T.C.
SAKARYA UNIVERSITY
INSTUTION OF SOCIAL SCIENCES
DEPARTMENT OF ISLAMIC ECONOMICS AND FINANCE

THE IMPACT OF OIL SHOCKS ON BANK PROFITABILITY IN NET OIL-IMPORTING COUNTRIES: A COMPARISON BETWEEN ISLAMIC, INVESTMENT AND CONVENTIONAL BANKING

Burak ÇIKIRYEL

DOCTORAL THESİS

Thesis Supervisor: Prof. Dr. Fatih SAVAŞAN

APRIL - 2023

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"This thesis was defended online on 19/04/2023 and was unanimously accepted/~~not accepted~~ by the jury members whose names are listed below."

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Burak ÇIKIRYEL

19/04/2023

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Burak ÇIKIRYEL

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ABBREVIATION

ARDL	**:**	Autoregressive Distributed Lag
CWT	**:**	Continuous Wavelet Transform
DCC	**:**	Dynamic Conditional Correlation
EGARCH	**:**	Exponential Generalized Autoregressive Conditional Heteroskedasticity
GARCH	**:**	Generalized Autoregressive Conditional Heteroskedasticity
GMM	**:**	Generalized Method of Moments Estimator
MENA	**:**	Middle East and North Africa
MG	**:**	Mean Group
MGARCH	**:**	Multivariate Generalized Autoregressive Conditional Heteroskedastic
MODWT	**:**	Wavelet Maximum Overlap Discrete Wavelet Transform
MTAR	**:**	Momentum Threshold Autoregressive
NARDL	**:**	Non-Linear Autoregressive Distributed Lag
NIM	**:**	Net Interest Margin
OECD	**:**	Organization for Economic Co-operation and Development
OIC	**:**	Organisation of Islamic Cooperation
OLS	**:**	Ordinary Least Square
PMG	**:**	Pool Mean Group
ROAA	**:**	Return on Average Assets
ROAE	**:**	Return on Average Equity
SCP	**:**	Structure Conduct Performance
SSA	**:**	Sub-Saharan African
SVAR	**:**	Structural Vector Autoregressive
TAR	**:**	Threshold Autoregressive
U.S.	**:**	The United States of America
VAR	**:**	Vector Autoregressive
VECM	**:**	Vector Error Correction Model
VIF	**:**	Variance Inflation Factor

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ABSTRACT

Title of Thesis: The Impact of Oil Shocks on Bank Profitability in Net Oil-Importing Countries: A Comparison Between Islamic, Investment and Conventional Banking

Author of Thesis: Burak ÇIKIRYEL

Supervisor: Prof. Dr. Fatih SAVAŞAN

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Banks take a central position in the financial sector, playing many essential roles, such as facilitating the transmission mechanism of monetary policy and acting as intermediaries between savers and borrowers. On the other hand, oil is one of the primary inputs of economic activities, and its fluctuation becomes the major source of economic instability, causing major microeconomic and macroeconomic indicators to deteriorate. Because of their critical roles in the economy, their relationship attracts the attention of researchers, bankers, market participants, policymakers, and regulators. There is a growing body of literature that has examined the link between oil shocks and bank performance. However, the previous studies focused on the effect of oil shocks on bank profitability by concentrating on either oil-exporting countries or country-specific studies. The current study endeavors to fill the gap in the literature by extending the previous research. It investigates the impact of oil shocks on bank performance from the perspective of net oil-importing countries, paying close attention to the differences among bank types. The dynamic panel method (generalized method of moments) is used to control for the persistence of profitability and endogeneity in the model. The study found that oil shocks seem to have both direct and indirect impacts on bank profitability. Inflation, economic growth, and real effective exchange rate serve as the transmission channel between oil shocks and bank performance, and this varies according to bank types. Knowing the co-movement of oil shocks with bank performance can help bankers, government officials, and monetary authorities in setting strategies and developing effective policies for the stability of the financial sector.

Keywords: Oil Shocks, Bank Profitability, Net Oil-Importing Countries, Direct Effect, Indirect Effect

ÖZET

Başlık: Net Petrol İthalatçısı Ülkelerde Petrol Şoklarının Banka Kârlılığı Üzerindeki Etkisi: İslami, Yatırım ve Konvansiyonel Bankacılık Arasında Bir Karşılaştırma

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Bankalar, parasal aktarım mekanizmasına olanak sağlamak ve tasarruf sahipleri ile borçlananlar arasında aracılık yapmak gibi ekonomide birçok önemli rol oynayarak finans sektöründe merkezi bir konuma sahiptir. Öte yandan petrol, ekonomik hayatın en önemli girdilerinden biridir. Petrol piyasasındaki dalgalanmalar ekonomik istikrarsızlığın ana kaynağı haline gelerek makroekonomik ve mikroekonomik göstergelerin bozulmasına neden olmaktadır. Ekonomideki kritik rolleri nedeniyle petrol ve banka performansı arasındaki ilişki araştırmacıların, bankacıların, piyasa katılımcılarının, politika yapıcıların ve düzenleyicilerin dikkatini çekmektedir. Petrol şokları ve banka performansı arasındaki ilişkiyi inceleyen ve giderek genişleyen bir literatür vardır. Ancak önceki çalışmalar petrol şoklarının banka karlılığı üzerindeki etkisini ya petrol ihraç eden ülkeler ya da tek bir ülke perspektifinden ele almıştır. Mevcut çalışma önceki araştırmaları bir adım öteye taşıyarak literatürdeki boşluğu doldurmayı hedeflemektedir. Bu çalışma petrol şoklarının banka performansı üzerindeki etkisini net petrol ithal eden ülkeler açısından, banka türleri arasındaki farklılıkları dikkat alarak incelemektedir. Çalışmada karlılığın sürekliliğini (kalıcılığını) ve içselliği kontrol etmek için dinamik panel metodu (genelleştirilmiş momentler metodu) kullanılmaktadır. Bu araştırma, petrol şoklarının banka karlılığı üzerinde hem doğrudan hem de dolaylı etkilerinin olduğunu ortaya koymuştur. Enflasyon, ekonomik büyüme ve reel efektif döviz kurunun, petrol şokları ve banka performansı arasında aktarım mekanızması işlevi gördüğünü tespit etmiştir ve bu durum banka türlerine göre değişiklik göstermektedir. Petrol şokları ve banka performansı arasındaki ilişkiyi bilmek, bankacılara, hükümet yetkililerine ve para otoritelerine finans sektörünün istikrarı için stratejiler belirlemede ve etkili politikalar geliştirmede yardımcı olacaktır.

Anahtar Kelimeler: Petrol Şokları, Banka Karlılığı, Net Petrol İthal Eden Ülkeler, Doğrudan Etki, Dolaylı Etki

INTRODUCTION

Background Information

Oil

Crude oil has been the world's most important natural resource since the 1950s. Crude oil is formed from the remains of dead organisms, such as plants and animals. It is believed that these organisms remain beneath land or seabed for a long time and turn into carbon-rich substances that we use today as raw material for a variety of purposes. The color of crude oil is usually black or dark brown. However, it sometimes has different colors in the color spectrum, such as yellow, red, tan, and green. It is extracted from the underground, and giant drilling machines are utilized for its extraction. Once extracted, it is refined into petroleum products such as jet fuel, diesel, and gasoline. Moreover, it is composed mainly of carbon and hydrogen and is considered hydrocarbon in the fossil fuel industries, such as gas and coal. It is noteworthy to mention that petroleum and crude oil are used interchangeably in the literature. Petroleum is a more comprehensive word that implies crude oil and petroleum products. Thus the word “petroleum” covers crude oil in addition to the wide range of products formed by refining and processing crude oil.

Crude oil is a primary source of energy production, generating heat for houses and workplaces and providing fuel for vehicles and machines. It is also a lifeblood in industrialized countries and is employed as a component in many industrial products, such as cosmetics and plastics. In short, crude oil is an indispensable part of daily life with many uses. Moreover, it is a non-renewable energy source implying that once it is used, it is gone and cannot be easily obtained again. A growing consensus is that crude oil heavily damages the environment by increasing greenhouse gas emissions and causing pollution during extraction. Although there is a sense of common humanity that oil harms the environment, most people believe that a life without oil would be challenging and complex. Therefore, many countries on the earth recently, individually or as a group, have taken various measures trying to reduce greenhouse gas emissions by minimizing their fossil fuel use and encouraging renewable energy sources, such as wind and solar energy. The Paris Climate

Accords have also emerged as a result of this concern, and 196 countries have adopted the legally binding international agreement on climate change (UNFCCC, 2023).

Oil is an integral part of everyday life with its many uses, and it is commonly traded in the commodity market both as a spot and derivative. The top five producers of world crude oil in 2021 are the United States (U.S.) (14.5%), Russia (13.1%), Saudi Arabia (12.1%), Canada (5.8%), and Iraq (5.3%), respectively (U.S. Energy Information Administration, 2022b). Even though the U.S. led the most crude oil production, the world's biggest crude oil exporter in 2021 (in other words, the biggest world crude oil supplier) is Saudi Arabia, taking up a 16.5% share of world total oil exports. Russia followed as the second largest oil exporter, accounting for 8.3% of the global share of oil exports, and it is followed by Canada (7.5%), Iraq (7.3%), and the United Arab Emirates (7.1%), respectively (Statista, 2023). On the other hand, China (22.3%), the U.S. (13.5%), India (10.4%), South Korea (6.5%), and Japan (6.1%) are the five largest global oil importers in 2021, respectively (Workman, 2021).

Graph 1: Top Exporters, Producers, Importers of Crude Oil and Their Shares Globally in 2021

Source: U.S. Energy Information Administration, Statista, World's Top Exports

Changes in oil prices in the international commodity market depend on various factors, such as the creation of cartels and the advent of new technologies. One of the most important factors affecting oil prices is the changes in its supply. The Organization of the Petroleum Exporting Countries (OPEC) is an example of a cartel that has an influencing power on the world oil supply and, in turn, its prices. OPEC was founded in 1960 with the aim of coordinating energy policies for its members and ensuring stability in the oil market. This objective is to provide a cost-effective, efficient, and regular supply of oil to the markets, a consistent flow of income to producers, and fair prices for those invested in the oil sector (OPEC, 2023). OPEC in 2021 only exports 47.7% of global crude oil exports and holds over 80% of the world's proven oil reserves (AlSeiari, 2022). This leads OPEC members to own a great deal of economic leverage in determining supply and its price.

Some factors, such as increases in Non-OPEC production (for instance, U.S., Canada, and China), political disputes among OPEC members, and political upheaval in the Middle East and North Africa region, disrupt the dominance of OPEC in international oil politics. Despite the presence of the long-standing OPEC, U.S. and Russia can also be considered the influential driving forces in global oil politics, helping achieve a balance in oil prices and a competitive oil market.

Control over global energy resources and their extraction and use of oil revenues sparks political conflicts between resource-rich countries and the world powers (such as U.S. and European Union countries). The U.S. invasion of Iraq and The North Atlantic Treaty Organization (NATO) invasion (some also call it intervention) of Libya are remarkable examples of how world powers pursue their political and economic interests in world energy politics. Even though the Middle East and North African countries take up 44.5% of the world's total oil exports in 2021 (British Petroleum, 2022) and are the main suppliers of world energy, there is either war or political turmoil or heavy political influence of world powers on these countries' policy implementations.

While some resource-rich countries benefit from these natural resources by turning them into profitable opportunities, others fail to take optimum advantage of their presence. These debates have raised the question of whether natural resources are a "curse" or a "blessing,"

and extensive literature has emerged on this subject, some of them are as follows: (Atil et al., 2020; Lotfalipour et al., 2022; C. Sharma & Paramati, 2022; Van Der Ploeg, 2011; R. Wang et al., 2021; S. Wen & Jia, 2022). This phenomenon is described as "Dutch disease," "natural resource curse," or "paradox of plenty" in the literature. This current section provides brief information about the oil and oil market. In the next section, we will move on to the discussion about bank performance, which is another important dimension of the current research.

Bank Performance

In general terms, banks are the intermediaries between savers and borrowers. The primary function of banks is to receive deposits from savers and use these deposits to make loans for borrowers. They earn profits from the difference between deposit and loan ratios. Banks also drive profits by offering their clients a wide range of financial services, such as financial management and currency exchange, in addition to their primary function. The banking sector is highly regulated around the world, and relevant authorities often follow and oversee banks' operations since they are considered the backbone of the financial system.

The term "bank" refers to a wide range of different financial institutions. In general, banks can be categorized into three types, and these are retail, corporate or commercial, and investment banks. Each bank type has its unique business model, products, and services. Understanding the differences among bank types is essential because it will allow us to interpret the results based on the dynamics of each bank type.

Retail banks are the first types that come to mind when someone thinks of banks. They are the most common financial institutions offering personal banking products and services to the general public. They often have branches across certain regions (sometimes countries) or, in some cases, serve only online[1] through apps. Retail banks mainly collect deposits from savers by promising to pay interest on their deposits in compensation and provide loans to borrowers in return for interest payments. They make profits from the difference between deposit and financing rates. They simply play the role of being intermediaries between savers

[1] This is known as online banking, Internet banking, or web banking.

and borrowers. In addition to loan services, they also offer a wide range of products and services, such as savings and checking accounts and debit and credit cards.

It is important to underline that Islamic banks can be considered under the category of retail banks. Islamic banks have different business models than traditionally operated retail banks[2]. The religion of "Islam" prescribes a detailed code of conduct for every aspect of human life, including economic and financial activities. Considering these codes of conduct, Islamic finance places equal emphasis on ethical, moral, social, and religious dimensions of financial transactions and promotes equity and fairness through these dimensions for the common good of society (Iqbal, 1997). Thus, Islamic banks are expected to provide products and services in accordance with Islamic law[3] and perspective. Even though there are certain critics of the Islamic banks' modes of financing and activities, most believe that it will take some time to establish the ideal and desirable Islamic banking model. In addition, it should be borne in mind that Islamic banks are built on the foundations and mindset of conventional banks.

Islamic banks offer similar products and services as conventional banks (traditional retail banks). The primary differences are that the contractual frameworks are formed based on Shariah, and every transaction needs to involve trade instead of merely money exchange. In short, Islamic banks involve real business activities in their transactions, and they do not deal with activities that encompass interest-based transactions, unlawful products (alcohol, pork, etc.), excessive uncertainty (gharar), gambling, black market, manipulation, cheating, deception, selling items without ownership, and so on.

The second category of bank type, corporate or commercial banks, serves businesses and designs products and services for their business clients, such as cash management, trade financing, and letters of credit. The primary difference between retail and commercial banks is that the latter focuses on and offers products more to business customers than individuals. In some countries, corporate banking falls under the retail banking (in some cases investment

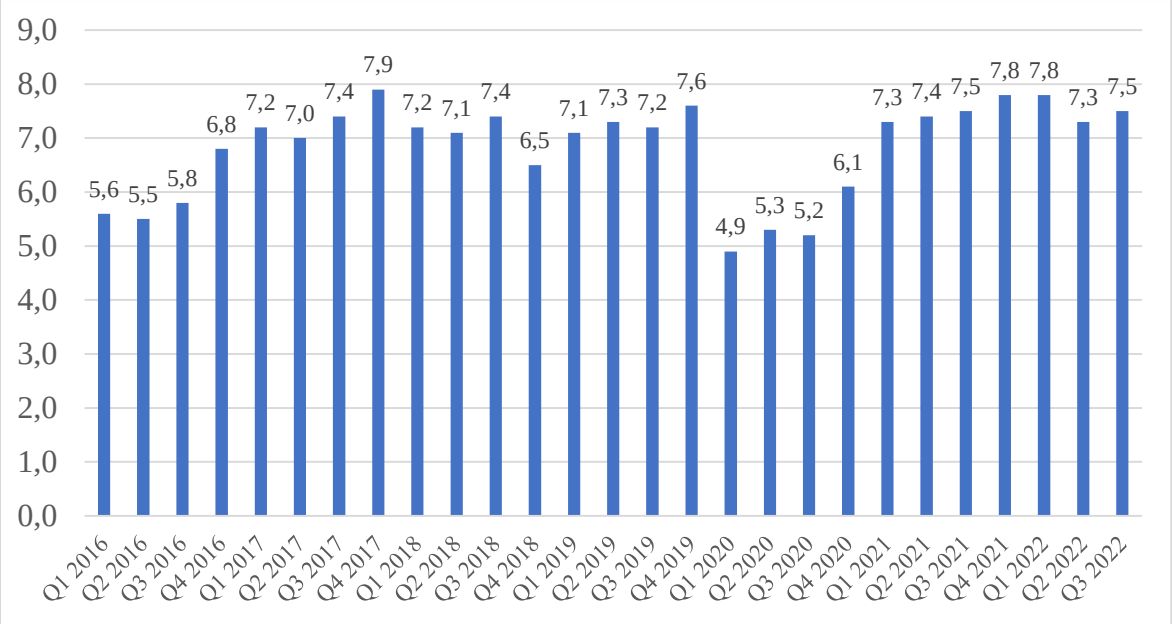
[2] These banks are called conventional banks throughout the research.
[3] It is known as Shariah.

banking) umbrella, and banks have two different divisions and serve individuals and businesses together.

Last but not least, investment banks, as the last category, behave like financial advisors and concentrate on providing a variety of financial services to corporate clients, governments, pension and hedge funds, and other financial institutions. Their primary function is to become an intermediary between investor and issuer, providing services to customers to raise capital for business needs through debt or equity financing. Moreover, investment banks deal with complex financial services, such as security trading, asset, and wealth management (investment advice), underwriting corporate bonds and equity shares, assisting mergers and acquisitions, securitization, and so on.

The stability of the financial system is vital for healthy economic development. Instability in the financial system (financial institutions, markets, and infrastructure) may lead to an inefficient flow of funds between savers and borrowers, deteriorating the efficient allocation of resources among economic agents. This may have adverse implications on some macroeconomic dynamics, such as inflation, exchange rate, and economic growth, paralyzing prevailing economic conditions. Banks are the cornerstone of the financial system providing services to almost all economic agents, such as retail customers, small and medium enterprises, financial institutions, corporate companies, and governments. The market capitalization of the global financial sector reached its peak at $16 trillion in 2021 and fell back to $14.5 trillion by May 2022. Traditional banking institutions make up half of this valuation, whereas specialists (for instance: insurance companies and crowdfunding platforms) and fintech companies account for the other half (up from a 30% share over the five years) (Dietz et al., 2022). Although the share of traditional banking in the financial system has decreased dramatically over the past five years, it maintains significant weight in the financial system. Therefore maintaining the soundness and stability of banks is vital for the financial system and overall economic activities.

Graph 2 below shows the market capitalization[4] (cap) of the global banking sector from the 1st quarter of 2016 to the 3rd quarter of 2022 (in trillion euros). The market cap of the banking sector was 7.5 trillion euros in the third quarter of 2022 (Statista, 2022). The size of the market cap is almost one-third of the U.S. real gross domestic product ($25.46 trillion (The U.S. Bureau of Economic Analysis, 2023)), and it is also above the real gross domestic product of most countries around the globe. These graphs are important in terms of showing the size of the banking sector worldwide.



Graph 2: Market Cap of the Banking Sector Worldwide from 1st Qr. 2016 to 3rd Qr. 2022 (in trillion euros)

Source: Statista (2022)

The 2007–2008 financial crisis, called the Global Financial Crisis (GFC), originated in the U.S. financial markets, and its adverse impact on real and financial sectors spread worldwide. The financial crisis caused a loss of trust in financial institutions, particularly banks in the U.S., and severely damaged the world economy. In order to alleviate the adverse impact and prevent depositors from incurring losses, government authorities around the globe announced bailout packages for banking institutions by intervening in the banking sectors. These bailout

[4] Market capitalization is calculated as the number of shares in a company multiplied by the price per share.

packages generally consist of capital injections, institutional (depositor) protection schemes, and issuing debt backed by the government. In all cases above, public funds are used to rescue failing banks, which brings out social injustices to the public who are not part of banks' operations or income but paying the cost of rescue through their taxes. Even though some countries take measures to prevent taxpayers from bearing the cost of failing banks (such as Europe in the name of the Single Resolution Mechanism), efforts to find a permanent solution to the issue are still ongoing. This overall picture provides evidence that there is a need for the transformation of these institutions to have a sustainable and stable banking sector.

In the literature, the return on average assets and return on average equity are commonly used indicators (dependent variables) to measure the bank's performance. Those variables that contribute to the measurement of bank performance (independent variables) are called bank-specific and macroeconomic variables. While common bank-specific variables compose bank size, capitalization, asset quality/credit risk, efficiency, and liquidity, macroeconomic variables consist of inflation, economic growth, and exchange rate. The details about the bank performance measurement and related variables are provided in the methodology section.

Subject of the Study

The Nexus Between Oil and Bank Performance

Banks lie at the center of the global financial system by playing many essential roles in economies, such as enabling the transmission mechanism of monetary policy and acting as intermediaries between savers and borrowers. The primary function of banks is financial intermediation facilitating the flow of funds between surplus and deficit economic units. Many types of banks perform multiple types of transactions around the globe, such as retail, commercial, and investment banks. Since banks play central roles in the financial system, the financial soundness and stability of the banking sector are crucial not only for the financial system but also for the economy as a whole. This suggests that the profitability of banks can be interpreted as a significant indicator of the sustainability of the current financial system.

Oil has become one of the most critical natural resources since the 1950s. It has been extensively used across a wide range of areas around the globe. Foremost among them is transportation, the industrial sector, residential and commercial areas, and the power industry, respectively (U.S. Energy Information Administration, 2022a). The air, land, and sea transportation industries consume most of the oil worldwide. The industrial sector comes second and utilizes crude oil or petroleum products (made by processing crude oil and other liquids at petroleum refineries) as raw material to produce a variety of goods and services we benefit from, such as plastics, fertilizers, and even medicines. It is followed by residential and commercial areas, which employ oil as an important energy source, such as heating, cooking, etc. Last but not least, another important area of oil use is to generate electricity to obtain the energy we need in our everyday lives. These areas, as mentioned above, are the most common places where oil is widely utilized. As can be observed, oil is one of the most significant inputs of economic activities. Therefore, its price changes, either ups or downs, inevitably have considerable impacts on various industries. In addition to the private sector, fluctuations in oil prices have a widespread effect on countries' oil expenses or incomes, depending on whether the respective country is an oil importer or exporter.

There is a strong interconnection between the banking system and the overall economy. While any fragility in the banking sector may have severe repercussions on the economy, disruption and stagnation in economic activities may also profoundly affect the banking sector. Thus, the disruption that may occur on one side may trigger the shocks on the other side. For instance, oil is one of the primary inputs in economic activities. Any volatility in oil prices may significantly impact almost all sectors of the economy, and these events consequently create uncertainties about the demand and supply of funds in the financial system, causing some financial and economic issues that may not be solved in the short run.

Since this research discusses the impact of oil market activities on bank profitability in oil-importing countries, we prefer to elaborate on the example from the perspective of net oil-importing countries. The effect of oil market activities on bank performance in net oil-importing countries might be either directly via the demand and supply of funds in the financial system or indirectly through its influence on inflation, economic growth, or foreign

exchange rate. In other words, changes in oil market activities may directly affect the bank's performance by influencing the volume of liquidity demanded and supplied or have an indirect impact through macroeconomic channels, such as the level of inflation, economic growth, or foreign exchange rate (Poghosyan & Hesse, 2009).

Importance of the Study

Oil is one of the primary inputs of economic activities. Despite the development of alternative sources, oil has maintained its importance in the world economy for the last eight decades. It also seems to be an indispensable part of our lives for the near future. Any fluctuation in economic activities or oil supply disruptions could cause changes in crude oil prices, spending, and volatility. Consequently, these oil shocks[5] are expected to impact the financing needs of economic units and, in turn, affect the banks' performance. For instance, a recession in the economy causes a slowdown and contraction in economic activities. An economic downturn could lead to less oil demand in the industries where oil is consumed most, such as transportation, the industrial sector, residential and commercial areas, and the power industry. This consequently results in less demand for financing and, in turn, less bank profitability. Such instances necessitate the research in this specific area to determine whether this relationship is as expected and raise the question of "what is the nature of the relationship between oil shocks and bank profitability and whether macroeconomic variables can mediate this relationship?"

Even though these questions are raised by many researchers and the relationship between oil shocks and bank profitability has been investigated in the literature, most studies focus on either oil-exporting countries (Khandelwal et al., 2016; Killins & Mollick, 2020; Poghosyan & Hesse, 2009) or individual oil-importing countries (Katırcıoglu et al., 2018; C.-C. Lee & Lee, 2019). On that account, this study attempts to fill the gap by addressing the relationship between oil and bank profitability in a group of net oil-importing countries, which contain three bank types at the same time: conventional, investment, and Islamic. In addition to the direct impact of oil prices on bank profitability, possible transmission channels

[5] Oil shocks refer to oil price changes, oil spending and oil price volatility.

(macroeconomic) of oil shocks on bank performance are also examined. The results will be of interest to researchers, bankers, market participants, policymakers, and regulators whose main objectives are to strengthen the resilience and stability of the financial system.

Aim of the Study

There are three main questions to be addressed in this research:

1. Do oil shocks have a direct impact on bank profitability in net oil-importing countries?
2. Do macroeconomic variables (exchange rate, inflation, and economic growth) serve as the transmission channels between oil shocks and bank performance in net oil-importing countries?
3. Do the effects of oil shocks (whether direct or indirect) on bank profitability vary among different bank types (Islamic, conventional, and investment banks) in net oil-importing countries?

The main objectives of the research are:

1. To test whether oil shocks directly impact the bank performance of net oil-importing countries;
2. To examine the role of macroeconomic variables in shaping the relationship between oil shocks and bank performance in net oil-importing countries;
3. To investigate whether (direct and indirect) oil shocks have a varying effect on different bank classes in these countries.

This study endeavors to answer these questions and addresses these research objectives by looking at the nexus between oil-finance-macroeconomic dynamics from the oil-importing countries' perspective.

Finally, the contributions of this study to the literature are as follows. Firstly, the literature on the interaction between oil shocks and bank profitability is scarce, and it has not received much attention (Katırcıoglu et al., 2018; C.-C. Lee & Lee, 2019; Poghosyan & Hesse, 2009). This research will contribute to the emerging literature in this field by paying the utmost attention to this significant issue. Secondly, this study will allow us to gain further insight

into bank-specific and macroeconomic factors of bank profitability in net oil-importing countries. Thirdly, this research will reveal whether oil prices affect bank profitability and if this is the case, what could be the relevant channel through which bank performance is impacted? Thirdly, since the Islamic (through profit and loss sharing instruments) and investment banks theoretically engage in more real investment activities in the economy, it is expected that their profitability is more affected by the oil price fluctuations since the impact of oil price changes on the economy is well documented (Cunado & Pérez de Gracia, 2003; Hamilton, 1983, 1996; Jones et al., 2004). All these issues will be discussed in detail in the following chapters.

Methodology of the Study

This research uses the system generalized method of moments (GMM) model to run the estimation on the impact of oil prices on bank profitability in net oil-importing countries. This model will allow the researcher to control for the persistence of profitability and endogeneity in the model. One of the remarkable issues in this research is whether oil prices directly or indirectly (through macroeconomic variables) affect bank profitability. This study follows the footsteps of Poghosyan and Hesse (2009) to test this hypothesis. The details regarding the methods and the data are provided in the methodology part.

Conclusion

The latest disturbances in the global oil market due to the war between Russia and Ukraine have proven that the world cannot live (not literally) without crude oil in the short term. Even though countries search for alternative safe havens to crude oil, it has been experienced that people have no choice but to use oil to fulfill world energy and material needs. However, this does not mean that the world cannot diversify its energy sources and raw materials away and reduce its dependence on crude oil in the long run.

Considering the dependency on crude oil and its wide range of uses, we expect to have a relationship between crude oil and the banking sector. Volatility in oil prices often affects the costs of energy and raw materials in the economy, and these events usually shift the economic prospects and, in turn, the funding needs of households, firms, and governments.

Shift in the funding needs eventually cause a change in the transaction volumes of banks and consequently affect their profitability. This effect can be either direct, as mentioned here, or indirect through macroeconomic channels, such as exchange rate, inflation, and economic growth. In this respect, this research aims to investigate the direct and indirect (through macroeconomic dynamics) impacts of oil shocks on bank performance in a group of net oil-importing countries. It also compares whether oil shocks have varying effects on different bank types. This study uses the dynamic panel method (generalized method of moments) to control for the persistence of profitability and endogeneity in the model.

The remainder of this research is structured as follows: **Chapter 1** discusses the existing literature on the determinants of bank profitability, the nexus between oil and bank performance, and the association between oil and possible transmission channels (exchange rate, inflation, and economic growth); **Chapter 2** explains the methodology and the data used in this research; **Chapter 3** reveals the empirical results and discusses the findings; and finally, **Chapter 4** summarizes the research, draws a conclusion, offers policy implications and recommends the future research direction.

CHAPTER 1: LITERATURE REVIEW

1.1. Introduction

Banks stay at the heart of the financial system, playing central roles in economic activities, such as enabling the transmission mechanism of monetary policy and acting as intermediaries between savers and borrowers. Their primary function is to become an intermediary between surplus and deficit economic units. This role of banks helps achieve efficient markets and reduce transaction costs by mixing funds (of surplus units) and matching them with areas of resource shortages (deficit units).

Due to their critical position in the economy, banks are highly regulated by government authorities and international standard setters (such as the Bank of International Settlements). These institutions regulate and supervise banks' operations closely to prevent interruption in the flow of funds between these two units. Any disruption in the flow of funds may cause severe instability in financial activities, which may threaten the overall economy. Therefore, the soundness and stability of banks are of paramount importance for the country's financial and economic system and the overall world economy.

Oil is one of the most important commodities globally and has a wide range of economic uses. Shocks in oil prices may have severe repercussions on all institutions (such as banks) and the dynamics of the economy. Three different oil shocks are introduced in the literature: oil supply, aggregate oil demand, and specific oil demand shocks. Oil supply shocks imply any unexpected disruptions in the oil supply side. Political tensions, wars, natural disasters, and similar incidents can adversely affect the oil supply, disrupting oil production. For instance, the war in Libya and Iraq and political tensions in Russia (due to the war between Russia and Ukraine) and Venezuela, and hurricanes in the U.S. can profoundly impact the global oil supply chain, affecting world economic activities. Aggregate oil demand shocks refer to abrupt changes in global oil demand. Such changes, for instance, may occur because of positive or negative market expectations in economies, ending up with more or less oil demand on a global scale. As for the specific oil demand shocks, Kilian (2009) describes it as a shock that occurs when higher precautionary oil demand arises related to uncertainty

about the future availability of oil supplies or vice versa. For example, the Middle East supplies almost one-third of global oil consumption. Wars and turmoil in the Middle East push some countries to stockpile oil beyond their needs in case of future shortages, creating specific oil demand shocks in the oil market.

Both crude oil and petroleum product prices can vary depending on the size, duration, and type of oil shocks. These types of oil shocks may cause disruptions or create uncertainty about the supply and demand of oil-related goods and services. Considering the intensity of oil use in goods and services in the economy, fluctuations in its prices may lead to a shift in the demand and supply of the funds and also affect the macroeconomic dynamics, which can later impact the demand and supply of the funds. In this regard, this current study tries to explore the association between oil shocks and bank profitability in net oil-importing countries. Considering this, the first section discusses the literature on the determinants of bank profitability since the impact of oil shocks on bank profitability is the main interest of this research. It is followed by the existing literature on the nexus between oil and bank profitability. Since there is a possibility that the impact of oil shocks on bank profitability can be indirect, the following sections delve into the possible transmission channels (macroeconomic channels) of oil prices on bank profitability, namely inflation, economic growth, and exchange rate. Finally, this chapter ends with the concluding remarks.

1.2. Determinants of Bank Profitability

Banks are the center of the global financial system by playing many essential roles in economies, such as enabling the transmission mechanism of monetary policy and acting as intermediaries between savers and borrowers. The financial soundness and stability of the banking sector are crucial not only for the financial system but also for the economy as a whole. This suggests that the profitability of banks can be interpreted as an indicator of the sustainability of the current financial system.

Three types of banks are included in our analysis: Islamic, conventional[6], and investment banks. The question arises whether the impact of oil will be different for the profitability of

[6] Conventional and Islamic banks are considered under the category of retail banks that are discussed above.

these different bank classes. Investigating how Islamic banks differ from conventional banks in the sense of business orientation, efficiency, asset quality, and stability over the period 1995–2009, Beck et al. (2013) documented the evidence that Islamic banks are less efficient but have higher intermediation ratios, higher asset quality, and are better capitalized than conventional banks. In comparison to conventional banks, Islamic banks perform better in terms of capitalization and asset quality during crises and are less prone to disintermediate. Furthermore, the authors reported that Islamic banks outperformed conventional banks during the Global Financial Crisis due to their superior capitalization and asset quality.

Examining the impact of bank loan and fee income on the performance of Islamic and conventional banks employing the data from a sample of 20 countries for the period from 2000 to 2015, Azad et al. (2019) explored that bank fee is a significant determinant of Islamic banks' profitability. Authors argue that widely used indicators, such as the loan-to-deposit ratio, referring to banks' credit risk, have less of an impact on the profitability of Islamic banks than conventional banks. Moreover, while Islamic banks are less sensitive to deposit ratios than their conventional peers, which contributes to lower credit risk, excessive dependence on fee-based income might have implications on their growth, profitability, and sustainability in the long run. Similarly, studying the profitability dynamics of Islamic banks in comparison with conventional banks on a sample of 74 Islamic and 354 conventional commercial banks in Organisation of Islamic Cooperation (OIC) countries and the United Kingdom over the period between 2007 and 2013 using a dynamic panel approach, Yanikkaya et al. (2018) reported that almost all explanatory variables of Islamic banks' profitability appear to be different than those of conventional banks, implying that the profitability of Islamic banks has its own peculiar dynamics. Moreover, their analysis confirmed that the use of profit and loss-sharing contracts, as compared to fee-based ones, would contribute to the better performance of Islamic banks.

Exploring the direct and indirect impact of oil windfall on Islamic, investment, and conventional bank profitability in OIC countries covering the period from 2000 to 2012 and the role of institutional variables in shaping this relationship, Nagayev (2017) found that oil liquidity has a positive influence on the profitability of investment and Islamic bank, but it is

not related to the earnings of conventional banks. Real effective exchange rate (for all bank types), government spending, and inflation (for investment and commercial banks) appear to play the role of the indirect transmission channel between the profitability of all bank types and oil revenue. Besides, institutional variables seem not to contribute to the nexus between oil revenue and bank performance except for better law enforcement (for conventional banks) and bureaucracy quality (for Islamic banks).

In terms of operations, there are significant differences between Islamic, conventional, and investment banks. Key differences are as the following: Firstly, Islamic and conventional banks concentrate on collecting deposits and financing their clients, whereas investment banks focus on financing or facilitating trades and investments on a large scale for institutional clients in addition to the various services[7] they provide; Secondly, operations of Islamic and commercial banks are strongly influenced by economic growth and demand for financing, whereas operations of investment banks largely rely on the performance of capital markets (Nagayev, 2017). Hence, it is expected that oil prices may have a significant direct and indirect (through transmission channels, such as an interaction of oil variables with inflation, economic growth, and exchange rate) effect on the profitability of Islamic and commercial banks. However, its impact on the profitability of investment banks is ambiguous. On the one hand, rises in oil prices, for instance, may lead oil-importing countries to spend more on oil purchases causing some institutional clients to pull out some of their resources from capital markets to cover their oil expenses, which consequently drags the value of capital markets down and exerts a negative effect on investment banks. On the other hand, rises in oil prices may lead governments to grow their demand for financing to bear the higher cost of oil expenses, which may result in more issuance of government bonds and Sukuk and consequently may have a significant positive effect on investment bank profitability.

