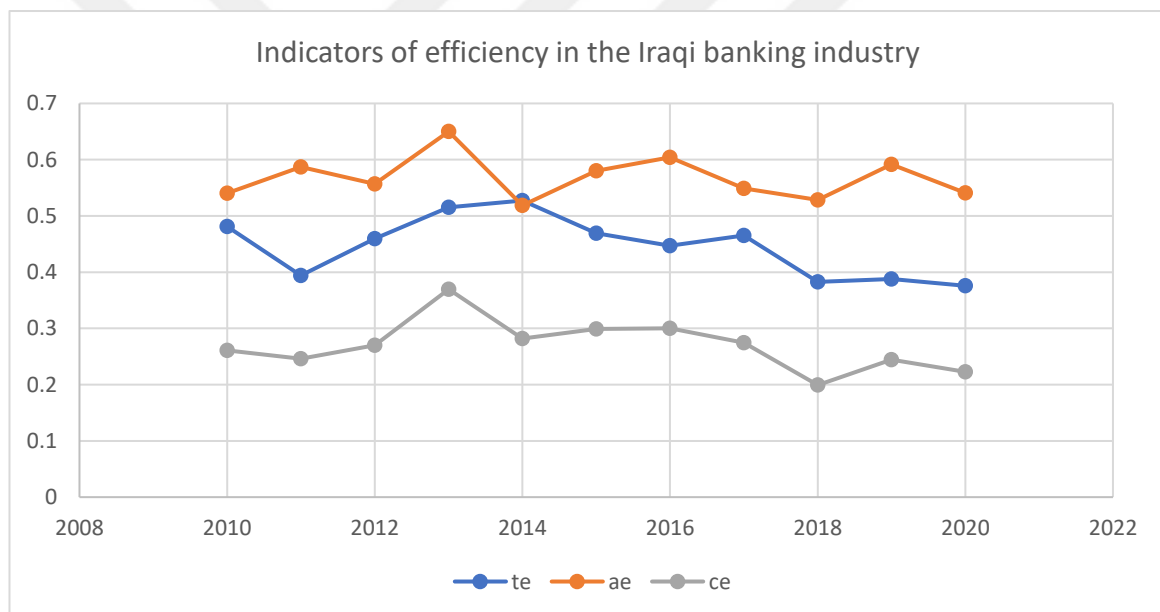


Figure 5. 2: Indicators of efficiency in the Iraqi Banking Industry

Figure 5.2 shows efficiency indicators in the Iraqi banking sector for the period 2010-2020. In terms of technical efficiency, we show that the value was close to 0.48 in 2010 and then approached 0.51 in 2014 and reached the lowest value of 0.37 in 2020. With the transition to allocative efficiency, it was close to 0.48 in 2010 and then rose to 0.51 in 2014, then fell to the lowest value in 2020.

Price-cost efficiency recorded a clear convergence during the study period 2010-2020. Regarding Figure 5.3, the capital of the Iraqi banking sector started slowly and gradually rose to reach its peak in 2018 and then decreased after that.

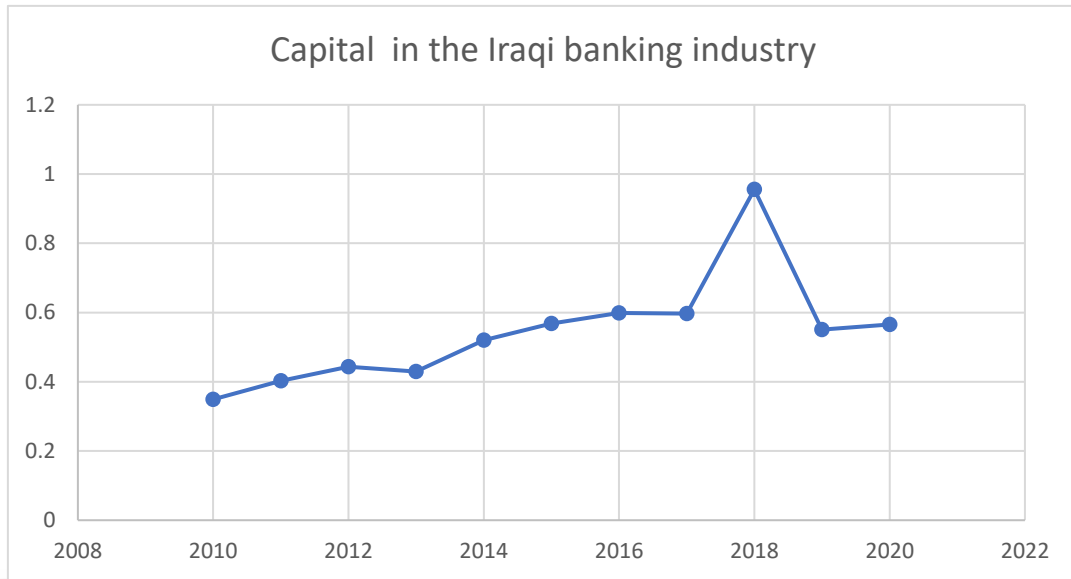


Figure 5. 3: Capital in the Iraqi Banking Industry

5.3.10 Results and Discussion

Using three-stage least squares estimation, Table 5.2 presents the results of the simultaneous relationship between efficiency, stability, and capital. The risk equation using Z-score as the dependent variable is represented by Equation (1), and Equation (2) shows the result of the equation in terms of capital as the dependent variable. In contrast, technical efficiency is represented as the dependent variable in Equation (3).

5.3.11 Risk -Capital results

Regarding the results of Equation (1) and Equation (2), the results indicate that there is a simultaneous inverse relationship between solvency risk and capital requirements, with evidence that the effect does not match in both directions with $\beta_{\text{(capital)}} = -7.301$ and $\beta_{\text{(Z-score)}} = -0.115$. The apparent results indicate that capital has a greater impact than solvency, meaning that increasing capitalization increases the chances of banks being exposed to risks, and this is consistent with the moral hazard hypothesis. This result is consistent with Fiordelisi et al. (2011), and Saeed et al. (2020), that banks respond to regulatory measures by increasing capital, leading to increased asset risk. Competition imposes itself on an imperfect, risk-exposed banking industry, leading experienced managers to take more risks than reduce them. Within the framework of the two proposed hypotheses, Hughes et al. (1995) and Hughes and Mester (1998), levels of efficiency in banks are likely to affect capital and risk, and regulators of efficient and better-managed companies may allow leverage, other things being equal. However, companies with low efficiency tend to take greater risks to compensate for the lower

returns, which leads to efficiency affecting banking risk levels (Berger and DeYoung, 1997; Altunbas et al., 2007). Moving on to Equation (2), where capital was adopted as a dependent variable, the results show a negative and significant effect of efficiency on capital, indicating the simultaneous relationship between efficiency, capital, and risk. Moreover, we find that the size of the bank has a negative and significant effect on solvency, capital requirements, and technical efficiency. We also observe a positive effect of concentration on the aforementioned variables, signifying the concentration of assets in state-owned public banks, which stand out due to their greater capitalization, efficiency, and solvency in comparison to commercial banks. Public banks still dominate despite financial liberalization policies that have lasted for about 20 years.

Regarding the second model, if non-performing loans are adopted as an indicator of risk, there is no evidence of a significant relationship between distressed loans, capital, and technical efficiency. At the same time, we find an inverse relationship between the levels of liquidity held by banks and non-performing loans. The strict credit policy of commercial banks and the high levels of risk in the Iraqi banking sector push these banks to maintain a high level of liquidity to reduce levels of bank default, which later leads to banks incurring irreparable losses. The results are consistent with Abbas et al. (2021) and Dias (2021).