Unlike conventional and investment banks, Islamic banks started operations at the beginning of the 1970s and can be considered infants compared to the other types. Islamic banks can be

[7] Such as raising capital for institutional clients, creating collateralized instruments and selling them in the market, engaging in proprietary trading and swaps, brokerage and underwriting activities, helping companies with mergers and acquisitions, and research and asset management activities.

defined as financial institutions that operate based on Islamic laws (Shariah). In theory, it is believed that Islamic banks are founded on the basis of profit and loss-sharing financing modes, and profit and loss-sharing contracts are believed to comprise the majority of their transactions. In practice, Islamic banks do operate based on profit and loss-sharing modes on the liability side when they collect deposits from their clients (contract with them to share a certain percentage of the profits). However, they do not operate based on profit and loss-sharing modes on the asset side. In other words, when they collect savings from households and businesses (savers), they form profit and loss-sharing contracts and agree to share a certain percentage of profits with their clients, and if any losses occur, the clients will incur losses (lose some or all of their capital) while the banks get nothing in return for labor they provide. However, the deposits they collect are not used to finance households and businesses based on profit and loss-sharing modes. Instead, Islamic banks purchase the products their clients are interested in and sell the items on markup (cost+plus), allowing clients to pay in installments. Such transactions comprise a vast majority of their asset side (IIBI, 2023). Therefore, the only difference between Islamic and conventional banks in relation to the transaction is the products or commodities[8] that are the subject of the transaction during the contractual agreement with the Islamic banks. In this case, the Islamic banks' ultimate objective is similar to that of conventional banks. It is to provide loans based on installments.

In the literature, the underlying determinants of the banks' profitability are divided into two main categories: bank-specific factors and macroeconomic factors (these factors are also called internal and external determinants) (see: Athanasoglou et al. (2008), Athanasoglou et al. (2006), Demirgüç-Kunt and Huizinga (1999)). On the one hand, bank-specific factors can be defined as the determinants that are influenced by the bank's management decisions, policies, and actions. Put differently, these factors are the direct result of the bank's management decisions, policies, and actions, for instance, credit risk and efficiency. On the

[8] This is where Islamic banks bear risk by buying and selling the commodities or products, which is also one of the basic facts that legalizes contractual agreement in the eyes of Islamic laws. However, to avoid double taxation, this transaction of buying and selling products does not end up with the transfer of ownership between banks and clients in practice. That is why such transactions take place only on paper to be complied with Shariah principles. However, this does not change the fact that Islamic banks place the entire risk on their customers in order to avoid double taxation.

other hand, macroeconomic factors are defined as determinants that reflect existing economic conditions in an environment within which banks operate. Therefore, they are not indicators of banks' management decisions. They are out of their control, and those factors, therefore, are not influenced by banks' particular decisions.

As indicators of bank profitability, return on average asset and return on average equity are commonly employed variables. These two variables are the function of bank-specific and macroeconomic factors. In the literature, while the widely used bank-specific variables are capitalization, asset quality, efficiency, liquidity, and bank size, the commonly employed macroeconomic variables are inflation, economic growth, and exchange rate. All of them are included in this research. Since this study focuses on the impact of crude oil on bank profitability, we use three types of oil variables to have a robust empirical study: oil spending, changes in oil prices, and volatility of oil prices.

Since the seminal work of Short (1979), the main determinants of bank profitability have been investigated extensively. Examining the nexus between commercial bank profit rates and banking concentration for 60 banks in Canada, Western Europe, and Japan covering the period between 1972-1974 using the ordinary least square (OLS) method, Short (1979) documented the evidence that greater market power results in higher profits, implying the more concentrated the banking sector, the more profitable the banks are. Similarly, exploring the financial performance of the 12 commercial banks in Bangladesh during and after a period of financial liberalization, 1983-2012, using the random effects model, Robin et al. (2018) showed that larger banks seem to be more profitable than smaller banks implying the more concentration the banking sector is exposed to, the greater profits they can earn. In addition, empirical results indicate that post-financial reform does not help improve banks' profitability except for the variable of net interest margin.

Apart from the commonly used bank profitability determinants, following studies have focused on the impact of different sectoral dynamics and business cycles on bank profitability. Applying the ordinary least square and fixed effects model on a sample of 201 U.S. banks over the period 1985-1990 to investigate whether there is a significant impact of portfolio mix on large banks, Miller and Noulas (1997) discovered that while the influence

of real estate loans on bank performance is negative, construction and land development loans have a strong positive effect on bank performance. Moreover, bank performance is inversely related to loss provisions to total loans and non-interest expense to total expenses, while this relationship turns out to be positive in the case of salary and benefits per employee, non-interest income to total income, consumer loans to total loans, total deposits to total assets, and total transactions deposits to total deposits. Focusing on the effect of bank-specific, industry-specific, and macroeconomic determinants of bank profitability in Greece using system GMM for the period 1985-2001, Athanasoglou et al. (2008) documented that banks seem to maintain moderate profit persistence from one year to the next, implying that the deviations from the perfectly competitive market are not significant. All bank-specific factors (capital, credit risk, productivity growth, operating expenses management) except size have a significant effect on bank profits, and the sign of the impact is as expected. Turning to the macroeconomic variables, inflation and business cycle have a positive and significant impact on bank profits. Moreover, there is no evidence to support the effect of the structure–conduct–performance (SCP) hypothesis and the ownership status on the profitability of Greek banks.

Moreover, employing the system GMM estimation on a sample of 4787 banks in eight EU countries on the data ranging from 1992 to 2007, Goddard et al. (2013) depicted that efficient and well-diversified banks earn higher profits, but profitability is lower for highly capitalized banks. There is evidence of declining profit persistence from one year to the next after introducing the euro and the execution of the Financial Services Action Plan. In addition, using the system GMM model on a sample of 372 Swiss banks for the period spanning from 1999 to 2009, Dietrich and Wanzenried (2011) illustrated that operational efficiency, the growth of total loans, funding costs, the business model, and effective tax rate are the main determinants of Swiss bank profitability. During the financial crisis, state-owned banks performed better than privately-owned banks. The dynamic model employed showed that the bank profits tend to persist, indicating the existence of obstacles to market competition, informational opacity, and sensitivity to regional and macroeconomic shocks.

The determinants of bank profitability may differ for different bank classes, and also the same variable may have different effects on different bank classes. That is because if different bank types are included in the study, it is better to use dummy and interaction variables to point out similarities and dissimilarities. For instance, in analyzing the dynamics of growth and profitability in three different classes of bank types, namely savings, cooperative and commercial banks, for five EU countries applying a two-step system GMM over the period between 1992 and 1998, Goddard et al. (2004a) found that the persistence of profit appears to be higher for savings and cooperative banks than for commercial banks. Banks with high capital–assets ratio or a high liquidity ratio have a tendency to make a modest profit on average. While the positive relationship between concentration and profitability supports the concept of the SCP hypothesis, there is a weak association between bank-level x-inefficiency and profitability. Since three different classes of banks, Islamic, conventional, and investment banks, are included in the current study, it employs dummy and interaction variables to highlight the varieties among different bank types.

Some studies highlight the importance of ownership playing an important role in generating high or low profits. While Dietrich and Wanzenried (2011) and Molyneux and Thornton (1992) underlined the fact that government ownership provides banks to maintain higher profitability than foreign ownership, Bouzgarrou et al. (2018) and Demirgüç-Kunt and Huizinga (1999) illustrated that foreign banks achieve better financial performance than government-owned banks. However, Athanasoglou et al. (2008) stressed that there is no link between banks' ownership status and profitability, implying that some other determinants have more explanatory power in explaining banks' profitability. The indicated results reveal that the sample plays a significant role in determining the relationship between ownership status and bank profitability.

Including both macroeconomic and bank-specific variables simultaneously in the specification may improve the model's explanatory power and offer broader perspectives on banks' profitability. Investigating the bank-specific and macro-economic determinants of Indian commercial banks’ profitability using pooled, fixed, and random effects models and GMM for 69 commercial banks in India ranging over the period 2008-2017, Al-Homaidi et

al. (2018) underlined the importance of including both bank-specific and macroeconomic factors in the study and found that the profitability of Indian commercial banks measured by three different variables (return on asset, return on equity, and net interest margin) seems to be explained by the majority of bank-specific and macroeconomic factors included in the study. In addition, by examining the financial inclusion and bank profitability of 122 Japanese banks using ordinary least square, fixed effects, and system GMM for the period spanning from 2004 to 2018, Kumar et al. (2021) emphasized that inflation and growth are the key macroeconomic factors explaining bank profitability significantly. However, exploring the determinants of bank profitability in the South Eastern European region for the 71 to 132 banks employing fixed and random effects within the period from 1998-2002, Athanasoglou et al. (2006) revealed that inflation seems to have an influence on bank profitability while real GDP per capita does not have any effect on it. Since macroeconomic determinants have strong explanatory power in explaining the bank profitability and may serve as possible transmission channels between oil prices and bank profitability, it is vital to include macroeconomic determinants in this study in addition to the bank-specific variables.

Table 1 below shows the summary of the literature on bank profitability. The table contains the following information for each study: author(s), investigated banking sector, sample, data period, methodology, and empirical results. To comprehensively understand the link between oil and bank profitability, the direct and possible indirect impacts of oil prices on bank profitability must be scrutinized closely. The next section discusses the bank profitability and oil nexus before the study elaborates on the possible transmission mechanism between the oil market and bank profitability. In other words, the direct relationship will be examined first, and then the possible indirect effects (possible transmission mechanism, inflation, exchange rate, and economic growth) will be treated next.

Table 1: Summary of Literature on Bank Profitability

Author(s)	Banking Sector Investigated	Sample	Data Period	Methodology	Empirical Results
Short (1979)	Canada, Western Europe, and Japan	60 Banks	1972-1974	Ordinary Least Square	The increasing market power results in greater bank profits.
Smirlock (1985)	US	2704 Banks	1973-1978	Ordinary Least Square	Size has a positive and significant impact on bank profitability.
Rhoades (1985)	US	6492 Banks	1969-1978	Ordinary Least Square	Market share plays a significant role in increasing bank profitability.
Bourke (1989)	12 EU Countries, North America, and Australia	90 Banks	1972-1981	Ordinary Least Square	The results indicate that bank size, capital adequacy, liquidity ratios, and interest rates are all positively related to bank profitability.
Molyneux and Thornton (1992)	18 EU Countries	1371 Banks	1986-1989	Ordinary Least Square	While capital ratio, concentration, government ownership, nominal interest rates, and staff expenses are positively related to profitability, there is a weak inverse relationship between liquidity and profitability.
Berger (1995a)	US	4800 Banks	1980-1989	Ordinary Least Square	Banks with greater market share and diversified products turn out to be more profitable.
Berger (1995b)	US	Over 80.000 Banks	1983-1989	Grainger Causality Test	There is a positive relationship between bank capitalization and profitability, and each variable positively Granger-caused the other.
Miller and Noulas (1997)	US	201 Banks	1985-1990	Ordinary Least Square and Fixed Effects	While the influence of real estate loans on bank performance is negative, construction and land development loans have a strong positive effect on bank performance. Moreover, bank performance is inversely related to loss provisions to total loans and non-interest expense to total expenses, while this relationship turns out

					to be positive in the case of salary and benefits per employee, non-interest income to total income, consumer loans to total loans, total deposits to total assets, and total transactions deposits to total deposits.
Demirgüç-Kunt and Huizinga (1999)	80 Countries	7900 Banks	1988-1995	Weighted Least Square	While the impact of inflation, bank concentration, and a more competitive banking sector (making up a larger portion of GDP) on bank profitability are positive, banks with relatively high non-interest earning assets and relying more on deposits for their funding seem less profitable. Furthermore, foreign banks earn more than domestic banks in developing countries, but the opposite is valid for industrial countries.
Goddard et al. (2004a)	5 EU Countries	583 Banks	1992-1998	Two-Step System GMM	The persistence of profit appears to be higher for savings and cooperative banks than for commercial banks. Banks with high capital–assets ratio or a high liquidity ratio have a tendency to make a modest profit on average. While the positive relationship between concentration and profitability supports the concept of the SCP hypothesis, there is a weak association between bank-level x-inefficiency and profitability.

Goddard et al. (2004b)	6 EU Countries	665 Banks	1992-1999	Ordinary Least Square and Two-Step System GMM	Even though the competition among banks has become fierce, there is apparent evidence of significant profit persistence, emphasizing the insufficiency of growth in competition. The result indicates that the influence of off-balance sheet items on bank profitability differs across the countries. The impact of ownership and size on bank profitability is unconvincing, while the capital-assets ratio significantly and positively affects bank profitability.
Athanasoglou et al. (2006)	7 South Eastern European Countries	71 to 132 Banks	1998-2002	Fixed and Random Effects	There is apparent evidence that competitive interest rates and operating efficiency have a crucial impact on bank profit rates. Concentration is positively and significantly associated with bank profitability implying the existence of the SCP hypothesis. Finally, with respect to the macroeconomic variables, while inflation seems to have an influence on bank profitability, real GDP per capita does not have any effect on it.
Pasiouras and Kosmidou (2007)	15 EU Countries	584 Banks	1995-2001	Fixed Effects	Bank-specific and macroeconomic factors and market structure affect the profitability of both domestic and foreign banks.

Athanasoglou et al. (2008)	Greece	-	1985-2001	System GMM	Banks seem to maintain moderate profit persistence from one year to the next, implying that the deviations from the perfectly competitive market are insignificant. All bank-specific factors (capital, credit risk, productivity growth, operating expenses management) except size have a significant effect on bank profits, and the sign of the impact is as expected. Turning to the macroeconomic variables, inflation and business cycle have a positive and significant impact on bank profits. Moreover, there is no evidence to support the effect of the SCP hypothesis and the ownership status on the profitability of Greek banks.
Dietrich and Wanzenried (2011)	Switzerland	372 Banks	1999-2009	System GMM	The results illustrate that operational efficiency, the growth of total loans, funding costs, the business model, and the effective tax rate are the main determinants of Swiss bank profitability. During the financial crisis, state-owned banks perform better than privately-owned banks. The dynamic model employed shows that the bank profits tend to persist, indicating the existence of obstacles to market competition, informational opacity, and sensitivity to regional and macroeconomic shocks.
Goddard et al. (2013)	8 EU Countries	4787 Banks	1992-2007	System GMM	Efficient and well-diversified banks earn higher profits, but profitability is lower for highly capitalized banks. There is evidence of declining profit persistence from one year to the next after introducing the euro and the execution of the Financial Services Action Plan.

Dietrich and Wanzenried (2014)	118 Countries	10165 Banks	1998-2012	System GMM	The determinants of profitability differ according to the varying income levels of the countries. Thus, the level of income plays a crucial role in determining profitability.
Robin et al. (2018)	Bangladesh	12 Banks	1983-2012	Random Effects	Empirical results indicate that post-financial reform does not help improve banks' profitability except for the variable of net interest margin. Larger banks seem to be more profitable than smaller banks implying the more concentration the banking sector is exposed to, the greater profits they can earn.
Al-Homaidi et al. (2018)	India	69 Banks	2008-2017	Pooled, Fixed, Random and GMM	The profitability of Indian commercial banks measured by three different variables (return on asset, return on equity, and net interest margin) seems to be explained by the majority of bank-specific and macroeconomic factors included in the study.
(Bouzgarrou et al. (2018)	France	170 Banks	2000-2012	System GMM	The result shows that foreign banks in France appear to be more profitable than domestic banks.
Le and Ngo (2020)	23 Countries	20 to 22 Banks	2002-2016	System GMM	The number of bank cards issued can improve bank profitability, the number of automated teller machines (ATMs), and the number of point of sale (POS) terminals. Concentration has a negative impact on bank profitability, reflecting that competition enhances bank profitability. There is a positive association between capital market development and bank profitability, implying that they can be regarded as complementary.

Kumar et al. (2021)	Japan	122 Banks	2004-2018	Ordinary Least Square, Fixed Effects, and System GMM	While there is a negative association between branch contraction and bank profitability in Japan, the numbers of loan accounts and automated teller machines (ATMs) do not have any impact on bank profitability. Cost management, credit risk management, and bank size are the key bank-specific factors explaining bank profitability. Moreover, inflation and growth are also macroeconomic determinants of bank profitability.

Source: Created by the author.

1.3. Bank Profitability and Oil Nexus

Oil is one of the non-renewable sources of energy that plays an important role in almost all economic activities. Its importance stems from its use as an input in productive activities, making it one of the vital production factors. It is widely used in almost all the sectors, such as transportation, heating, and industrial sectors. Despite the continuous development of alternative and renewable energy sources, oil stands out as the greatest energy source, providing the majority of global energy use.

There is a broad literature available on the relationship between oil price changes and macroeconomic activities (see: Hamilton (1983), Hamilton (1996), Cunado and Pérez de Gracia (2003), Jones et al. (2004), Kang and Ratti (2013b), Kang and Ratti (2013a), Togonidze and Kočenda (2022)). However, there is limited research on the effect of oil on bank profitability (see: Poghosyan and Hesse (2009), Katırcıoglu et al. (2018), Lee and Lee (2019)). That limited research revolves around either the oil-exporting countries or country-specific studies. However, this research aims to investigate the (direct or indirect) impact of oil prices on bank profitability by comparing Islamic, conventional, and investment banks in a group of net oil-importing countries.

Oil price shocks or fluctuations are one of the major sources of economic instability, causing major microeconomic and macroeconomic indicators to deteriorate. The impact of oil shocks or fluctuations on bank profitability attracts the attention of researchers, bankers, market participants, policymakers, and regulators whose main objectives are to strengthen the resilience and stability of the financial system. Oil price shocks or fluctuations might have either a direct effect on bank profitability of oil-importing countries through the changes in the demand for financing of households, firms, and governments; or indirect through macroeconomic channels, such as inflation, economic growth, and exchange rate.

Analyzing the link between oil price fluctuations and bank profitability (measured by the return on asset) employing system GMM for 145 banks from 11 oil-exporting Middle Eastern and North African (MENA) countries (Algeria, Bahrain, Iran, Kuwait, Libya, Oman, Qatar, Saudi Arabia, Sudan, United Arab Emirates, and Yemen) covering the period 1994-2008,

Poghosyan and Hesse (2009) revealed that oil price shocks indirectly affect bank profitability, and the shocks are channeled through country-specific macroeconomic and institutional variables. It seems that the influence of oil price shocks on bank profitability is more apparent in investment banks as compared to conventional and Islamic banks. The significant impact of oil prices on investment banks' profitability is explained by higher market demand for underwriting services during bullish market conditions. While bank-specific variables, such as capitalization (equity to total assets) and liquidity (liquid assets to deposits), have a positive influence on bank profitability, and the effect of inefficiency (costs to income) on the banking performance appears to be negative, credit risk (loan loss reserves to loans) and size (log of total assets) are not related to bank profitability. As for the country-specific macroeconomic factors, while inflation (CPI rate) and fiscal stance (government surplus to GDP) demonstrate positive and significant association with bank profitability, there is an absence of a relationship between bank profitability and some macroeconomic factors, namely GDP growth (real GDP growth), institutional development (CPIA index from the World Bank) and concentration (Herfindahl-Hirschman index). The methodological approach of Poghosyan and Hesse (2009) establishes the basis of the present research.

Some studies depicted that the impact of oil on bank profitability may differ based on the time period considered. Because regardless of whether oil exporters or importers, countries take lessons from past experiences and modify their policies by taking precautionary measures to immunize the negative impact of oil price changes. On that account, applying the ordinary least square method on a sample of 10 Canadian banks over the period between 1995 and 2015, Xu and Xie (2015) found that there is apparent evidence of a significant and positive relationship between the oil price and bank profitability in the early period (before the 2008 Global Financial Crises). However, this relationship disappears in the second period, reflecting the immunization of Canadian banks to oil price fluctuation.

Some studies explore the impact of oil on individual bank profitability rather than a group of banks. This can provide more accurate and precise measurements as the results are not interpreted based on the average (mean) value of a group of banks. For instance, Palanisamy and Prabhakaran (2018) examined the impact of oil prices and macroeconomic variables on

the profitability of Bank Muscat, which is a private bank located in Oman, covering the period between 2010 and 2016 using the ordinary least square method. The authors explored that the impact of oil prices on bank profitability seems insignificant, implying that the effect might be channeled through bank-specific and macroeconomic variables because correlation analysis depicts interdependency among these variables. Since Oman is a net oil exporter country, falling oil prices may lead to less revenue generated by the oil sector and end up with lower growth of bank deposits. This will lower the spending of economic agents and, consequently, their demand for financing, affecting the bank's profitability adversely. Similarly, Al-Harthy et al. (2021) investigated the impact of oil prices on bank profitability by employing the random effects model on a sample of the seven largest commercial banks in Oman for the period spanning from 2013 to 2017. The research presented evidence of no association between oil prices and commercial bank performances. Although this study is an extension of the first, the result is in line with the previous work, with the only exception that no transmission channel is introduced between oil prices and bank profitability.

Another important research area of bank profitability and oil relationship is to investigate the issue from an individual oil-importing country's perspective. Analyzing the long-run equilibrium relationship between the banking sector’s profitability and oil prices in addition to some macroeconomic determinants in Türkiye using the autoregressive distributed lag (ARDL) model over the period between 1960 and 2015, Katırcıoglu et al. (2018) revealed that there exists a long-run equilibrium link between bank profitability and oil prices. The authors asserted that oil price changes have a direct and negative impact on bank profitability due to the decline in oil-related business lending. Moreover, it is observed that there is an indirect effect of oil price changes on bank profitability through the channels of inflation. The result of this research is important in terms of highlighting the importance of incorporating transmission channels into the specification. In contrast, studying the impact of oil price shocks on the performance of 85 U.S. banks using fixed effects and system GMM over the period between 2009 and 2020, Patrão (2021) found that oil price shocks have a direct and positive effect on bank performance. Even though these two countries are net oil importers, the results appear to be contradictory. This contradiction shows researchers that

the relationship between oil and bank profitability may vary depending on the sample considered.

A growing body of literature revolves around studies investigating the relationship between oil and bank profitability from the perspective of an oil-exporting country. These studies have significant implications for the policies of bank executives, banking supervisors, and policymakers because they show that they must carefully consider and scrutinize oil price market fluctuations in order to be able to anticipate the risks that may generate for the banking sector (Patrão, 2021). Investigating the impacts of the global decline in oil price on the financial performance of three deposit money banks in Nigeria employing the ordinary least square method for the period 2000-2016, Osuma et al. (2019) found that a decline in oil prices has a negative effect on the performance of banks that provided syndicated loans to the oil and gas sector. This result is in harmony with expectations because falling oil prices lead to reduce oil revenue in Nigeria and, consequently, lower demand for financing of the oil sector, resulting in a negative impact on bank profitability. Likewise, analyzing the performance of 22 Canadian banks and oil price movements using the system GMM within the period from 1996 to 2018, Killins and Mollick (2020) unveiled that oil prices tend to have a positive impact in both a direct and indirect manner on bank profitability. Furthermore, when oil interacts with non-interest income, the coefficient turns out to be a significantly positive effect on bank profitability. This can be interpreted as evidence that oil price hikes give rise to more banking transactions (derivatives, fees) and, as a result, increase the bank profits. Moreover, examining the oil price shocks on the performance of 22 UAE banks (comparing conventional and Islamic banks) utilizing the random effects model over the period between 2013 and 2017, Kandil and Markovski (2019) showed that falling oil prices have an adverse influence on banking performance, which is in line with the expectations. The authors further explained that lower oil prices had a negative effect on the growth of assets and liabilities as a result of the slowdown in economic activity, fiscal consolidation, and falling levels of employment. Thus, deterioration in the growth of assets and liabilities consequently reduces banking profitability.

Another strand of literature discusses the response of bank profitability to oil price shocks in a group of oil-exporting countries. Discussing the impact of oil and gas price shocks on the performance of 70 banks in the Gulf Cooperation Council (GCC) countries utilizing system GMM over the period between 2000 and 2017, Saif-Alyousfi et al. (2021) indicated that the surge in oil prices has direct consequences on bank performance through the channel of price-induced bank deposits and related lending to business activities. The negative impact of the falling oil prices on bank performance is greater than the positive impact of the rising oil prices, implying the presence of an asymmetric effect of oil prices on the bank profitability of Islamic and conventional banks. While Islamic banks are more sensitive to the negative shocks of oil prices, conventional banks benefit more from the increased cash flow generated by rising oil prices. Besides, the authors provided evidence that the nexus between oil prices and bank performance in GCC has been distorted and negatively affected by the ongoing Yemen War, the Arab Spring, and Global Financial Crisis.

Similar to the previous research, applying the GMM model for a sample of 92 banks in GCC for the period spanning from 2002 to 2017 to assess the factors influencing banks' performances amid oil price fluctuations, Mahmah and Trabelsi (2021) argued that oil prices significantly influence banking performance, and contrary to the previous findings, the authors asserted that the business structure makes conventional banks more vulnerable to oil price falls than Islamic banks because Islamic banks seem to maintain and increase their lending portfolio even during low oil prices. However, conventional banks appear to perform better due to raising funds at a lower cost and earning higher returns on lending, implying the economies of scale. In addition, Esmaeil et al. (2020) studied the effects of oil price fluctuations, Arab revolutions, and bank-specific and macroeconomic variables on the profitability of 40 GCC banks using the ARDL model covering the period between 2008-2017 and found a positive and significant relationship between oil prices and bank profitability, which is in harmony with the previous results. The results appear similar for both Islamic and conventional banks due to the same regulatory framework to which they are exposed. Oil price fluctuations and Arab springs have a more profound impact on conventional banks as compared to Islamic banks. Similar to previous results, Islamic banks

are found to sustain their profits during the shocks better than conventional banks because the speed of adjustment for Islamic banks is higher in the case of unexpected shocks.

It is worthy of note that some studies use other dependent variables apart from commonly used variables to measure bank profitability. The majority of studies use an average return on asset and an average return on equity to measure the bank's performance; however, the followings are the other determinants used to specify bank performance: net interest margin, bank stock returns, bank indices, lending growth, net profit ratio, and Tobin's Q. It is worth emphasizing that these other determinants are usually employed in addition to the commonly used variables to support the empirical results. They are rarely used alone to measure the bank's performance.

Table 2 below illustrates all relevant literature on the link between oil and bank performance. The table contains the following information for each study: author(s), investigated banking sector, sample, data period, methodology, and empirical results. Following the discussion, this study tests whether the impact of oil on the bank performances of net oil-importing countries is significant. Would this effect be different for Islamic, investment, and commercial banks? Besides, this study tests the indirect effect of oil on banking performance through various transmission channels, such as inflation, exchange rate, and economic growth.

While the possible direct and indirect impact of oil on the bank profitability is explained here, in the following section, we would like to provide more details on the link between oil and possible transmission channels, say inflation, economic growth, or foreign exchange, respectively.

Table 2: Summary of Literature on Bank Profitability and Oil Nexus

Author(s)	Banking Sector Investigated	Sample	Data Period	Methodology	Empirical Results
Poghosyan and Hesse (2009)	11 Oil-Exporting MENA Countries	145 Banks	1994-2008	System GMM	The empirical results show that oil price shocks indirectly affect bank profitability, and the shocks are channeled through country-specific macroeconomic and institutional variables. It seems that the influence of oil price shocks on bank profitability is more apparent in investment banks as compared to conventional and Islamic banks.
Xu and Xie (2015)	Canada	10 Banks	1995-2015	Ordinary Least Square	There is apparent evidence of a significant and positive relationship between the oil price and bank profitability in the early period. However, this relationship disappears in the second period, reflecting the immunization of Canadian banks on oil price fluctuation.
Khandelwal et al. (2016)	6 GCC Countries	42 Banks	1994-2014	System GMM	The results indicate that oil prices significantly affect the bank asset quality. It also reveals feedback loops between oil price movements, bank balance sheets, and asset prices.
Saif-Alyousfi et al. (2018)	Qatar	8 Banks	2000-2016	System GMM	The results show that oil and gas price shocks indirectly impact non-performing loans of Qatari banks through the channels of GDP growth, fiscal position, and the unemployment rate.
Palanisamy and Prabhakaran (2018)	Oman	1 Bank	2010-2016	Ordinary Least Square	The impact of oil prices on bank profitability seems insignificant, implying that the effect might be channeled through bank-specific and macroeconomic variables.

Katırcıoglu et al. (2018)	Türkiye	-	1960-2015	ARDL	There is a long-run equilibrium relationship between bank profitability and oil price changes. Moreover, there is a direct and negative impact of oil price changes on bank profitability as a result of the decline in oil-related business lending. It is also observed that oil price changes have an indirect effect on bank profitability through the channels of inflation.
Osuma et al. (2019)	Nigeria	3 Banks	2000-2016	Ordinary Least Square	The study found that a decline in oil prices has a negative effect on the performance of banks that provided syndicated loans to the oil and gas sector.
Kandil and Markovski (2019)	UAE	22 Banks	2013-2017	Random Effects	Falling oil prices adversely influence banking performance in line with expectations.
Lee and Lee (2019)	China	182 Banks	2000-2014	System GMM	Oil prices have significant effects on bank performance.
El-Chaarani (2019)	8 Oil Producing Countries	36 Banks	2002-2017	Ordinary Least Square	While oil price movements directly impact the bank performance of Bahrain, Oman, and Iran, the result reveals no direct relationship between oil price fluctuations and bank performance for Jordan, Kuwait, Qatar, Saudi Arabia, and the United Arab Emirates.
Esmaeil et al. (2020)	5 GCC Countries	40 Banks	2008-2017	ARDL	The results disclose the positive and significant relationship between oil prices and bank profitability.
Alqahtani et al. (2020)	GCC	Banking Price Indices	2010-2017	DOLS and FM-OLS	The research reveals that oil prices affect bank indices positively. However, the association becomes negative after the former reaches around $95 per barrel. This is close to the psychological barrier that exists in the equity market in the U.S.

Killins and Mollick (2020)	Canada	22 Banks	1996-2018	System GMM	The finding suggests that oil prices have a tendency to have a positive impact in both a direct and indirect manner on bank profitability.
Mahmah and Trabelsi (2021)	GCC	92 Banks	2002-2017	System GMM	The empirical findings provide evidence that oil prices significantly influence banking performance. The business structure makes conventional banks more vulnerable to oil price falls than Islamic banks.
Al-Harthy et al. (2021)	Oman	7 Banks	2013-2017	Random Effects	The research presents evidence of no association between oil prices and commercial bank performances.
Saif-Alyousfi et al. (2021)	GCC	70 Banks	2000-2017	System GMM	The results depict that oil and gas price rises have direct consequences on bank performance through the channel of price-induced bank deposits and related lending to business activities.
Patrão (2021)	US	85 Banks	2009-2020	Fixed Effects and System GMM	The main finding of the research is that oil price shocks have a direct and positive effect on bank performance.

Source: Created by the author

1.4. Possible Transmission Channels of Oil Prices on Bank Profitability

1.4.1. Oil and Inflation Nexus

The literature on the relationship between crude oil and inflation is well documented. Some studies argued potential categories of oil price shocks and provided evidence that oil price has a pass-through impact on inflation (Barsky & Kilian, 2004; Bhar & Mallik, 2013; S.-S. Chen, 2009), while other studies indicated that the effect of oil prices on inflation has declined over time due to various reasons, such as a decline in the share of oil in consumption and production, improvement in monetary policies, improvement in energy efficiency, flexible labor market, an absence of concurrent negative shocks, deregulation in the transportation sector, a lesser degree of persistence of oil price shocks (Blanchard & Gali, 2007; Castillo et al., 2020; Choi et al., 2018; Hooker, 2002; Katayama, 2013; Mankiw, 2007; Tiwari et al., 2019). Although some studies showed oil prices have more impact on oil-importing countries (Salisu et al., 2017), others asserted that oil-exporting countries are more affected (Raheem et al., 2020). Some studies depicted the existence of the influence of oil prices on inflation at different time horizons (Köse & Ünal, 2021; Lacheheb & Sirag, 2019; Raheem et al., 2020; Salisu et al., 2017; Tiwari et al., 2019; Zakaria et al., 2021), while some studies highlighted the asymmetric relationship between oil prices and inflation (Choi et al., 2018; Lacheheb & Sirag, 2019; Raheem et al., 2020; Salisu et al., 2017; Zakaria et al., 2021).

Several studies identify different categories of oil shocks to determine the source of their occurrences. These categories of oil shocks enable policymakers to take appropriate measures to mitigate future inflationary effects. Examining the impact of oil price increases on inflation and output in India using the vector autoregression model for the period from 1994 to 2000, Bhattacharya and Bhattacharyya (2001) presented that 20% oil price shocks give rise to a 1.3% increase in inflation of other commodities and the effect of oil price changes reflects on prices five to seven months after the shock. The impact of shocks on inflation has tended to prevail for around two years, although the magnitude of shocks has been weaker towards the late period. Besides, the study emphasizes the causes of oil price shocks, whether it derives from demand or supply factors, referring to the monetary authority effectiveness in the case of demand factors. Moreover, Raheem et al. (2020) extended the

current literature by introducing three kinds of oil price shocks on inflation. The author covered all G7 countries using monthly data from 1997 to 2019 and revealed that demand, supply, and risk shocks have a dynamic impact on the inflation rate. Moreover, Chen (2009), using monthly data from 1973 to 2007 for the sample of United States and 19 Organisation for Economic Co-operation and Development (OECD) countries, employs structural vector autoregression model to study inflationary effects of oil prices. The study introduces three kinds of shocks in the crude oil market: oil supply, global demand and oil-market specific demand shocks. The different data set led to different results in his case. Although the evidence for the whole data set presented that largest conditional oil price pass-through ratio emanates from oil supply shocks, historical decomposition of oil price (1973-1984) suggests that global aggregate demand and oil-market specific demand are the main drivers of oil price movements.

There is growing literature emphasizing the weaker relationship between oil prices and inflation. Mankiw (2007) asserts that improvement in energy efficiency could be one important reason because today's world is much more energy-efficient than in the past. Blanchard and Gali (2007) offers four potential explanation for the weaker relationship between inflation and oil prices: good luck (an absence of concurrent negative shocks), a decline in the share of oil in consumption and production, advancement in monetary policy, and more flexible labor markets.

Examining 72 advanced and emerging economies for the period spanning from 1970 to 2015, Choi et al. (2018) shed light on the effect of oil price volatility on domestic inflation, showing a 10% rise in oil prices results in a 0,4% growth in domestic inflation. This effect lasts only two years, and then it disappears. Interestingly, the study illustrates an asymmetric relationship between oil prices and inflation, with positive oil price shocks having a greater impact than negative shocks. This study highlights the significance of a more credible monetary policy and less dependence on energy imports for the weakening link between oil prices and inflation. Their results also show that transportation and energy subsidies serve as a transmission channel between oil prices and inflation, supporting the previous explanations above. Similarly, studying the declining effects of oil price shocks on U.S. macroeconomic

variables between 1951-2007, Katayama (2013) documented the evidence that the impact of oil price shocks has been becoming weaker on macroeconomic determinants due to three possible factors: deregulation in the transportation sector, improvement in the energy efficiency and lesser degree of persistence of oil price shocks.

Moreover, using wavelet coherence analysis on a U.S. sample over the period from 1871 to 2018, Tiwari et al. (2019) found that there has been a decline in the oil price-inflation pass-through over the period, and the causality runs from oil prices to inflation, indicating that oil prices are the leading variable. The empirical results documented the evidence that the oil prices-inflation nexus appears to be stronger in the medium and long runs, implying the long-term effects of oil prices on inflation. The weakening of the relationship between inflation and oil prices is due to the implementation of more credible monetary policies. Analyzing the association between oil price fluctuations and inflation of the U.S. economy for the period from 1973 to 2019 using the standard New Keynesian micro-founded model, Castillo et al. (2020) discovered that higher oil prices lead to higher levels of average inflation, especially when the central bank reacts to output fluctuations. This implies that suitable monetary policy instruments responding more strongly to the changes in expected inflation can alleviate the influence of oil price volatility on inflation. This could also offer a potential explanation of the weakening link between oil price volatility and inflation after 2002.

However, some studies do not support the reasons mentioned above for the weak relationship, only highlighting the central bank policies as effective tools to lessen the impact of oil prices on inflation. For instance, investigating the influence of oil price shocks on inflation in the U.S. market ranging over the period 1962-2000, Hooker (2002) reported that oil prices contributed considerably to U.S. inflation before 1981, but afterward pass-through effect was trivial. His findings do not lend support to the hypothesis that a decline in the share of energy or deregulation of energy-producing and -consuming industries play a significant function in the declining effects of oil prices on inflation. Instead, the monetary policies created an environment where inflation becomes less sensitive to oil price changes.

Though some empirical results have shown that oil prices exert more influence on net oil-importing countries than oil-exporting ones, others argued that the opposite is true. For

example, Salisu et al. (2017), using the Mean Group (MG) and Pool Mean Group (PMG) estimator, studied the role of asymmetries in the oil price-inflation relationship for some net oil-importing and -exporting countries employing the data from 2000 to 2014. The results demonstrate the presence of a long-run relationship for both samples and oil prices exert greater influence on the inflation of net-oil importing countries than the oil-exporting ones. The oil price asymmetries appear to be more important for oil-exporting countries. On the contrary, using the non-linear autoregressive distributed lag (NARDL) model for a sample of 20 oil-importing and exporting countries for the period between 1986 and 2017, Raheem et al. (2020) endeavored to explore whether there exists an asymmetric relationship between oil price and inflation. The research provides evidence for oil-exporting countries that inflation rises at a higher degree in response to an increase in oil price; however, it falls at a slower magnitude for the oil price decline. The study suggests that oil-exporting countries use government subsidies when there is a positive oil price shock and use taxes when there is a negative oil price shock, highlighting government intervention in domestic oil prices. For the oil-importing countries, the association between oil prices and inflation is weak, and also oil prices have only a short-run effect on inflation.

Identifying when the inflationary effect of oil prices occurs is as important as determining the existing relationship between them, as this will enable policymakers to make the necessary decisions at appropriate times. Köse and Ünal (2021) investigated the effect of oil price and oil prices volatility on inflation in Türkiye (an oil-importing country) over the period from 1988 to 2019 and documented the limited effect of oil prices and oil prices volatility on inflation in the early months but more effective over the subsequent months. According to the author, the probable cause may be related to the nature of this commodity, such as the long-term purchase contract and inventories held. In the same manner, Zakaria et al. (2021) investigated the extent of the association between world oil prices on inflation rates in South Asian countries employing cointegration, vector autoregression model, and non-linear methods over the period between 1980 and 2018. The analysis shows a long-term relationship between oil prices and inflation, and the causality runs from oil prices to inflation.

Some studies have looked into the non-linear and asymmetric relationship between oil prices and inflation. They have probed whether or not oil price rises affect inflation differently than declines in oil prices. It is interesting to note that a vast number of researchers have reported the presence of the non-linear and asymmetric relationship between these two variables. Lacheheb and Sirag (2019) focused on the nexus between oil price changes and inflation in Algeria employing NARDL on the data ranging from 1970 to 2014, depicted that there exists an asymmetric relationship between oil prices and inflation, indicating that rising oil prices have a tendency to escalate price levels while a decline in oil prices seem to be an insignificant effect on inflation. Furthermore, the estimated results confirm that oil prices appear to have an impact on price levels in both the short and long terms. Zakaria et al. (2021) also confirmed the same notion by employing the N-ARDL model that documented the evidence of the asymmetric impact of oil prices on the inflation rate, as positive oil price shocks significantly affect general price levels, and negative oil price shocks are unrelated to inflation. The primary causes of oil price pass-through to inflation in the sample countries are high global oil prices, high depreciation of the local currency, and less active monetary policy.

Given the net oil-importing countries, changes in oil prices may have either direct or indirect effects on inflation. An increase in oil prices might push up the prices of goods and services made with petroleum products and directly affect inflation. The indirect impact occurs when the rise in oil prices reflects on the costs of transportation, heating, cooking, electricity and so on. Because companies may pass production costs on to their customers, a rise in these expenses may have an impact on the prices of a wide range of goods and services. The degree of impact of oil prices on inflation hinges on the level of oil and petroleum products used during the production of goods and services (Federal Reserve Bank of San Francisco, 2007). In turn, inflation will raise the cost of capital, thus, reducing the demand for loans and ultimately diminishing the bank's profitability.

1.4.2. Oil and Economic Growth Nexus

There is a vast and growing literature documenting the nexus between oil and economic growth. Those researches revolve around exploring ten main interests:

- key factors affecting the nexus between oil and economic growth,
- theoretical approaches to the issue in question,
- the impact of this relationship on a global scale,
- based on country classifications, such as resource-rich and resource-poor countries,
- multiple time dimensions of the impact,
- temporary and permanent effects of one variable on another,
- the origins and the directions of effect,
- symmetrical vs. asymmetrical relationship,
- linear vs. non-linear relationship,
- policy recommendations about the repercussions of this relationship on the economy.

This section discusses each subject matter in detail and explores ongoing discussions. Revealing the whole framework on this subject will provide its readers with a broad perspective.

The impact of oil price shocks on economic growth may differ depending on whether the effect originates from oil demand or supply. Some studies in the literature analyze the impact of oil price shocks on economic growth by decomposing the sources of oil price shocks into three, namely, oil supply shocks, specific oil demand shocks, and aggregate oil demand shocks (Chatziantoniou et al., 2013; Gong et al., 2021).

Oil supply shocks imply any unexpected disruptions in the oil supply side. Political tensions, wars, natural disasters, and similar incidents can adversely affect the oil supply, disrupting oil production. For instance, the war in Libya and Iraq and political tensions in Russia (due to the war between Russia and Ukraine) and Venezuela, and hurricanes in the U.S. can have a profound impact on the global oil supply chain, affecting world economic growth. Aggregate oil demand shocks refer to abrupt changes in global oil demand. Such changes, for instance, may occur because of positive or negative market expectations in economies, ending up with more or less oil demand on a global scale. As for the specific oil demand shocks, Kilian (2009) describes it as a shock that occurs when higher precautionary oil demand arises related to uncertainty about the future availability of oil supplies or vice versa. For example, the Middle East supplies almost one-third of global oil consumption. Wars and

turmoil in the Middle East push some countries to stockpile oil beyond their needs in case of future shortages, and this creates specific oil demand shocks in the oil market.

Examining the dynamic effects of oil price shocks on macroeconomics and different industries in the Chinese economy ranging from January 2001 to June 2019, Gong et al. (2021) discovered that oil supply and specific oil demand shocks have a tendency to increase oil prices and reduce economic output over the short term. In contrast, an increase in oil prices generated by aggregate oil demand shocks has the propensity to boost economic output. This is probably due to the effect of aggregate oil demand shocks on the economic output being higher than the negative effect of increasing oil prices. Likewise, Chatziantoniou et al. (2013) found a significant positive influence of aggregate oil demand shocks on economic growth in four European Mediterranean countries while emphasizing the absence of the impact of oil supply and specific oil demand shocks on economic growth.

Analyzing the effect of oil price shocks on the economic growth of 16 MENA countries using Structural vector autoregressive (SVAR) methodology on yearly data ranging from 1952 to 2005, Berument et al. (2010) uncovered that one standard deviation shock in oil prices has a positive and significant impact on the growth of the most net oil-exporting economies. In order to have a deep understanding of oil price shocks on the economic growth of the rest of the countries, the authors distinguished the oil shocks as oil demand and oil supply shocks. They discovered that while positive oil supply shocks led to output declines, positive oil demand shocks gave rise to output growth. In general, it seems that if a rise in prices stems from supply disruptions, the effect tends to have more negative consequences than the demand side.

Oil has a low price elasticity of demand and supply, meaning that very large price fluctuations are required to significantly increase supply or decrease demand. Even a minor unanticipated oil supply disruption may cause a price rise. Moreover, rapidly rising global economic growth results in increasing oil demand due to the relatively high-income elasticity of oil demand. If the aggregate demand for oil is larger than its aggregate supply due to rapid economic growth, this might cause a significant rise in oil prices. Consequently, rising oil prices account for a larger share of GDP, affecting economic growth adversely. The above-mentioned cycle

describes the periodic relationship between global GDP growth and oil prices (Difiglio, 2014). Coglianese et al. (2017) documented the evidence that the price elasticity of oil supply is lower than the price elasticity of oil demand since it is hard to raise oil production instantly. In addition, when oil prices fluctuate at their low level, and there is high spare capacity available in markets, the world economy becomes less sensitive to the economic consequences of disruption in oil price spikes.

Zhang (2008) stated that oil shocks might have immediate and postponed effects. Immediate effects may emerge from the demand side of the economy. Large oil price increases may diminish aggregate demand at a macro level and reduce individual consumption at a micro level. The postponed effect is more related to the supply side. An increase in oil prices leads to inflation and, in turn, reduces real wages and labor supply. In addition, it may also influence investors' decisions, but its effect on output is delayed.

According to the Keynesian approach, an increase in oil prices diminishes the real wages in oil-importing countries; thus, this reduces labor supply and, consequently, output falls. Based on the supply-side theory, an increase in oil prices makes energy, considered one of the factors of production, more expensive for firms. Thus, firms will reduce their demand for energy because of higher costs, which will result in less production. Even though both theories emphasize the negative relationship between oil prices and economic growth in oil-importing countries by providing the same end results, they bring different approaches to the subject matter in question. There is another approach to the relationship between energy and economic growth, claiming that energy is neutral to growth because energy accounts for a small share of GDP. This approach is called the "neutrality hypothesis" in the literature (Guenichi, 2014). Guenichi (2014) investigated the effects of oil price shocks on different sectors in Tunisia and documented that oil price shocks do not exert any influence on the agricultural and service sectors while discovering the significant association between oil prices and the industrial sector. The author concluded that contrary to the neoclassical theory, energy is not neutral to economic growth.

Oil price declines are often perceived as a positive stimulus to global economic growth because they transfer the wealth from oil producers to oil consumers, the latter of which are

typically economies with a higher propensity to spend than the former (Kirby & Meaning, 2015). The expansion of world oil demand and an increase in oil prices may become important factors to oil producers and the world economic growth because oil-exporting countries may stimulate world economic growth by investing their oil revenues across the countries. This may result in favorable economic conditions when the revenues are channeled into effective investment areas. For this to be achieved, the positive impact of those investments is required to outweigh the adverse effect of oil price rises. In addition, Cologni and Manera (2014) unveiled that changes in the world oil demand have a statistically significant impact on the output while oil-exporting countries' reactions to price shocks are substantially weaker. It simply implies that oil-importing countries pay close attention to price changes and react faster than the former.

It is more appropriate to classify countries based on net oil importers or exporters to gain a deeper understanding of the impact of oil price shocks on different sets of countries. Positive oil price shocks may have the immediate impact of raising the cost of production for oil-importing countries. This probably declines the output in response, and the slope of the aggregate demand curve determines the magnitude of the decline. Moreover, higher oil prices lead to a decline in the disposable income in the economy and, consequently, reduce consumption. When oil price rises are regarded as permanent, private investment also declines.

Furthermore, when rises in oil prices have been persistent, it may negatively affect the use of oil in the production of goods and services; both capital and labor productivity deteriorate, and the potential output drops. This whole cycle is called the input-cost effect. However, the magnitude of the impact depends on the degree of wage indexation and short-term substitution between energy and other inputs. As a result, increasing oil prices diminishes output and puts upward pressure on inflation, leading to a drop in government tax revenues and a deterioration in the budget balance. Commerce and exchange rates are also affected by oil price volatility. Since oil has a low price elasticity of demand and supply, oil-importing countries cannot reduce their oil consumption in the short term. It is quite obvious that this will cause more spending on oil imports, exerting downward pressure on the exchange rate.

Depreciation in local currency induces a rise in inflation as a result of higher input costs, which may reduce output. It is important to note that depreciation in the local currency may also stimulate the aggregate demand for oil-importing countries since goods and services become cheaper to foreigners; however, this may not occur in the short term.

Examining the oil price shocks on economic growth in Liberia covering the period between 1980 and 2015 using the unrestricted VAR model, Wesseh and Lin (2018) found that an increase in oil prices surprisingly has an important role in affecting oil-importing Liberian economic growth. The results showed that a 1% increase in oil prices resulted in a 43% increase in aggregate output. The findings are contrary to most studies in the literature. According to the authors, the possible reason is that the rise in oil prices in Liberia stimulates the substitution of oil inputs for other factors of production, particularly labor. Since the share of the service sector in GDP makes up a large portion of Liberia, the substitution of energy for labor induces a rise in the aggregate output.

Changing the structure of economies from manufacturing-based to service-based economies leads countries to be less dependent on raw material shortages. Having persistent and long-lasting economic growth is also helpful in avoiding huge economic disruptions and letting the disruptions stay short-lived. Although the aforementioned factors, the rapid technological and digital development, expanding alternative energy sources, and new oil discoveries result in increasing the elasticity of oil demand and improving economic resilience to oil price volatility, oil continues to have a significant impact on global economies, influencing the trajectory of economic activities.

Contrarily, Akinsola and Odhiambo (2020) documented the evidence that the economic growth of oil-importing sub-Saharan African (SSA) countries is affected negatively by oil price increases in the long run, while there is no statistically significant relationship between oil prices and economic growth in the short run. Such findings support the theoretical literature described above. The reason for the findings in the short run may be subsidized oil prices in SSA countries.

Oil windfalls usually account for a large share of GDP in oil-exporting countries. An increase in the oil revenue because of raises in oil prices initially leads to the flow of more foreign

currency into the domestic market and, consequently, results in the appreciation of the local currency (income effect). If oil-exporting countries let the oil income flow into the domestic market, this will lead to greater purchasing power for economic agents of oil-exporting countries. This clearly indicates wealth transfer will occur from oil-importing countries to oil-exporting countries. Even though the appreciation of local currency causes non-energy sectors to lose competitiveness in the international market, it may also encourage investment and offer lower-priced imported intermediary goods and services, boosting domestic production and output. Higher oil prices are likely to encourage more labor and capital inflows into the energy sector, and this leads to more investment in the energy sector (Berument et al., 2010), contributing to the rise in economic output. Appreciated currency may also erode the competitiveness of the economies of oil-exporting countries, and this may cause some companies to close down, and new investments to be delayed and, consequently, lower the economic output. In fact, the economic performance of oil-exporting countries depends primarily upon how the income is spent or how monetary and fiscal policy is managed.

Studying the effects of oil price shocks on the economic growth of selected MENA countries for the period spanning from 1952 to 2005 using the Vector Autoregression (VAR) model, Berument et al. (2010) provided new evidence that hikes in oil prices have a significant and positive effect on the economic growth of mostly net-oil-exporting countries. In contrast, other countries are not affected by the oil price shocks. After identifying oil shocks as demand and supply oil shocks, the economic growth of net-oil-exporting countries is positively and significantly affected regardless of whether the rise in the oil prices emerged from demand or supply shocks. However, for the rest of the countries, output rises with positive oil demand shocks but declines with positive oil supply shocks. By the same token, Aloui et al. (2018) looked into the nexus between oil prices and economic growth in Saudi Arabia, one of the major oil-producing countries in the world, using an annual sample period between 1969–2014 and found a positive relationship between these two variables in the short term. The authors recommended that since oil prices lead to economic growth, policymakers should take necessary measures to build sufficient liquidity buffers to maintain economic stability

during low oil price periods and to diversify the private sector in the medium term to lessen dependence on oil.

Another important concept discussed in the literature is the relationship between the endowments of natural resources and weak economic performance. It is usually termed a resource curse, also known as the paradox of plenty. The resource curse refers to a paradoxical situation in which resource-rich countries fail to show good economic performance and make effective use of these resources. Majumder et al. (2020) argued that five factors cause the failure to transform natural resources into economic growth: Dutch disease, political rent-seeking and corruption, poor institutional quality, commodity price volatility, and lack of diversification. In order to fully understand the negative impact of these factors on economic growth, it is worth mentioning them briefly.

- Dutch disease emerges when income from natural resources causes appreciation in national currency, eroding the competitiveness in the international markets.
- Political rent-seeking and corruption refer to the powerful political elites who abuse the income from natural resources for their own business benefit and political interests.
- Poor institutional quality causes the inefficient distribution of natural resources and turns them into curses instead of blessings.
- Commodity price volatility creates economic uncertainty, increases budget constraints, makes economic planning difficult, and may lead to weaker economic growth.
- Lack of diversification simply means "putting all your eggs in one basket" and being dependent on one or a certain group of resources, leaving the economy vulnerable to market fluctuations.

The end result of these factors will be weaker economic growth. Majumder et al. (2020) recommended that resource-rich countries promote trade openness to acquire competitive pricing for their resources in the international market and gain access to more efficient technologies for resource extraction. Even though these factors are widely discussed in the literature, and it is believed many oil-producing countries were affected by them, the results are mixed. For instance, Cotet and Tsui (2013), in their dynamic panel model, discovered that there is no evidence that higher oil incomes slow down economic growth.

It is worth mentioning that even minor fluctuations in the prices of oil can cause huge energy expenditures in an economy. For instance, McKillop (2012) reported that a one-cent rise in gasoline prices (refined products of crude oil) costs billions of dollars to consumers, while a one-dollar rise costs $100 billion, indicating how minor changes can have serious repercussions on the entire economy. Oil is an important input in the production of many goods and services. Any anticipated rise in oil prices will increase the input costs of production, and firms will pass on the higher costs to consumers through higher prices if the rise in oil prices is regarded as persistent and widespread rather than temporary. Household income is fixed in the short term, and the volume of consumption will fall as the higher prices do not allow consumers to buy the same amount of goods and services, even though the changes in private savings may partially offset this. The short-term impact of higher oil prices differs from one country to another, depending on the oil intensity of production and the willingness of firms to bear some of their costs. Substitution among products, labor market flexibility, liquidity constraints, and scope for consumption smoothing also play significant roles (Barrell et al., 2011). A permanent rise in oil prices may cause inflation and slow down economic growth in the medium and long term. In the medium term, the effect of oil price shocks on prices and economic growth relies on the behavior of wages, price setters, central bank policies, and government subsidies. In the longer term, firms look for alternative energy sources and try to improve their production process in a more energy-efficient way in addition to substitution oil inputs with other factors of production, such as labor and capital (Barrell et al., 2011).

Guan et al. (2021) provided a fresh insight into the dynamic nexus between the volatility of oil prices and economic growth for natural resource-dependent economies (top ten oil exporters) between 2000 and 2020 using the PMG model. The study provides evidence that volatility in the oil market could destabilize oil-producing economies in the long run, not in the short run.

Temporary or permanent effects of one variable on another have also generated heated discussion over the topic. According to Idrisov et al. (2015), for the nexus between oil prices and economic growth in Russia, a permanent rise in oil prices does not exert a statistically

significant effect on long-term economic growth, and it only predetermines short-run transitional trends. Likewise, examining the association between oil prices and growth, Barrell and Kirby (2008) documented that if a rise in oil prices has been persistent and widespread, it diminishes output everywhere except oil-producing countries such as Norway, Russia, and the OPEC member states. The income from oil export was spent on various sectors, and consequently, output and imports rose.

A causal relationship between oil and economic growth is another area that draws the attention of many authors. A causal relationship exists when a change in one variable has a direct impact on another variable. As pointed out below in the various studies, the results concerning the causal relationship between oil and economic growth are contradictory.

Based on a sample of Japan over the period 2000-2008 employing an exponential generalized autoregressive conditional heteroskedasticity (EGARCH) model, Hanabusa (2009) uncovered that there is a bidirectional relationship between oil price changes and economic growth. However, Kırca et al. (2020) studied whether the association between the oil-gas prices index and economic growth is permanent in Türkiye using the Toda-Yamamoto causality test for the period spanning from 1998Q1 to 2019Q4 and found that there is unidirectional causality from oil price index to economic growth.

Investigating the causal link between oil prices and economic growth in 22 African countries (including oil-exporting and non-oil-exporting countries) from 1990 to 2015 using the PMG panel ARDL approach, Azomahou et al. (2021) identified a positive unidirectional cause and effect relationship from oil prices to economic growth. The possible reason is that most African countries, either oil importers or exporters, gain from the revenue generated from the oil trade. The higher the prices, the more income they generate, which spurs economic growth. Similarly, in their recent study, Yu et al. (2022) explored the association between oil prices volatility and global economic performance on the data ranging from 2007 to 2020 (including financial crises and the pandemic era) using wavelet analysis and disclosed that there is unilateral causality from oil prices to economic growth for the almost entire period. As it is observed above, the causal relationship between oil and economic growth has

contradictory results. This may be expected because each region has its own peculiar dynamics of the oil industry and economic structure.

Some researchers also look into the effect of one variable's volatility on another. Van Eyden et al. (2019) provided a fresh insight into the dynamic nexus between oil price volatility and economic growth. Authors documented that oil price volatility has a negative effect on the economic growth of OECD countries and also oil price uncertainty negatively and significantly affects oil-producing countries. Maheu et al. (2020) investigated the volatility link between oil price shocks and economic growth in the U.S. and found that conditional variance (not the conditional mean) of growth rises as a result of the local maximum oil price exceedance.

Another hot discussion regarding the relationship between oil and economic growth is whether the effect of one variable on another is asymmetric. Asymmetry in this context simply means whether the positive and negative effects of one variable have different impacts during ups and downs on another variable. Studying the relationship between oil price shocks and economic growth in Japan based on the quarterly data from 1957Q1 to 2006Q4 using Hamilton's non-linear approach, Zhang (2008) reported that adverse oil price shocks are prone to have a greater effect on growth than positive oil price shocks. Kisswani (2021) tested the asymmetric effect of oil prices on GDP in 5 Asian countries and found that even though the existence of the asymmetric effect is apparent in the long run, the results are mixed in the short run varies from country to country. Akinsola and Odhiambo (2020) also underscored the existence of the asymmetric effect of oil prices on the economic growth of oil-importing SSA countries. The decline in oil prices has a statistically positive effect on economic growth, while oil price surges have a significant negative impact. Contrary to the previous evidence, Maheu et al. (2020), using the NARDL method, investigated the asymmetric effects of changes in crude oil prices on economic growth in China's 31 provinces by decomposing hikes and plunges. The study uncovered that economic growth is found to respond to any deviation in crude oil prices in both the short and long term, and there are no asymmetric effects except for some provinces.

Oil price shocks have different impacts across countries, and factors such as monetary policy regime, labor market behavior, oil intensity of production, and export exposure to oil-producing markets play a critical role in the extent of the impact (Barrell & Holland, 2004).

The impact of higher oil prices on economic growth is also dependent on central bank policy. If a central bank targets an inflation rate and implements a tight monetary policy regime, it might end up with greater GDP losses. Bernanke et al. (1997) asserted that the reduction of output and employment in the 1997s was because of an increase in the interest rates (FED's endogenous response) in response to the higher inflation caused by oil shocks. Akinsola and Odhiambo (2020) suggests that it would be significant for policymakers to discover and apply energy-efficient strategies and use technological development to alleviate oil price risks, particularly in the long term. In addition, the study also stressed that trade, investment incentives, infrastructure development, and remittances are all ways to diversify revenue away from natural resources. Park and Shin (2018) stressed the significance of the negative implications of oil price shocks on the economy can be alleviated through government interventionist measures such as price restraint, price-fixing, and subsidy support. Ahmadi and Mattei (2021) suggests policymakers that while oil shocks occur, they should attach particular importance to both the underlying cause of the shocks and the state of the economy.

1.4.3. Oil and Exchange Rate Nexus

Oil is one of the non-renewable sources of energy that plays an important role in almost all productive activities. Its importance stems from its use as an input in productive activities, making it one of the vital production factors. It is widely used almost in all the sectors of the economy, such as transportation, heating, and industrial sectors. Despite the continuous development of alternative and renewable energy sources, oil stands out as the greatest energy source, providing the majority of global energy use. Fluctuations in or shocks to the oil prices are one of the major sources of economic instability, causing major macroeconomic indicators to deteriorate (W. Ahmad et al., 2020; Lizardo and Mollick, 2010; Juan Carlos Reboredo et al., 2014), such as exchange rate, inflation, and economic growth. The impact of oil price fluctuations on macroeconomic indicators has attracted the attention of many, especially after the 1973 petrol crisis. Demand, supply, and speculative factors are the main

reasons causing oil price fluctuations (W. Ahmad et al., 2020). As a consequence, the effect of oil price fluctuations and shocks on the macroeconomy has been the focus of many theoretical and empirical studies in the literature.

Oil prices traditionally play a significant role in resource-rich countries since oil exports positively contribute to their budget revenues. The more they export, the more revenue they generate. While higher oil prices result in higher revenues and stronger domestic currency, falling oil prices have the opposite effect (Fedoseeva, 2018). The direction of prices also has serious implications for countries heavily dependent on oil imports. Higher oil prices give rise to spending more on energy, causing a heavy burden on the government budget and weaker domestic currency, while falling oil prices, on the other hand, bring the opposite. Stable oil prices for both sides are more desirable since they lead to better maintenance of budget balance and robust budget projections.

An exchange rate depicts the value of a local currency in terms of another foreign currency.. It is calculated as local currency per foreign currency. There are three main exchange rate regimes: free-floating, managed float, and fixed. In a free-floating exchange rate regime, monetary authority does not intervene in the value of its currency, leaving it to the market forces, namely demand and supply. In a fixed exchange rate regime, a value of a currency is pegged to the value of another currency, and monetary authority constantly intervenes in the exchange market to maintain the value of its currency. As for the managed float exchange rate regime, the exchange rate is neither entirely freely floating nor fixed; rather, the monetary authority influences the movements of its exchange rate by buying and selling currencies to maintain a specific range. After the Bretton Woods system collapsed, many countries abandoned a fixed exchange rate regime and shifted to a floating exchange rate regime. This led exchange rates around the world to expose to more volatility. Individuals, businesses, and governments compare the value of their currency with other currencies and then make feasible trading and investment strategies. Thus, the stability of the exchange rate plays a significant role in maintaining uninterrupted international trade and investment.

In addition, fluctuations in exchange rates may impact the price of final products, which, in turn, may affect the competitive position of the respective country. For instance, other things

held constant, when the currency of country A depreciates (appreciates) in relation to the other currencies, its goods and services become cheaper (more expensive) for the foreigners, and foreign goods and services become more expensive (cheaper) in the domestic market. So the export income of country A tends to increase (decrease) because the demand for its products from foreign markets will rise (decline) due to (less) competitive prices in the domestic market, and their imports from the international market will drop (soar) due to the higher (lower) prices. As a result, the depreciation (appreciation) of the local currency is prone to improve (worsen) its balance of trade by enhancing (deteriorating) the competitiveness of domestic goods and services in foreign markets while increasing (decreasing) the cost of imported goods and making them less (more) competitive in the domestic market.

Governments, investors, arbitrageurs, currency traders, speculators, and risk managers are all interested in the relationship between oil prices and exchange rates. Some are trying to manage their risk exposure to oil price and exchange rate fluctuations, while others struggle to buy and sell an asset (oil as a commodity and currency as a financial asset) in different markets in order to make a profit from the price differences. Therefore, the information transmission between the oil price and the exchange rate is of great interest to all parties.

Given that the U.S. dollar is the major invoicing and settlement currency of crude oil prices in international markets, there is expected to be interdependence between oil prices and exchange rates. Any event that is considered valuable to affect the oil price is likely to influence the value of exchange rates and vice versa. In countries whose economies are heavily reliant on oil, there is likely to be a substantial link between the exchange rate and oil prices (Li et al., 2017).

Because the dollar is the major invoicing and settlement currency in international crude oil markets, the real appreciation of the dollar is likely to have a negative impact on crude oil-importing countries (excluding the U.S.). Also, the dollar exchange rate volatility creates uncertainty about the international purchasing power of crude oil exporting countries. In the short term, a weak dollar may worry crude oil-exporting countries, while a strong dollar

benefits them (the opposite is true for oil-importing countries). In the long run, however, an overvalued dollar may result in an adverse demand shock for them (Y. J. Zhang et al., 2008).

On the one hand, other things held constant, a rise in real oil prices is usually found to lead to a real appreciation of the dollar in the short term (Beckmann and Czudaj, 2013) because oil-importing countries that would like to maintain the same amount of oil consumption will demand more dollars to settle their payments obligations arising from their oil imports. On the other hand, a decline in real oil prices may tend to a real depreciation of the dollar because oil-importing countries will pay less in the dollar for their oil imports, and hence the demand for the dollar will fall. This may be true if oil-importing countries do not change their consumption pattern in the short run because of lower oil prices and if oil-exporting countries do not cut the supply of oil due to the lower oil prices. The impact may vary depending on dynamics in the domestic and international markets in the long term.

From the perspective of those who make a profit on the price differences, if the prospect of the dollar is not considered promising, they will channel their investments to the oil market, thus driving up oil prices. However, when a large amount of money leaves the oil market, it is obvious that it will cause volatility in the exchange rate of the dollar. As a consequence, there will be investment and speculation opportunities for traders based on the relationship between the oil market and the dollar exchange rate market. Furthermore, such an association will remain as long as the U.S. dollar is the major invoicing and settlement currency of crude oil prices in the international markets (Y. J. Zhang et al., 2008).

The association between oil prices and exchange rates is worth analyzing because the exchange rate is one of the main channels through which the impact of oil prices is transmitted to the real economy. Moreover, there is another approach asserting a potential effect of the exchange rate on oil prices, implying the causality runs from the exchange rate to oil prices. Mainly, there are three transmission channels of oil prices to exchange rate: the terms of trade channel, the wealth effect channel, and the portfolio reallocation channel. In addition, there is one transmission channel of the exchange rate to oil prices discussed in the literature: the law of one price for tradable goods. In short, while there are three theoretical approaches explaining the direction of causality from oil prices to exchange rate, only one

theoretical approach discusses the direction of causality from exchange rate to oil prices. These four theoretical approaches will be discussed below, one by one.

The terms of trade channel were introduced by Amano and Van Norden (1998a, 1998b) and concentrate on oil as a major determinant of the terms of trade. The primary difference of this channel is that it focuses on real exchange rates instead of nominal ones. The basic concept is to link the price of oil to the price level, which has an impact on the real exchange rate. Basically, the model contains two sectors: tradable and non-tradable sectors. If we assume that the output prices of sectors can change in response to the rise in oil prices (while keeping the law of one price in the tradable sector), it may be observed that an increase in the price of oil may cause the exchange rate to appreciate or depreciate. The direction and magnitude of the impact depend upon the oil intensity of both the tradable and non-tradable sectors. For instance, when the tradable sector is considered more energy-intensive than the non-tradable sector, both its output prices and real exchange rate may rise. On the contrary, when the tradable sector is regarded as less energy-intensive, it may result in a depreciation of the exchange rate (Fowowe, 2014). The overall impact of oil price changes transmitted through inflation depends on the oil intensity of both sectors. If the prices of both sectors are assumed not to be fixed anymore, an impact on the nominal exchange rate can be observed. Therefore, the response of the real exchange rate is then determined by how the nominal exchange rate behaves, but relative to the impact of any changes in the price of tradable (and non-tradable) sectors (Beckmann et al., 2020). Normally, transmission occurs via relative prices and has no direct impact on the nominal exchange rate. However, considering the purchasing power parity, inflation may have long-run implications on the nominal exchange rate since a relative rise in domestic prices (at least for tradable goods) should lead to a depreciation of the nominal exchange rate (Beckmann and Czudaj, 2013).

The wealth effect and portfolio reallocation channel were introduced by the seminal works of Krugman (1980) and Golub (1983), and these channels primarily focus on the nominal exchange rate dynamics. According to the wealth channel, a rise in oil prices translates to a wealth transfer from oil-importing economies to oil-exporting economies, which results in depreciation (appreciation) of oil-importing (oil-exporting) countries' exchange rates

through current account imbalances and portfolio reallocation, respectively (Basher et al., 2016). Thus, the wealth channel arises as a result of a short-run impact, whereas the portfolio channel reflects (short-run in some cases, please check the following instance) medium- and long-run effects. Portfolio choices of oil-importing and exporting economies play a crucial role in determining the effect on the exchange rate. For instance, if we assume that oil-exporting countries reinvest their oil-generated revenues in dollar assets, we expect the dollar will appreciate in the short run. The opposite may also happen if their investments are evaluated elsewhere. However, the direction of the dollar in the long-run is not obvious and dependent upon two important factors: (i) the weight of oil in U.S. total imports as compared to the U.S. weights in oil exporting countries' imports; and (ii) the oil exporters' relative preferences for the U.S. dollar assets (Bénassy-Quéré et al., 2007). Golub (1983), assuming the inelastic demand for oil in oil-importing countries, documented the evidence that increases in oil prices may distribute wealth differently between oil-importing and exporting countries, causing oil-exporting countries to run a current account surplus and oil-importing countries to run a current account deficit. In response to higher oil prices and the resulting effect of the current account deficit, oil-importing countries diminish their oil expenditure, leading to less demand for the dollar, consequently inducing the depreciation of the dollar. Furthermore, Krugman (1980) developed his theoretical foundation considering the speculation factor. He reported that an increase in oil prices might have a positive or negative impact on exchange rates depending on the comparison of the direct balance of payments burden of the higher oil price with the indirect balance of payments benefits of oil exporters' spending and investment.

The potential impact of exchange rates on oil price movements is highlighted by Blomberg and Harris (1995). Their argument relies on the "law of one price for tradable goods." They stated that since oil is a homogeneous internationally traded commodity priced in U.S. dollars, a depreciation in the value of the dollar will diminish the oil prices for foreigners relative to the price of their commodities in foreign currencies, pushing up their purchasing power and oil demand which will consequently raise the oil prices. According to this approach, the exchange rate is inversely related to oil prices.

As can be seen from the above theoretical explanations, the oil-exchange rate relationship seems to be bidirectional, and this reflects the general consensus in the literature. Drawing on the four theoretical approaches described above, Breitenfellner and Cuaresma (2008) summarized five possible channels through which oil prices and exchange rates might interact: the purchasing power, local price, investment, currency market, and monetary policy channels. Although these five channels seem to differ from the above theoretical approaches, it has a similar approach. The authors summarized the entire transmission steps that the above theoretical approaches touch upon while mentioning the interaction between these two variables.

The existing studies treat the subject from different angles. The most discussed topics on the subject are highlighted below in Table 3.