Table 5. 3: Three-Stage Least Squares Estimates of the Relationship Between Capital, Risk, and Technical Efficiency

	First model				Second model		
	Eq (1)	Eq (2)	Eq (3)		Eq (1)	Eq (2)	Eq (3)
	Z-score	Capital	Tech		Bloan	Capital	Tech
Capital	-7.301*		-.421***		-10.726		-.028
	(4.204)		(.113)		(13.82)		(.364)
Efficiency	-18.359**	-2.301***			35.03	-.203	
	(6.966)	(.643)			(23.443)	(1.943)	
Risk		-0.115**	-.052***			-.029	.018
		(.056)	(.016)			(.04)	(.013)
ROA	-.129	-.017	-.007		.263	.003	-.006
	(.313)	(.04)	(.017)		(.967)	(.047)	(.021)
Size	-10.625**	-1.346***	-.583***		-7.434	-.875*	-.076
	(4.135)	(.391)	(.129)		(12.492)	(.472)	(.316)
RMSD	.957	.123*	.053*		1.663	.116	-.008
	(.615)	(.068)	(.028)		(1.829)	(.081)	(.049)
Liquidity	-.19	.007	-.002		-176.056***	-5.013	3.135
	(4.594)	(.607)	(.252)		(13.51)	(7.034)	(2.194)
C3	0.146**	.018**	.008***		0.400**	.018	-.005
	(.058)	(.008)	(.003)		(.177)	(.014)	(.007)

GDPG	.144	.017	.008		-0.203	-.004	.004
	(.096)	(.014)	(.006)		(.283)	(.015)	(.006)
INF	-.034	-.003	-.002		.933	.03	-.016
	(.217)	(.029)	(.012)		(.642)	(.043)	(.017)
Constant	62.069** *	7.825***	3.397***		159.048**	8.402	-1.616
	(23.73)	(2.372)	(.745)		(72.034)	(5.961)	(3.164)
Obs	196	196	196		196	196	196
Chi²	17.61**	18.85**	37.64***		195.29***	7.96	9.92

Standard errors are in parentheses , *** p<.01, ** p<.05, * p<.1

In the third model, we adopted the standard deviation of returns as an indicator to measure the risks in bank returns. Table No. () presents the results of the relationship estimates between risk variables (VORA, VORE), technical efficiency, and capital. The results provide evidence that capital has a positive effect on asset return fluctuations. The implementation of stricter capital regulation requirements is likely to lead decision-makers in the banking industry to reassess their investment strategies. In response to these regulations, there may be a shift towards more dangerous assets that provide lower returns. This adjustment may lead to increased volatility and instability in the proceeds from these assets. By pursuing more risky investments, banks may seek to improve their returns within the constraints imposed by tighter capital regulations. However, this strategy involves greater uncertainty and potential financial risks. It, therefore, emphasizes the need for banks to carefully balance regulatory requirements with prudent risk management practices to maintain stability and protect against negative consequences.

By moving to investigate the effect of technical efficiency on the fluctuations of return on assets, the low efficiency often leads to increased risk as a means to compensate for lower profits, thus affecting the amount of risk in banks, which gives justification for investing in assets with high returns to compensate for the restrictions imposed by capital requirements, which results in fluctuations in returns as a result of risks. (Berger and DeYoung, 1997; Altunbas et al., 2007).

Table 5. 4: Three-Stage Least Squares Estimates of the Relationship Between Capital, Risk (VROA, VORE), and Technical Efficiency in the Iraqi Banking Industry

Third model						Forth model		
	Eq (1)	Eq (2)	Eq (3)		Eq (1)	Eq (2)	Eq (3)	
	VROA	Capital	Tech		VROE	Capital	Tech	
Capital	.917***		-.244***		3.716***		-.272***	
	(.139)		(.026)		(1.146)		(.06)	
Efficiency	3.761***	-4.1***			13.675***	-3.6***		
	(.204)	(.443)			(1.507)	(.855)		
Risk		1.09***	.266***				.073***	
		(.166)	(.014)		-.191	.051	(.008)	
ROA	-.022	.024	.006		(.209)	(.06)	.014	
	(.06)	(.066)	(.016)		7.352***	-1.974***	(.015)	
Size	1.346***	-1.468***	-.358***		(1.726)	(.558)	-.538***	
	(.443)	(.479)	(.115)		-.559	.15	(.11)	
RMSD	-.103	.112	.027		(.357)	(.095)	.041	
	(.1)	(.108)	(.026)		3.114	-.833	(.025)	
Liquidity	.816	-.89	-.217		(3.152)	(.9)	-.228	
	(.908)	(1.003)	(.242)		-.055*	.015*	(.233)	
C3	-.008	.009	.002		(.033)	(.009)	.004*	
	(.009)	(.01)	(.002)		.042	-.011	(.002)	
GDPG	.003	-.004	-.001		(.066)	(.018)	-.003	
	(.019)	(.021)	(.005)		-.087	.023	(.005)	
INF	-.02	.021	.005		(.149)	(.04)	.006	
	(.043)	(.047)	(.011)		-.191	.051	(.011)	
Constant	-8.281***	9.029***	2.202***		-42.589***	11.432***	3.115***	
	(2.609)	(2.849)	(.675)		(10.042)	(3.319)	(.647)	
Obs	196	196	196		196	196	196	
Chi ²	720.00***	172.83***	1505.53***		127.56***	25.69**	265.84***	

Standard errors are in parentheses, *** p<.01, ** p<.05, * p<.1

Table 5.4 presents the results of Three-stage Least squares estimates of the relationship between capital, risk, and allocative efficiency. The results of Eq (1) and Eq (3) show a positive two-way relationship between solvency and allocative efficiency, the parameter of $\beta_{Efficiency\ AE} = 34.419$ while $\beta_{Z-score} = 0.028$, This indicates that the effects of efficiency on solvency are higher compared to the effects of solvency on efficiency.

Table 5. 5: Three-Stage Least Squares Estimate of the Relationship Between Capital, Risk, and Allocative Efficiency

	5				6		
	Eq (1)	Eq (2)	Eq (3)		Eq (1)	Eq (2)	Eq (3)
	Z-score	Capital	AE		Bloan	Capital	AE
Capital	8.756**		-.256***		-18.81		-.192
	(3.614)		(.066)		(12.828)		(.192)
Efficiency	34.419***	-3.886***			-7.044	-2.282	
	(12.545)	(1.018)			(65.788)	(2.164)	
Risk		.11***	.028***			-.032	-.0162
		(.038)	(.009)			(.022)	(.01)
ROA	-.798*	.089*	.023**		.665	.064	.021*
	(.461)	(.051)	(.011)		(1.844)	(.067)	(.012)
Size	.67	-.086	-.021		-21.209***	-.795*	-.055
	(2.934)	(.315)	(.084)		(8.175)	(.42)	(.209)
RMSD	-.965	.11	.028		3.087	.158**	.028
	(.715)	(.072)	(.018)		(2.255)	(.08)	(.032)
Liquidity	6.292	-.715	-.184		-174.847***	-6.198*	-.281
	(6.413)	(.692)	(.165)		(22.391)	(3.665)	(1.711)
C3	-.056	.007	.002		.5**	.023**	.003
	(.073)	(.007)	(.002)		(.24)	(.009)	(.005)
GDPG	.031	-.003	-.001		-.125	.001	.002
	(.121)	(.014)	(.004)		(.344)	(.014)	(.003)
INF	-.044	.005	.001		.879	.027	-.001
	(.265)	(.03)	(.008)		(.691)	(.033)	(.011)
Constant	-17.655	2.052	.524		245.131***	9.475**	.774
	(18.783)	(1.847)	(.485)		(58.313)	(4.531)	(2.332)
Obs	196	196	196		196	196	196
Chi ²	15.38*	22.96***	34.87***		168.83***	11.16	15.82*

Standard errors are in parentheses, *** p<.01, ** p<.05, * p<.1

Table 5.5 reports our findings for the relationship between capital, risk (VORA, VORE), and allocative efficiency that don't differ from the results compared with the results in Table 5.6 We can show a simultaneous relationship between the variables risk, capital, and allocative efficiency. There is also a positive effect of banking concentration on the three variables; this provides evidence that the banking sector has not moved to the competitive market, as liquidity has remained concentrated in public banks.