Table 3: A List of Subjects Used in Existing Studies

Subject-based approaches	Key references
Linear and non-linear relationship	(H. Chen et al., 2016; Prasad Bal and Narayan Rath, 2015; Tiwari, Dar, et al., 2013)
Short, medium, or long-run impact	(K. L. Chang, 2014; Tiwari, Mutascu, et al., 2013; Volkov and Yuhn, 2016)
Symmetric or asymmetric impact	(Atems et al., 2015; H. Chen et al., 2016; Jung et al., 2020)
Category of shocks (supply, aggregate, and specific demand shocks)	(Basher et al., 2016; Forhad and Alam, 2021; Selmi et al., 2012)
Direction of causality	(Brahmasrene et al., 2014; Lv et al., 2018; Tiwari and Albulescu, 2016; Yin and Ma, 2018)
Before, during, and after the crisis period	(Brayek et al., 2015; Juan C. Reboredo and Rivera-Castro, 2013; Turhan et al., 2014)
Based on exchange rate types	(Lv et al., 2018; Selmi et al., 2012; Y. Wang et al., 2022)
Based on real and nominal values	(Atems et al., 2015; Doğan et al., 2012; Huang and Guo, 2007)
Developed and developing countries	(Alssadek and Benhin, 2021; Doğan et al., 2012; Jiang et al., 2020)
Oil-exporters and importers	(H. Baghestani et al., 2019; Lizardo and Mollick, 2010; D. Wen et al., 2020; Yang et al., 2017)

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There is voluminous empirical research in the literature regarding the interaction between oil prices and exchange rates. These studies were primarily inclined to discuss this interaction

based on the following methodologies: cointegration and causality link to investigate long run and lead-lag relationship; multivariate models such as VAR and vector error correction model (VECM) to study the lead-lag relationship between exchange rates and oil prices as endogenous variables; univariate and multivariate generalized autoregressive conditional heteroskedasticity (GARCH) models to explore the relevance of the spillover and volatility effects; non-linear models such as Markov-switching and wavelet approach to model a non-linear relationship interaction between exchange rates and oil prices; the copula-GARCH methods to capture symmetric, asymmetric and time-varying comovements (dependence structure) between exchange rates and oil prices; and finally out-of-sample forecasting.

The first category of empirical research centers on cointegration and causality links to investigate the long-run and the lead-lag relationship between oil prices and exchange rates (Amano and Van Norden, 1998a; Chaudhuri and Daniel, 1998; Lizardo and Mollick, 2010; Saidu et al., 2021; Sari et al., 2010). Investigating the long-run relationship between the real domestic oil prices and the real effective exchange rate of Germany, Japan, and the U.S. over the post-Bretton Woods period, Amano and Van Norden (1998a) explored the cointegrating relationship between oil prices and exchange rate and documented strong evidence that the price of oil Granger-causes the real exchange rate, but not vice versa. Similarly, analyzing the long-run link and the causal relationship between real oil price and monthly real U.S. dollar producer price exchange rates for sixteen OECD countries over the post-Bretton Woods period, Chaudhuri and Daniel (1998) found that real U.S. dollar producer price exchange rates for most of the industrial countries and the real price of oil have a cointegrating relationship over the post-Bretton Woods period and the direction of causality runs from real oil prices to real exchange rates.

The second category of empirical research examines the lead-lag relationship between exchange rates and oil prices as endogenous variables using multivariate models such as VAR and VECM (Alley, 2018; Atems et al., 2015; H. F. Chang et al., 2013; Pershin et al., 2016; Yildirim and Arifli, 2021; Yin and Ma, 2018; Y. J. Zhang et al., 2008). Using ARDL, VAR, and VECM on a sample of oil exporting country (Nigeria) for the period spanning from January 2008 to December 2015, Alley (2018) found that positive shocks in oil prices

led to the appreciation of naira while negative shocks on oil prices result in depreciation. Moreover, the appreciation of the naira discouraged non-oil export while depreciation stimulated them. Conversely, Pershin et al. (2016), using a Vector AutoRegressive (VAR) model, examined the relationship between oil prices and exchange rates in three oil-importing African countries, namely Botswana, Kenya, and Tanzania, from 2003 to 2014. The study uncovered that, in the event of an oil price shock, the behavior of the three selected countries' exchange rates differs, and no general rule can be made for the sample countries.

The third category of empirical research analyzes the volatility and volatility spillover effect between oil price and exchange rate utilizing univariate and multivariate GARCH models (W. Ahmad et al., 2020; Jawadi et al., 2016; Narayan et al., 2008; Y. J. Zhang et al., 2008). Narayan et al. (2008), employing GARCH and EGARCH models, investigated the relationship between oil price and the Fiji- U.S. exchange rate using daily data over the period between 2000-2006. The study unveiled that an increase in oil prices led to an appreciation of the Fijian dollar vis-à-vis the U.S. dollar. Since Fiji is an oil-importing country, an increase in oil prices is expected to depreciate its currency based on the wealth effect. However, the Reserve Bank of Fiji (RBF) has utilized monetary policy tools and increased its interest rates to curb the impact of oil price shocks on its exchange rate. Interestingly, this research has shown that monetary policy tools are effective instruments that can be used to keep the exchange rate in check against oil price shocks. Studying the volatility determinants of crude oil and foreign exchange markets and the jump spillover between them for the two major oil-importing countries (India and China) using GARCH models from 2013 to 2019, Ahmad (2020) revealed that while there is a positive return spillover from the oil market to the foreign exchange market. However, there is a lack of return spillover in the other direction. Moreover, the study shows that oil jumps affect exchange rate conditional volatility negatively, and disentangled exchange rate jumps significantly affect conditional oil price volatility.

The fourth category of empirical research studies the non-linear structure of the crosscorrelations between oil prices and exchange rate markets (A. H. Ahmad and Moran Hernandez, 2013; Basher et al., 2016; Beckmann and Czudaj, 2013; Juan C. Reboredo and

Rivera-Castro, 2013; Tiwari, Dar, et al., 2013; Tiwari, Mutascu, et al., 2013; Tiwari and Albulescu, 2016; Uddin et al., 2013; Yang et al., 2017; Youssef and Mokni, 2020). Using a wavelet transform framework for the sample of Romania for the period between 1986-2009 to examine the non-linear influence of oil prices on the real effective exchange, Tiwari, Mutascu, et al. (2013) revealed that oil prices have a significant impact on the real effective exchange rate both in the short and long run time horizons. Employing such a framework provides robust results because the classical Granger causality linear framework for the entire sample shows no relationship at all. Similarly, employing the non-linear models, threshold autoregressive (TAR) and its variant momentum threshold autoregressive (MTAR), for the sample of twelve major oil producers and consumers in the world over the period from 1970 to 2012 to investigate the long-run relationship and asymmetric adjustment between the real oil prices and the real bilateral exchange rates, A. H. Ahmad and Moran Hernandez (2013) uncovered that there exists a long run relationship in six of the twelve countries and asymmetric adjustment in four countries.

The fifth category of empirical research focuses on the conditional dependence structure and risk transmission between oil prices and exchange rates using copula-based GARCH models (R. Aloui et al., 2013; Bedoui et al., 2018; Brayek et al., 2015; K. L. Chang, 2014; Chkir et al., 2020; Juan C. Reboredo, 2012; J. Wang et al., 2020, 2022; C. C. Wu et al., 2012). Analyzing how oil prices and exchange rates co-move using copula functions on a sample of twenty-three major oil trading countries from 2000 to 2010, Juan C. Reboredo (2012) discovered that oil price–exchange rate dependence appeared to be weak even though it increased significantly in the aftermath of the global financial crisis. There are many empirical studies observing the intense interaction of oil prices and exchange rates after each economic crisis, leaving aside the methods used in the analysis (Albulescu and Ajmi, 2021; Bedoui et al., 2018; Brayek et al., 2015; K. L. Chang, 2014; H. Chen et al., 2016; Ding and Vo, 2012; Fedoseeva, 2018; Malik and Umar, 2019; Mensah et al., 2017; Juan C. Reboredo and Rivera-Castro, 2013; Juan Carlos Reboredo et al., 2014; Turhan et al., 2014; D. Wen et al., 2020). This indicates the importance of differentiating crisis and after-crisis times from the entire period. In addition, policymakers should pay close attention to the association between oil prices and exchange rates during and after the crisis period for the efficient

management of the economy. Inversely, examining the conditional dependence structure between crude oil prices and U.S. dollar exchange rates (against five major currencies in international trade) using a copula-GARCH approach over the 2000-2011 period, R. Aloui et al. (2013) found evidence of significant and symmetric dependence for almost all the oil-exchange rate pairs. Obviously, this result is contrary to the previous one, and this shows us that the interaction between oil and exchange rates differs based on the exchange rate pairs considered.

The last category of empirical research revolves around information transmission and out-of-sample prediction (Hamid Baghestani and AbuAl-Foul, 2020; Breen and Hu, 2021; Cayen et al., 2010; Das and Dutta, 2020; Ferraro et al., 2015; J. Wang et al., 2020). Analyzing the effect of three major international benchmark crude oil price fluctuations on the real exchange rate forecast of the Chinese currency, known as renminbi (RMB, or yuan), using a hybrid Copula function and bivariate neural network model from 1994 to 2017, Wang et al. (2020) explored that oil price variations have a significant impact on the exchange rate, and oil price information has proven to be useful in China's real exchange rate forecasts. According to the authors, the bivariate model offers significant predictive performance for this interaction. Likewise, using a structural VAR with identification restriction to examine the forecasting power of world oil and precious metal price on the exchange rate (BDT-Bangladesh currency-/US dollar) and interest rate movements for the period from 1990 to 2016, Das and Dutta (2020) concluded that oil price has a great impact in forecasting both exchange and interest rate in short-run.

As observed from the above discussions, it appears to be a bidirectional relationship between oil prices and exchange rates, and results may vary depending on the methods used and the sample considered. As the literature on oil prices and exchange rate nexus evolves, it will not only enlighten the interested parties regarding the issue and also provide perspectives and tools for them to use in their decision-making processes.

1.5. Concluding Remarks

This section first discusses the literature on the determinants of bank profitability since the main subject of this research is to examine the impact of oil shocks on bank performance. Then, the existing literature on the link between oil and bank profitability is examined. Finally, the link between oil shocks and possible transmission channels (namely inflation, economic growth, and exchange rate), which can mediate the relationship between oil and bank performance, is discussed.

The current work is a contribution to the existing literature on the relationship between oil shocks and bank performance. The study of Hesse and Poghosyan (2009) provides the basis for the current research. This research extends the aforementioned study by looking at the issue from three different perspectives: 1) It includes all available net oil-importing countries in the data set, which simultaneously has three classes of bank types, conventional, Islamic, and investment banks, allowing comparison among different bank types; 2) It contains three different oil shocks (oil spending, oil price changes, and oil price volatility) to measure the true impact of oil on bank performance; 3) It evaluates the direct - through the changes in the demand for financing of households, firms, and governments- and indirect -through macroeconomic channels, such as inflation, economic growth, and exchange rate- impacts of oil variables on bank performance and whether to see macroeconomic variables can mediate this relationship.

CHAPTER 2: RESEARCH METHODOLOGY

2.1. Introduction

This chapter explains the empirical analysis used in this research. As to reiterate, this thesis aims to address the implications of oil shocks on the performance of three different classes of banks in net oil-importing countries, namely conventional, investment, and Islamic banks.

The following section presents empirical models used in this research, providing detail on empirical specifications. Then, Section 2.3. introduces the variables employed in the analysis. Next, estimation issues are discussed in Section 2.4.. Finally, the chapter ends with a conclusion section.

2.2. Empirical Models

In light of relevant tests, this research will employ an appropriate panel data analysis to conduct an empirical study on the impact of oil shocks on bank profitability in net oil-importing countries, comparing three bank classes: Islamic, conventional, and investment banks. This research also tests whether this effect depends on the macroeconomic determinants. One of the main objectives of this research is to determine whether oil prices directly or indirectly impact bank profitability (through macroeconomic variables). This study benefits from the hypothesis-testing strategy constructed by Hesse and Poghosyan (2009) to test this hypothesis.

The following empirical specification is formed to test the relationship between bank profitability and bank-specific, macroeconomic, and oil price shocks:

$$y_{ijt} = \alpha + \beta y_{ijt-1} + \gamma \mathrm{Bank}_{ijt} + \theta \mathrm{Macro}_{jt} + \vartheta \mathrm{OiI}_{t} + \mu_{i} + \varepsilon_{ijt} \qquad (1)$$

where i, j, and t indices denote bank, country, and time respectively; α is the deterministic component; y as a dependent variable represents bank profitability; Bank denotes the vector of the bank-specific determinants of bank profitability; Macro is the vector of country-specific macroeconomic determinants of bank profitability; Oil represents the measure of oil

shocks. Apart from state dependence (y_{ijt-1}) and observed heterogeneity ($Bank_{ijt}, Macro_{jt}, and\ OiI_t$), the model also accounts for bank-specific unobserved heterogeneity, $\mu_i \sim N(0, \sigma_\mu)$, and random idiosyncratic errors, $\varepsilon_{ijt} \sim N(0, \sigma_\varepsilon)$. While Bank and Macro show the set of control variables, Oil is the focus variable in this specification.

Based on the empirical specification above, the effect of oil price shocks on bank profitability can be direct (coefficient ϑ) and indirect (channeled through macroeconomic variables, coefficient θ). If all the variables are included in the model simultaneously, it might be difficult to distinguish whether the effect of oil price shocks on bank profitability is direct or indirect. Therefore, the following hypothesis testing strategy constructed by Hesse and Poghosyan (2009) is adopted to test oil prices' direct and indirect effects (see Figure 1).

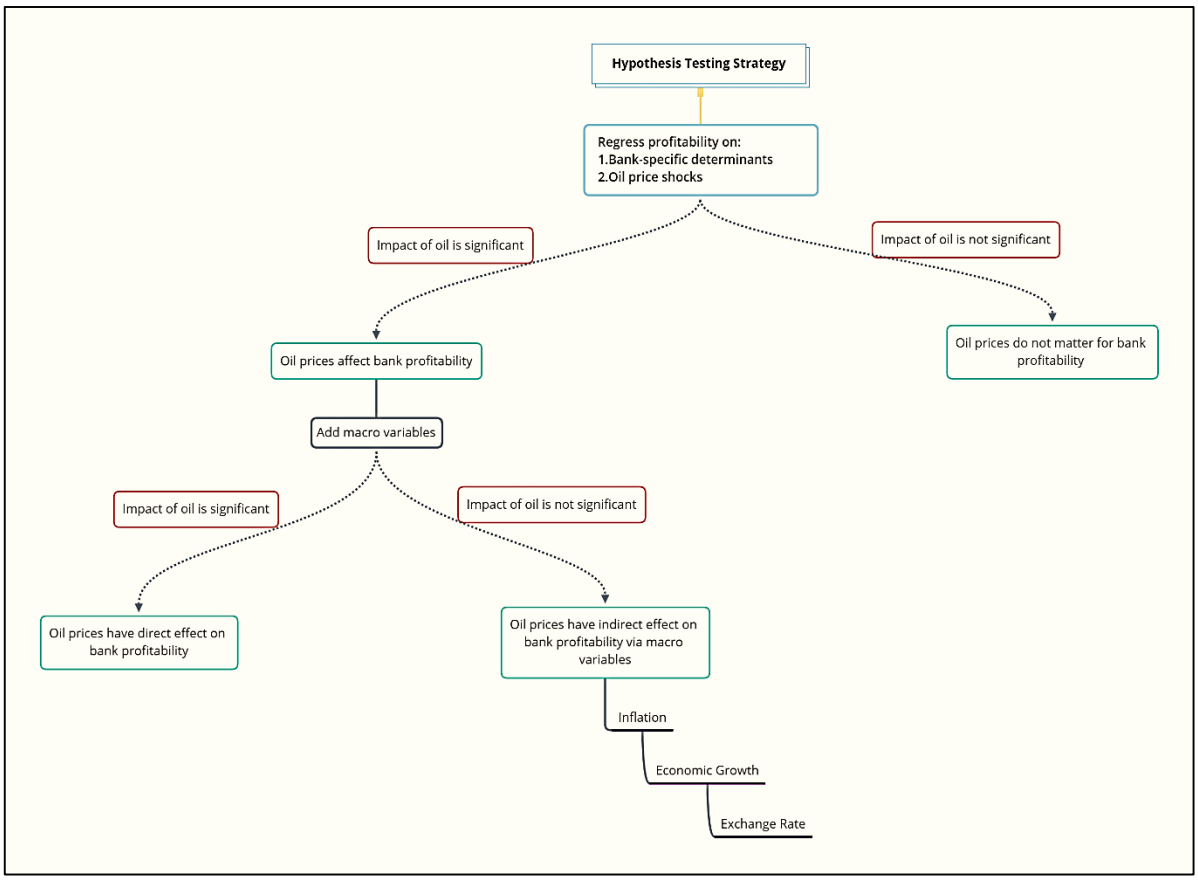

Figure 1: Hypothesis Testing Strategy

Source: Poghosyan and Hesse (2009)

First of all, bank-specific and oil shocks will be introduced into the specification.

$$y_{ijt} = \alpha + \beta y_{ijt-1} + \gamma \text{Bank}_{ijt} + \vartheta \text{OiI}_t + \mu_i + \varepsilon_{ijt} \quad (2)$$

where i, j, and t indices refer to the bank, country, and time respectively; α is the deterministic component; y represents the vector of bank profitability; Bank denotes the vector of the bank-specific determinants of bank profitability; Oil refers to the oil shocks. μ_i and ε_{ijt} are bank-specific unobserved heterogeneity and random idiosyncratic errors, respectively. If the impact of oil variables turns out to be insignificant, then the study will infer that oil prices are not associated with bank profitability.

If oil price shocks happen to be significant, it implies that oil shocks have a significant direct impact on bank profitability. However, this research will take one step further to distinguish between the direct and indirect effects of the oil price shocks. In order to distinguish the direct and indirect effects of the oil price shocks, it will include macroeconomic variables in the specification because macroeconomic variables may represent a proxy for possible transmission channels of oil shocks.

$$y_{ijt} = \alpha + \beta y_{ijt-1} + \gamma \text{Bank}_{ijt} + \theta \text{Macro}_{jt} + \vartheta \text{OiI}_t + \mu_i + \varepsilon_{ijt} \quad (3)$$

where i, j, and t indices are the bank, country, and time respectively; α is the deterministic component; y refers to the bank profitability; Bank is the vector of the bank-specific determinants of bank profitability; Macro refers to the macroeconomic determinants of bank performance; Oil represents the measure of oil shocks; μ_i and ε_{ijt} are bank-specific unobserved heterogeneity and random idiosyncratic errors, respectively.

If the impact of oil shocks is still significant in the model, then we can infer that oil price shocks directly affect bank profitability. Suppose the effect of oil price shocks on bank performance appears insignificant or diminishes. In that case, we can infer that oil shocks

may indirectly affect bank profitability through macroeconomic channels. Hence, the effect of oil price shocks on the relationship between macroeconomic variables and the bank performance is tested by including interactive terms of oil shocks with such alternative macro channels as inflation, economic growth, and the real effective exchange rate. In other words, the effect of oil shocks on the link between macroeconomic variables and the performance of Islamic, investment, and conventional banks is estimated by augmenting the baseline model with the interaction terms between oil shocks and inflation, economic growth, and real effective exchange rate.

$$y_{ijt} = \alpha + \beta y_{ijt-1} + \gamma \text{Bank}_{ijt} + \theta \text{Macro}_{jt} + \vartheta \text{OiI}_t + \delta \text{Macro}_{jt} \text{ x } \text{OiI}_t + \mu_i + \varepsilon_{ijt} \quad (4)$$

where i, j, and t indices refer to bank, country, and time respectively; α is the deterministic component; y implies bank profitability; Bank refers to the vector of the bank-specific determinants of bank profitability; Macro denotes the macroeconomic determinants of bank performance; Oil represents the measure of oil shocks; $\text{Macro}_{jt} \text{ x } \text{OiI}_t$ is an interaction term between oil shocks and macro channels; μ_i and ε_{ijt} are bank-specific unobserved heterogeneity and random idiosyncratic errors, respectively. If the interaction term between oil shocks and macroeconomic variables becomes significant, the study will conclude that there is an indirect impact of oil shocks on bank performance channeled through macroeconomic variables.

In this model, the oil variable is defined as a conditioning variable. Therefore, we focus on the coefficients θ and δ.

$$\frac{\Delta y_{ijt}}{\Delta \text{Macro}_{jt}} = \theta + \delta \text{OiI}_t \quad (5)$$

This equation will show us how the marginal increase in oil shocks influences the relationship between each of the macro-channels and banking performance.

2.3. Variables and Data

The analysis uses an unbalanced panel dataset of 1366 banks from 15 net oil-importing countries covering the period from 1990 to 2020, including 53 Islamic, 127 investment, and 1186 conventional banks. The sample is obtained by the application of a filter that excludes banks with less than three consecutive observations. The highest and lowest one percentile of bank-specific and macroeconomic variables are winsorized to reduce the effects of outliers and irregular values on the estimates. This study employs unconsolidated data when available and consolidated if unconsolidated data are not available in order to avoid double-counting subsidiaries of international banks (Khediri et al., 2015).

Table 4 illustrates the list of banks from the sample of countries categorized by bank specialization as conventional, Islamic, and investment banks. The main criterion for the selection of the sample size is as follows: a country must be a net oil importer and contain all three classes of bank types. The data of all available countries that complied with this criterion are obtained from FitchConnect[9]. The analysis assesses the direct and indirect impact of oil variables (such as oil spending, oil price changes, and oil price volatility) on bank performance and investigates whether macroeconomic variables can mediate this relationship. Our focus variables are the oil variables and their interactions with the potential macro-channels.

[9] It is important to note that countries such as the United Kingdom, Indonesia, Mauritania, and Tunisia are all oil producers, but their production is insufficient for the domestic market; therefore, they import the rest of their needs from other countries. The UK, Indonesia, and Tunisia produced more oil than they needed until 2006, 2004, and 2000, respectively, and became oil importers for the rest of the data period. Mauritania produced more oil than its consumption only in 2006 when the year oil was first extracted. Hence, this study considered all these countries as oil importers.

Table 4: Sample of Banks by Specialization

Country Code	Country	Conventional	Investment	Islamic	All Banks
BGD	Bangladesh	49	1	4	54
BHS	The Bahamas	33	1	1	35
DEU	Germany	370	29	1	400
GBR	United Kingdom	230	55	4	289
IDN	Indonesia	164	1	10	175
JOR	Jordan	11	3	3	17
LBN	Lebanon	67	2	3	72
MRT	Mauritania	12	1	2	15
PAK	Pakistan	36	14	11	61
PHL	Philippines	44	2	1	47
SGP	Singapore	28	10	1	39
TUN	Tunisia	20	2	2	24
TUR	Türkiye	76	3	5	84
YEM	Yemen	7	1	4	12
ZAF	South Africa	39	2	1	42
	Total:	1186	127	53	1366

Source: Created by the author.

After a careful review of the literature, the following variables were employed for the empirical study. The return on average assets and return on average equity are used as the indicators of bank profitability (as dependent variables), which are the function of bank-specific and macroeconomic determinants. While bank-specific variables include bank size, capitalization, asset quality/credit risk, efficiency, and liquidity, macroeconomic variables consist of inflation, economic growth, and exchange rate. In addition, three main covariates, namely oil spending, oil price changes, and oil price volatility, are incorporated into the model to address our research questions. Oil variables and their interaction with the potential macro-channels are the focus variables in this study.

Oil spending and oil price changes are expected to have positive effects on bank performance because rises (decline) in oil prices result in more (less) payment required by households, firms, and governments for their oil consumption and, consequently, more (less) demand for financing, affecting the bank's profitability positively (negatively). In particular, Islamic and investment banks are likely to get affected more since they engage in real economic activities. Volatility in oil prices may adversely influence economic activities since oil is an essential input in the production of many goods and services and creates uncertainties about the demand and supply of funds in the financial system, consequently affecting the banking performance adversely. Therefore, oil price volatility is expected to have a negative association with bank performance. Other potential routes through which oil variables may influence the bank profitability are inflation, economic growth, and real effective exchange rate. All the variables employed in this research are explained in detail below.

Return on average asset (ROAA) and return on average equity (ROAE). There are mainly two variables representing bank profitability in the literature: return on average asset and return on average equity. These two distinct ratios show slightly different aspects of bank profitability. On the one hand, ROAA is a ratio defined as the net profits expressed as a percentage of average total assets and shows the ability of bank management to turn its assets into profits. On the other hand, ROAE is a ratio defined as the net profits expressed as a percentage of average total equity and indicates how much profit is received by shareholders from investing their capital in the bank. Alternatively, ROAE can also be shown as ROAA times the total assets to equity ratio, and the latter is called the bank’s equity multiplier, which measures the degree of financial leverage. A bank with lower leverage (higher equity) will usually reveal higher ROAA but lower ROAE, assuming all other things being equal. Since ROAE ignores the risks associated with high leverage and financial leverage is controlled by respective authorities, ROAA seems to be a better ratio to asses the bank profitability (Athanasoglou et al., 2008). However, this study includes ROAE to assess the robustness of the results. Net interest margin (NIM) is another variable used to measure bank performance in the literature, and it shows the difference between interest income and interest expense as a percentage of a bank’s assets. This study does not use NIM as a dependent variable to measure bank performance because the ratio contains information about bank performance;

however, it does not fully reflect it. An example can be given in order to clarify the subject matter. For instance, if the NIM of a bank is 6% and ROAA is zero, then the ROAE will also be zero. It is apparent that this nominally very high NIM only indicates the inefficiency of a bank since the bank seems to have a high non-interest cost of intermediation (NIM minus ROAA) (V. Sharma, 2015).

Bank size. Bank size usually is measured as the natural logarithm of the value of total assets (sometimes its squares in order to capture this possible non-linear link) and is considered one of the important determinants of banks' profitability. It is usually introduced to explain existing economies of scale (due to greater product and loan diversification, market power, and other reasons) or diseconomies of scale (due to bureaucracy, less diversification, and other reasons) in the market (Athanasoglou et al., 2008). While some studies find a positive or negative relationship between bank profitability and bank size (Bourke, 1989; Kumar et al., 2021; Smirlock, 1985), some identify the absence of this relationship (Athanasoglou et al., 2008). While Smirlock (1985) claims that size has an important role in increasing bank profitability due to the greater product and loan diversification, Kumar et al. (2021) assert that there is a negative relationship between these two variables because smaller banks are able to focus on profitable segments while also lowering their agency costs. However, Athanasoglou et al. (2008) highlight the absence of a relationship between bank profitability and bank size. This finding provides alternative interpretations for the link between bank size and profitability, asserting that newly founded banks are not particularly profitable (if at all profitable) as they focus more on expanding market share than on improving profitability. Hence, there is no a priori expectation regarding the effect of bank size on bank profitability.

Capitalization. Capitalization is measured by equity over total assets and is an important factor in explaining the performance of financial institutions. It demonstrates the allocation of a bank's funding sources between debt and equity. Thus, the ratio of equity to total assets (capital ratio) is an indicator of debt level and risk of insolvency (Bouzgarrou et al., 2018). In other words, capitalization illustrates the capital strength and solvency of a bank in the case of adverse developments. The impact of capital ratio on bank profitability is ambiguous because the relevant literature has shown that the impact can be positive and negative.

A bank with an excessively high capital ratio shows that it operates cautiously and disregards profitable investment opportunities, which increases the opportunity cost of capital, negatively affecting the profitability of the bank. Put differently, well-capitalized banks are considered less risky and safer than institutions with lower capital ratios. According to the risk-return trade-off, a bank that takes less risk gets less return on its investment (Berger, 1995b). From the above point of view, there is an adverse relationship between capitalization and bank profitability. Apart from Berger (1995b), the findings of Modigliani (1963) and Dietrich (2011) are in line with this view.

However, there are several reasons to believe that a higher capital level positively impacts bank profitability. First, banks with more capital cautiously operate and lend to those more able to pay the debt. Such banks are prudent in their lending process; therefore, there may occur less default on debt repayments, resulting in higher profitability of banks. Second, well-capitalized banks are able to lower their funding cost because holding a relatively large share of capital upgrades the creditworthiness of banks (Molyneux, 1993), helping to reach cheaper capital sources. Third, banks with higher capital are able to reduce the risk emerging from risky assets, leading to fostering bank profitability. Fourth, capital might be seen as a safety net to increase the proportion of riskier assets, such as loans. Fifth, when the market is down and fragile, banks with higher capital can maintain the same level of lending activities, taking advantage of the higher capitalization and avoiding the cost of financial distress (Berger, 1995b). Sixth, banks holding large capital need less external funding and borrow less, which lowers the cost of funding and further improves profitability (Kosmidou, 2008). Finally, higher capitalization lowers the agency costs of outside equity and increases firm value by providing incentives for managers to act more toward shareholders' interest (Le and Ngo, 2020). These are the possible reasons that a higher capital level in a bank's balance sheet may result in greater profitability. Many empirical findings support the view that a higher capital level leads to greater profit (Bourke, 1989; Demirgüç-Kunt and Huizinga, 1999; Goddard et al., 2004b; Molyneux and Thornton, 1992; Pasiouras and Kosmidou, 2007).

Last but not least, the relationship between capital ratio and bank profitability is discussed in detail above; however, the discussion only highlights the impact of capital ratio on bank

profitability. In other words, capital ratio is considered as an independent variable, while bank profitability is regarded as a dependent variable. However, higher profits may increase the capital level. If this occurs, there arises an issue of reverse causality from bank profit to the capital level. The capital ratio should be modeled as an endogenous determinant of bank profitability to tackle the issue of reverse causality (as opposed to a strictly exogenous one). This case is also highlighted in many articles considering this relationship (Athanasoglou et al., 2008; Athanasoglou Panayiotis et al., 2006; Bouzgarrou et al., 2018; Dietrich and Wanzenried, 2014; C. C. Lee and Hsieh, 2013; Tan, 2016, 2017; Tan and Floros, 2012; Trujillo-Ponce, 2012). There is no expectation regarding the direction of the variable, and this study considers capitalization as an endogenous determinant of bank profitability to tackle the issue of reverse causality.

Asset quality/credit risk. In the literature, three indicators are commonly used to measure asset quality. These are (i) loan loss reserves, (ii) loan loss provisions, and (iii) non-performing loans, all scaled by gross loans. This study uses the ratio of loan loss reserves over gross loans to proxy asset quality (also called credit risk) following (Beck et al., 2013; Nizam et al., 2019; Pervana et al., 2015; Poghosyan and Hesse, 2009). This study acknowledges that a better proxy for asset quality could be non-performing loans to gross loans to show the exact impact of credit risk on bank profitability. However, data on the other two variables are filled out very poorly in the database, which is why this study chooses to use loan loss reserves over gross loans. From a theoretical point of view, the loans provided by banks are placed on the asset side of the balance sheet, and the asset quality of banks depends on their quality. Most of a bank’s assets are often composed of loans, which pose the greatest risk to the bank's capital account. Therefore, higher exposure to credit risk is associated with lower profitability (Athanasoglou et al., 2008). There are many reasons that expose commercial banks to excessive credit risk, thus adversely affecting their profitability. These are poor corporate practices, poor credit risk management processes, outdated data use, absence or non-adherence to proper credit risk management practices, poor enforcement of creditor rights, and a weak legal environment. Thus, this variable plays a significant role in determining a bank’s overall profitability. The above explanations are valid when the return on average asset and the return on average equity are regarded as dependent variables.

However, when net interest margin is a proxy for bank performance, it turns out that the relationship between credit risk and interest margin is expected to be positive because banks apply an implicit risk premium to the interest rates charged for the transactions to compensate for the possibility of non-repayment or default on credit (Y. K. Chen et al., 2018; Doliente, 2005; Maudos and Fernández de Guevara, 2004). Therefore, banks having higher credit risk offer higher interest margins. Not but not least, some studies use the ratio of loans to total assets and loans under the follow-up to total loans to measure credit risk. The ratio of loans to total assets is a measure of the income source of banks, and its impact on profitability would be positive unless the banks take on an excessive amount of risk (Alper and Anbar, 2011; C. C. Lee et al., 2014). Loans under the follow-up to total loans is a ratio that can be considered another proxy for credit risk, and it indicates the health of a bank's loan portfolio, and it is expected to have a negative impact on bank profitability (Alper and Anbar, 2011).

Efficiency. Advances in information, communications, and financial technologies enable banks to operate their services more efficiently. As a result, the cost-to-income ratio, a measure of operational efficiency, has been falling to varying degrees practically everywhere with these advancements, subsequently increasing a bank's profit (Trujillo-Ponce, 2012). Expenses of financial institutions, in general, can be considered mainly in two categories: overheads and operating expenses. Previous empirical studies have employed a range of variables as a proxy for a bank's efficiency. These studies consider either overheads (Bouzgarrou et al., 2018; Tan, 2016, 2017; Tan and Floros, 2012) or operating expenses (Athanasoglou et al., 2008; Dietrich and Wanzenried, 2011; Garcia and Guerreiro, 2016; Konstantinos, 2012; Liu and Wilson, 2009; Pervana et al., 2015) to gauge bank efficiency (or total expenses including overheads and operating expenses (Alharbi, 2017; Poghosyan and Hesse, 2009)), all scaled by either gross revenues or total assets. On the one hand, overheads are fixed expenses that banks incur over time and do not indicate the effectiveness of bank management. On the other hand, operating expenses can be a better proxy to measure bank efficiency since it shows how effective the bank management is and how well banks manage their operational costs (Athanasoglou et al., 2008). Thus, this study opts for operating expenses over gross revenues to proxy bank efficiency. It is important to emphasize that other variables are also used to measure bank efficiencies, such as a log of overhead costs (Flamini

et al., 2009) and operating expenses divided by interest income (Al-Homaidi et al., 2018). Most studies expect a negative correlation between operating expenses and bank profitability (Athanasoglou et al., 2008; Dietrich and Wanzenried, 2011, 2014; Garcia and Guerreiro, 2016; Konstantinos, 2012; Pervana et al., 2015). A well-managed bank can lower the operating cost, which subsequently boosts a bank's profitability, implying the negative relationship between these two variables. However, there is also a counter-argument asserting operating expenses impact bank profitability positively. Molyneux and Thornton (1992) found that operating expenses have a positive effect on profitability in the European banking industry. They argued that higher operating expenses emanate from higher levels of salaries and wages while raising salaries and wages increases the productivity of employees, having a larger impact on profitability than the amount paid out as salaries and wages. This supports the view of efficiency wage theory, which advocates that paying higher salaries and wages to employees incentivizes them to be more productive and prevents skilled workers from quitting their jobs. The empirical findings of Naceur and Goaied (2010) and Guru, Staunton, and Shanmugam (2002) support this theoretical view. In addition, there is also a possibility that banks may pass their higher costs onto depositors by paying less on their deposits and borrowers by charging higher interest rates on their loans. Therefore, there is no a priori expectation regarding the effect of operating expenses on bank profitability.