Table 5. 6: Three-Stage Least Squares Estimates of the Relationship Between Capital, Risk, and Allocative Efficiency

	7					8		
	Eq (1)		Eq (2)	Eq (3)		Eq (1)	Eq (2)	Eq (3)
	VROA		Capital	AE		VROE	Capital	AE
Capital	-1.569***			-.27***		-6.128***		-.269***
	(.482)			(.065)		(1.289)		(.055)
Efficiency	-5.798***		-3.697***			-22.756***	-3.713***	
	(1.883)		(.872)			(4.845)	(.752)	
Risk			-.632***	-.17***			-.163***	-.044***
			(.164)	(.048)			(.03)	(.008)
ROA	.106		.068	.018		.295	.048	.013
	(.078)		(.048)	(.012)		(.284)	(.047)	(.012)
Size	-.668		-.425	-.115		-.262	-.043	-.012
	(.499)		(.303)	(.087)		(1.915)	(.31)	(.085)
RMSD	.226*		.144**	.039**		.709	.116	.031
	(.121)		(.072)	(.019)		(.45)	(.072)	(.019)
Liquidity	-.256		-.17	-.047		-1.156	-.189	-.051
	(1.103)		(.695)	(.182)		(4.123)	(.675)	(.178)
C3	.025**		.016**	.004**		.074*	.012*	.003*
	(.012)		(.007)	(.002)		(.043)	(.007)	(.002)
GDPG	.024		.015	.004		.12	.019	.005
	(.021)		(.014)	(.004)		(.084)	(.014)	(.004)
INF	-.022		-.014	-.004		-.093	-.015	-.004
	(.047)		(.031)	(.008)		(.187)	(.031)	(.008)
Constant	5.998*		3.819**	1.032**		11.539	1.885	.508
	(3.127)		(1.814)C	(.502)		(11.552)	(1.82)	(.494)
Obs	196		196	196		196	196	196
Chi ²	14.81*		32.81***	33.04***		33.50***	44.85***	47.70***

Standard errors are in parentheses , *** p<.01, ** p<.05, * p<.1

5.3.12 Robustness Tests

Table 5.6 shows a report on the model's robustness tests using price-cost efficiency to represent efficiency. Form results (25). The results provide evidence of the existence of a significant inverse relationship between price-cost efficiency and financial solvency. However, efficiency's effect is stronger than financial solvency, which is consistent with our previous results. We also find that there is a simultaneous inverse relationship between capital efficiency and price cost. Moreover, the results showed a simultaneous effect between price-cost efficiency and financial solvency. By moving to the indicators of the banking industry sector, the results showed a positive impact of both market capitalization and banking concentration on the three dependent variables (Z-Score, capital, and cost efficiency). When moving on to the effect of macroeconomic variables (GDPG), it appears that the variables have a positive and

significant effect. The three equations indicate that the largest effect was on solvency. Table 5.6 shows the results of the investigation into the simultaneous relationship between non-performing loans, cost efficiency, and capital. Our results provide significant evidence of the existence of a two-way inverse relationship between the risk index (non-performing loans) and capital, which is consistent with Kwan and Eisenbeis (1997). The results of the two equations from the model (10) indicate that there is a positive relationship between cost efficiency and non-performing loans, which consists of. In addition, we find a positive and significant effect of cost efficiency on capital, which is in line with Quadts and Nguyen (2016).

Table 5. 7: Three-Stage Least Squares Estimates of the Relationship Between Capital, Risk, and Cost Efficiency

	9				10		
	Eq (1)	Eq (2)	Eq (3)		Eq (1)	Eq (2)	Eq (3)
	Z-score	Capital	CE		Bloan	Capital	CE
Capital	-4.897		-.18***		-17.647**		.138
	(3.436)		(.065)		(7.812)		(.145)
Efficiency	-32.4***	-4.459***			86.123***	3.193*	
	(6.824)	(1.427)			(20.159)	(1.928)	
Risk		-3.989**	-.028***			-.045**	.01**
		(.071)	(.006)			(.021)	(.004)
ROA	-.141	-.025	-.005		.098	.002	-.002
	(.23)	(.034)	(.006)		(.929)	(.047)	(.01)
Size	-3.949*	-.625**	-.129***		-21.228***	-1.043**	.198
	(2.058)	(.272)	(.049)		(7.17)	(.425)	(.126)
RMSD	.896**	.138**	.029***		1.511	.091	-.011
	(.427)	(.061)	(.01)		(1.594)	(.079)	(.021)
Liquidity	-.786	-.016	-.016		-175.304***	-7.909**	1.772**
	(3.204)	(.51)	(.088)		(13.61)	(3.779)	(.724)
C3	.106**	.015**	.003***		.5***	.024**	-.005*
	(.041)	(.007)	(.001)		(.15)	(.01)	(.003)
GDPG	.253***	.031*	.008***		-.519*	-.021	.006*
	(.073)	(.017)	(.002)		(.3)	(.017)	(.003)
INF	.003	.005	0.001		.886	.042	-.009
	(.154)	(.024)	(.004)		(.648)	(.035)	(.008)
Constant	26.59**	3.989**	.848***		227.908***	10.835**	-2.196*
	(11.46)	(1.698)	(.277)		(41.193)	(4.549)	(1.133)
Obs	196	196	196		196	196	196
Chi ²	44.53***	18.75**	42.62***		210.51***	9.79	10.07

Standard errors are in parentheses, *** p<.01, ** p<.05, * p<.1

Table 5. 8: Three-Stage Least Squares Estimates of the Relationship Between Capital, Risk (VROA VROE), and Cost Efficiency

	11					12		
	Eq (1)		Eq (2)	Eq (3)		Eq (1)	Eq (2)	Eq (3)
	VROA		Capital	CE		VROE	Capital	CE
Capital	.325			-.126		.765		-.116**
	(.557)			(.078)		(1.634)		(.059)
Efficiency	5.218***		-3.315*			17.909***	-4.006**	
	(1.141)		(1.942)				(1.659)	
Risk			(.481)	.165***		-.187*	.094	.044***
			2.226	(.039)		(.105)	(.116)	(.01)
ROA	-.016		-.014	.001		1.921**	.001	.007
	(.036)		(.034)	(.006)		(.949)	(.038)	(.005)
Size	-.057		-.349	-.02		-.351*	-.557*	-.118***
	(.327)		(.247)	(.051)		(.2)	(.3)	(.04)
RMSD	-.062		.095	.016*		3.846***	.12**	.023***
	(.067)		(.059)	(.01)		(1.439)	(.061)	(.008)
Liquidity	.986**		-.166	-.151		-.017	-.202	-.156*
	(.498)		(.718)	(.092)		(.019)	(.693)	(.08)
C3	.001		.006	0		-.013	.008	.001*
	(.007)		(.005)	(.001)		(.035)	(.005)	(.001)
GDPG	-.013		.011	.003		-.103	.011	.001
	(.011)		(.012)	(.002)		(.069)	(.013)	(.002)
INF	-.026		.017	.005		-.187*	.019	.005*
	(.024)		(.026)	(.004)		(.105)	(.026)	(.003)
Constant	-.611		2.226	.265		-12.953**	3.406*	.765***
	(1.803)		(1.395)	(.274)		(5.288)	(1.805)	(.222)
Obs	196		196	196		196	196	196
Chi ²	30.62***		12.15	34.66***		45.65***	15.05*	43.54***

Standard errors are in parentheses, *** p<.01, ** p<.05, * p<.1

5.4 Conclusion

This paper examines the relationship between risk, capital, and efficiency in the Iraqi banking industry. We investigate the simultaneous impact of banking regulation, such as stringency in capital requirements, the strength of the supervisory authority's influence on risks, and the mechanism of its interaction with competition, in shaping the risky behavior of banks. We are motivated by the fact that previous literature focusing on banking behavior in Iraq is almost rare and that the available evidence for the Middle East region is mixed and inconclusive due to the differences in regulatory influences on banking behavior during periods of financial liberalization. Our analysis shows that there is a negative relationship between capital requirements and risk behavior in the banking industry, meaning that increasing capitalization increases the chances of banks being exposed to risks, and this is consistent with the moral

hazard hypothesis. The results also indicate that efficiency in banks affects capital and risk, with efficient firms taking greater risks to compensate for low returns. The study also found that the size of the bank had a negative impact on financial liquidity, capital requirements, and technical efficiency. We also notice a positive effect of concentration on indicators of risk, efficiency, and regulatory capital requirements, and this is an indication of the concentration of assets in state-owned public banks compared to commercial banks, as public banks are characterized by their high capitalization, efficiency, and solvency. Its dominance despite financial liberalization policies that lasted for about 20 years.

This is an incentive for commercial banks to change their policy and push towards merging with each other and expanding the volume of credit in proportion to the size of the assets owned by those banks. The results also give evidence of the need for the Iraqi banking sector to integrate with the global banking industry and expand horizontally to include operations of multiple segments and regions. New and use of modern technology that facilitates deposit and exchange processes.

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CONCLUSION

Policymakers attach utmost importance to developing the banking industry because of its crucial role in the economic transformation process and as a catalyst for economic development processes. After 2004, the Iraqi government, as part of its policies of transition towards a market economy, initiated ambitious reform measures in the financial and banking sector aimed at developing the Iraqi banking industry within the framework of expanding financial inclusion and restructuring. The economic transition phase is characterized by continuous dynamism and is exposed to different levels of risks in an environment dominated by competition and varying levels of efficiency between different banks.

The banking sector plays a crucial role during periods of economic transformation, acting as a catalyst for development by facilitating capital mobilization, investment, and economic growth. Over the past two decades, the Iraqi government has initiated reform programs aimed at modernizing and revitalizing the banking sector in Iraq. These efforts are considered crucial for the transition from a centrally planned economy to a more market-oriented economy and usually involve various reforms and policy measures targeting different aspects of the banking system. The study aims to examine banking performance in terms of efficiency, capital requirements, and risks for the years 2010-2020, with a focus on the determinants of profitability in light of the relationship between efficiency, stability, and competition. We delve into the implications of transformations in the Iraqi banking sector during this period of economic transformation, and through a comprehensive examination of these changes, we aim to provide insight into the challenges, opportunities, and overall impact of banking sector reforms on Iraq's economic development path.

In this thesis, we studied the relationship between efficiency, stability, and profitability in the Iraqi banking sector during the transition toward a market economy in three essays.

The first paper covers the measurement and analysis of banking efficiency and market power in the Iraqi banking sector during the period of economic transition between 2010 and 2020. An attempt to anticipate the changes that occur due to changes in the regulatory and structural environment during the period of economic transition has cast a shadow on the financial performance of the financial sector in general and the banking sector in particular. In the first part, we used Data Envelopment Analysis (DEA) as a non-parametric method to measure price-cost efficiency. The results provided evidence that the average cost efficiency of

banks remained stable and at a good level, even taking into account the geopolitical crises that Iraq experienced in 2014 as well as in 2019 during the COVID-19 crisis, and this is a Pointing to the quality of the banks' input management and no major impact from the surrounding environmental conditions. In the second part, we first used the bank-level trans-log production function for each bank to calculate marginal costs. We then estimated the market power of industrial banking by estimating and analyzing the Lerner index. The results demonstrated the instability of the market power index during the study period, as results fluctuated between an increase to levels approaching perfect competition and a subsequent rapid decline. Both results measuring price-cost efficiency and market power provide insight into the state of volatility associated with economic transitions to a market economy, with the results consistent with Fries and Taci (2005).

In the second paper, we empirically analyzed the effects of efficiency, risk-taking, and competition on profitability in the Iraqi banking sector. We adopted balanced panel data for a sample comprising data from 20 private commercial banks for the period between 2010 and 2020. We used the one-step generalized method of moment system estimator (GMM-SYM) to examine the relationship between variables. Based on previous research, we used three different indices to measure bank profitability. The key financial metrics to consider are return on assets (ROA), return on equity (ROE), and net interest margin (NIM). To measure competition, we adopted the customized Lerner index. Numerous indicators have been used to measure the impact of different levels of risk on profitability. In addition, we used some macroeconomic variables, such as economic growth rate and unemployment, to examine the impact of changes in the economic environment on bank performance. In addition, we conducted a robustness check by using the Boone index as a measure of competition at different levels of risk. In addition, we used the C3 concentration index and the HHI competition index. Our analysis shows that bank solidity index, credit risk, and liquidity risk have an impact on bank profitability. In particular, we found a positive and substantial relationship between the bank's soundness and its profitability. On the other hand, liquidity risk was found to have a negative relationship with return on assets (ROA). In contrast, credit risk was found to have a negative relationship with net interest margin (NIM). Our research shows that more cost-efficient Iraqi banks achieve higher returns on capital. Furthermore, we have observed that increased competition within the Iraqi banking sector is leading to lower profitability.

In the third paper, we use the three-stage least squares method (3SLS) to measure the simultaneous relationship between efficiency, risk behavior, and capital requirements. The study shows a simultaneous inverse relationship between solvency risk and capital requirements, with capital having a greater influence than solvency. This suggests that banks respond to regulatory measures by increasing their capital, leading to increased asset risk. Competition in the risky banking industry encourages experienced managers to take more risks. Bank efficiency levels affect capital and risk, and regulators may allow efficient firms to leverage. However, companies with low efficiency tend to take greater risks, which affects the bank risk level.

The study also finds a negative and significant effect of efficiency on capital, indicating a simultaneous relationship between efficiency, capital, and risk. The size of the bank has a negative and significant impact on solvency, capital requirements, and technical efficiency. The concentration on state-owned public banks, which have greater capitalization, efficiency, and solvency, still dominates despite financial liberalization policies. The study also finds an inverse relationship between liquidity held by banks and non-performing loans, suggesting that commercial banks maintain high levels of liquidity to reduce bank failure rates and incur irreparable losses. From the above findings of the three papers, the results of the study demonstrate the importance of the banking sector in times of economic change and its role in achieving financial stability, providing guidance for policymakers to explore successful mechanisms for transitioning to a market economy.

It also gives importance to the gradual transformation without intersecting stages and taking into account the specificities of each economy during periods of financial liberalization. The results also demonstrate the importance of restructuring the Iraqi banking sector to facilitate a controlled transition to a market economy. Accordingly, we make several recommendations for decision-makers and investors in the Iraqi banking industry.

1. Restructure the Banking Industry: Emphasize the reorganization of Iraq's banking industry to enable a seamless and regulated transition to a market-oriented economy. This will foster a more competitive and efficient financial landscape.
2. Augment Collaboration between Public and Private Sectors: Fortify connections between public and commercial banks to promote cooperation and synergy. This will facilitate the transition to an open economy by utilizing the advantages of both sectors.

3. Facilitate market entry and departure: Ensuring banks possess the liberty to enter and depart the market is essential for fostering a dynamic banking industry. This measure will draw new participants, foster innovation, and motivate current banks to enhance their offerings.
4. Privatize Public Banks: Advance the privatization of public banks as a component of financial reform. Transferring ownership from the public to the private sector will stimulate competition, enable banks to independently establish interest rates, and allow lending decisions to be based on market conditions.
5. Advocate for bank mergers: stimulate mergers between commercial banks to diminish the supremacy of state banks and bolster the financial robustness and efficiency of the private banking sector.
6. Enhance Banking Service Quality and Competitiveness: Prioritize the elevation of banking service standards and the promotion of competitiveness among local financial entities. This will enhance efficiency, customer happiness, and overall sector performance.
7. Align Interest Rates with Economic Objectives: Set interest rates that fulfill economic aims rather than political interests. This will facilitate sustainable expansion and align the banking sector with overarching economic objectives.
8. Enhance banks' autonomy in Loan management: Provide banks with increased discretion to oversee their loan portfolios in accordance with creditworthiness and market dynamics. This will improve risk management and enable banks to make educated lending choices.
9. Alleviate lending constraints: Diminish limitations on banks' financial portfolios that hinder efficient lending. Granting banks greater flexibility will enhance their capacity to address market demands and stimulate economic growth.