Liquidity. It is crucial for banks to retain enough liquidity in order to meet regulatory standards, absorb unforeseen losses, and be able to fulfill their obligations under their liabilities. The major role of banks is to convert short-term financing, such as deposits, into long-term borrowings, such as loans. Other things being equal, bank profit is expected to increase as more deposits are transformed into loans. In other words, a bank holding a lower proportion of liquid assets grasps an opportunity to earn higher profits and gets exposed to higher risks, indicating a negative relationship between liquidity and bank profitability. This is also what portfolio theory puts forward in the literature. However, a bank holding a low level of liquidity may face financial strains to meet regulatory standards, absorb unforeseen losses, and be able to fulfill its obligations, and this tends to cause a bank to take more risk and increase its funding costs (even bank failure), thus, reducing profitability, reflecting the positive relationship between liquidity and bank profit. Thus, it is evident in the literature

that there are contradictory results regarding the direction of this relationship. Molyneux and Thornton (1992) and Goddard et al. (2004b) conducted research on the determinants of bank profitability in European countries and found that liquidity is negatively associated with bank profitability. These studies show that European banks holding less liquid assets are likely to earn higher profits. In contrast, Bourke (1989) documented the opposite results showing that if banks have poor management practices in loan allocation and monitoring, higher levels of loans (lower liquidity) may increase non-performing loans and further cause a decline in bank profitability, emphasizing the positive relationship between liquidity and bank profitability. Pasiouras and Kosmidou (2007), who investigated the factors influencing the profitability of domestic and foreign commercial banks in the European Union, found contradictory results for domestic and foreign commercial banks. While there is a negative association between liquidity and bank profitability for domestic banks, this association turns out to be positive in the case of foreign banks. In addition, examining the profitability of different classes of Japanese banks, Liu and Wilson (2009) discovered that the liquidity variable is insignificant in regressions when the return on average asset and return on average equity are considered dependent variables for profitability, pointing out the absence of an association between liquidity and bank profitability. Thus, considering the above discussions, there is no a priori expectation concerning the impact of liquidity on bank profitability. Last but not least, liquid assets to total assets and total loans to total assets are commonly used as a measure of bank liquidity in the literature[10]. The ratio of total loans to total assets shows what percentage of the total assets is tied up in loans, and the greater the value, the less liquidity is available for bank use (Trujillo-Ponce, 2012). This ratio does not directly show the liquidity of a bank but indirectly indicates the remaining assets available for bank use. Thus, this study uses liquid assets to total assets to demonstrate the direct relationship between liquidity and bank profitability.

[10] Liquid assets to total assets are occasionally denoted as liquid assets to deposits and short-term funding (Beck et al., 2013) or liquid assets to deposits (Hesse and Poghosyan, 2009). Total loans to total assets are also sometimes replaced with total loans to total deposits (Patrão, 2021) or total loans to customers and short-term funding (Bouzgarrou et al., 2018; Kosmidou, 2008; Saif-Alyousfi et al., 2021). Financing gap to total assets (Y. K. Chen et al., 2018) and deposit and short-term funding over average assets ratio (Alharbi, 2017) are the two uncommon variable employed in the literature.

Inflation. The relationship between inflation and bank profitability is ambiguous and depends on whether inflation is anticipated or unanticipated by banks. If banks anticipate future inflation, they will adjust their interest rates accordingly (profit and loss sharing ratios in the case of Islamic banks), and their income will increase faster pace than the cost, implying a positive impact of inflation on bank profitability. However, suppose banks are unable to forecast future inflation and adjust their interest rate in a timely manner; in that case, their cost will rise more rapidly than their income, resulting in a negative association between inflation and bank profitability. Moreover, high inflation reduces the real income of households and firms, diminishes their real value of deposits and liquidity, and raises the likelihood of loan defaults and non-performing loans, which, in turn, negatively impacts bank performance (Pervana et al., 2015). Likewise, inflation raises the cost of capital. Thus, the demand for financing contracts diminishes. Conflicting results in the literature support the discussion above, while some researchers found a positive association between inflation and profitability (Athanasoglou et al., 2006, 2008; Bourke, 1989; Demirgüç-Kunt and Huizinga, 1999; Kumar et al., 2021; Molyneux and Thornton, 1992), some discovered a negative association (Ali et al., 2011; Kosmidou, 2008; Mirzaei et al., 2013). Thus, there is no prior expectation regarding the direction of the variable. A range of variables used in previous empirical studies as a proxy for inflation is the consumer price index, producer price index, and GDP (gross domestic product) price deflator. This study uses the latter variable to measure the impact of inflation on bank performance.

Exchange rate. Two different proxies are used for the exchange rate in the literature: nominal and real effective exchange rates. The only difference is that the latter is corrected for relative movements in the national price or cost indicators of the home country. An increase in the real exchange rate implies an appreciation of the local currency. The real exchange rate is more sensible than the nominal exchange rate in the sense that the former accounts for the relative prices of goods and services in the two countries. Hence, the real effective exchange rate is used as a proxy for the exchange rate variable. A rise in real effective exchange rate declines the cost of foreign goods and services in real terms resulting in an expansion of imports and a reduction in exports, thus, negatively affecting the export competitiveness of

local firms and their demand for external financing. Therefore, this study presumes that a real effective exchange rate is negatively associated with the financial sector performance.

Economic growth. Another important key determinant influencing bank profitability is the economic activity in the country. Higher economic growth leads to an optimistic perspective on the economy as a whole and raises the demand for credit by creating borrowing opportunities while creating more deposits in banking institutions that are necessary to finance new projects. In such an environment, banks would like to lend as much as possible in the hope of earning higher profits. Conversely, during a period of recession, economic agents are unwilling to invest due to the negative outlook on the economy and diminishing their demand for credit, and the quality of loan portfolios is likely to deteriorate, leading banks to be reluctant to lend. In such an uncertain economic climate, banks would reduce the credit supply, and, in turn, bank profitability would decline. Thus, following the literature (Athanasoglou et al., 2006; Dietrich and Wanzenried, 2011; Kosmidou, 2008; Trujillo-Ponce, 2012; M. W. Wu and Shen, 2011), the impact of economic growth on bank profitability is expected to be positive. Finally, two common determinants are employed as an indicator of economic activity in the literature, GDP growth, and GDP per capita growth. This study uses real GDP per capita growth to proxy economic activity.

Oil spending / Oil price changes / Oil price volatility: This study uses three different variables to assess the impact of oil on bank profitability. Before explaining each variable, it is important to stress that the data in this study only contains net-oil-importing countries. The first variable, oil spending, shows the changes in each country's oil expenditure yearly; it is the first difference of oil price multiplied by the quantity (consumption in thousand barrels). Oil spending is expected to have a positive relationship with the bank profitability because rises (decline) in oil spending, caused by either price or quantity, result in more (less) payment required by households, firms, and governments for their oil consumption and, consequently, more (less) demand for financing, affecting the bank's profitability positively (negatively). Thus, this study expects a positive association between oil spending and bank profitability. The second variable indicates changes in oil prices calculated as the first difference of oil price. By the same token, upward (downward) changes in oil prices may

lead to the more (less) payment required by households, firms, and governments for their oil consumption, assuming that countries cannot change or adjust their oil consumption in the short term because of inelastic demand in its nature, and this gives rise to more (less) demand for financing, affecting the bank's profitability positively (negatively). It is essential to bear in mind that countries may not change their oil consumption in the short term up to a certain threshold, and once that threshold is exceeded, changes in consumption can be observed. Yet, we are more inclined to expect that oil price changes are positively associated with bank profitability. The last variable is the oil price volatility measured by the standard deviation of oil price. Oil is one of the most significant inputs of economic activities. Any volatility in oil prices may have a significant impact on almost all sectors of the economy, and these events consequently create uncertainties about the demand and supply of funds in the financial system, affecting the banking performance adversely. Although some factors, such as rapid technological and digital development, expanding alternative energy sources, and new oil discoveries, result in increasing the elasticity of oil demand and improving economic resilience to oil price volatility, oil continues to have a significant impact on global economies, influencing the trajectory of economic activities and in turn financial system. Hence, we presume that higher volatility in oil prices exerts a negative influence on bank profitability. The data of Europe Brent Spot Price FOB (Dollars per Barrel) is used for the analysis.

In addition to the above variables, we initially included bank concentration in our regression. However, based on the variance inflation factor (VIF), we discovered that bank size is highly correlated with bank concentration. This is expected because the calculation of bank concentration is based on the bank's total assets (total assets of the three largest commercial banks as a share of total commercial banking assets in a country). This raises the concern of a multicollinearity problem where a high degree of correlation causes issues when fitting and interpreting the regression model. Thus, we removed the bank concentration from the regression model.

The data in this research are collected from the FitchConnect database for bank-specific variables, Thomson Reuters Refinitiv (DataStream) for macroeconomic variables, and

Thomson Reuters Refinitiv (DataStream) plus Worldometer for oil variables. Panel data analysis will be conducted. Table 5 below presents the summary of variables, expected signs, and data sources used in this research.

Table 5: Description of Variables, Their Expected Signs, and Sources

Code	Variable	Sign	Source
(P)	**Bank Profitability: Dependent Variables**		
P1	Return on average assets (ROAA)		FitchConnect
P2	Return on average equity (ROAE)		FitchConnect
(B)	**Bank-Specific Factors: Control Variables**		
B1	Bank size: Log of total assets	+ | -	FitchConnect
B2	Capitalization: Ratio of equity to total assets	+ | -	FitchConnect
B3	Asset quality/Credit risk: Ratio of loan loss reserves over gross loans	-	FitchConnect
B4	Efficiency: Operat. expenses over gross revenues	+ | -	FitchConnect
B5	Liquidity: Liquid assets to total assets	+ | -	FitchConnect
(C)	**Macroeconomic Factors: Independent Variables**		
C1	Inflation: GDP price deflator	+ | -	DataStream
C2	Economic growth: Real GDP per capita growth	+	DataStream
C3	Exchange rate: Real effective exchange rate	+ | -	DataStream
(O)	**Oil Revenue: Independent Variables**		
O1	Oil spending: First difference of oil price multiplied by the quantity	+	DataStream and Worldometer
O2	Oil price changes: First difference of oil price	+	DataStream
O3	Oil price volatility: Standard deviation of oil price	-	DataStream

Source: Created by the author.

2.4. Methodology

This study uses panel data to analyze the impact of oil on the bank performance of net oil-importing countries. Panel data combines cross-sectional and time series data, showing observations of multiple units (e.g., countries, banks, firms) at several points in time. Panel data has been employed widely in empirical studies of various issues, such as bank-level performance and firm investment behavior. The literature cites many advantages of using panel data, which will be summarized below.

Data Variability: By combining cross-sectional and time-series data, it is evident that variability in the variables increases. This offers several advantages. First, variability in the explanatory variables is crucial for the accuracy of the estimates in econometric modeling. In other words, the greater the variability of a dependent variable, the lower the estimated coefficient's standard error. Second, the cross-sectional variability of a variable enables the assessment of time-invariant factors and explanatory variables. Some variables do not change over time within a cross-section. Cultural habits, religious affiliations, and companies' organizational structures can be given as examples of time-invariant determinants (Ibrahim, 2018b). However, these factors may play significant roles in explaining dependent variables but cannot be included in time series analyses as dependent variables because of an absence of data variability. For instance, Islam forbids interest rate-based transactions, and in the absence of Islamic banks in some heavily muslim-populated countries, high percentage of population due to religious concerns might stay unbanked. This may have important implications for the bank's performance in these countries.

Normality and Degree of Freedom: It indicates the available number of observations that vary in analysis and is more related to the data variability. Data availability, particularly for developing nations, is a significant barrier to having precise estimation. Take the issue of Islamic bank profitability. In some countries, Islamic banks have been established in recent years, and the size of data on Islamic bank profitability is limited and also shows little variability over time. This makes analysis of bank profitability for these countries unreliable since researchers have to produce the estimate of bank profitability with a small sample size

of cross-sectional data. Non-normality, multicollinearity, and lack of degree of freedom are the common statistical issues that arise due to the small sample size.

Heterogeneity, Dynamics, and Omitted Variable Bias: Employing cross-sectional data does not allow us to capture (unobserved) heterogeneity across units and the dynamic nature of the dependent variable. Thus, the estimation of an empirical model employing a cross-sectional dataset may get affected by omitted variable bias. The term "heterogeneity" refers to factors specific to but varied across individual units. This heterogeneity may have an impact on the variables used in the analysis. For instance, managerial skills and banking regulations may impact bank performance, but their effects are unobserved through standard determinants of bank profitability. Bank profitability may also be dynamic in nature as banks set a target for profitability based on past performances. This indicates that the estimation would be biased if these variables are omitted, and this is known as omitted variable bias. Using panel data allows for incorporating heterogeneity across units and dynamics in the modeling and thus prevent the emergence of omitted variable bias (Ibrahim, 2018b).

Disaggregation and Aggregation Bias: Using aggregate data in time series analysis may fail to uncover underlying microeconomic dynamics due to aggregation biases. In other words, information about each component in the aggregate data is ambiguous in time series analysis. For instance, many early studies have evaluated bank performance employing using aggregate capitalization data. While this can provide an aggregate look into the topic, it fails to uncover potential differences between bank types. Since Islamic banks are infant and smaller than their counterparts, they are heavily capitalized to avoid the risks they face during their daily operations. Thus, using aggregate data does not help researchers figure out the impacts of different classes of bank capitalization on bank profitability. There is a need for panel data to investigate heterogeneity in adjustment dynamics between different types of individuals, households, or firms. Panel technics can minimize estimation biases that may stem from the aggregating groups into a single time series (Clower, 2021).

Despite these benefits, panel data nevertheless have the same statistical flaws as cross-sectional and time-series data. Heteroskedastic errors and error correlation (cross-sectional dependence) are the typical issues with cross-sectional data. Autocorrelation and non-

stationarity, on the other hand, are the two fundamental statistical problems with time-series data. There may also be an issue of the endogeneity of explanatory variables in addition to those mentioned above. These statistical challenges must be taken into account for proper panel data modeling.

The structure of panel data has the potential to overcome these challenges. Baltagi (2013) introduces two different sets of panel data: macro and micro panels. While macro panels imply panel data of cross-sectional units over a long time period (generally over twenty years), micro panels usually cover many cross-sectional units (in hundreds or thousands) for a relatively short number of periods. Moreover, panel data can be classified as balanced (all cross-sectional data include measurements in all periods) and unbalanced (each cross-sectional unit has different numbers of observations). It is important to note that using balanced or unbalanced data does not matter since econometric modeling can typically account for both.

There are two main types of panel data analysis: static and dynamic. While static models include fixed effects (FE) and random effects (RE), dynamic models comprise mean group (MG), pool mean group (PMG), and generalized method of moments (GMM). The main difference between static and dynamic panel data analysis is the introduction of lagged dependent variables into the right-hand side of the equation in the cases of a dynamic model. The introduction of lagged dependent variables into the specification implies that the effects of the entire time period of the independent variables are taken into consideration. In other words, the historical background of the model is taken into account by adding lagged dependent variables into the specification. For instance, if a bank maintains high-profit persistence from one year to the next, it indicates the existence of obstacles to market competition, emphasizing the insufficiency of an increase in competition. Another important point to be highlighted about profit persistence is that banks set their profit targets according to the previous year's performance; therefore, including the lagged dependent variable in the model plays an important role in explaining bank profitability. Since this current study focuses on bank profitability as a dependent variable, it is important to build a dynamic

econometric model to fit the purpose of the study. Therefore, this study uses a proper dynamic model for its empirical analysis.

As long as the potential dynamic behavior or persistence of a variable is theoretically justified, it is essential to incorporate the variable in the specification to have proper modeling of panel data. There has been an increasing number of empirical research employing dynamic panel model specifications across countries, states, firms, households, individuals, etc. These studies cover a wide range of topics, such as bank profitability (Killins and Mollick, 2020), firm performance (K. Chang et al., 2022), economic growth (Gyedu et al., 2021), tourism (Konstantakopoulou, 2022), green finance (Zhou and Xu, 2022) and many others. Further, it is pertinent to note that there is voluminous research in the literature investigating bank profitability using dynamic panel model specifications (see: Athanasoglou et al. (2008), García-Herrero et al. (2009), Flamini et al. (2009), Tan and Floros (2012), C. C. Lee and Hsieh (2013), Trujillo-Ponce (2012), Dietrich and Wanzenried (2014) Tan (2016), Tan (2017), Bouzgarrou et al. (2018)).

The dynamic panel model specification is designed to account for the persistence or partial adjustments of the dependent variable. The simple equation for the dynamic model becomes:

$$y_{it} = \rho y_{i,t-1} + \beta x_{it} + (u_i + \varepsilon_{it}) \quad (6)$$

where y_{it} is a dependent variable and $y_{i,t-1}$ is the lagged dependent variable showing the potential dynamic behavior or the persistence of the dependent variable, x_{it} is an explanatory variable or vector of explanatory variables, u_i is an unobserved individual-specific time-invariant effect that allows for heterogeneity in the means of the y_{it} series across individuals, and ε_{it} is the standard (is a disturbance) error term.

Incorporating the lagged dependent variable into the equation allows researchers to capture dynamic effects. The coefficient of $y_{i,t-1}$ measure the degree of persistence of the dependent variable or speed of adjustment at which it goes back to its long-run conditional mean. The slope of the lagged dependent variable is expected to be between 0 and 1, $0< \rho \leq 1$. If the value of ρ is higher or close to 1, it is regarded as higher persistence of the dependent variable. In other words, if the value of ρ is higher, the adjustment of y_{it} to its long-run mean will be

slower when shocks occur. In addition, incorporating the dynamic term or the lagged dependent variable into the equation enables the interpretation and measurement of the temporal effects of the explanatory variables on the dependent variable. β is a vector that measures the simultaneous change in y_{it} as a result of a unit change in x. The total long-run impact of explanatory variables on the dependent variable can be shown by $\beta(1-\rho)$.

The main statistical problem in the context of estimation (1) is endogeneity. The endogeneity problem arises from the existence of the correlation between the right-hand-side variables and the error terms. There are two sources of endogeneity issue, and it arises when

- there is an existence of a correlation between the dependent variables, x_{it} , and the error terms, $u_i + \varepsilon_{it}$
- there is the existence of a correlation between the lagged dependent variable, $y_{i,t-1}$, and error terms, $u_i + \varepsilon_{it}$.

While the former normally derives from the existence of omitted variables and reverse causality, and the latter occurs through the construction of the equation. Since u_i (individual effects) is a part of the right-hand side of the equation, the covariance between individual effects and lagged dependent variable is not zero $\text{cov}(y_{i,t-1}, u_i + \varepsilon_{it}) \neq 0$. Endogeneity issue contributes to the problems of heteroskedasticity, serial correlation, and cross-sectional dependence/contemporaneous correlation, which are potential issues in panel analysis (Ibrahim, 2018a).

An endogenous variable refers to the variable that is determined by other variables present within the model. Endogeneity can lead to biased estimated coefficients of the "endogenous" right-hand-side variables. Thus, such biased estimated coefficients result in misleading conclusions and improper theoretical interpretations. Several factors can cause endogeneity to arise: reverse causality, omitted variables, and selection bias.

Reverse causality, or reverse causation, refers to the phenomenon that shows a different relationship between dependent and independent variables than we would expect. It simply occurs when the dependent variable (y_{it}) causes changes in the independent variable (x_{it}) instead of the other way around. Therefore, it leads to an error term to be associated with the

independent variable. Bank capital, which is one of the main determinants of bank profitability, can be given as an example. On the one hand, banks holding high capital would make less profit due to depriving those funds of investing in profitable areas. On the other hand, more profitable banks would allocate higher levels of capital to be safer and sounder in cases where they suffer losses if the risks materialize. Thus, bank profitability may cause changes in bank capital. To cope with the endogeneity issue arising from reverse causality, researchers employ lagged-one values of dependent variables instead of contemporaneous values (Ibrahim, 2018a).

Omitted variable arises when a statistical model leaves out explanatory variables that have explanatory power on a dependent variable. In other words, it arises when relevant variables for the model are excluded from the right-hand side of the equation. If a model has too many variables, there is a risk of having irrelevant variables in the model, or if a model has inadequate explanatory variables, there is a potential risk of omitting relevant ones in the model. Hence, the construction of a model needs to strike the right balance between including too many variables and missing relevant variables. Omitting variables is a source of endogeneity resulting in biased estimates.

Selection bias refers to the selection of an improper sample population in such a way that proper randomization is not realized. For example, when the bank profitability of a country is estimated, the inclusion of data only during the expansion and peak phases of the business cycle may lead to biased estimates, and it does not represent the correct estimation of bank profitability in that country unless the study focuses on that certain time period.

Incorporating individual-specific effects allows for heterogeneity and overcomes the omitted variable bias originating from (unobserved) time-invariant characteristics of the individuals or panels. Alternative sets of (controlled) explanatory variables are included in the model to check for robustness to minimize the issue of omitted variable bias in empirical implementation. In that sense, the classification of the dependent variable must be properly achieved. These are:

- Focal explanatory variables: These are the variables that capture the cause-and-effect relationship most central to the study being investigated.

- Core explanatory variables: These variables are core variables included in the model from the previous studies that have built the theoretical framework of the topic researched.
- Conditional explanatory variables: These are the additional variables that might have explanatory power on the dependent variable.

The baseline model should be first estimated by including only focal and core explanatory variables. Then conditional explanatory variables can be incorporated into the regression at one time or one set or category in one go. This practical approach is a commonly used method in econometric analysis. The study mainly concentrates on the focal variables. Since there is no certain rule for adding or removing variables from the equation, regressing different combinations of variables would enhance credibility by minimizing the omitted variable bias and showing robustness (Ibrahim, 2018a).

The endogeneity issue can be overcome by employing instrumental variables. The GMM estimators is the commonly used econometric tool to address the endogeneity issue regardless of the sources of endogeneity. GMM was first introduced into the econometrics literature by the seminal work of Hansen (1982). Since then, it has been a widely used econometric approach in empirical studies.

There are three major advantages of GMM estimators. First, GMM adopts internal and external instruments to address the endogeneity problem arising from including lagged dependent variables in the model. Second, GMM allows for heterogeneity by including individual-specific effects. Lastly, GMM minimizes omitted variable bias as well as the impact of measurement errors. Conversely, there are also some limitations of GMM. It is more complex compared to the other panel techniques, and there is also a possibility to manipulate the results. It does not account for cross-sectional dependence (contemporaneous correlation); thus, the model includes the time dummy. In addition, GMM relies on the assumption that the number of observations is large and the data contains a short time period.

There are two commonly used GMM estimators for dynamic panel models: First difference GMM and system GMM. The first difference GMM is developed by Arellano and Bond (1991). First difference GMM removes individual specific effects in the equation by differencing and uses instruments to address the endogeneity issue arising from the

correlation between the error term and the lagged dependent variable. There are several drawbacks of the first difference GMM that need to be tackled. First, when the first difference GMM implements differencing the variables, there arises a loss of information from the level variable. Second, when the lagged dependent variable and explanatory variables are persistent over time, the instruments appear to be weak (Blundell and Bond, 1998). Last but not least, as the time period extends, this would add to the problem of instrument proliferation and consequently affect the estimation (Roodman, 2009).

System GMM is a modified version of the first difference GMM and first introduced by Arellano and Bover (1995) and fully developed by Blundell and Bond (1998). They extend the first difference GMM to overcome the issues of instrument weakness and the loss of information in the level of variables. The instruments generated for the regression in the first difference are the same as the ones in the first difference GMM. As to the regression in level, the lagged difference of the corresponding variables is incorporated into the specification as the instruments. Similar to the first difference GMM, the system GMM has one and two-step estimators. The system GMM has an advantage over the first difference GMM especially when the explanatory variables are persistent.

First of all, the system GMM panel data technique accounts for the persistence of the dependent variable (bank profitability in our case) by incorporating the lagged dependent variable among explanatory variables and correcting for endogeneity bias. Second, some of the variables in the specification may be potentially endogenous, which makes the application of alternative econometric methods (such as pooled OLS and fixed effects methods) inappropriate. For instance, the relationship between capital ratio and bank profitability is discussed in detail above; however, the discussion only highlights the impact of capital ratio on bank profitability. In other words, capital ratio is considered as an independent variable, while bank profitability is regarded as a dependent variable. However, higher profits may be reinvested into the company again as capital and, in turn, increase the bank's capital level. If this occurs, there arises an issue of reverse causality from bank profit to the capital level. The capital ratio should be modeled as an endogenous determinant of bank profitability to tackle the issue of reverse causality (as opposed to a strictly exogenous one). Thus, the system

GMM enables us to instrument endogenous variables and have consistent estimates. Finally, if some of the important determinants of bank profitability are excluded from the specification, the ordinary least squares method provides bias estimates due to the omitted variables. The system GMM panel data technique provides robust results for the omitted variable problem. Considering the current study, some explanatory variables, such as profitability, are highly persistent, and the inclusion of their lagged levels might be very weak instruments for the first differenced equations. In such instances, the first-differenced GMM panel data technique suffers from a downward bias (Blundell and Bond, 1998). Thus, the additional set of first-differenced instruments and equations in levels make the system GMM estimator more efficient by overcoming the weak instrument problem inherent to the first-differenced GMM estimator (Poghosyan and Hesse, 2009). Hence, this current study uses dynamic panel methods (namely, the system GMM) to control the persistence of profitability and endogeneity in the model.

2.5. Concluding Remarks

This chapter covers the empirical approach employed in the current research process. First, it explains the empirical models used in this research, defining the specification models addressing our research objectives. Second, it describes the dependent and explanatory variables and their expected impact on analysis. Finally, it discusses the econometric methods designed to tackle the possible estimation issues.

The analysis assesses the direct and indirect impact of oil variables (such as oil spending, oil price changes, and oil price volatility) on bank performance and investigates whether macroeconomic variables can mediate this relationship. A panel data set of a total of 1366 banks from 15 net oil-importing countries covering the period from 1990 to 2019, which includes 53 Islamic, 127 investment, and 1186 conventional banks, was gathered, and we concluded that the system GMM is an appropriate model to run the estimation.

The following chapter unveils descriptive statistics of variables employed in this research, shows the scatter plots and correlation tables, discusses the estimated results, and finally concludes the chapter.

CHAPTER 3: EMPIRICAL FINDINGS

3.1. Introduction

The current study addresses three major research questions: first, the direct effect of oil shocks on the performance of the banks in net oil-importing economies; second, the indirect impact of oil shocks on the performance of the banks in net oil-importing economies; the role of macroeconomic variables in shaping this relationship; finally, it compares the profitability dynamics of Islamic banks with conventional and investment banks.

First, the preliminary analysis is presented. Empirical results and robustness tests, respectively, follow it. Finally, the last section concludes the chapter.

3.2. Preliminary Analysis

3.2.1. Descriptive Statistics

Table 6 below presents descriptive statistics for the dependent and explanatory variables employed in this study. In particular, the table provides the number of observations, means, standard deviations, and minimum and maximum values for each of the indicators from conventional, investment, and Islamic banks. Table 7 shows the independent group t-tests for differences in means with unequal variances. It simply demonstrates independent t-tests run on each sample of bank classes to find out whether the means of variables are significantly different from each other.

Following the literature, bank profitability is proxied by two alternative indicators: return on average asset and return on average equity. The results reveal that the profitability, as measured by the return on average assets, of the investment banks is greater (1.52%) than conventional (1.04%) and Islamic (0.89%) banks. This can be understood that since Islamic banks are infant and smaller than their counterparts, they are super-cautious in their operations and, in turn, earn lesser profits. This is also proven by the lesser standard deviation of Islamic (6.84%) and conventional banks (6.60%) as compared to investment banks (7.66%) since higher profitability is associated with higher volatility of net earnings. Islamic banks seem to have lower profitability with lower volatility of net earnings. However,

employing coefficients of variation (risk per unit of return, measured by the standard deviation to mean): Islamic banks (7.68) seem to earn a lower return for per unit of risk compared to conventional banks (6.34) and investment banks (5.03), which means Islamic banks take higher risk per unit of return as compared to other bank types. The second profitability measure is the return on average equity, which is how much income a bank generates for each dollar of stockholders' equity. Regarding the return on average equity, the outputs document evidence that conventional banks (19.75) are creating more income from the money that investors have put into the banks in comparison to investment (4.90) and Islamic banks (7.61). The results appear to be in contrast to the previous results of the return on average asset; however, this is because the return on average equity ignores the risks associated with high leverage.

Islamic banks in the sample are roughly equal in size to investment banks (8.61 versus 8.53, respectively), while conventional banks are significantly larger (9.05). Further, the results report that investment banks (34.7%) hold the larger size of aggregate liquidity to meet their operational needs, and followed by conventional (30.36%) and Islamic banks (26.04%), respectively. Table 7 confirms the results above implying that these differences are statistically significant.

Furthermore, Islamic banks are better capitalized, have lesser loan loss reserves, and are less cost-effective as compared to conventional banks, which supports the findings of (Beck et al., 2013). Beck et al. (2013) discovered that Islamic banks are less efficient, have higher asset quality, and are better capitalized than conventional banks, and this helped Islamic banks outperform during the crisis period. The qualities of Islamic banks can also enable them to immunize the negative impact of oil price changes. Put differently, well-capitalized banks are considered less risky and safer compared to institutions with lower capital ratios, and according to the risk-return trade-off, a bank that takes less risk gets less return on its investment, and the results seem to verify this information when the return on average asset and return on average equity of Islamic banks are taken into account. In addition, since there is no Shariah-compliant interbank money market or lender-of-last-resort option for Islamic banks, they need to maintain extra capital buffers to safeguard financial stability. Moreover,

the inefficiency of Islamic banks emanates from the higher cost of monitoring and documentations due to profit and loss sharing contracts and higher cost of Shariah-compliant procedures. Investment banks appear to be better capitalized and have lesser asset quality than other bank types and they are also more efficient than Islamic banks but not conventional banks.

Table 6: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Conventional Banks					
Return on A. Assets	19314	1.04	6.60	-168.49	289.93
Return on A. Equity	19173	19.75	1577.53	-5917.62	217750.00
Capitalization	21153	15.37	19.14	-566.02	138.02
Asset Quality	12874	6.67	11.89	-2.25	228.19
Efficiency	20623	46.08	4205.13	-580600.00	62782.14
Liquidity	21067	30.36	23.64	-9.14	128.29
Bank Size	20362	9.05	1.01	4.30	12.58
Investment Banks					
Return on A. Assets	1675	1.52	7.66	-97.62	71.49
Return on A. Equity	1660	4.90	34.54	-850.02	234.27
Capitalization	1846	33.81	31.27	-25.67	118.72
Asset Quality	716	11.44	18.99	0.00	100.00
Efficiency	1732	61.19	481.79	-12025.00	5366.67
Liquidity	1834	34.70	29.97	0.00	100.00
Bank Size	1671	8.53	1.18	4.61	11.99
Islamic Banks					
Return on A. Assets	1212	0.89	6.84	-174.28	56.64
Return on A. Equity	1204	7.61	20.32	-261.47	80.00
Capitalization	1347	22.16	34.05	-669.48	99.66
Asset Quality	944	6.60	10.91	0.00	100.00
Efficiency	1329	85.65	665.65	-16680.57	12575.00
Liquidity	1344	26.04	19.46	0.03	99.29
Bank Size	1347	8.61	0.77	5.30	10.42

Source: Created by the author.

Period: 1990-2020

3.2.2. Correlation Table and Scatterplots

Table 7: T-Tests for Differences in Means

	ConB vs. InvB	ConvB vs. IsB	InvB vs. IsB
Return on A. Assets	-0.482**	0.142	0.624**
	[0.193]	[0.202]	[0.271]
Return on A. Equity	14.854	12.137	-2.717**
	[11.424]	[11.407]	[1.030]
Capitalization	-18.439**	-6.784**	11.655**
	[0.739]	[0.936]	[1.179]
Asset Quality	-4.766**	0.068	4.835**
	[0.717]	[0.370]	[0.793]
Efficiency	-15.106	-39.574	-24.467
	[31.487]	[34.508]	21.621
Liquidity	-4.348**	4.315**	8.664**
	[0.718]	[0.555]	[0.878]
Bank Size	1.044**	0.442**	-0.082**
	[0.032]	[0.022]	[0.035]
Observations	23009	22510	3193

Source: Created by the author.
Independent group t-tests for differences in means with unequal variances.
ConB = conventional banks, InvB = investment banks, IslB = Islamic banks.
* $p < 0.1$, ** $p < 0.05$. Standard errors in brackets.

Table 8 below demonstrates the correlation between variables employed in this research. First, the correlation between return on average asset and other variables is explained, and then we will move on to the discussion of return on average equity. As measured by return on average asset, the profitability of conventional banks tends to rise as the oil spending increase and is insignificant in the case of investment and Islamic banks. Changes in oil prices tend to have no impact on bank profitability of all types. These results indicate that conventional banks are prone to be affected by the quantity changes in oil rather than price changes. Oil price volatility appears to be positively correlated with the income of conventional banks, but this correlation turns out to be negative for Islamic banks and insignificant for investment banks. We found that returns on average assets of all types of banks are positively associated with the capitalization ratios, while asset quality, except for investment banks, is negatively related to earnings. More equity (capitalization) invested in

banks tend to result in higher earnings for all bank types. In addition, higher liquidity tends to reduce the net earnings of Islamic banks. This is in line with the expectation since there is no Shariah-compliant interbank money market to invest the surplus funds or lender-of-last-resort option for Islamic banks in the case of financial distress, forcing them to keep a higher level of liquidity and, in turn, earning lesser profits. Interestingly, while the cost inefficiency variable impacts the conventional bank performance negatively but it is positively correlated with the return on average assets of Islamic banks. Further, we discovered that as the bank size gets larger, the returns of conventional banks tend to fall, while this association is positive for Islamic banks, implying Islamic banks earn more as the bank size becomes larger and insignificant for investment banks.

As to the macroeconomic variables, while inflation is inversely related to the earnings of conventional banks, it is positively correlated with the profits of Islamic banks. Economic growth tends to move together in the same direction as bank performance, implying the pro-cyclicality of bank earnings. Lastly, the real effective exchange rate is negatively correlated with the return on average assets of commercial banks only and is insignificant for the other two bank types.

As for the return on average equity, the profitability of Islamic banks tends to rise as the oil spending increase and is insignificant in the case of investment and conventional banks. Contrary to previous results, oil price volatility tends to have a negative influence on investment bank profitability. We observed that capitalization turns out to be negatively related to the earnings of Islamic banks and unrelated to the bank performance of investment and conventional banks. This is expected because a bank with lower leverage (higher equity) will usually reveal a higher return on average asset but the lower return on average equity. Surprisingly, the result of the cost inefficiency variable is inconsistent with the previous results as it is correlated with the return on average equity of investment (positively) and Islamic (negatively) banks. Further, liquidity appears to be the same in sign but insignificant for all types of banks in contrast to the previous outcome. Apparently, there is no noticeable difference for the rest of the variables.

Table 8: Correlation Table

Specialization of Banks	Conventional	Investment	Islamic	Overall
Return on A. Assets vs.:				
Return on A. Equity	0.014**	0.558**	0.551**	0.015**
Capitalization	0.266**	0.142**	0.465**	0.258*
Asset Quality	-0.112**	-0.008	-0.348**	-0.121**
Efficiency	-0.042**	0.014	0.461**	-0.013**
Liquidity	-0.006	0.009	-0.116**	-0.008
Bank Size	-0.055**	-0.028	0.076**	-0.048**
Oil Spending	0.014**	0.011	0.034	0.015**
Changes in Oil Prices	0.011	0.009	0.006	0.011
Volatility	0.021**	-0.01	-0.084**	0.012*
Inflation	-0.025**	-0.015	0.078**	-0.019**
Economic Growth	0.081**	0.061**	0.014	0.074**
Exchange Rate	-0.031**	0.024	-0.031	-0.031**
Return on A. Equity vs.:				
Capitalization	-0.003	0.019	-0.127**	-0.003
Asset Quality	-0.003	-0.133**	-0.187**	-0.003
Efficiency	-0.001	0.104**	-0.106**	-0.001
Liquidity	-0.006	0.005	-0.031	-0.005
Bank Size	0.004	-0.001	0.152**	0.004
Oil Spending	0.000	0.003	0.049*	0.001
Changes in Oil Prices	0.002	-0.002	0.025	0.002
Volatility	0.007	-0.076**	-0.0258	0.006
Inflation	0.001	-0.016	0.287**	0.002
Economic Growth	0.012	0.066**	0.047*	0.012
Exchange Rate	0.006	0.019	-0.033	0.006
Capitalization				
Asset Quality	0.108**	0.421**	-0.213**	0.111**
Efficiency	-0.026**	0.004	0.391**	-0.014**
Liquidity	0.161**	0.051**	0.053*	0.138**
Bank Size	-0.393**	-0.581**	-0.235**	-0.413**
Oil Spending	-0.023**	-0.024	-0.004	-0.022**
Changes in Oil Prices	-0.009	-0.018	-0.013	-0.011*
Volatility	0.091**	0.069**	-0.027	0.085**
Inflation	-0.081**	-0.087**	-0.102**	-0.086**
Economic Growth	-0.012*	-0.019	-0.091**	-0.029**
Exchange Rate	-0.113**	-0.062**	-0.181**	-0.141**
Asset Quality				
Efficiency	0.032**	-0.041	-0.217**	0.014

Liquidity	0.257**	0.011	0.219**	0.235**
Bank Size	-0.231**	-0.434**	-0.222**	-0.247*
Oil Spending	0.014	-0.015	-0.048	0.007
Changes in Oil Prices	0.015*	-0.011	-0.014	0.011
Volatility	-0.045**	0.029	-0.011	-0.038**
Inflation	0.071**	0.106**	0.037	0.064**
Economic Growth	-0.101**	0.037	-0.117**	-0.092**
Exchange Rate	0.022**	0.159**	-0.091**	0.012
Efficiency				
Liquidity	-0.016**	-0.014	0.038	-0.014**
Bank Size	0.009	-0.011	-0.002	0.007
Oil Spending	0.004	-0.028	-0.014	0.004
Changes in Oil Prices	0.005	-0.027	-0.024	0.004
Volatility	-0.001	-0.049**	-0.084**	-0.001
Inflation	0.002	-0.007	-0.021	0.001
Economic Growth	-0.001	-0.004	0.007	-0.001
Exchange Rate	0.005	-0.019	-0.002	0.004
Liquidity				
Bank Size	-0.205**	-0.029	-0.217**	-0.189**
Oil Spending	0.011	-0.029	0.055**	0.007
Changes in Oil Prices	0.023**	-0.022	0.054**	0.021**
Volatility	-0.032**	0.037	-0.002	-0.024**
Inflation	0.023**	-0.064**	0.084**	0.016**
Economic Growth	-0.056**	-0.063**	-0.013	-0.055**
Exchange Rate	-0.159**	-0.154**	0.026	-0.149**
Bank Size				
Oil Spending	-0.008	0.016	-0.071**	-0.008
Changes in Oil Prices	0.002	0.018	-0.051*	0.002
Volatility	0.065**	0.021	0.072**	0.049**
Inflation	-0.116**	-0.056**	0.018	-0.101**
Economic Growth	-0.012*	-0.032	-0.015	-0.006
Exchange Rate	-0.129**	-0.265**	-0.126**	-0.115**

Source: Created by the auhor.
* $p < 0.1$, ** $p < 0.05$.

A scatter plot depicts the relationship between two numeric variables, which makes it easy to read the possible direction of variables on the figures. Figure 2-7 in the appendix displays the scatterplots with three distinct oil variables on the x-axis and bank profitability on the y-axis. The figures exhibit the scatterplots of three bank types -conventional, investment, and

Islamic banks- in addition to the overall relationship. Oil 1, Oil 2, and Oil 3 denote oil spending, oil price changes, and oil price volatility, respectively. A cursory look at the figures indicates that there seems to be no apparent relationship between the variables except the ones that Oil 1 and Oil 2 tend to have a slightly positive relationship with the Islamic bank profitability when the return on average equity is placed on the y-axis.

To sum up, the findings of the preliminary analysis show that different bank classes introduced into the sample are heterogeneous in terms of varying bank-specific characteristics. Some macroeconomic factors also give the impression of having potentially heterogeneous effects on bank earnings. Different sets of oil variables are prone to have varying impacts on the income of different bank classes, especially when the return on average asset is replaced with the return on average equity.

However, these analyses are based on raw data, and it requires more extensive treatment by advanced econometric methods to come out with more reliable inferences. Hence, this current study, controlling for the persistence of profitability and endogeneity in the model using dynamic panel methods (the system GMM), addresses the relationship between bank profitability and its determinants (oil variables, bank-specific and macroeconomic factors).

Pool OLS and fixed effects as alternative estimation techniques produce biased estimated coefficients of the lagged dependent variable, leading to misleading conclusions and improper theoretical interpretations. We run the same specifications with pool OLS and fixed effects. The results[11] lend support for the upward bias (pooled OLS) and downward bias (fixed effects model) estimated coefficients of the lagged dependent variable, confirming that the system GMM is an appropriate technique for our model (Poghosyan and Hesse, 2009).

3.3. Empirical Results

This section discusses how the performance of banks from net oil-importing countries responds to the changes in oil shocks and whether macroeconomic variables play a significant role in determining this relationship. This study uses two proxies to measure bank

[11] The results can be found in the appendix section.

profitability: return on average asset (ROAA) and return on average equity (ROAE). The results of ROAA will be investigated first, and then we will move on to ROAE. The following bank-specific variables, defined as the determinants that are influenced by the bank's management decisions, policies, and actions, are included in the study to show the impact of each on bank performance: capitalization, asset quality (credit risk), efficiency, liquidity, and bank size. Three distinct oil variables are introduced into the equations: oil spending, oil price changes, and oil price volatility. In addition, macroeconomic variables, defined as determinants that reflect existing economic conditions in an environment within which banks operate, are incorporated into the specification to demonstrate whether they can mediate the relationship between oil and bank profitability. It is known that macroeconomic determinants are not indicators of banks' management decisions, and they are out of their control and, therefore, are not influenced by banks' particular decisions.

3.3.1. Oil–Bank Profitability Nexus (Return on Average Asset as Dependent Variable)

This section examines the possible direct and indirect effects of oil shocks (variables) on bank performance employing the system GMM panel data technique. Firstly, the model introduces the bank-specific variables and oil variables to gauge whether there is a significant direct relationship between the oil market and bank profitability. If the impact of oil shocks turns out to be insignificant, then the study will infer that oil variables are insignificant and not associated with bank profitability. If oil shocks happen to be significant, there tends to be a direct influence of oil shocks on bank performance.

Using the full sample below in Table 9, oil spending and oil price changes have a positive relationship with the bank profitability as expected because rises (decline) in oil spending, caused by either price or quantity, result in more (less) payment required by households, firms, and governments for their oil consumption and, consequently, more (less) demand for financing, affecting the bank's profitability positively (negatively). Since oil has a low-price elasticity of demand and supply, all the parties above require more funds to finance their oil needs and maintain the same level of input in production or consumption. Households and firms will apply for more financing from banks to pay their oil expenses, and also rises in oil

prices (amount of consumption) may also lead governments to grow their demand for financing to bear the higher cost of oil expenses, which may result in more issuance of government bonds and Sukuk (to be purchased by banks). These more financing needs consequently would have a significant positive effect on bank profitability. Moreover, there is a direct and positive impact of oil spending and oil price changes on bank profitability as a result of the rises in oil-related business lending. It is important to underline that investment bank profitability is likely to be positively (negatively) affected by buoyant advising, fee, trading, and other such income during oil price (or oil spending) booms (falls) (Poghosyan and Hesse, 2009) in addition to the above factors.

Table 9: Direct Effect (Only Bank-Specific Var.)

	Oil1	Oil2	Oil3
ROAA (lagged)	0.280**	0.278**	0.291**
	(0.048)	(0.048)	(0.049)
Capitalization	0.014	0.013	-0.037
	(0.018)	(0.018)	(0.030)
Asset Quality	-0.020**	-0.019**	-0.128**
	(0.006)	(0.006)	(0.024)
Efficiency	-0.013**	-0.017**	-0.014**
	(0.003)	(0.002)	(0.003)
Liquidity	0.009**	0.010**	0.022**
	(0.003)	(0.003)	(0.006)
Bank Size	0.130**	0.157**	-0.188
	(0.026)	(0.023)	(0.264)
Oil Spending	0.004**		
	(0.001)		
Oil P. Changes		0.004**	
		(0.001)	
Oil Volatility			0.001
			(0.005)
AR(1)	0.000	0.000	0.000
AR(2)	0.166	0.130	0.056
Hansen test	0.218	0.344	0.730
Number of instruments	63	63	63
Number of groups	1102	1104	1104

Source: Created by the author.
(One-Step System GMM, Robust, Nonconstant, Capitalization variable is used as endogenous)
* $p < 0.1$, ** $p < 0.05$, Standard errors in parentheses

Furthermore, the expansion of world oil demand and an increase in oil prices may become important factors to oil producers and world economic growth because oil-exporting countries may stimulate world economic growth by reinvesting their oil revenues across the countries. This may result in favorable economic conditions in oil-importing countries when the revenues are channeled into effective investment areas. For this to be achieved, the positive impact of those investments is required to outweigh the adverse effect of oil price rises.

Our results support the findings of Patrão (2021) as the researcher using fixed effects and system GMM over the period between 2009 and 2020 found that oil price shocks have a direct and positive effect on bank performance by studying the impact of oil price shocks on the performance of 85 U.S. (individual net oil-importing country) banks. On the other hand, our results contradict the findings of Katırcıoglu et al. (2018), as the authors revealed a direct and negative impact of oil price changes on bank profitability due to the decline in oil-related business lending.

However, it is important to underline that the effect of both variables on the dependent variable is minimal. There might be several reasons why oil shocks have such a small impact on bank profitability. These are:

- continuous development of alternative and renewable energy sources,
- improvement in energy efficiency through rapid technological and digital development,
- changing the structure of economies from manufacturing-based to service-based economies,
- new oil discoveries,
- substitution of oil inputs with other factors of production, such as labor and capital,
- a decline in the share of oil in consumption and production,
- improvement in interventionist monetary policy,
- government interventionist measures such as price restraint, price-fixing, and subsidy support.

These factors make countries less dependent on oil as an input, increase the elasticity of oil demand, and improve economic resilience to oil price shocks, consequently weakening the relationship between oil shocks and bank performance.

As for the oil price volatility, the coefficient is not statistically significant at any conventional significance level. The main reasons why volatility in oil prices has no impact on bank performance could be the use of long-term energy contracts and derivative instruments and the absence of concurrent adverse shocks. Using long-term energy contracts and derivative instruments protects countries from the volatility in oil prices and secures their long-term energy consumption at a fixed price. In addition, the factors mentioned right above may also play an important role in breaking this relationship.

Next, the outcomes relating to bank-specific characteristics suggest that coefficients of capitalization are not statistically significant at any conventional level of significance, indicating that bank profitability is independent of dynamics between debt and equity. A higher level of loan loss reserves and cost inefficiency tend to put negative pressure on the bank earnings since asset quality and efficiency coefficients show negative signs. The more funds allocated as loan loss reserves relative to the gross loans result in a decline in bank profitability as expected. Results show that a well-managed bank can lower the operating cost, which subsequently boosts a bank's profitability, implying the negative relationship between these two variables. However, liquidity and bank size appear to exert a positive influence on bank profitability. The liquidity outcomes refer that a bank holding a low level of liquidity may face financial strains to meet regulatory standards, absorb unforeseen losses, and be able to fulfill its obligations. This tends to cause a bank to bear more risk and increase its funding costs (even bank failure), thus reducing profitability, reflecting the positive relationship between liquidity and bank profit. Bank size seems to have an important role in increasing bank profitability through greater product and loan diversification and market power, implying the existence of economies of scale.

The historical background of the model is taken into account by adding lagged dependent variables into the specification. If banks maintain high-profit persistence from one year to the next, it indicates the existence of obstacles to market competition, emphasizing the

insufficiency of an increase in competition. The dynamic model employed in this study showed that banks maintain moderate profit persistence from one year to the next, implying that the deviations from the perfectly competitive market are insignificant. Another important point to be highlighted about profit persistence is that banks set their profit targets according to the previous year's performance; therefore, including the lagged dependent variable in the model plays an important role in explaining bank profitability.

Since the sample in this study consists of three different bank classes that differ in terms of business conduct and characteristics as indicated by the preliminary analysis, we augment the baseline model with the interaction between bank dummy (DummyIN-investment bank- and DummyIS-Islamic bank-) and oil shocks (oil spending, oil price changes, and oil price volatility) in Table 10 below. The introduction of dummy variables with continuous variables allows us to have different slopes of that particular continuous variable across two different values, which are dummy variable can take on. According to the results below, the impact of oil shocks does not differ across different classes of banks.

Table 10: Direct Effect (Only Bank-Specific Var. + Dummy Var.)

	Oil1	Oil2	Oil3
ROAA (lagged)	0.308**	0.309**	0.311**
	(0.050)	(0.050)	(0.049)
Capitalization	-0.023	-0.024	-0.026
	(0.022)	(0.022)	(0.023)
Asset Quality	-0.120**	-0.121**	-0.122**
	(0.023)	(0.023)	(0.024)
Efficiency	-0.013**	-0.013**	-0.013**
	(0.003)	(0.003)	(0.003)
Liquidity	0.024**	0.023**	0.024**
	(0.006)	(0.006)	(0.006)
Bank Size	0.715	0.718	0.738
	(0.586)	(0.585)	(0.592)
DummyIN	-50.959	-49.762	-52.291
	(142.136)	(134.957)	(140.295)
DummyIS	-80.576	-78.123	-81.503
	(178.651)	(167.283)	(174.057)
Oil Spending	0.005**		
	(0.001)		
DummyIN*Oil Spending	0.001		
	(0.007)		
DummyIS*Oil Spending	-0.001		
	(0.003)		
Oil P. Changes		0.005**	
		(0.001)	
DummyIN*Oil P. Changes		0.003	
		(0.008)	
DummyIS*Oil P. Changes		-0.001	
		(0.003)	
Oil Volatility			0.003
			(0.004)
DummyIN*Oil Volatility			-0.038
			(0.053)
DummyIS*Oil Volatility			0.010
			(0.014)
AR(1)	0.000	0.000	0.000
AR(2)	0.140	0.127	0.104
Hansen test	0.399	0.562	0.745
Number of instruments	65	65	65
Number of groups	1102	1104	1104

Source: Created by the author.
(One-Step System GMM, Robust, Capitalization variable is used as endogenous)
DummyIN and DummyIS denotes dummy of Investment and Islamic bank, respectively
* $p < 0.1$, ** $p < 0.05$, Standard errors in parentheses

In order to distinguish the direct and indirect effects of oil shocks on bank profitability, this research augments the baseline specification by a set of macroeconomic variables. If the impact of oil shocks is still significant in the model, we can make an inference that oil shocks directly affect bank profitability. If the influence of oil shocks appears to be insignificant, we will conclude that the effect of oil market activities on bank performance is indirect and channeled through macroeconomic variables.

The estimation results reported below in Table 11 suggest that the impact of oil shocks is still significant when macroeconomic variables are accounted for. This implies the existence of a direct effect of oil shocks (except volatility) on banks' earnings. It is important to underline that the coefficients of oil spending and oil price changes reduced from 0.005 to 0.004, although the magnitude of changes is apparently very thin. Moreover, there is another possibility that oil variables might be significant while having bank-specific and macroeconomic variables in the equation, but macroeconomic variables may remain as potential channels of transmission. This small change and the aforementioned reason require further analysis of possible transmission channels.

As for the macroeconomic determinants, inflation appears to be negatively related to bank profitability, referring banks cannot forecast future inflation and adjust their interest rate (profit and loss sharing rates in the case of Islamic banks) promptly. Their costs will rise more rapidly than their income, resulting in a negative association between inflation and bank profitability. The other likely two reasons are: high inflation reduces the real income of households and firms, diminishes their deposits and liquidity, and raises the likelihood of loan defaults and non-performing loans, which, in turn, negatively impacts bank performance; and high inflation also increases the cost of capital; thus, the demand for financing contracts and in turn earnings diminish.

The coefficient of economic growth is positive and significant in the equation, which is in line with our priors and the academic literature. Higher economic growth leads to an optimistic view of the economy and raises the demand for credit while creating more deposits in banking institutions necessary to finance new projects. In such an environment, banks are willing to lend more in the hope of earning greater profits. The opposite occurs when the

economy experiences a recession. Thus, the direction of economic growth is as anticipated. Finally, the real exchange rate is found to respond negatively to any deviation in bank earnings when oil price changes and oil volatility are regarded as the dependent variable; however, the real exchange rate coefficient becomes insignificant when oil spending is taken into account as the explanatory variable. A rise in real effective exchange rate declines the cost of foreign goods and services in real terms resulting in an expansion of imports and a reduction in exports, thus, negatively affecting the export competitiveness of local firms and their investments and, in turn, their demand for external financing. The results are in line with our initial presumption.

Table 11: Indirect Effect (Bank-Specific Var. + Macro Var.)

	Oil1	Oil2	Oil3
ROAA (lagged)	0.264**	0.265**	0.261**
	(0.051)	(0.051)	(0.051)
Capitalization	-0.017	-0.015	-0.016
	(0.024)	(0.023)	(0.024)
Asset Quality	-0.105**	-0.105**	-0.105**
	(0.022)	(0.021)	(0.021)
Efficiency	-0.001**	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)
Liquidity	0.025**	0.025**	0.025**
	(0.007)	(0.007)	(0.007)
Bank Size	-0.160	-0.136	-0.128
	(0.215)	(0.211)	(0.216)
Inflation	-0.040**	-0.040**	-0.036**
	(0.009)	(0.009)	(0.009)
Economic Growth	0.072**	0.073**	0.087**
	(0.014)	(0.014)	(0.014)
Exchange Rate	-0.401	-0.423*	-0.525**
	(0.255)	(0.253)	(0.259)
Oil Spending	0.004**		
	(0.001)		
Oil P. Changes		0.004**	
		(0.001)	
Oil Volatility			0.006
			(0.005)
AR(1)	0.000	0.000	0.000
AR(2)	0.252	0.233	0.224
Hansen test	0.219	0.236	0.273
Number of instruments	66	66	66
Number of groups	953	954	954

Source: Created by the author.
(One-Step System GMM, Robust, Capitalization variable is used as endogenous)
* $p < 0.1$, ** $p < 0.05$, Standard errors in parentheses

This study also further investigates whether oil shocks have varying influences on different bank classes after introducing macroeconomic variables into the equation. Table 12 below reports that the interactions between the oil shocks and bank dummies are not statistically significant, implying that the influence of oil shocks on bank earnings does not vary among the different bank types.

Table 12: Indirect Effect (Bank-Specific Var. + Macro Var. + Dummy Var.)

	Oil1	Oil2	Oil3
ROAA (lagged)	0.287**	0.287**	0.284**
	(0.055)	(0.055)	(0.054)
Capitalization	-0.016	-0.016	-0.016
	(0.024)	(0.024)	(0.024)
Asset Quality	-0.105**	-0.106**	-0.105**
	(0.022)	(0.022)	(0.022)
Efficiency	-0.001**	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)
Liquidity	0.025**	0.025**	0.025**
	(0.007)	(0.007)	(0.007)
Bank Size	-0.230	-0.238	-0.180
	(0.537)	(0.535)	(0.534)
Inflation	-0.041**	-0.041**	-0.037**
	(0.010)	(0.010)	(0.009)
Economic Growth	0.072**	0.072**	0.087**
	(0.014)	(0.014)	(0.014)
Exchange Rate	-0.393	-0.419*	-0.525**
	(0.251)	(0.251)	(0.258)
DummyIN	24.776	27.067	22.248
	(55.754)	(56.735)	(52.051)
DummyIS	14.575	17.215	11.114
	(72.782)	(72.742)	(66.170)
Oil Spending	0.004**		
	(0.001)		
DummyIN*Oil Spending	0.004		
	(0.008)		
DummyIS*Oil Spending	0.001		
	(0.003)		
Oil P. Changes		0.004**	
		(0.001)	
DummyIN*Oil P. Changes		0.006	
		(0.009)	
DummyIS*Oil P. Changes		0.002	
		(0.003)	
Oil Volatility			0.007
			(0.005)
DummyIN*Oil Volatility			-0.027
			(0.054)
DummyIS*Oil Volatility			0.013
			(0.016)
AR(1)	0.000	0.000	0.000
AR(2)	0.334	0.307	0.289
Hansen test	0.176	0.191	0.245
Number of instruments	68	68	68
Number of groups	953	954	954

Source: Created by the author.
(One-Step System GMM, Robust, Capitalization variable is used as endogenous)
DummyIN and DummyIS denotes dummy of Investment and Islamic bank, respectively
* $p < 0.1$, ** $p < 0.05$, Standard errors in parentheses

Other attempts have been made to provide fresh insight into the direct and indirect effects of oil shocks. To investigate whether oil shocks influence the nexus between the various macroeconomic factors and banking performance, interactive terms of oil shocks with the macroeconomic variables (in addition to the bank dummies) such as inflation, economic growth, and real effective exchange rate are introduced into the model. In other words, this research estimates the interactions of categorical (conventional, Islamic, and investment banks) and two continuous variables (oil shocks plus each macroeconomic variable). Before discussing the three-way interaction, it is essential to examine whether macroeconomic factors have varying impacts on different bank classes since these results will provide the basis for combining collected evidence to produce final interpretations.

The results below in Table 13 unveiled that the interaction between the investment bank dummy and inflation is not statistically significant at any conventional level of significance, implying the impact of inflation on investment bank earnings is not different from the conventional bank. However, the interaction between the Islamic bank dummy and inflation indicates that there is a positive linkage between inflation and Islamic bank profitability as compared to the negative impacts of other types. We can draw an inference that Islamic banks can better predict inflation and adjust their rates to improve their earnings, turning inflation into an advantage. Perhaps, the reason is that the balance sheet of Islamic banks comprises the majority of the Murabaha contract (IIBI, 2023), which is a sale contract (markup or cost-plus financing) between a bank and its customers. Such transactions induce banks to be involved in real market activities by buying the assets from suppliers and selling them at a markup to the clients. Thus, this leads Islamic banks to monitor the prices of goods and services more closely than the other bank types and, in turn, better forecast inflation. Secondly, when there is an increase (decrease) in the price level, interest rates tend to rise (fall). Since Islamic banks use conventional bank rates as benchmarks, they are able to adjust their financing rates promptly; however, they cannot immediately modify profit and loss

sharing rates since overall rates in this pool are determined by a pool of investments, which have varying maturity dates. In other words, profit and loss sharing rates adjust slowly compared to the conventional deposit rates in an inflationary environment. This gives Islamic banks an advantage over others by widening the margins between deposit and financing rates and, in turn, raising the profitability of Islamic banks (Özdemir and Lila, 2020). Last but not least, Islamic banks contractually impose floating rates on borrowed funds in some cases by using leasing contracts (such as Ijarah), enabling them to alter the financing rates according to the fluctuations in the price level and consequently earn better.

Table 13: Indirect Effect (Interaction Between Dummy Var. and Inflation)

	Oil1	Oil2	Oil3
ROAA (lagged)	0.291**	0.291**	0.286**
	(0.055)	(0.055)	(0.055)
Capitalization	-0.017	-0.017	-0.017
	(0.025)	(0.024)	(0.025)
Asset Quality	-0.105**	-0.105**	-0.105**
	(0.022)	(0.022)	(0.022)
Efficiency	-0.001**	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)
Liquidity	0.025**	0.025**	0.025**
	(0.007)	(0.007)	(0.007)
Bank Size	-0.290	-0.294	-0.251
	(0.543)	(0.541)	(0.541)
Inflation	-0.048**	-0.048**	-0.045**
	(0.011)	(0.011)	(0.011)
DummyIN	30.239	32.053	27.781
	(61.831)	(62.373)	(57.407)
DummyIS	19.784	21.685	17.032
	(81.068)	(80.265)	(73.342)
DummyIN*Inflation	0.005	0.005	0.008
	(0.059)	(0.059)	(0.059)
DummyIS*Inflation	0.077**	0.077**	0.080**
	(0.017)	(0.017)	(0.017)
Economic Growth	0.073**	0.074**	0.087**
	(0.014)	(0.014)	(0.014)
Exchange Rate	-0.351	-0.376	-0.469*
	(0.248)	(0.248)	(0.254)
Oil Spending	0.004**		
	(0.001)		
Oil P. Changes		0.004**	
		(0.001)	
Oil Volatility			0.006
			(0.005)
AR(1)	0.000	0.000	0.000
AR(2)	0.420	0.388	0.381
Hansen test	0.143	0.153	0.178
Number of instruments	68	68	68
Number of groups	953	954	954

Source: Created by the author.
(One-Step System GMM, Robust, Capitalization variable is used as endogenous)
DummyIN and DummyIS denotes dummy of Investment and Islamic bank, respectively
* $p < 0.1$, ** $p < 0.05$, Standard errors in parentheses

In Table 14, the average marginal effects of the dummy variables also confirm the information mentioned above and provide the exact coefficient of each bank type for that specific macro variable. It supports the results that the influence of inflation on the profitability of Islamic banks is positive as compared to the negative effect of other types.

Table 14: Average Marginal Effects of Dummy Variables for Each Oil Variable

Inflation	**dy/dx**	**Std. Err.**	**z**	**P>z**	**[95% Conf.]**	**[Interval]**
Dummy	**Oil Spending**					
Conventional	-0.048	0.011	-4.460	0.000	-0.068	-0.027
Investment	-0.043	0.057	-0.740	0.457	-0.155	0.070
Islamic	0.030	0.013	2.240	0.025	0.004	0.056
Dummy	**Oil P. Changes**					
Conventional	-0.048	0.011	-4.460	0.000	-0.068	-0.027
Investment	-0.043	0.057	-0.740	0.457	-0.155	0.070
Islamic	0.030	0.013	2.220	0.027	0.003	0.056
Dummy	**Oil Volatility**					
Conventional	-0.045	0.011	-4.250	0.000	-0.065	-0.024
Investment	-0.037	0.058	-0.640	0.522	-0.150	0.076
Islamic	0.036	0.013	2.690	0.007	0.010	0.061

Source: Created by the author.

Table 15 shows the summary of how much the effect of inflation on bank profitability at different levels of oil shocks for each type of bank class. In other words, the study checks whether the impact of inflation on bank performance is affected by the changes in oil shocks. The purpose of the analysis is that macroeconomic variables may represent possible transmission channels of oil shocks on bank profitability. Therefore, we employ three-way interaction between oil shocks, inflation, and bank dummy (continuous by continuous plus dummy variable, oil shocks as a conditioning variable) to distinguish these effects on various bank types. Table 15 below is the summary of the findings.[12]

[12] For more details, please refer to Table 16 to 18.

Table 15: Summary of Indirect Effect (Inflation as Transmission Var.)

Dependent Variable: Bank Profitability (Return on Average Asset)				
Sample	**Conventional**	**Investment**	**Islamic**	**Transmission V.**
(Oil Spending)	$\leq 12^{-}\uparrow, \geq 26^{+}\uparrow$	ins	$8\text{-}10^{+}\downarrow$	Inflation
(Oil P. Changes)	$\leq 90^{-}\uparrow$	ins	$40\text{-}90^{+}\uparrow$	Inflation
(Volatility)	$\leq 20^{-}\uparrow$	ins	$\leq 14^{+}\downarrow$	Inflation

Source: Created by the author.

An up arrow (↑) shows an upward trend (from a negative number to zero or towards a higher positive number), and a down arrow (↓) illustrates a downward trend (from a positive number to zero or towards a lower negative number). A minus sign ($^{-}$) represents a negative relationship, while a plus sign ($^{+}$) signifies a positive relationship. Insignificance is indicated as 'ins.'

Inflation

First, we begin the analysis with the inclusion of oil shocks and their interaction with inflation and bank dummy into the baseline model. Considering oil spending as an explanatory variable in the regressions, the results suggest that inflation negatively determines the commercial bank profitability until oil spending reaches 12, and the effects turn positive at levels higher than 26, but no significant impact between levels 12 and 26. The reason why inflation has a positive impact on conventional bank performance after level 26 is perhaps that banks get used to the concurrent adverse shocks of oil-induced inflation at higher levels of oil shocks. In the case of Islamic banks, inflation tends to impact bank earnings positively when the oil spending is between 8 and 10; however, increasing oil spending weakens the relationship between inflation and bank earnings in this range. As for the investment banks, no significant effect of oil spending on the inflation-profitability link is observed.

Considering oil price changes as explanatory variables in the regressions, the relationship between conventional bank earnings and inflation is negative when the changes in oil prices are in the range between 10-90 and weakens (approach to zero) when the changes get larger and vanish away after level 90. As to the Islamic banks, there is a positive and magnifying marginal effect of oil price changes on the inflation-bank earnings linkage at higher levels of changes in the oil price (40-90). The outputs for investment banks depict that inflation is not significantly associated with bank profitability at any changes in oil price.

Further, we assess the marginal effect of oil price volatility on the nexus between inflation and bank performance. The results show that inflation negatively affects conventional bank earnings when the oil price volatility is between 2-20. This negative effect is diminished (approach to zero) at higher levels of oil price volatility. On the other hand, inflation positively influences Islamic bank performance when oil price volatility is between 2 and 14, and the relationship has moderated over higher levels of oil price volatility. When the oil markets become more volatile, the impact of inflation on Islamic bank profitability weakens, probably due to the challenge of estimating the direction of the market. This is likely because Islamic banks have difficulties in adjusting their rates during highly volatile environments and therefore earn less profit. Even though higher oil price volatility seems to put pressure on the earnings of Islamic banks by reducing the positive impact of inflation, inflation may conceivably serve to some extent (2-14) as the indirect channel of transmission linking the volatility of oil prices to Islamic bank profitability. Again, in the case of investment banks, there is no significant effect of oil price volatility on the association between inflation and bank earnings at any level of oil price volatility.

In the case of conventional banks, inflation appears to potentially serve as the indirect channel of transmission linking oil shocks to bank profitability. It is apparent that when oil shocks get larger, there is a negative relationship between inflation and bank earnings. An increase in oil shocks may lead to more demand for financing from individuals, firms, and government perspectives and, in turn, positively affect the bank's profitability. However, a rise in oil shocks is also expected to push up the prices of goods and services made with petroleum products and lead to rising inflation. And higher inflation reduces the real income of households and firms, diminishes the real value of deposits and liquidities, and raises the likelihood of loan defaults and non-performing loans, which, in turn, negatively impacts bank performance. Higher inflation also increases the cost of capital; thus, the demand for financing contracts and, in turn, bank earnings diminish. Although oil shocks have a direct and positive impact on bank earnings through higher demand for financing, it also has an adverse and indirect effect on conventional bank earnings through the creation of inflation. Last but not least, the negative impact of inflation on conventional bank profits declines (even positive at some level of oil spending) at almost all levels of oil shocks. It shows that

conventional banks seem to use oil shocks as an indicator to lessen the negative effect of inflation. This provides evidence that oil shocks could be a potential indicator for conventional banks to forecast future inflation and adjust their rate to improve their earnings.

As for the Islamic banks, there exists a positive marginal effect of oil shocks on the relationship between inflation and bank profitability; thus, inflation is likely a channel of transmission. This simply means that, at some level of oil shocks, Islamic banks can forecast future inflation and adjust their rates accordingly in addition to the advantages of the inflationary environment mentioned above, and their income will increase faster than the cost, implying a positive impact of inflation on bank profitability. Besides, it seems that when oil price changes are greater, Islamic banks better predict inflation and improve their earnings. However, if the causes of oil shocks originate from either increase in oil spending or higher volatility of oil prices, it weakens the ability of Islamic banks to foresee future inflation. This makes sense because detecting changes in oil prices is easier than predicting the impact of volatility and the changes in the amount of oil consumption.

Table 16: Indirect Effect (Margins), Oil Spending-Inflation

Inflation

Bank Profitability	Conventional Banks		Investment Bank		Islamic Banks	
	Inflation					
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Oil Spending = 2	-0.095**	0.022	-0.103	0.131	0.023	0.019
Oil Spending = 4	-0.083**	0.019	-0.087	0.110	0.022	0.016
Oil Spending = 6	-0.071**	0.017	-0.070	0.090	0.021	0.013
Oil Spending = 8	-0.058**	0.015	-0.053	0.072	0.019*	0.011
Oil Spending = 10	-0.045**	0.014	-0.036	0.057	0.018*	0.011
Oil Spending = 12	-0.033**	0.013	-0.019	0.047	0.017	0.012
Oil Spending = 14	-0.021	0.014	-0.002	0.047	0.016	0.014
Oil Spending = 16	-0.008	0.016	0.016	0.057	0.015	0.017
Oil Spending = 18	0.004	0.018	0.033	0.073	0.014	0.021
Oil Spending = 20	0.017	0.021	0.050	0.091	0.013	0.024
Oil Spending = 22	0.029	0.024	0.067	0.111	0.012	0.028
Oil Spending = 24	0.042	0.027	0.084	0.132	0.011	0.032
Oil Spending = 26	0.054*	0.030	0.101	0.153	0.009	0.036

Oil Spending = 28	0.066**	0.033	0.118	0.174	0.008	0.040
Oil Spending = 30	0.079**	0.037	0.135	0.196	0.007	0.044
Oil Spending = 32	0.091**	0.040	0.152	0.218	0.006	0.048

Source: Created by the author.

Table 17: Indirect Effect (Margins), Oil Price Changes-Inflation

Inflation

Bank Profitability	Conventional Banks		Investment Bank		Islamic Banks	
	Inflation					
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Oil P. Changes = 10	-0.081**	0.019	-0.151	0.147	0.018	0.016
Oil P. Changes = 20	-0.074**	0.018	-0.129	0.129	0.019	0.014
Oil P. Changes = 30	-0.067**	0.016	-0.107	0.110	0.020	0.012
Oil P. Changes = 40	-0.061**	0.015	-0.085	0.093	0.021*	0.011
Oil P. Changes = 50	-0.053**	0.014	-0.062	0.076	0.021**	0.011
Oil P. Changes = 60	-0.046**	0.013	-0.040	0.061	0.022**	0.011
Oil P. Changes = 70	-0.039**	0.013	-0.018	0.050	0.023*	0.012
Oil P. Changes = 80	-0.032**	0.013	0.004	0.045	0.024*	0.013
Oil P. Changes = 90	-0.025*	0.013	0.026	0.048	0.025*	0.015
Oil P. Change = 100	-0.018	0.013	0.049	0.058	0.026	0.017
Oil P. Change = 110	-0.011	0.014	0.071	0.073	0.027	0.019

Source: Created by the author.