The revised suggestions establish a framework for overhauling Iraq's banking system, fostering a competitive market economy, and improving the efficiency and responsiveness of domestic financial institutions.

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APPENDIX 1: LIST OF BANKS

bank	Founding year
Baghdad	1992
Commercial Iraq	1992
Iraqi Islamic	1992
Middle east	1993
Iraqi investment	1993
United Bank	2002
Al Ahly Iraqi	1995
Iraqi Credit	1998
Summer	1999
Commercial gulf	2000
Elaphe	2001
Mosul	2001
AL Shamal	2004
Ashour	2005
Kurdistan	2005
National Islamic	2005
Mansour	2006
Trans Iraq	2006
Jihan	2008
Babylon	1999

APPENDIX 2: PRICE-COST EFFICIENCY PER YEAR FOR ALL BANKS

BANK	YEAR	DUMS	CRSTE	VRSTE	SCALE	
Baghdad	2010	1	0.294	0.309	0.951	drs
Baghdad	2011	1	0.291	0.307	0.948	drs
Baghdad	2012	1	0.302	0.327	0.924	drs
Baghdad	2013	1	0.415	0.651	0.638	drs
Baghdad	2014	1	0.426	0.737	0.578	drs
Baghdad	2015	1	0.314	0.392	0.801	drs
Baghdad	2016	1	0.172	0.191	0.9	irs
Baghdad	2017	1	0.156	0.179	0.874	irs
Baghdad	2018	1	0.171	0.191	0.897	irs
Baghdad	2019	1	0.143	0.168	0.853	irs
Baghdad	2020	1	0.139	0.165	0.844	irs
Commercial Iraq	2010	2	0.866	0.883	0.981	irs
Commercial Iraq	2011	2	0.654	0.67	0.976	irs
Commercial Iraq	2012	2	0.621	0.633	0.98	irs
Commercial Iraq	2013	2	0.457	0.468	0.975	irs
Commercial Iraq	2014	2	1	1	1	-
Commercial Iraq	2015	2	0.77	0.799	0.964	drs
Commercial Iraq	2016	2	1	1	1	-
Commercial Iraq	2017	2	0.691	0.7	0.987	drs
Commercial Iraq	2018	2	0.578	0.58	0.996	irs
Commercial Iraq	2019	2	0.577	0.585	0.986	drs
Commercial Iraq	2020	2	0.432	0.463	0.932	irs
Iraqi Islamic	2010	3	0.129	0.345	0.373	irs
Iraqi Islamic	2011	3	0.173	0.286	0.606	irs
Iraqi Islamic	2012	3	0.26	0.287	0.907	irs
Iraqi Islamic	2013	3	0.31	0.314	0.987	irs
Iraqi Islamic	2014	3	0.299	0.336	0.888	irs
Iraqi Islamic	2015	3	0.317	0.349	0.908	irs
Iraqi Islamic	2016	3	0.379	0.395	0.959	irs
Iraqi Islamic	2017	3	0.378	0.446	0.848	irs
Iraqi Islamic	2018	3	0.373	0.427	0.874	irs
Iraqi Islamic	2019	3	0.387	0.415	0.933	irs
Iraqi Islamic	2020	3	0.416	0.437	0.952	irs
Middle east	2010	4	0.15	0.162	0.926	irs
Middle east	2011	4	0.166	0.18	0.921	irs
Middle east	2012	4	0.167	0.185	0.904	irs
Middle east	2013	4	0.164	0.186	0.879	irs
Middle east	2014	4	0.137	0.16	0.856	irs
Middle east	2015	4	0.115	0.138	0.828	irs
Middle east	2016	4	0.103	0.133	0.775	irs
Middle east	2017	4	0.089	0.127	0.7	irs
Middle east	2018	4	0.189	0.255	0.741	irs
Middle east	2019	4	0.18	0.255	0.706	irs

Middle east	2020	4	0.164	0.227	0.722	irs
Iraqi investment	2010	5	0.19	0.228	0.832	irs
Iraqi investment	2011	5	0.248	0.254	0.977	irs
Iraqi investment	2012	5	0.322	0.326	0.988	irs
Iraqi investment	2013	5	0.418	0.423	0.988	drs
Iraqi investment	2014	5	0.281	0.328	0.857	irs
Iraqi investment	2015	5	0.262	0.326	0.804	irs
Iraqi investment	2016	5	0.25	0.352	0.711	irs
Iraqi investment	2017	5	0.283	0.367	0.772	irs
Iraqi investment	2018	5	0.393	0.473	0.833	irs
Iraqi investment	2019	5	0.532	0.67	0.794	irs
Iraqi investment	2020	5	0.508	0.661	0.769	irs
United Bank	2010	6	0.774	0.798	0.97	drs
United Bank	2011	6	0.55	0.566	0.972	drs
United Bank	2012	6	0.382	0.385	0.993	irs
United Bank	2013	6	0.531	1	0.531	drs
United Bank	2014	6	0.518	0.594	0.871	drs
United Bank	2015	6	0.34	0.353	0.962	irs
United Bank	2016	6	0.344	0.353	0.974	drs
United Bank	2017	6	0.322	0.325	0.991	drs
United Bank	2018	6	0.329	0.341	0.965	drs
United Bank	2019	6	0.53	0.563	0.941	irs
United Bank	2020	6	0.249	0.356	0.7	irs
Al Ahly Iraqi	2010	7	0.149	0.344	0.433	irs
Al Ahly Iraqi	2011	7	0.155	0.303	0.513	irs
Al Ahly Iraqi	2012	7	0.158	0.328	0.48	irs
Al Ahly Iraqi	2013	7	0.283	0.383	0.739	irs
Al Ahly Iraqi	2014	7	0.326	0.386	0.844	irs
Al Ahly Iraqi	2015	7	0.301	0.357	0.844	irs
Al Ahly Iraqi	2016	7	0.203	0.288	0.703	irs
Al Ahly Iraqi	2017	7	0.205	0.272	0.753	irs
Al Ahly Iraqi	2018	7	0.116	0.224	0.515	irs
Al Ahly Iraqi	2019	7	0.281	0.329	0.855	irs
Al Ahly Iraqi	2020	7	0.526	0.527	0.997	drs
Iraqi Credit	2010	8	1	1	1	-
Iraqi Credit	2011	8	0.653	0.653	1	-
Iraqi Credit	2012	8	0.704	0.757	0.93	drs
Iraqi Credit	2013	8	0.819	0.863	0.95	drs
Iraqi Credit	2014	8	1	1	1	-
Iraqi Credit	2015	8	0.786	0.788	0.997	drs
Iraqi Credit	2016	8	1	1	1	-
Iraqi Credit	2017	8	1	1	1	-
Iraqi Credit	2018	8	0.232	0.351	0.662	irs
Iraqi Credit	2019	8	0	0.269	0	irs
Iraqi Credit	2020	8	0.002	0.276	0.009	irs

Sommer	2010	9	0.242	0.386	0.626	irs
Sommer	2011	9	0.299	0.378	0.792	irs
Sommer	2012	9	0.258	0.36	0.715	irs
Sommer	2013	9	0.312	0.359	0.87	irs
Sommer	2014	9	0.295	0.367	0.805	irs
Sommer	2015	9	0.282	0.346	0.814	irs
Sommer	2016	9	0.32	0.345	0.927	irs
Sommer	2017	9	0.229	0.307	0.747	irs
Sommer	2018	9	0.249	0.481	0.518	irs
Sommer	2019	9	0.267	0.522	0.511	irs
Sommer	2020	9	0.16	0.428	0.373	irs
Commercial gulf	2010	10	0.149	0.217	0.685	irs
Commercial gulf	2011	10	0.187	0.212	0.884	irs
Commercial gulf	2012	10	0.22	0.245	0.897	irs
Commercial gulf	2013	10	0.297	0.314	0.947	irs
Commercial gulf	2014	10	0.247	0.261	0.946	irs
Commercial gulf	2015	10	0.342	0.349	0.982	irs
Commercial gulf	2016	10	0.425	0.427	0.996	irs
Commercial gulf	2017	10	0.359	0.395	0.908	irs
Commercial gulf	2018	10	0.269	0.323	0.833	irs
Commercial gulf	2019	10	0.417	0.513	0.813	irs
Commercial gulf	2020	10	0.37	0.493	0.75	irs
Elaph	2010	11	0.11	0.295	0.371	irs
Elaph	2011	11	0.292	0.321	0.912	irs
Elaph	2012	11	0.177	0.244	0.725	irs
Elaph	2013	11	0.283	0.349	0.811	irs
Elaph	2014	11	0.329	0.365	0.902	irs
Elaph	2015	11	0.361	0.448	0.805	irs
Elaph	2016	11	0.507	0.535	0.948	irs
Elaph	2017	11	0.409	0.469	0.872	irs
Elaph	2018	11	0.384	0.45	0.854	irs
Elaph	2019	11	0.526	0.546	0.964	irs
Elaph	2020	11	0.318	0.398	0.798	irs
Mosul	2010	12	0.21	0.246	0.852	irs
Mosul	2011	12	0.236	0.266	0.889	irs
Mosul	2012	12	0.542	0.603	0.899	drs
Mosul	2013	12	0.364	0.366	0.994	irs
Mosul	2014	12	1	1	1	-
Mosul	2015	12	0.487	0.532	0.917	drs
Mosul	2016	12	0.737	0.962	0.766	drs
Mosul	2017	12	0.742	1	0.742	drs
Mosul	2018	12	0.268	0.29	0.924	irs
Mosul	2019	12	0.31	0.426	0.727	irs
Mosul	2020	12	0.257	0.388	0.662	irs
AL Shamal	2010	13	0.302	0.305	0.991	drs

AL Shamal	2011	13	0.24	0.245	0.98	irs
AL Shamal	2012	13	0.315	0.383	0.822	drs
AL Shamal	2013	13	0.365	0.448	0.816	drs
AL Shamal	2014	13	0.631	1	0.631	drs
AL Shamal	2015	13	0.368	0.372	0.988	drs
AL Shamal	2016	13	0.498	0.505	0.986	irs
AL Shamal	2017	13	0.437	0.466	0.937	irs
AL Shamal	2018	13	0.351	0.394	0.89	irs
AL Shamal	2019	13	1	1	1	-
AL Shamal	2020	13	1	1	1	-
Ashour	2010	14	0.226	0.445	0.508	irs
Ashour	2011	14	0.198	0.506	0.392	irs
Ashour	2012	14	0.343	0.479	0.716	irs
Ashour	2013	14	0.281	0.451	0.623	irs
Ashour	2014	14	0.243	0.415	0.586	irs
Ashour	2015	14	0.087	0.278	0.312	irs
Ashour	2016	14	0.03	0.278	0.106	irs
Ashour	2017	14	0.031	0.268	0.116	irs
Ashour	2018	14	0.018	0.264	0.069	irs
Ashour	2019	14	0.045	0.291	0.154	irs
Ashour	2020	14	0.073	0.308	0.236	irs
Kurdistan	2010	15	0.204	0.245	0.83	irs
Kurdistan	2011	15	0.114	0.191	0.598	irs
Kurdistan	2012	15	0.128	0.186	0.685	irs
Kurdistan	2013	15	0.185	0.215	0.862	irs
Kurdistan	2014	15	0.241	0.267	0.903	drs
Kurdistan	2015	15	0.078	0.132	0.591	irs
Kurdistan	2016	15	0.101	0.123	0.814	irs
Kurdistan	2017	15	0.04	0.091	0.437	irs
Kurdistan	2018	15	0.012	0.099	0.118	irs
Kurdistan	2019	15	0.68	1	0.68	irs
Kurdistan	2020	15	1	1	1	-
National Islamic	2010	16	0.602	0.948	0.635	irs
National Islamic	2011	16	0.516	0.713	0.724	irs
National Islamic	2012	16	1	1	1	-
National Islamic	2013	16	1	1	1	-
National Islamic	2014	16	0.774	0.792	0.976	irs
National Islamic	2015	16	0.997	1	0.997	irs
National Islamic	2016	16	1	1	1	-
National Islamic	2017	16	1	1	1	-
National Islamic	2018	16	1	1	1	-
National Islamic	2019	16	1	1	1	-
National Islamic	2020	16	0.961	0.98	0.981	drs
Mansour	2010	17	0.482	0.516	0.933	irs
Mansour	2011	17	0.48	0.538	0.892	irs

Mansour	2012	17	0.638	0.645	0.989	irs
Mansour	2013	17	1	1	1	-
Mansour	2014	17	0.87	0.871	0.999	drs
Mansour	2015	17	1	1	1	-
Mansour	2016	17	0.297	0.402	0.739	irs
Mansour	2017	17	0.756	0.764	0.989	irs
Mansour	2018	17	0.597	0.639	0.934	irs
Mansour	2019	17	0.404	0.482	0.837	irs
Mansour	2020	17	0.403	0.481	0.838	irs
Trans Iraq	2010	18	1	1	1	-
Trans Iraq	2011	18	0.121	0.817	0.148	irs
Trans Iraq	2012	18	0.174	0.961	0.181	irs
Trans Iraq	2013	18	1	1	1	-
Trans Iraq	2014	18	1	1	1	-
Trans Iraq	2015	18	0.701	0.857	0.818	irs
Trans Iraq	2016	18	0.455	0.59	0.772	irs
Trans Iraq	2017	18	0.339	0.498	0.68	irs
Trans Iraq	2018	18	0.312	0.493	0.633	irs
Trans Iraq	2019	18	0.306	0.497	0.616	irs
Trans Iraq	2020	18	0.413	0.519	0.796	irs
Jihan	2010	19	1	1	1	-
Jihan	2011	19	1	1	1	-
Jihan	2012	19	0.512	0.607	0.843	irs
Jihan	2013	19	0.783	0.806	0.972	irs
Jihan	2014	19	0.508	0.518	0.981	irs
Jihan	2015	19	0.583	0.586	0.995	drs
Jihan	2016	19	0.349	0.42	0.831	irs
Jihan	2017	19	0.348	0.43	0.809	irs
Jihan	2018	19	0.217	0.328	0.66	irs
Jihan	2019	19	0.111	0.26	0.427	irs
Jihan	2020	19	0.113	0.257	0.441	irs
Babylon	2010	20	0.11	0.364	0.304	irs
Babylon	2011	20	0.234	0.398	0.587	irs
Babylon	2012	20	0.169	0.35	0.483	irs
Babylon	2013	20	0.469	0.519	0.903	irs
Babylon	2014	20	0.427	0.474	0.901	irs
Babylon	2015	20	0.337	0.392	0.86	irs
Babylon	2016	20	0.271	0.357	0.758	irs
Babylon	2017	20	0.207	0.313	0.66	irs
Babylon	2018	20	0.199	0.319	0.622	irs
Babylon	2019	20	0.207	0.33	0.626	irs
Babylon	2020	20	0.225	0.344	0.655	irs