Table 18: Indirect Effect (Margins), Oil Price Volatility-Inflation

Inflation

Bank Profitability	Conventional Banks		Investment Bank		Islamic Banks	
	Inflation					
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
VOL = 2	-0.061**	0.018	-0.115	0.084	0.045**	0.014
VOL = 4	-0.057**	0.016	-0.097	0.078	0.041**	0.013
VOL = 6	-0.053**	0.015	-0.079	0.073	0.037**	0.011
VOL = 8	-0.048**	0.013	-0.062	0.068	0.033**	0.010
VOL = 10	-0.044**	0.012	-0.044	0.065	0.028**	0.010
VOL = 12	-0.041**	0.011	-0.026	0.062	0.024**	0.011
VOL = 14	-0.035**	0.010	-0.008	0.060	0.021*	0.012
VOL = 16	-0.031**	0.010	0.010	0.060	0.016	0.014
VOL = 18	-0.027**	0.010	0.028	0.060	0.012	0.016
VOL = 20	-0.022**	0.011	0.046	0.062	0.008	0.018
VOL = 22	-0.019	0.012	0.063	0.065	0.003	0.021
VOL = 24	-0.014	0.013	0.081	0.069	-0.001	0.024
VOL = 26	-0.010	0.015	0.099	0.073	-0.005	0.026
VOL = 28	-0.006	0.016	0.117	0.079	-0.009	0.029
VOL = 30	-0.001	0.018	0.135	0.085	-0.014	0.032

Source: Created by the author.

Next, we introduce the interaction terms of the real effective exchange rate with different bank dummies to observe whether the real effective exchange rate has a varying impact on different bank classes. The estimated results below in Table 19 reveal that the interaction between the investment bank dummy and the exchange rate is not statistically significant at

any conventional significance level. This is also supported by the results of the average marginal effect of the dummy variable, implying that the exchange rate's effect on investment banks' profits is not different from conventional banks. On the other hand, the exchange rate appears to be positively and significantly associated with the performance of Islamic banks.

In the case of conventional banks, the possible scenario is that when there is a rise in the real effective exchange rate, it reduces the cost of foreign goods and services to local people and raises the costs of local goods and services to foreign buyers, thus, negatively affecting the export competitiveness of local firms and their demand for external financing. This consequently leads to less financing needs from conventional banks and adversely affects their profitability.

It is known that Islamic banks offer products and instruments that are backed by genuine trade or business. This ensures each transaction must have a tangible or identifiable underlying asset, linking the financial sector with the real economy. Thus, any factors affecting the price stability of these assets may have severe repercussions for the business decision of corporate and retail customers, which have a strong connection with Islamic bank operations. In this respect, when there is a decline in the real effective exchange rate, corporate and retail customers of Islamic banks might postpone their investments and consumptions during the low real value of the local currency. Since some of their investments and consumptions are foreign exchange-sensitive, depreciation in the currency may be considered a source of financial instability (Trad et al., 2017). Besides, they become more pessimistic about the prevailing uncertain economic climate when the exchange rate does not reflect its true value. This situation might entail corporate companies and consumers to lower their demand for financing and cause Islamic banks to earn lesser profits, implying a positive relationship between reel effective exchange rate and bank profitability (or vice versa). Secondly, since Sukuk and lease certificates have become widespread and available in recent years, Islamic banks lack Shariah-compliant instruments to invest their surplus funds over the research period. Thus, most Islamic banks might have taken a position in foreign currencies and assets to evaluate those surplus funds in the hope of earning profit from

foreign exchange fluctuations. This might have also contributed to the direction of this positive relationship.

Table 19: Indirect Effect (Interaction Between Dummy Var. and Exchange Rate)

	Oil1	Oil2	Oil3
ROAA (lagged)	0.287**	0.287**	0.282**
	(0.055)	(0.055)	(0.055)
Capitalization	-0.016	-0.016	-0.016
	(0.024)	(0.024)	(0.024)
Asset Quality	-0.105**	-0.105**	-0.104**
	(0.022)	(0.022)	(0.022)
Efficiency	-0.001**	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)
Liquidity	0.025**	0.025**	0.025**
	(0.007)	(0.007)	(0.007)
Bank Size	-0.222	-0.228	-0.179
	(0.537)	(0.535)	(0.536)
Inflation	-0.040**	-0.040**	-0.036**
	(0.010)	(0.010)	(0.009)
Exchange Rate	-0.604**	-0.632**	-0.746**
	(0.282)	(0.282)	(0.290)
DummyIN	21.065	23.022	18.042
	(59.656)	(60.444)	(55.426)
DummyIS	14.060	16.312	11.059
	(79.896)	(79.731)	(72.528)
DummyIN*Exchange Rate	2.047	2.060	2.151
	(1.590)	(1.585)	(1.569)
DummyIS*Exchange Rate	1.552**	1.569**	1.648**
	(0.587)	(0.587)	(0.593)
Economic Growth	0.072**	0.073**	0.087**
	(0.014)	(0.014)	(0.014)
Oil Spending	0.004**		
	(0.001)		
Oil P. Changes		0.004**	
		(0.001)	
Oil Volatility			0.006
			(0.005)
AR(1)	0.000	0.000	0.000
AR(2)	0.345	0.317	0.305
Hansen test	0.172	0.187	0.229
Number of instruments	68	68	68
Number of groups	953	954	954

Source: Created by the author.
(One-Step System GMM, Robust, Capitalization variable is used as endogenous)
DummyIN and DummyIS denotes dummy of Investment and Islamic bank, respectively
* $p < 0.1$, ** $p < 0.05$, Standard errors in parentheses

In Table 20, the average marginal effects of the dummy variables are provided, and it shows coefficient of each bank type for that specific macro variable. It verifies Islamic banks differ from other types by having positive effect of exchange rate on bank performance.

Table 20: Average Marginal Effects of Dummy Variables for Each Oil Variable

Exchange Rate	**dy/dx**	**Std. Err.**	**z**	**P>z**	**[95% Conf.]**	**[Interval]**
Dummy	**Oil Spending**					
Conventional	-0.604	0.282	-2.140	0.032	-1.157	-0.051
Investment	1.442	1.569	0.920	0.358	-1.632	4.517
Islamic	0.948	0.512	1.850	0.064	-0.055	1.951
Dummy	**Oil P. Changes**					
Conventional	-0.632	0.282	-2.240	0.025	-1.184	-0.080
Investment	1.428	1.563	0.910	0.361	-1.636	4.491
Islamic	0.937	0.511	1.830	0.067	-0.065	1.939
Dummy	**Oil Volatility**					
Conventional	-0.746	0.290	-2.570	0.010	-1.314	-0.177
Investment	1.405	1.545	0.910	0.363	-1.623	4.434
Islamic	0.902	0.515	1.750	0.080	-0.108	1.912

Source: Created by the author.

The following output summarizes the marginal effect of oil shocks on the nexus between the exchange rate and bank performance of different bank classes. The purpose of investigating this relationship is to explore whether exchange rates serve as the transmission channels between oil shocks and bank earnings. Therefore, we use three-way interaction between oil shocks, exchange rate, and bank dummy (continuous by continuous plus dummy variable). The table below is the summary of the findings[13].

[13] For more details, please refer to Table 22 to 24.

Table 21: Summary of Indirect Effect (Exchange Rate as Transmission Var.)

Dependent Variable: Bank Profitability (Return on Average Asset)				
Sample	**Conventional**	**Investment**	**Islamic**	**Transmission V.**
(Oil Spending)	≤24⁻↑	ins	ins	Exchange R.
(Oil P. Changes)	≤110⁻↑	ins	ins	Exchange R.
(Volatility)	≤30⁻↑	ins	ins	Exchange R.

Source: Created by the author.

An up arrow (↑) shows an upward trend (from a negative to zero or towards a higher positive number), and a down arrow (↓) illustrates a downward trend (from a positive to zero or towards a lower negative number). A minus sign (⁻) represents a negative relationship, while a plus sign (⁺) signifies a positive relationship. Insignificance is indicated as 'ins.'

Exchange Rate

Oil spending and oil price changes seem to have a negative marginal effect on the association between exchange rates and conventional bank profitability. As oil spending (2-24) and changes in oil prices (10-110) increase, the negative link between the exchange rate and conventional bank earnings becomes rather weaker. Besides, there is a significant negative but diminishing marginal effect of oil price volatility on the exchange rate-bank earnings relationship at all levels. In contrast, the outputs for investment and Islamic banks indicate that the exchange rate is not significantly related to bank profitability at any change in the flow of different oil shocks. In other words, oil shocks have no marginal effect on the linkage between the exchange rate and bank earnings of investment and Islamic banks.

The exchange rate appears to be the potential channel of transmission of shocks from the oil sector to the financial industry in the case of conventional banks only. We need to refer to the theory of terms of trade channels to explain this complex relationship because this theory considers oil as a major determinant of the terms of trade and investigates the relationship between real exchange rates and oil prices. The basic concept is to link oil prices to the price level, which consequently impacts the real exchange rate. From the perspective of oil-importing countries, when there is a hike in either oil prices or oil spending, the higher cost of energy will reflect on the prices of goods and services produced out of oil and reduce the real value of the local currency. Reduction in the real exchange rate positively impacts the export competitiveness of local firms and grows their demand for financing; consequently, it escalates conventional banks' earnings. In other words, a rise in real oil prices, other things

held constant, usually leads to a real appreciation of the dollar in the short term (Beckmann and Czudaj, 2013). Because oil-importing countries that would like to maintain the same amount of oil consumption will demand more dollars to settle their payments obligations arising from their oil imports and increase the demand for financing, in turn, the bank profitability. On the other hand, a decline in real oil prices may tend to a real depreciation of the dollar because oil-importing countries will pay less in the dollar for their oil imports, and hence the demand for the dollar and financing will fall, and consequently, bank profitability drops. The same interpretation might be valid in the case of oil price volatility because firms usually prefer to stand on the safe side (keeping the prices of goods and services higher) when the oil market is volatile.

Table 22: Indirect Effect (Margins), Oil Spending-Exchange Rate

Exchange Rate

Bank Profitability	Conventional Banks		Investment Bank		Islamic Banks	
	Exchange Rate					
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Oil Spending = 2	-0.845*	0.432	1.726	2.789	-0.493	0.652
Oil Spending = 4	-0.834*	0.432	1.762	2.762	-0.519	0.651
Oil Spending = 6	-0.823*	0.432	1.797	2.736	-0.544	0.650
Oil Spending = 8	-0.812*	0.432	1.833	2.712	-0.570	0.649
Oil Spending = 10	-0.801*	0.432	1.868	2.689	-0.596	0.648
Oil Spending = 12	-0.789*	0.432	1.904	2.669	-0.621	0.648
Oil Spending = 14	-0.778*	0.433	1.940	2.649	-0.647	0.648
Oil Spending = 16	-0.767*	0.433	1.975	2.632	-0.672	0.648
Oil Spending = 18	-0.756*	0.434	2.011	2.616	-0.698	0.649
Oil Spending = 20	-0.745*	0.434	2.047	2.603	-0.723	0.650
Oil Spending = 22	-0.734*	0.435	2.082	2.591	-0.749	0.651
Oil Spending = 24	-0.723*	0.435	2.118	2.580	-0.775	0.652
Oil Spending = 26	-0.713	0.436	2.154	2.572	-0.800	0.654
Oil Spending = 28	-0.702	0.437	2.189	2.566	-0.826	0.656
Oil Spending = 30	-0.691	0.438	2.225	2.561	-0.851	0.658
Oil Spending = 32	-0.680	0.439	2.261	2.559	-0.877	0.661

Source: Created by the author.

Table 23: Indirect Effect (Margins), Oil Price Changes-Exchange Rate

Exchange Rate

Bank Profitability	Conventional Banks		Investment Bank		Islamic Banks	
	Exchange Rate					
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Oil P. Changes = 10	-0.891**	0.433	1.722	2.783	-0.527	0.652
Oil P. Changes = 20	-0.885**	0.433	1.748	2.759	-0.536	0.651
Oil P. Changes = 30	-0.879**	0.433	1.773	2.735	-0.544	0.651
Oil P. Changes = 40	-0.874**	0.433	1.799	2.712	-0.552	0.650
Oil P. Changes = 50	-0.868**	0.433	1.824	2.689	-0.561	0.650
Oil P. Changes = 60	-0.862**	0.433	1.850	2.666	-0.569	0.650
Oil P. Changes = 70	-0.857**	0.434	1.875	2.645	-0.578	0.650
Oil P. Changes = 80	-0.851*	0.434	1.901	2.623	-0.586	0.650
Oil P. Changes = 90	-0.845*	0.434	1.926	2.603	-0.594	0.650
Oil P. Changes = 100	-0.840*	0.434	1.952	2.583	-0.603	0.650
Oil P. Changes = 110	-0.834*	0.435	1.978	2.563	-0.611	0.650

Source: Created by the author.

Table 24: Indirect Effect (Margins), Oil Price Volatility-Exchange Rate

Exchange Rate

Bank Profitability	Conventional Banks		Investment Bank		Islamic Banks	
	Exchange Rate					
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
VOL = 2	-0.933**	0.449	1.231	2.908	-0.579	0.665
VOL = 4	-0.932**	0.449	1.200	2.845	-0.590	0.662
VOL = 6	-0.932**	0.449	1.169	2.783	-0.601	0.658
VOL = 8	-0.932**	0.448	1.137	2.723	-0.612	0.655
VOL = 10	-0.931**	0.448	1.106	2.664	-0.623	0.652
VOL = 12	-0.931**	0.448	1.075	2.606	-0.634	0.650
VOL = 14	-0.931**	0.447	1.043	2.550	-0.645	0.647
VOL = 16	-0.931**	0.447	1.012	2.496	-0.656	0.644
VOL = 18	-0.929**	0.447	0.981	2.443	-0.668	0.642
VOL = 20	-0.929**	0.447	0.949	2.392	-0.679	0.640
VOL = 22	-0.929**	0.446	0.918	2.343	-0.690	0.638
VOL = 24	-0.929**	0.446	0.887	2.297	-0.701	0.636
VOL = 26	-0.929**	0.446	0.856	2.252	-0.712	0.635
VOL = 28	-0.928**	0.446	0.824	2.210	-0.723	0.633
VOL = 30	-0.928**	0.446	0.793	2.171	-0.734	0.632

Source: Created by the author.

In addition to the other two macroeconomic variables, this study also introduces the interaction terms of economic growth with different bank types to ascertain whether the effect of economic growth on bank types is dissimilar. The estimated results in Table 25 document that the interaction of economic growth with the investment bank dummy is not statistically significant, implying the effect of economic growth on the investment bank earnings is not different from the conventional. However, the interaction term between Islamic bank dummy and economic growth turns out to be significant, and surprisingly its impact on the bank performance is negative.

Although the result of Islamic banks looks counter-intuitive, there are many research found a negative association between economic growth and bank profitability (Abreu and Mendes, 2002; Acaravcı and Çalım, 2013; Garcia and Guerreiro, 2016; Liu and Wilson, 2009; Pasiouras and Kosmidou, 2007; Yanikkaya et al., 2018). There could be two likely reasons

for this negative relationship. First, the Islamic bank's customers are generally considered conservative, and the teachings of Islam discourage Muslims from incurring debt unless it is necessary. Therefore, during higher economic growth, conservative customers would use their own capital generated through economic growth, resulting in less demand for financing and profitability of Islamic banks. Second, economic growth may induce competition among different bank types. Since Islamic banks incur additional costs compared to the other two bank types, such as the Shariah-compliance process and employment of Shariah advisors, they may not be able to run their bank operations as profitably as others, which may adversely affect bank profits (Liu and Wilson, 2009).

Table 25: Indirect Effect (Interaction Between Dummy Var. and Economic Growth)

	Oil1	Oil2	Oil3
ROAA (lagged)	0.287**	0.286**	0.282**
	(0.055)	(0.055)	(0.055)
Capitalization	-0.016	-0.016	-0.016
	(0.024)	(0.024)	(0.024)
Asset Quality	-0.105**	-0.106**	-0.105**
	(0.022)	(0.022)	(0.022)
Efficiency	-0.001**	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)
Liquidity	0.025**	0.025**	0.025**
	(0.007)	(0.007)	(0.007)
Bank Size	-0.261	-0.264	-0.218
	(0.540)	(0.537)	(0.538)
Inflation	-0.039**	-0.039**	-0.036**
	(0.009)	(0.009)	(0.009)
Exchange Rate	-0.351	-0.377	-0.470*
	(0.247)	(0.246)	(0.253)
Economic Growth	0.090**	0.090**	0.104**
	(0.015)	(0.015)	(0.015)
DummyIN	26.497	28.291	23.581
	(57.113)	(57.596)	(53.186)
DummyIS	16.247	18.247	13.094
	(74.481)	(73.698)	(67.607)
DummyIN*Economic Growth	-0.012	-0.010	-0.010
	(0.108)	(0.108)	(0.107)
DummyIS*Economic Growth	-0.128**	-0.126**	-0.134**
	(0.024)	(0.024)	(0.025)
Oil Spending	0.004**		
	(0.001)		
Oil P. Changes		0.004**	
		(0.001)	
Oil Volatility			0.007
			(0.005)
AR(1)	0.000	0.000	0.000
AR(2)	0.338	0.309	0.299
Hansen test	0.167	0.177	0.235
Number of instruments	68	68	68
Number of groups	953	954	954

Source: Created by the author.
(One-Step System GMM, Robust, Capitalization variable is used as endogenous)
DummyIN and DummyIS denotes dummy of Investment and Islamic bank, respectively
* $p < 0.1$, ** $p < 0.05$, Standard errors in parentheses

The average marginal effects of dummy variables for each oil variable are provided below in Table 26. Unlike other types, the results show that economic growth negatively affects

Islamic bank performance.

Table 26: Average Marginal Effects of Dummy Variables for Each Oil Variable

Eco. Growth	**dy/dx**	**Std. Err.**	**z**	**P>z**	**[95% Conf.]**	**[Interval]**
Dummy	**Oil Spending**					
Conventional	0.090	0.015	6.090	0.000	0.061	0.119
Investment	0.077	0.107	0.720	0.469	-0.132	0.287
Islamic	-0.038	0.019	-1.980	0.048	-0.076	0.000
Dummy	**Oil P. Changes**					
Conventional	0.090	0.015	5.990	0.000	0.060	0.119
Investment	0.080	0.107	0.750	0.455	-0.130	0.289
Islamic	-0.036	0.019	-1.870	0.061	-0.074	0.002
Dummy	**Oil Volatility**					
Conventional	0.104	0.015	6.800	0.000	0.074	0.134
Investment	0.095	0.107	0.890	0.375	-0.115	0.304
Islamic	-0.029	0.019	-1.560	0.119	-0.066	0.008

Source: Created by the author.

Finally, we test the three-way interaction between oil shocks, economic growth, and bank dummy to examine whether oil shocks significantly influence the economic growth-bank earnings relationship. This will allow us to decide whether economic growth serves as the indirect channel of transmission linking oil shocks to bank performance. Table 27 below is the summary of the findings[14].

Table 27: Summary of Indirect Effect (Economic Growth as Transmission Var.)

Dependent Variable: Bank Profitability (Return on Average Asset)				
Sample	**Conventional**	**Investment**	**Islamic**	**Transmission V.**
(Oil Spending)	$\leq 20^{+}\downarrow$	ins	ins	Economic G.
(Oil P. Changes)	$\leq 110^{+}\downarrow$	ins	ins	Economic G.
(Volatility)	$\leq 20^{+}\downarrow$	ins	ins	Economic G.

Source: Created by the author.

An up arrow (↑) shows an upward trend (from a negative to zero or towards a higher positive number), and a down arrow (↓) illustrates a downward trend (from a positive to zero or towards a lower negative number). A minus sign ($^{-}$) represents a negative relationship, while a plus sign ($^{+}$) signifies a positive relationship. Insignificance is indicated as 'ins.'

[14] For more details, please refer to Table 28 to 30.

Economic Growth

There is a positive but diminishing marginal effect of oil spending and oil price changes on the economic growth-profitability relationship in the range between 2-20 and 10-110, respectively. The marginal effects of oil price volatility on the nexus between economic growth and bank earnings decline slowly, remain positive and significant until level 20, and disappear after this level. Apparently, the results indicate that the impact of economic growth on the profitability of investment and Islamic banks is not affected by oil shocks.

It is obvious that economic growth potentially serves as the indirect channel of transmission linking oil shocks to conventional bank profitability only. There might be several channels where the impact of oil shocks is transmitted to economic growth and then profitability.

We first consider oil spending and oil price changes as the dependent variable. As mentioned in the literature, there are three kinds of shocks in the crude oil market: oil supply, global demand, and oil-market-specific demand shocks. Chen (2009) asserts that the historical decomposition of oil prices suggests that global aggregate demand and oil-market-specific demand are the main drivers of oil price movements. And it is also known that oil supply shocks rarely occur. If the change in oil prices or spending is demand-driven, this cannot be considered independent of economic activity. The more oil demanded may spur economic activities and, in turn, more demand for financing, and as a result, bank earnings increase.

Besides, since oil has a low price elasticity of demand and supply, oil-importing countries cannot immediately reduce their oil consumption when positive oil shocks occur. Apparently, this will cause more foreign currency spending on oil imports, exerting downward pressure on the exchange rate. Depreciation in local currency improves the export competitiveness of a country and, in turn, drives up economic growth. Economic growth leads to greater financing needs and thus contributes significantly and positively to bank profitability.

As for the oil price volatility, when there is high volatility in oil prices, countries seem to effectively apply the substitution of energy for other production factors, such as labor and capital. In addition, firms will look for alternative energy sources and try to improve their production process in a more energy-efficient way in addition to substitution oil inputs with

other factors of production (Barrell et al., 2011). And these factors induce a rise in the aggregate output. Higher economic growth leads to an optimistic view of the economy as a whole and raises the demand for financing by creating borrowing opportunities while generating more deposits in banking institutions that are necessary to finance new projects. In such an environment, banks would like to lend as much as possible in the hope of earning higher profits. This result supports the findings of Wesseh and Lin (2018).

Table 28: Indirect Effect (Margins), Oil Spending-Economic Growth

Economic Growth

Bank Profitability	Conventional Banks		Investment Bank		Islamic Banks	
	Economic Growth					
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Oil Spending = 2	0.140*	0.035	0.053	0.108	-0.051	0.037
Oil Spending = 4	0.126*	0.029	0.044	0.097	-0.044	0.031
Oil Spending = 6	0.112*	0.023	0.035	0.105	-0.037	0.025
Oil Spending = 8	0.098*	0.018	0.026	0.129	-0.030	0.021
Oil Spending = 10	0.084*	0.015	0.017	0.162	-0.023	0.020
Oil Spending = 12	0.071**	0.015	0.008	0.199	-0.016	0.022
Oil Spending = 14	0.055**	0.018	-0.001	0.239	-0.009	0.026
Oil Spending = 16	0.041**	0.023	-0.010	0.280	-0.002	0.032
Oil Spending = 18	0.027**	0.029	-0.019	0.321	0.005	0.039
Oil Spending = 20	0.013*	0.035	-0.028	0.364	0.012	0.046
Oil Spending = 22	-0.001	0.042	-0.037	0.407	0.019	0.054
Oil Spending = 24	-0.014	0.049	-0.046	0.450	0.026	0.061
Oil Spending = 26	-0.028	0.055	-0.055	0.493	0.033	0.069
Oil Spending = 28	-0.043	0.062	-0.064	0.536	0.040	0.077
Oil Spending = 30	-0.057	0.069	-0.073	0.580	0.048	0.085
Oil Spending = 32	-0.071	0.076	-0.082	0.624	0.055	0.093

Source: Created by the author.

Table 29: Indirect Effect (Margins), Oil Price Changes-Economic Growth

Economic Growth

Bank Profitability	Conventional Banks		Investment Bank		Islamic Banks	
	Economic Growth					
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Oil P. Changes = 10	0.134**	0.029	0.057	0.111	-0.042	0.039
Oil P. Changes = 20	0.124**	0.026	0.050	0.103	-0.039	0.034
Oil P. Changes = 30	0.115**	0.023	0.044	0.105	-0.035	0.030
Oil P. Changes = 40	0.106**	0.020	0.038	0.116	-0.032	0.026
Oil P. Changes = 50	0.097**	0.018	0.031	0.135	-0.029	0.023
Oil P. Changes = 60	0.088**	0.016	0.025	0.158	-0.025	0.020
Oil P. Changes = 70	0.079**	0.015	0.019	0.183	-0.022	0.019
Oil P. Changes = 80	0.071**	0.015	0.012	0.211	-0.019	0.018
Oil P. Changes = 90	0.061**	0.016	0.006	0.240	-0.016	0.019
Oil P. Changes = 100	0.052**	0.018	0.000	0.269	-0.012	0.020
Oil P. Changes = 110	0.043**	0.020	-0.007	0.300	-0.009	0.023

Source: Created by the author.

Table 30: Indirect Effect (Margins), Oil Price Volatility-Economic Growth

Economic Growth

Bank Profitability	Conventional Banks		Investment Bank		Islamic Banks	
	Economic Growth					
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
VOL = 2	0.143**	0.023	0.042	0.214	-0.057	0.048
VOL = 4	0.132**	0.021	0.051	0.181	-0.045	0.037
VOL = 6	0.121**	0.019	0.060	0.153	-0.034	0.027
VOL = 8	0.109**	0.017	0.069	0.133	-0.022	0.020
VOL = 10	0.098**	0.016	0.078	0.124	-0.010	0.019
VOL = 12	0.087**	0.015	0.087	0.128	0.001	0.026
VOL = 14	0.076**	0.015	0.095	0.145	0.013	0.035
VOL = 16	0.065**	0.015	0.104	0.171	0.025	0.046
VOL = 18	0.054**	0.016	0.113	0.202	0.036	0.058
VOL = 20	0.043**	0.018	0.122	0.237	0.048	0.070
VOL = 22	0.032	0.020	0.131	0.274	0.060	0.082
VOL = 24	0.021	0.022	0.140	0.312	0.071	0.094
VOL = 26	0.010	0.024	0.149	0.350	0.083	0.106
VOL = 28	-0.001	0.027	0.158	0.390	0.095	0.118
VOL = 30	-0.012	0.029	0.167	0.430	0.106	0.130

Source: Created by the author.

3.3.2. Robustness Tests (Return on Average Equity as Dependent Variable)

Prior to deriving the implications from the results above, the robustness tests were conducted using an alternative proxy for the response variable. For this reason, the return on average asset is replaced with the return on average equity. These two distinct ratios show slightly different aspects of bank profitability. On the one hand, ROAA is a ratio defined as the net profits expressed as a percentage of average total assets and shows the ability of bank management to turn its assets into profits. On the other hand, ROAE is a ratio defined as the net profits expressed as a percentage of average total equity. It indicates how much profit shareholders receive from investing their capital in the bank. Alternatively, ROAE can also be shown as ROAA times the total assets to equity ratio, and the latter is called the bank's equity multiplier, which measures the degree of financial leverage. A bank with lower leverage (higher equity) will usually reveal higher ROAA but lower ROAE, assuming all other things being equal. Since ROAE ignores the risks associated with high leverage and financial leverage is controlled by respective authorities, ROAA seems to be a better ratio to asses the bank profitability (Athanasoglou et al., 2008). However, this study employs ROAE as a second proxy to assess the robustness of previous results. The same flow of analysis is applied to the ROAE.

First, only bank-specific and oil variables are introduced into the equation to examine whether there is a direct relationship between oil variables and bank profitability. The results in Table 31 have similar signs and significance to those of ROAA. Three oil variables look like having a significant influence on bank incomes. The only difference is that oil price volatility appears to be negative and significant. This implies that higher oil volatility significantly and negatively impacts bank earnings. Oil price volatility generates uncertainties regarding firm profitability, valuations, and investment decisions and adversely affects economic activities and demand for financial services and, in turn, bank earnings.

Table 31: Direct Effect (Only Bank-Specific Var.)

	Oil1	Oil2	Oil3
ROAE (lagged)	0.290**	0.291**	0.292**
	(0.034)	(0.034)	(0.034)
Capitalization	0.055	0.058	0.028
	(0.098)	(0.098)	(0.098)
Asset Quality	-0.173**	-0.175**	-0.164**
	(0.048)	(0.048)	(0.047)
Efficiency	-0.147**	-0.147**	-0.146**
	(0.008)	(0.008)	(0.008)
Liquidity	0.067**	0.066**	0.069**
	(0.013)	(0.013)	(0.013)
Bank Size	1.521**	1.529**	1.645**
	(0.112)	(0.113)	(0.103)
Oil Spending	0.026**		
	(0.006)		
Oil P. Changes		0.019**	
		(0.005)	
Oil Volatility			-0.113**
			(0.034)
AR(1)	0.000	0.000	0.000
AR(2)	0.767	0.734	0.734
Hansen test	0.107	0.102	0.108
Number of instruments	63	63	63
Number of groups	1102	1104	1104

Source: Created by the author.
(One-Step System GMM, Robust, Nonconstant, Capitalization variable is used as endogenous)
* $p < 0.1$, ** $p < 0.05$, Standard errors in parentheses

Next, the interactions between bank dummies and oil shocks are included in the equation to observe whether different oil shocks have a varying effect on conventional, investment, and Islamic banks. The outputs in Table 32 reveal that the influence of oil shocks does not differ among bank classes, similar to the previous results.

Table 32: Direct Effect (Bank-Specific Var. + Dummy Var.)

	Oil1	Oil2	Oil3
ROAE (lagged)	0.290**	0.291**	0.288**
	(0.036)	(0.034)	(0.036)
Capitalization	-0.591**	0.061	-0.634**
	(0.223)	(0.097)	(0.224)
Asset Quality	-0.573**	-0.171**	-0.586**
	(0.104)	(0.045)	(0.105)
Efficiency	-0.110**	-0.147**	-0.109**
	(0.019)	(0.008)	(0.019)
Liquidity	0.113**	0.068**	0.112**
	(0.037)	(0.012)	(0.037)
Bank Size	-2.307	1.529**	-2.867
	(3.466)	(0.110)	(3.498)
DummyIN	250.007	-3.038**	296.072
	(271.508)	(1.346)	(309.213)
DummyIS	72.477	1.019	93.227
	(116.975)	(0.868)	(121.929)
Oil Spending	0.027**		
	(0.006)		
DummyIN*Oil Spending	-0.021		
	(0.043)		
DummyIS*Oil Spending	-0.008		
	(0.017)		
Oil P. Changes		0.019**	
		(0.006)	
DummyIN*Oil P. Changes		0.008	
		(0.029)	
DummyIS*Oil P. Changes		-0.000	
		(0.016)	
Oil Volatility			-0.060*
			(0.034)
DummyIN*Oil Volatility			-0.086
			(0.295)
DummyIS*Oil Volatility			-0.014
			(0.077)
AR(1)	0.000	0.000	0.000
AR(2)	0.553	0.737	0.492
Hansen test	0.471	0.103	0.638
Number of instruments	65	67	65
Number of groups	1102	1104	1104

Source: Created by the author.
(One-Step System GMM, Robust, Capitalization variable is used as endogenous)
DummyIN and DummyIS denotes dummy of Investment and Islamic bank, respectively
* $p < 0.1$, ** $p < 0.05$, Standard errors in parentheses

Further, this study incorporates macroeconomic variables into the specifications to ascertain

whether oil variables directly impact bank earnings or indirectly through macroeconomic variables. If oil variables turn out to be significant, this study will conclude that oil shocks have a direct effect on bank profitability. If they are insignificant, we infer the impact of oil is transmitted through macroeconomic variables. The results in Table 33 unveiled that oil spending and oil price changes remain significant in the equation, indicating their direct influence on bank earnings. However, the oil price volatility becomes insignificant, signifying the indirect influence of oil price volatility on bank performance. It is important to highlight that the real exchange rate is negative and significant in the results of ROAA; however, it is insignificant here.

Table 33: Indirect Effect (Bank-Specific Var. + Macro Var.)

	Oil1	Oil2	Oil3
ROAE (lagged)	0.283**	0.277**	0.281**
	(0.034)	(0.040)	(0.034)
Capitalization	0.114	0.132	0.103
	(0.090)	(0.087)	(0.091)
Asset Quality	-0.519**	-0.529**	-0.521**
	(0.098)	(0.101)	(0.100)
Efficiency	-0.112**	-0.134**	-0.111**
	(0.019)	(0.052)	(0.019)
Liquidity	0.113**	0.113**	0.113**
	(0.036)	(0.037)	(0.037)
Bank Size	1.338**	1.365**	1.266**
	(0.229)	(0.661)	(0.588)
Inflation	-0.190**	-0.189**	-0.182**
	(0.068)	(0.067)	(0.068)
Economic Growth	0.578**	0.578**	0.655**
	(0.104)	(0.113)	(0.110)
Exchange Rate	0.120	0.284	-0.069
	(0.129)	(1.451)	(1.560)
Oil Spending	0.023**		
	(0.006)		
Oil P. Changes		0.018**	
		(0.006)	
Oil Volatility			0.048
			(0.120)
AR(1)	0.000	0.000	0.000
AR(2)	0.781	0.816	0.857
Hansen test	0.505	0.266	0.508
Number of instruments	67	66	66
Number of groups	953	954	954

Source: Created by the author.
(One-Step System GMM, Robust, Capitalization variable is used as endogenous)
* $p < 0.1$, ** $p < 0.05$, Standard errors in parentheses

After incorporating macroeconomic variables into the equation, this study checks whether the different oil shocks have a varying effect on different bank types. The results in Table 34 resemble the previous one as the effects of three oil variables on the performance of Islamic and investment banks are not different from that of conventional.

Table 34: Indirect Effect (Bank-Specific Var. + Macro Var. + Dummy Var.)

	Oil1	Oil2	Oil3
ROAE (lagged)	0.254**	0.277**	0.253**
	(0.039)	(0.038)	(0.038)
Capitalization	-0.376**	0.084	-0.353*
	(0.182)	(0.166)	(0.181)
Asset Quality	-0.543**	-0.519**	-0.545**
	(0.106)	(0.103)	(0.106)
Efficiency	-0.112**	-0.174**	-0.111**
	(0.020)	(0.068)	(0.020)
Liquidity	0.110**	0.108**	0.108**
	(0.037)	(0.038)	(0.037)
Bank Size	-5.872*	0.811	-5.315*
	(3.161)	(1.390)	(3.154)
Inflation	-0.202**	-0.183**	-0.181**
	(0.067)	(0.069)	(0.067)
Economic Growth	0.572**	0.547**	0.630**
	(0.108)	(0.116)	(0.109)
Exchange Rate	-1.154	-1.343	-2.353
	(1.890)	(1.896)	(1.946)
DummyIN	371.371	214.749	411.914
	(288.989)	(188.559)	(304.548)
DummyIS	235.230*	46.605	227.589*
	(132.497)	(72.427)	(133.693)
Oil Spending	0.021**		
	(0.006)		
DummyIN*Oil Spending	-0.024		
	(0.043)		
DummyIS*Oil Spending	0.007		
	(0.016)		
Oil P. Changes		0.018**	
		(0.006)	
DummyIN*Oil P. Changes		-0.025	
		(0.045)	
DummyIS*Oil P. Changes		0.016	
		(0.016)	
Oil Volatility			-0.015
			(0.035)
DummyIN*Oil Volatility			-0.128
			(0.289)
DummyIS*Oil Volatility			-0.026
			(0.075)
AR(1)	0.000	0.000	0.000
AR(2)	0.930	0.802	0.864

Hansen test	0.838	0.541	0.901
Number of instruments	68	68	68
Number of groups	953	954	954

Source: Created by the author.
(One-Step System GMM, Robust, Capitalization variable is used as endogenous)
DummyIN and DummyIS denotes dummy of Investment and Islamic bank, respectively
* $p < 0.1$, ** $p < 0.05$, Standard errors in parentheses

Finally, this research takes one more step to control potential transmission channels between oil shocks and macroeconomic variables. This study uses three-way interaction between oil, macroeconomic, and dummy variables to achieve this goal. Before discussing the three-way interaction, it is better to examine whether macroeconomic factors have varying impacts on different bank classes since these results will provide the basis for further discussions. Like the previous results, inflation is positively correlated with the Islamic banks' income, demonstrating that Islamic banks are better predictors of inflation and earn more out of it by adjusting their rates earlier (Table 35).