APPENDIX 3: LERNER INDEX DATA

Dmus	Bank	Year	Deposit	Labor	Assets
1	Baghdad	2010	804688	7993	964867
1	Baghdad	2011	699368	9208	879800
1	Baghdad	2012	1000000	11748	1300725
1	Baghdad	2013	1400000	13929	1790513
1	Baghdad	2014	1500000	16125	1837716
1	Baghdad	2015	897130	16833	1560205
1	Baghdad	2016	827926	15874	1293952
1	Baghdad	2017	714522	14720	1196237
1	Baghdad	2018	782000	14360	1234142
1	Baghdad	2019	801174	15260	1228558
1	Baghdad	2020	1100000	14918	1560451
2	Commercial Iraq	2010	80272	1017	228149
2	Commercial Iraq	2011	83430	1190	269750
2	Commercial Iraq	2012	112077	1417	306315
2	Commercial Iraq	2013	96691	1711	346970
2	Commercial Iraq	2014	121063	1997	468867
2	Commercial Iraq	2015	90606	2634	436669
2	Commercial Iraq	2016	121520	3213	482027
2	Commercial Iraq	2017	134713	2930	514800
2	Commercial Iraq	2018	135130	3396	494515
2	Commercial Iraq	2019	146612	4112	499775
2	Commercial Iraq	2020	288470	3910	670270
3	Iraqi Islamic	2010	25488	1094	80820
3	Iraqi Islamic	2011	190311	1927	310143
3	Iraqi Islamic	2012	173067	3067	377546
3	Iraqi Islamic	2013	196173	4147	456082
3	Iraqi Islamic	2014	183006	3909	472789
3	Iraqi Islamic	2015	187271	3792	502606
3	Iraqi Islamic	2016	176125	2385	464310
3	Iraqi Islamic	2017	191518	2677	489685
3	Iraqi Islamic	2018	162345	3838	530155
3	Iraqi Islamic	2019	281969	4481	810987
3	Iraqi Islamic	2020	245026	4706	839957
4	Middle east	2010	463327	6480	582433
4	Middle east	2011	505117	8381	670475
4	Middle east	2012	615784	10083	857467
4	Middle east	2013	551856	11131	831652
4	Middle east	2014	358118	12969	700420
4	Middle east	2015	331666	12311	693922
4	Middle east	2016	326517	9669	700481
4	Middle east	2017	332579	10301	750152
4	Middle east	2018	439026	9682	831867
4	Middle east	2019	280229	9253	692018

4	Middle east	2020	266696	8126	692428
5	Iraqi investment	2010	139014	2861	284666
5	Iraqi investment	2011	187225	3226	347963
5	Iraqi investment	2012	193308	4259	440253
5	Iraqi investment	2013	283287	4409	571895
5	Iraqi investment	2014	256735	4524	624807
5	Iraqi investment	2015	260109	4645	605115
5	Iraqi investment	2016	283975	3665	615468
5	Iraqi investment	2017	263857	3727	613810
5	Iraqi investment	2018	238583	2895	658093
5	Iraqi investment	2019	210962	2395	618062
5	Iraqi investment	2020	269018	2172	688939
6	United Bank	2010	286556	2435	519780
6	United Bank	2011	299377	3930	657888
6	United Bank	2012	246693	8340	709222
6	United Bank	2013	349519	8583	759002
6	United Bank	2014	186156	5827	629008
6	United Bank	2015	228902	7662	735930
6	United Bank	2016	138091	6754	689094
6	United Bank	2017	176014	7788	691154
6	United Bank	2018	73269	7146	736229
6	United Bank	2019	69438	4664	851129
6	United Bank	2020	152234	4170	969949
7	Al Ahly Iraqi	2010	51706	2408	111549
7	Al Ahly Iraqi	2011	75720	3670	192199
7	Al Ahly Iraqi	2012	154837	3937	344131
7	Al Ahly Iraqi	2013	360328	4273	557396
7	Al Ahly Iraqi	2014	338268	4571	639757
7	Al Ahly Iraqi	2015	267565	5462	563549
7	Al Ahly Iraqi	2016	278682	6240	612725
7	Al Ahly Iraqi	2017	303560	6883	605487
7	Al Ahly Iraqi	2018	290732	6428	544849
7	Al Ahly Iraqi	2019	250557	7357	636286
7	Al Ahly Iraqi	2020	419235	8016	898637
8	Iraqi Credit	2010	430018	4319	598192
8	Iraqi Credit	2011	261062	4127	447708
8	Iraqi Credit	2012	354914	3767	565682
8	Iraqi Credit	2013	380529	3489	607124
8	Iraqi Credit	2014	311749	8527	631784
8	Iraqi Credit	2015	162043	3227	622888
8	Iraqi Credit	2016	181439	3153	522745
8	Iraqi Credit	2017	147540	2622	496382
8	Iraqi Credit	2018	162336	2935	512024
8	Iraqi Credit	2019	208358	3351	526914
8	Iraqi Credit	2020	217501	2507	526914

9	Sommer	2010	38595	1261	119915
9	Sommer	2011	51778	1608	170801
9	Sommer	2012	104957	1861	272791
9	Sommer	2013	105254	2150	313370
9	Sommer	2014	135693	3069	422819
9	Sommer	2015	92153	2747	372594
9	Sommer	2016	81267	2521	364075
9	Sommer	2017	105401	2865	397584
9	Sommer	2018	80745	3068	415269
9	Sommer	2019	62691	2409	356236
9	Sommer	2020	54593	2448	339133
10	Commercial gulf	2010	190010	4679	273511
10	Commercial gulf	2011	216937	5719	356856
10	Commercial gulf	2012	260779	6405	435058
10	Commercial gulf	2013	417143	7973	794975
10	Commercial gulf	2014	455212	9442	832231
10	Commercial gulf	2015	409220	8016	847422
10	Commercial gulf	2016	427200	6795	855841
10	Commercial gulf	2017	271620	5254	665053
10	Commercial gulf	2018	232394	4929	653912
10	Commercial gulf	2019	201579	5030	642390
10	Commercial gulf	2020	180767	4406	621111
11	Elaphe	2010	55889	1210	206362
11	Elaphe	2011	147229	1720	361747
11	Elaphe	2012	122962	2418	389660
11	Elaphe	2013	112273	2396	270012
11	Elaphe	2014	88774	2560	335647
11	Elaphe	2015	188932	2415	525041
11	Elaphe	2016	106517	2016	409862
11	Elaphe	2017	89507	2345	383355
11	Elaphe	2018	85227	2128	438742
11	Elaphe	2019	49583	1822	365644
11	Elaphe	2020	24974	2171	350074
12	Mosul	2010	151794	2194	242042
12	Mosul	2011	156589	2588	266399
12	Mosul	2012	242406	3023	483119
12	Mosul	2013	269410	3422	574313
12	Mosul	2014	71464	8784	367043
12	Mosul	2015	86496	2435	387484
12	Mosul	2016	127486	1891	434497
12	Mosul	2017	121744	1546	437230
12	Mosul	2018	116674	1835	452520
12	Mosul	2019	118624	1936	462867
12	Mosul	2020	101140	1755	466322
13	AL Shamal	2010	712938	4988	845428

13	AL Shamal	2011	633705	6696	921190
13	AL Shamal	2012	1100000	9469	1608193
13	AL Shamal	2013	1200000	10514	1614553
13	AL Shamal	2014	1100000	2844	1503777
13	AL Shamal	2015	439537	7027	858315
13	AL Shamal	2016	189562	4199	685420
13	AL Shamal	2017	94747	4219	522420
13	AL Shamal	2018	73502	3568	484483
13	AL Shamal	2019	84443		473866
13	AL Shamal	2020	92070		508159
14	Ashour	2010	55265	1437	140328
14	Ashour	2011	69753	1779	170462
14	Ashour	2012	71553	2237	268749
14	Ashour	2013	83163	2796	356849
14	Ashour	2014	102471	2807	435007
14	Ashour	2015	115498	4774	464642
14	Ashour	2016	94829	4549	429648
14	Ashour	2017	81267	3702	426700
14	Ashour	2018	177655	3760	495166
14	Ashour	2019	139172	3223	424655
14	Ashour	2020	113093	3356	492101
15	Kurdistan	2010	324315	3138	494618
15	Kurdistan	2011	347610	3933	605835
15	Kurdistan	2012	574717	4950	1039772
15	Kurdistan	2013	563952	6786	1085786
15	Kurdistan	2014	517064	2958	1071714
15	Kurdistan	2015	428320	10079	1034634
15	Kurdistan	2016	338016	10501	1004944
15	Kurdistan	2017	384959	9604	1093300
15	Kurdistan	2018	569966	9050	1290063
15	Kurdistan	2019	555606	11941	1271574
15	Kurdistan	2020	636070	5433	1474259
16	National Islamic	2010	22057	768	89652
16	National Islamic	2011	129677	1611	237975
16	National Islamic	2012	298377	2075	604860
16	National Islamic	2013	316819	2852	629232
16	National Islamic	2014	243719	3583	613642
16	National Islamic	2015	376237	4059	732271
16	National Islamic	2016	329794	3724	683393
16	National Islamic	2017	470256	5083	807368
16	National Islamic	2018	156777	5083	640429
16	National Islamic	2019	92800	3561	558719
16	National Islamic	2020	87100	2771	492101
17	Mansour	2010	83253	1246	175466
17	Mansour	2011	156178	1690	278400

17	Mansour	2012	136083	2023	413423
17	Mansour	2013	485305	2522	797779
17	Mansour	2014	568324	3308	894308
17	Mansour	2015	753373	3530	1092484
17	Mansour	2016	788280	3997	1120939
17	Mansour	2017	988460	4170	1333345
17	Mansour	2018	1200000	4514	1579925
17	Mansour	2019	1100000	4402	1499447
17	Mansour	2020	952385	4223	1326647
18	Trans Iraq	2010	16944		89188
18	Trans Iraq	2011	59835	924	133624
18	Trans Iraq	2012	975	833	74824
18	Trans Iraq	2013	1133	497	76499
18	Trans Iraq	2014	54807	1842	330567
18	Trans Iraq	2015	96409	2581	389590
18	Trans Iraq	2016	123794	3941	448656
18	Trans Iraq	2017	36471	4881	406130
18	Trans Iraq	2018	37813	3604	394964
18	Trans Iraq	2019	61124	3357	384903
18	Trans Iraq	2020	39605	2701	408569
19	Jihan	2010	92658		157249
19	Jihan	2011	119003	1702	262088
19	Jihan	2012	224042	2566	468184
19	Jihan	2013	346306	6068	714741
19	Jihan	2014	246222	3540	635923
19	Jihan	2015	198029	3432	612028
19	Jihan	2016	315591	3945	666871
19	Jihan	2017	272774	4290	644886
19	Jihan	2018	328765	4428	680528
19	Jihan	2019	303328	4863	632481
19	Jihan	2020	380603	4341	711152
20	Babylon	2010	136761	1695	202546
20	Babylon	2011	161756	1830	273001
20	Babylon	2012	188920	2118	311848
20	Babylon	2013	165532	2568	344693
20	Babylon	2014	112649	3277	323523
20	Babylon	2015	99943	2839	370936
20	Babylon	2016	57253	3274	360546
20	Babylon	2017	37264	3818	346522
20	Babylon	2018	69247	3137	545215
20	Babylon	2019	126548	2993	479864
20	Babylon	2020	149197	3004	467716

APPENDIX 4: DATE FOR THE SECOND ARTICLE CHANGED BY SECTOR

year	ROA	ROE	NIM	cost efficiency	Adjusted Lerner	C3	BOONE
2010	2.7575	8.536	1.93405	0.26085	.430268	91.09609	0.004238
2011	2.907	8.7405	1.62291	0.24625	.416816	76.78566	-0.00065
2012	3.586	9.6435	1.18641	0.2703	.480535	72.46367	-0.00239
2013	3.2985	8.5475	2.08036	0.36965	.483637	70.86367	-0.01931
2014	2.0285	4.624	1.31268	0.2818	.371974	66.85952	0.012633
2015	1.408	2.9195	1.58942	0.299	.326423	82.16864	-0.02411
2016	1.569	3.264	1.43884	0.30035	.41082	78.45877	0.025853
2017	0.995	2.042	0.992046	0.2748	.354303	78.57767	-0.10956
2018	0.27	0.6375	0.753882	0.19925	.309096	82.25535	-0.19476
2019	0.468947	1.027	0.455611	0.2444	.26701	87.09262	0.005635
2020	1.08333	2.096	0.404245	0.2227	.340541	88.82545	0.006535

APPENDIX 5:THIRD ARTICLE DATA AFTER CHANGE BY SECTOR

year	Bloan	Liquidity	Z-Score	VROA	VROE	TE	AE	CE
2010	15	0.839568	6.00558	0.89741	2.09662	0.48115	0.54065	0.26085
2011	11.6	0.851305	10.0164	0.826172	2.0666	0.394	0.58725	0.24625
2012	12.6	0.847811	5.54039	1.11155	3.20809	0.45945	0.55675	0.2703
2013	15.2	0.871341	3.74559	1.22707	3.4175	0.51535	0.6501	0.36965
2014	11.7	0.87634	2.6398	1.31145	3.8522	0.52735	0.51865	0.2818
2015	17	0.876799	2.3082	1.34428	4.08872	0.4691	0.5803	0.299
2016	20.2	0.86383	3.07162	1.41492	4.00281	0.44715	0.6041	0.30035
2017	23.1	0.843642	2.68077	1.18921	3.06444	0.46525	0.5491	0.2748
2018	20.8	0.838642	3.57631	0.974079	2.19565	0.3825	0.5286	0.19925
2019	17.35	0.84968	18.8675	0.887978	1.90904	0.3878	0.5914	0.2444
2020	18.8	0.846081	2.83446	0.86887	2.04159	0.3758	0.5411	0.2227

APPENDIX 6: THIRD ARTICLE DATA AFTER CHANGE BY SECTOR

year	HHI	labor	size	C3	RMS	INF	GDP	ROA
2010	7063.31	84.4147	5.38215	91.0961	2.31254	1.87	6.40257	2.7574
2011	3985.9	164.045	5.52683	76.7857	3.24233	1.87	7.54647	2.90701
2012	3082.78	132.035	5.66663	72.4637	2.7814	1.81	13.9364	3.58608
2013	2964.47	141.03	5.74492	70.8637	6.33176	1.81	7.62857	3.29844
2014	3024.29	112.53	5.78555	66.8595	5.91695	1.84	0.197017	2.02837
2015	3151.74	113.573	5.79215	93.8792	4.78646	1.81	4.72286	1.40789
2016	3197.46	97.8493	5.77864	90.7911	3.5711	1.78	13.7874	1.56887
2017	2460.86	81.1302	5.77417	91.4775	3.95249	1.78	-1.81975	0.995249
2018	1885.99	59.9887	5.79772	91.9648	5.63173	1.78	2.63385	0.298574
2019	1972.74	59.2828	5.78852	94.7594	5.09708	1.81	5.51379	0.468859
2020	1962.97	93.7291	5.81677	56.5982	6.95648	1.84	-11.3242	1.12839

C: CURRICULUM VITAE

PERSONAL INFORMATION

Surname, Name: FARAJ, Bha Aldan

EDUCATION

Degree	Institution	Year of Graduation
PhD	İstanbul univ.Economy	2024
MS	Çankaya Univ. Financial Economics	2018
BS	AL-Maaref Univ.College. Financial & Banking	2015
High School	AL-RAMADI High School	1986

WORK EXPERIENCE

Year	Place	Enrollment
2012- 2015	Taef company	Marketing Manager
2022 – 2024	Lecturer at Al Maaref University:	Econometrics

FOREIGN LANGUAGES

Advanced English, Elementary Turkish

Applications for econometrics

EVIEWS , STATA, OX, R

HOBBIES : Reading books , Exercising , .