Table 35: Indirect Effect (Interaction Between Dummy Var. and Inflation)

	Oil1	Oil2	Oil3
ROAE (lagged)	0.307**	0.308**	0.304**
	(0.042)	(0.042)	(0.042)
Capitalization	-0.299	-0.291	-0.297
	(0.188)	(0.184)	(0.186)
Asset Quality	-0.434**	-0.437**	-0.436**
	(0.117)	(0.117)	(0.116)
Efficiency	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Liquidity	0.125**	0.124**	0.123**
	(0.042)	(0.042)	(0.042)
Bank Size	-2.470	-2.359	-2.240
	(3.449)	(3.406)	(3.428)
Inflation	-0.175**	-0.173**	-0.157**
	(0.066)	(0.066)	(0.065)
DummyIN	243.864	256.569	270.587
	(214.344)	(220.302)	(226.466)
DummyIS	145.120	140.983	139.218
	(283.499)	(270.608)	(271.659)
DummyIN*Inflation	0.060	0.064	0.076
	(0.181)	(0.180)	(0.181)
DummyIS*Inflation	0.398**	0.400**	0.408**
	(0.102)	(0.101)	(0.101)
Economic Growth	0.565**	0.574**	0.617**
	(0.095)	(0.096)	(0.096)
Exchange Rate	-2.214	-2.400	-3.011*
	(1.607)	(1.603)	(1.640)
Oil Spending	0.017**		
	(0.006)		
Oil P. Changes		0.014**	
		(0.006)	
Oil Volatility			-0.020
			(0.036)
AR(1)	0.000	0.000	0.000
AR(2)	0.878	0.916	0.946
Hansen test	0.715	0.652	0.728
Number of instruments	68	68	68
Number of groups	953	954	954

Source: Created by the author.
(One-Step System GMM, Robust, Capitalization variable is used as endogenous)
DummyIN and DummyIS denotes dummy of Investment and Islamic bank, respectively
* $p < 0.1$, ** $p < 0.05$, Standard errors in parentheses

In Table 36, the average marginal effects of the dummy variables also confirm the information mentioned above. It demonstrates that the influence of inflation on the profitability of Islamic banks is positive as compared to the negative effect of other types.

Table 36: Average Marginal Effects of Dummy Variables for Each Oil Variable

Inflation	**dy/dx**	**Std. Err.**	**z**	**P>z**	**[95% Conf.]**	**[Interval]**
Dummy	**Oil Spending**					
Conventional	-0.175	0.066	-2.670	0.008	-0.303	-0.047
Investment	-0.115	0.172	-0.670	0.505	-0.452	0.222
Islamic	0.223	0.077	2.880	0.004	0.071	0.374
Dummy	**Oil P. Changes**					
Conventional	-0.173	0.066	-2.640	0.008	-0.302	-0.044
Investment	-0.109	0.172	-0.640	0.525	-0.446	0.228
Islamic	0.227	0.077	2.950	0.003	0.076	0.377
Dummy	**Oil Volatility**					
Conventional	-0.157	0.065	-2.410	0.016	-0.285	-0.029
Investment	-0.081	0.172	-0.470	0.637	-0.419	0.256
Islamic	0.251	0.076	3.300	0.001	0.102	0.401

Source: Created by the author.

Table 37: Summary of Indirect Effect (Inflation as Transmission Var.)

Dependent Variable: Bank Profitability (Return on Average Equity)

Sample	**Conventional**	**Investment**	**Islamic**	**Transmission V.**
(Oil Spending)	$\geq 10^{-}\uparrow$	ins	$8\text{-}10^{+}\downarrow$	Inflation
(Oil P. Changes)	$\geq 70^{-}\uparrow$	ins	$40\text{-}100^{+}\uparrow$	Inflation
(Volatility)	$\geq 22^{-}\uparrow$	$22\text{-}30^{+}\uparrow$	$\geq 14^{+}\downarrow$	Inflation

Source: Created by the author.

An up arrow (↑) shows an upward trend (from a negative to zero or towards a higher positive number), and a down arrow (↓) illustrates a downward trend (from a positive to zero or towards a lower negative number). A minus sign ($^{-}$) represents a negative relationship, while a plus sign ($^{+}$) signifies a positive relationship. Insignificance is indicated as 'ins.'

Inflation

For conventional and Islamic banks, inflation plays a significant role in transmitting oil shocks to bank profitability. The signs and directions of the relationship are akin to the previous results. Surprisingly, oil price volatility at its higher level has a positive marginal effect on the association between inflation and investment bank profitability. In other words, the result exhibits that inflation is positively related to investment bank earnings when the oil price volatility is between 22-30, and this positive effect grows at higher levels of oil price volatility. This implies that inflation potentially serves as the indirect transmission channel linking oil price volatility to investment bank profitability, and investment banks take advantage of unstable oil prices to forecast inflation better and make more profits in the energy sector. Additionally, rises in oil price volatility may lead governments (companies) to grow their demand for financing to protect themselves against oil price fluctuations, which may result in more issuance of government bonds (corporate bonds) and Sukuk and consequently may have a significant positive effect on investment bank profitability.

Table 38: Indirect Effect (Margins), Oil Spending-Inflation

Inflation

Bank Profitability	Conventional Banks		Investment Bank		Islamic Banks	
	Inflation					
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Oil Spending = 2	-0.348**	0.123	-0.191	0.432	0.160	0.132
Oil Spending = 4	-0.297**	0.105	-0.158	0.355	0.149	0.110
Oil Spending = 6	-0.246**	0.091	-0.124	0.283	0.138	0.091
Oil Spending = 8	-0.195**	0.080	-0.091	0.220	0.127*	0.077
Oil Spending = 10	-0.144*	0.076	-0.058	0.176	0.116*	0.070
Oil Spending = 12	-0.093	0.079	-0.024	0.168	0.105	0.072
Oil Spending = 14	-0.042	0.088	0.009	0.199	0.094	0.083
Oil Spending = 16	0.009	0.103	0.042	0.256	0.083	0.100
Oil Spending = 18	0.060	0.120	0.076	0.326	0.072	0.120
Oil Spending = 20	0.111	0.139	0.109	0.401	0.061	0.143
Oil Spending = 22	0.162	0.159	0.142	0.479	0.050	0.166
Oil Spending = 24	0.213	0.180	0.176	0.560	0.039	0.190
Oil Spending = 26	0.264	0.202	0.209	0.641	0.028	0.215
Oil Spending = 28	0.315	0.224	0.242	0.724	0.017	0.240
Oil Spending = 30	0.366	0.246	0.276	0.807	0.006	0.265
Oil Spending = 32	0.417	0.269	0.309	0.890	-0.005	0.291

Source: Created by the author.

Table 39: Indirect Effect (Margins), Oil Price Changes-Inflation

Inflation

Bank Profitability	Conventional Banks		Investment Bank		Islamic Banks	
	Inflation					
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Oil P. Changes = 10	-0.281**	0.103	-0.252	0.556	0.138	0.112
Oil P. Changes = 20	-0.254**	0.095	-0.215	0.476	0.141	0.100
Oil P. Changes = 30	-0.228**	0.088	-0.178	0.397	0.145	0.089
Oil P. Changes = 40	-0.202**	0.082	-0.141	0.321	0.147*	0.081
Oil P. Changes = 50	-0.175**	0.077	-0.104	0.252	0.151**	0.075
Oil P. Changes = 60	-0.149**	0.075	-0.067	0.195	0.154**	0.073
Oil P. Changes = 70	-0.123*	0.074	-0.030	0.165	0.157**	0.075
Oil P. Changes = 80	-0.098	0.075	0.007	0.175	0.161**	0.081
Oil P. Changes = 90	-0.072	0.078	0.044	0.221	0.164*	0.090
Oil P. Changes = 100	-0.046	0.082	0.081	0.285	0.167*	0.101
Oil P. Changes = 110	-0.020	0.088	0.118	0.358	0.171	0.113

Source: Created by the author.

Table 40: Indirect Effect (Margins), Oil Price Volatility-Inflation

Inflation

Bank Profitability	Conventional Banks		Investment Bank		Islamic Banks	
	Inflation					
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
VOL = 2	-0.188*	0.104	-0.504	0.371	0.235**	0.118
VOL = 4	-0.181*	0.094	-0.413	0.334	0.219**	0.103
VOL = 6	-0.171**	0.085	-0.321	0.299	0.203**	0.090
VOL = 8	-0.163**	0.077	-0.230	0.267	0.187**	0.081
VOL = 10	-0.154**	0.070	-0.138	0.240	0.172**	0.075
VOL = 12	-0.146**	0.064	-0.047	0.219	0.156**	0.074
VOL = 14	-0.138**	0.059	0.044	0.206	0.141*	0.078
VOL = 16	-0.129**	0.057	0.136	0.203	0.125	0.086
VOL = 18	-0.121**	0.057	0.227	0.209	0.109	0.098
VOL = 20	-0.112*	0.059	0.319	0.225	0.093	0.112
VOL = 22	-0.104*	0.063	0.409*	0.248	0.077	0.128
VOL = 24	-0.096	0.069	0.501*	0.277	0.062	0.144
VOL = 26	-0.088	0.076	0.592*	0.310	0.046	0.162
VOL = 28	-0.079	0.084	0.684**	0.346	0.030	0.179
VOL = 30	-0.071	0.092	0.775**	0.383	0.014	0.197

Source: Created by the author.

Next, this research interacts the bank dummies with the exchange rate to depict whether the exchange rate has varying effects on bank kinds. It is essential to note that the exchange rate has a positive correlation with Islamic bank performance in contrast to others (Table 41).

These results are in line with the previous ones.

Table 41: Indirect Effect (Interaction Between Dummy Var. and Exchange Rate)

	Oil1	Oil2	Oil3
ROAE (lagged)	0.306**	0.307**	0.302**
	(0.042)	(0.042)	(0.042)
Capitalization	-0.284	-0.276	-0.282
	(0.187)	(0.183)	(0.185)
Asset Quality	-0.428**	-0.431**	-0.430**
	(0.116)	(0.116)	(0.116)
Efficiency	-0.000	-0.001	-0.001
	(0.000)	(0.000)	(0.000)
Liquidity	0.123**	0.123**	0.121**
	(0.042)	(0.042)	(0.042)
Bank Size	-1.876	-1.765	-1.616
	(3.412)	(3.368)	(3.391)
Inflation	-0.128**	-0.126**	-0.107*
	(0.057)	(0.057)	(0.057)
Exchange Rate	-3.399*	-3.606*	-4.313**
	(1.868)	(1.868)	(1.914)
DummyIN	241.551	254.393	269.450
	(205.945)	(213.129)	(220.425)
DummyIS	96.203	93.564	89.692
	(270.560)	(259.900)	(261.461)
DummyIN*Exchange Rate	2.818	2.972	3.150
	(6.671)	(6.676)	(6.679)
DummyIS*Exchange Rate	9.338**	9.461**	9.881**
	(4.067)	(4.073)	(4.085)
Economic Growth	0.558**	0.566**	0.612**
	(0.096)	(0.097)	(0.097)
Oil Spending	0.018**		
	(0.006)		
Oil P. Changes		0.015**	
		(0.006)	
Oil Volatility			-0.021

			(0.036)
AR(1)	0.000	0.000	0.000
AR(2)	0.953	0.992	0.971
Hansen test	0.644	0.586	0.660
Number of instruments	68	68	68
Number of groups	953	954	954

Source: Created by the author.
(One-Step System GMM, Robust, Capitalization variable is used as endogenous)
DummyIN and DummyIS denotes dummy of Investment and Islamic bank, respectively
* $p < 0.1$, ** $p < 0.05$, Standard errors in parentheses

In Table 42, the average marginal effects of the dummy variables are presented and it displays Islamic banks differ from other types by having positive effect of exchange rate on bank performance.

Table 42: Average Marginal Effects of Dummy Variables for Each Oil Variable

Exchange Rate	dy/dx	Std. Err.	z	P>z	[95% Conf.]	[Interval]
Dummy	**Oil Spending**					
Conventional	-3.399	1.868	-1.820	0.069	-7.061	0.263
Investment	-0.581	6.357	-0.090	0.927	-13.039	11.878
Islamic	5.940	3.574	1.660	0.097	-1.066	12.945
Dummy	**Oil P. Changes**					
Conventional	-3.606	1.868	-1.930	0.054	-7.267	0.055
Investment	-0.634	6.359	-0.100	0.921	-13.098	11.830
Islamic	5.855	3.564	1.640	0.100	-1.129	12.840
Dummy	**Oil Volatility**					
Conventional	-4.313	1.914	-2.250	0.024	-8.065	-0.561
Investment	-1.163	6.362	-0.180	0.855	-13.633	11.307
Islamic	5.568	3.569	1.560	0.119	-1.427	12.563

Source: Created by the author.

Table 43: Summary of Indirect Effect (Exchange Rate as Transmission Var.)

Dependent Variable: Bank Profitability (Return on Average Equity)

Sample	Conventional	Investment	Islamic	Transmission V.
(Oil Spending)	$\geq 32^{-}\uparrow$	ins	ins	Exchange R.
(Oil P. Changes)	$\geq 110^{-}\uparrow$	ins	ins	Exchange R.
(Volatility)	$\geq 30^{-}\uparrow$	ins	ins	Exchange R.

Source: Created by the author.

An up arrow (↑) shows an upward trend (from a negative to zero or towards a higher positive number), and a down arrow (↓) illustrates a downward trend (from a positive to zero or towards a lower negative number). A minus sign ($^{-}$) represents a negative relationship, while a plus sign ($^{+}$) signifies a positive relationship. Insignificance is indicated as 'ins.'

Exchange Rate

Oil spending and oil price changes came out to have a negative and reducing marginal effect on the relationship between exchange rates and conventional bank profitability. Moreover, there is a significant negative but the diminishing marginal effect of oil price volatility on the exchange rate-bank earnings relationship at all levels. However, there is no evidence of exchange rates being indirect channels of transmission linking oil revenue to Islamic and investment bank profitability. These outputs in Table 43 confirm the prior evidence.

Table 44: Indirect Effect (Margins), Oil Spending-Exchange Rate

Exchange Rate

Bank Profitability	Conventional Banks		Investment Bank		Islamic Banks	
	Exchange Rate					
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Oil Spending = 2	-6.175**	2.735	-4.905	14.406	-4.108	6.587
Oil Spending = 4	-6.134**	2.731	-4.825	14.343	-4.196	6.583
Oil Spending = 6	-6.094**	2.727	-4.746	14.288	-4.283	6.580
Oil Spending = 8	-6.053**	2.724	-4.666	14.239	-4.370	6.578
Oil Spending = 10	-6.012**	2.722	-4.587	14.199	-4.457	6.576
Oil Spending = 12	-5.972**	2.720	-4.507	14.166	-4.544	6.576
Oil Spending = 14	-5.931**	2.719	-4.428	14.140	-4.631	6.577
Oil Spending = 16	-5.891**	2.718	-4.348	14.123	-4.718	6.578
Oil Spending = 18	-5.849**	2.718	-4.269	14.113	-4.805	6.581
Oil Spending = 20	-5.809**	2.718	-4.189	14.111	-4.893	6.584
Oil Spending = 22	-5.768**	2.719	-4.110	14.117	-4.980	6.588
Oil Spending = 24	-5.728**	2.720	-4.031	14.130	-5.067	6.594
Oil Spending = 26	-5.687**	2.722	-3.951	14.151	-5.154	6.600
Oil Spending = 28	-5.646**	2.724	-3.872	14.180	-5.241	6.607
Oil Spending = 30	-5.605**	2.727	-3.792	14.217	-5.328	6.615
Oil Spending = 32	-5.564**	2.730	-3.713	14.261	-5.415	6.624

Source: Created by the author.

Table 45: Indirect Effect (Margins), Oil Price Changes-Exchange Rate

Exchange Rate

Bank Profitability	Conventional Banks		Investment Bank		Islamic Banks	
	Exchange Rate					
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Oil P. Changes = 10	-6.547**	2.733	-5.135	14.197	-4.990	6.496
Oil P. Changes = 20	-6.524**	2.731	-5.041	14.141	-5.007	6.494
Oil P. Changes = 30	-6.502**	2.730	-4.946	14.088	-5.025	6.493
Oil P. Changes = 40	-6.479**	2.729	-4.852	14.038	-5.043	6.492
Oil P. Changes = 50	-6.456**	2.728	-4.758	13.991	-5.060	6.491
Oil P. Changes = 60	-6.433**	2.728	-4.664	13.949	-5.078	6.490
Oil P. Changes = 70	-6.411**	2.727	-4.570	13.909	-5.095	6.490
Oil P. Changes = 80	-6.388**	2.727	-4.476	13.874	-5.113	6.489
Oil P. Changes = 90	-6.365**	2.726	-4.382	13.842	-5.131	6.490
Oil P. Changes = 100	-6.343**	2.726	-4.288	13.813	-5.148	6.490
Oil P. Changes = 110	-6.321**	2.726	-4.193	13.788	-5.166	6.490

Source: Created by the author.

Table 46: Indirect Effect (Margins), Oil Price Volatility-Exchange Rate

Exchange Rate

Bank Profitability	Conventional Banks		Investment Bank		Islamic Banks	
	Exchange Rate					
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
VOL = 2	-7.593**	2.798	-8.850	14.822	-5.781	6.236
VOL = 4	-7.581**	2.796	-8.541	14.686	-5.804	6.227
VOL = 6	-7.569**	2.794	-8.231	14.555	-5.827	6.217
VOL = 8	-7.557**	2.792	-7.921	14.430	-5.850	6.208
VOL = 10	-7.545**	2.791	-7.611	14.311	-5.873	6.200
VOL = 12	-7.533**	2.789	-7.302	14.197	-5.896	6.192
VOL = 14	-7.521**	2.788	-6.992	14.089	-5.919	6.184
VOL = 16	-7.508**	2.786	-6.682	13.987	-5.942	6.176
VOL = 18	-7.496**	2.785	-6.372	13.891	-5.965	6.169
VOL = 20	-7.484**	2.784	-6.062	13.802	-5.988	6.163
VOL = 22	-7.472**	2.783	-5.753	13.719	-6.011	6.156
VOL = 24	-7.461**	2.782	-5.443	13.642	-6.034	6.151
VOL = 26	-7.448**	2.781	-5.133	13.572	-6.057	6.145
VOL = 28	-7.436**	2.780	-4.823	13.509	-6.080	6.140
VOL = 30	-7.424**	2.780	-4.514	13.453	-6.103	6.135

Source: Created by the author.

Apart from the other two macroeconomic factors, the interaction terms of economic growth with different bank kinds are also incorporated into the study. In line with the earlier results, economic growth is positively related to the conventional and investment banks' earnings, whereas Islamic banks differ from the other two banks, where economic growth is negatively related to Islamic bank incomes (Table 47).

Table 47: Indirect Effect (Interaction Between Dummy Var. and Economic Growth)

	Oil1	Oil2	Oil3
ROAE (lagged)	0.306**	0.307**	0.303**
	(0.042)	(0.042)	(0.042)
Capitalization	-0.275	-0.266	-0.272
	(0.184)	(0.180)	(0.182)
Asset Quality	-0.432**	-0.435**	-0.434**
	(0.116)	(0.116)	(0.115)
Efficiency	-0.000	-0.001	-0.001
	(0.000)	(0.000)	(0.000)
Liquidity	0.124**	0.123**	0.122**
	(0.042)	(0.042)	(0.042)
Bank Size	-2.025	-1.898	-1.763
	(3.388)	(3.344)	(3.366)
Inflation	-0.126**	-0.124**	-0.106*
	(0.057)	(0.057)	(0.056)
Exchange Rate	-2.106	-2.296	-2.894*
	(1.615)	(1.611)	(1.650)
Economic Growth	0.674**	0.682**	0.727**
	(0.107)	(0.108)	(0.109)
DummyIN	221.481	232.677	245.667
	(191.819)	(197.559)	(203.269)
DummyIS	112.280	107.970	104.618
	(255.370)	(244.572)	(246.114)
DummyIN*Economic Growth	-0.220	-0.211	-0.206
	(0.584)	(0.583)	(0.584)
DummyIS*Economic Growth	-0.782**	-0.778**	-0.798**
	(0.165)	(0.166)	(0.168)
Oil Spending	0.017**		
	(0.006)		
Oil P. Changes		0.014**	
		(0.006)	
Oil Volatility			-0.018
			(0.036)
AR(1)	0.000	0.000	0.000
AR(2)	0.967	0.993	0.959
Hansen test	0.573	0.512	0.573
Number of instruments	68	68	68
Number of groups	953	954	954

Source: Created by the author.
(One-Step System GMM, Robust, Capitalization variable is used as endogenous)
DummyIN and DummyIS denotes dummy of Investment and Islamic bank, respectively
* $p < 0.1$, ** $p < 0.05$, Standard errors in parentheses

The average marginal effects of dummy variables for each oil variable are presented below in Table 48. Unlike other types, the results show that economic growth negatively affects

Islamic bank performance.

Table 48: Average Marginal Effects of Dummy Variables for Each Oil Variable

Eco. Growth	**dy/dx**	**Std. Err.**	**z**	**P>z**	**[95% Conf.]**	**[Interval]**
Dummy	**Oil Spending**					
Conventional	0.674	0.107	6.300	0.000	0.464	0.883
Investment	0.454	0.575	0.790	0.429	-0.672	1.580
Islamic	-0.108	0.124	-0.870	0.383	-0.351	0.135
Dummy	**Oil P. Changes**					
Conventional	0.682	0.108	6.290	0.000	0.469	0.894
Investment	0.471	0.573	0.820	0.412	-0.653	1.595
Islamic	-0.096	0.124	-0.780	0.437	-0.338	0.146
Dummy	**Oil Volatility**					
Conventional	0.727	0.109	6.690	0.000	0.514	0.941
Investment	0.521	0.574	0.910	0.364	-0.604	1.647
Islamic	-0.071	0.121	-0.590	0.558	-0.309	0.167

Source: Created by the author.

Table 49: Summary of Indirect Effect (Economic Growth as Transmission Var.)

Dependent Variable: Bank Profitability (Return on Average Equity)

Sample	**Conventional**	**Investment**	**Islamic**	**Transmission V.**
(Oil Spending)	$\geq 32^{+}\uparrow$	ins	$\leq 4^{-}\uparrow, \geq 14^{+}\uparrow$	Economic G.
(Oil P. Changes)	$\geq 110^{+}\uparrow$	ins	$100\text{-}110^{+}\uparrow$	Economic G.
(Volatility)	$\geq 30^{+}\downarrow$	ins	ins	Economic G.

Source: Created by the author.

An up arrow (↑) shows an upward trend (from a negative to zero or towards a higher positive number), and a down arrow (↓) illustrates a downward trend (from a positive to zero or towards a lower negative number). A minus sign ($^{-}$) represents a negative relationship, while a plus sign ($^{+}$) signifies a positive relationship. Insignificance is indicated as 'ins.'

Economic Growth

As a final step, we test whether the impact of economic growth on banking performance is affected by the changes in the level of oil shocks. Table 49 shows the summary of the results. The marginal increase in oil spending and oil price changes tend to strengthen the positive nexus between economic growth and conventional bank performance at all levels. On the other hand, the marginal effects of oil price volatility on the linkage between economic growth and bank profitability decline slowly and remain positive and significant in all ranges. In contradiction with the former outputs, economic growth shows signs of being a transmission channel between oil shocks and Islamic bank profitability. The performance of Islamic banks is positively affected by economic growth when oil spending and oil price changes are in the range of 14-32 and 100-110, respectively. Interestingly, the marginal effect of oil spending on the nexus between economic growth and bank performance is negative in the range between 2-4, supporting the earlier results. Meanwhile, we find no significant effect of variations in oil shocks on the linkage between economic growth and investment bank profitability.

Table 50: Indirect Effect (Margins), Oil Spending-Economic Growth

Economic Growth

Bank Profitability	Conventional Banks		Investment Bank		Islamic Banks	
	Economic Growth					
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Oil Spending = 2	0.602**	0.211	0.429	0.615	-0.354**	0.176
Oil Spending = 4	0.619**	0.177	0.425	0.549	-0.245*	0.149
Oil Spending = 6	0.637**	0.147	0.420	0.569	-0.136	0.128
Oil Spending = 8	0.654**	0.125	0.416	0.668	-0.027	0.118
Oil Spending = 10	0.672**	0.115	0.411	0.818	0.082	0.121
Oil Spending = 12	0.689**	0.120	0.407	0.996	0.191	0.135
Oil Spending = 14	0.707**	0.140	0.402	1.189	0.299*	0.159
Oil Spending = 16	0.724**	0.168	0.398	1.392	0.409**	0.188
Oil Spending = 18	0.742**	0.201	0.393	1.600	0.518**	0.221
Oil Spending = 20	0.759**	0.237	0.389	1.812	0.627**	0.256
Oil Spending = 22	0.777**	0.276	0.384	2.026	0.736**	0.292
Oil Spending = 24	0.794**	0.315	0.379	2.242	0.845**	0.329
Oil Spending = 26	0.812**	0.355	0.375	2.460	0.954**	0.366
Oil Spending = 28	0.829**	0.396	0.370	2.678	1.063**	0.404
Oil Spending = 30	0.847*	0.437	0.366	2.897	1.172**	0.443
Oil Spending = 32	0.864*	0.479	0.361	3.117	1.282**	0.481

Source: Created by the author.

Table 51: Indirect Effect (Margins), Oil Price Changes-Economic Growth

Economic Growth

Bank Profitability	Conventional Banks		Investment Bank		Islamic Banks	
	Economic Growth					
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Oil P. Changes = 10	0.646**	0.184	0.336	0.621	-0.264	0.176
Oil P. Changes = 20	0.652**	0.166	0.355	0.577	-0.208	0.157
Oil P. Changes = 30	0.659**	0.150	0.375	0.575	-0.152	0.141
Oil P. Changes = 40	0.666**	0.135	0.395	0.615	-0.096	0.127
Oil P. Changes = 50	0.673**	0.125	0.414	0.691	-0.040	0.117
Oil P. Changes = 60	0.679**	0.118	0.434	0.791	0.016	0.111
Oil P. Changes = 70	0.686**	0.115	0.454	0.909	0.072	0.110
Oil P. Changes = 80	0.693**	0.118	0.474	1.037	0.127	0.114
Oil P. Changes = 90	0.701**	0.126	0.493	1.174	0.183	0.124
Oil P. Changes = 100	0.706**	0.137	0.513	1.315	0.239*	0.137
Oil P. Changes = 110	0.713**	0.152	0.533	1.460	0.295*	0.153

Source: Created by the author.

Table 52: Indirect Effect (Margins), Oil Price Volatility-Economic Growth

Economic Growth

Bank Profitability	Conventional Banks		Investment Bank		Islamic Banks	
	Economic Growth					
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
VOL = 2	0.864**	0.172	0.096	1.080	-0.050	0.232
VOL = 4	0.822**	0.154	0.206	0.938	-0.019	0.182
VOL = 6	0.779**	0.138	0.316	0.808	0.013	0.138
VOL = 8	0.737**	0.124	0.426	0.696	0.045	0.104
VOL = 10	0.695**	0.112	0.536	0.614	0.076	0.094
VOL = 12	0.652**	0.105	0.646	0.574	0.108	0.114
VOL = 14	0.611**	0.102	0.755	0.583	0.139	0.153
VOL = 16	0.568**	0.104	0.865	0.641	0.171	0.200
VOL = 18	0.525**	0.111	0.975	0.736	0.203	0.251
VOL = 20	0.483**	0.122	1.085	0.856	0.234	0.303
VOL = 22	0.441**	0.135	1.195	0.991	0.266	0.356
VOL = 24	0.398**	0.151	1.305	1.137	0.297	0.410
VOL = 26	0.356**	0.169	1.415	1.289	0.329	0.464
VOL = 28	0.314**	0.187	1.525	1.446	0.360	0.519
VOL = 30	0.271**	0.207	1.634	1.606	0.392	0.573

Source: Created by the author.

3.4. Concluding Remarks

First, this chapter unveils a preliminary analysis of the variables. Second, empirical estimations addressing research questions on the link between oil shocks and bank performance are presented. Next, the findings of empirical results are discussed in detail, and robustness tests are provided to explore the stability of main estimates. Finally, this section concludes the chapter.

Our main findings briefly show that oil shocks excluding oil price volatility have positive and direct impacts on the bank performance of net oil-importing countries, and this relationship does not vary among different bank types. After introducing macroeconomic variables into the equation to check the possible indirect relationship between oil shocks and bank profitability, the effect of oil shocks on bank performance has been moderated, drawing our attention to potential indirect channels.

Even though all macroeconomic variables appear to be indirect transmission channels linking oil shocks to conventional bank profitability, inflation and economic growth for Islamic banks and only inflation for the investment banks seem to serve as the indirect transmission channels. The following chapter, which is the summary and conclusion part, provides more detail about the findings, policy implications, and the direction of future research.

CONCLUSIONS

Oil price shocks or fluctuations are one of the major sources of economic instability, causing major microeconomic and macroeconomic indicators to deteriorate. The impact of oil shocks on bank profitability attracts the attention of researchers, bankers, market participants, policymakers, and regulators whose main objectives are to strengthen the resilience and stability of the financial system. Oil price shocks might have either a direct effect on bank profitability of oil-importing countries through the changes in the demand for financing of households, firms, and governments; or an indirect through macroeconomic channels, such as inflation, economic growth, and exchange rate.

In this regard, the analysis begins by checking whether oil plays a significant role in determining bank performance. For this, only bank-specific variables and the oil shocks are incorporated into the specification. The findings support the view that oil spending and oil price changes are important determinants of banking sector performance, positively contributing to the bank profitability of net oil importing countries, whereas bank earnings do not respond to the variations in oil price volatility. The findings demonstrate that more variations in oil prices and spending positively impact bank profitability as expected because rises (decline) in oil spending, caused by either price or quantity, result in more (less) payment required by households, firms, and governments for their oil expenses and, consequently, more (less) demand for financing, affecting the bank's profitability positively (negatively). In addition to the above factors, it is important to underline that investment bank profitability is likely to be positively (negatively) affected by buoyant advising, fee, trading, and other such income during oil price (or oil spending) booms (falls) (Poghosyan and Hesse, 2009). The main reason oil price volatility does not impact bank performance could be the use of long-term energy contracts and derivative instruments and the absence of concurrent adverse shocks in the economy. Moreover, the impacts of oil shocks do not differ across different classes of banks.

Next, macroeconomic variables are included in the equation in addition to the bank-specific and oil variables to observe whether oil shocks are transmitted to bank performance through macroeconomic dynamics. The output provides evidence that coefficients of oil spending

and oil price changes are still persistent, implying the direct impact of oil shocks on bank earnings. However, the effect of oil shocks on bank performance has moderated after adding macroeconomic variables into the equation, attracting our attention to potential indirect channels through which oil shocks may exert their influence on bank performance. Hence, this study further investigates the indirect relationship between oil shocks and bank profitability by introducing the interactive terms (three-way interaction) of oil shocks with the macroeconomic variables (in addition to the bank dummies) such as inflation, economic growth, and real effective exchange rate.

While inflation and economic growth potentially serve as the indirect channels of transmission linking oil shocks to Islamic bank profitability, potential routes through which oil shocks may influence conventional bank profitability are inflation, real effective exchange rate, and economic growth. As for the investment banks, only inflation appears to be the indirect channel of transmission between oil shocks and bank profitability.

Banks should be aware of the positive impact of oil shocks on bank performance directly via increased oil-related lending or business activity. The indirect channel suggests that the effect is transmitted through macroeconomic channels of the countries bolstered by increased expectations and business sentiment in the country (Poghosyan and Hesse, 2009).

Islamic banks are expected to be more sensitive to the impact of oil shocks than other types. Oil is an essential input in the production of many goods and services. Any shock that occurs in the oil market may eventually influence the costs of energy and raw materials in the economy and, consequently, business activities. Since Islamic banks are believed to apply Mudaraba contracts (profit and loss sharing contracts) that involve real business activities in their transactions, their performances are expected to be more responsive to the oil shocks. However, the results revealed the effects of oil shocks do not differ across different bank classes, and this result supports the findings of Esmaeil et al. (2020). The likely reason would be that Islamic banks operate based on profit and loss-sharing modes on the liability side when they collect deposits from their clients; however, they do not apply profit and loss-sharing modes of financing on the asset side. In other words, the deposits they collect are not used to finance households and businesses based on profit and loss-sharing modes. Instead,

Islamic banks purchase the products their clients are willing to buy and sell them on markup (cost+plus), allowing clients to pay in installments. This shows the asset side of their balance sheet comprises mainly Murabaha contracts (similar to the classical loan contract) (IIBI, 2023), while the liability side makes up Mudaraba contracts. Therefore, such business conduct makes Islamic banks resemble conventional banks and requires policymakers to apply similar approaches to both.

Moreover, the results show that the profitability of Islamic banks has its own peculiar dynamics, especially in the case of macroeconomic variables. The influence of inflation, economic growth, and exchange rate on Islamic bank performance indicate opposite signs as compared to other types. This provides evidence that macroeconomic dynamics have unique impacts on the profitability of Islamic banks. It is important to emphasize that this difference mainly stems from the fundamentals of Islamic bank operations and the perception of their customers.

It is recommended that policymakers should watch international oil prices and the volume of domestic oil consumption closely because they can help in formulating macroprudential policies to stabilize the banking systems of oil-importing economies. Considering oil shocks as one of the major driving forces of financial stability may help foster resilience in the financial sector and boost confidence in the economy. Hence, policymakers should carefully monitor the direction of oil prices and consumption to maintain the financial stability of the banking sector and prevent adverse events from having a disruptive effect on the financial systems. Since macroeconomic channels, such as inflation, economic growth, and exchange rate, can mediate the relationship between oil shocks and bank performance, policymakers, by using available tools, should take preventative measures to overcome the adverse effects of macroeconomic dynamics on the financial sector. These tools include government interventionist measures such as price restraint, price-fixing, subsidy support, and central bank policies. Besides, to alleviate oil price risks, particularly in the long term, policymakers should discover and apply energy-efficient strategies, use technological development, and create a more flexible labor market and environment where substitution of oil inputs with other factors of production, such as labor and capital, are smooth. This will allow

policymakers to have control of macroeconomic symptoms while observing the direction of oil shocks.

The findings suggest that countries relying on foreign energy resources, particularly oil imports, are required to properly manage the macroeconomic indicators and guide their banking system by paying close attention to the fluctuations in international oil prices and trends in the global energy sector. This implies that oil-dependent countries should consider the global energy sector as a major driving force that shapes macroeconomic and financial targets.

The results particularly imply that banks should closely monitor oil prices or consumptions for the allocation or utilization of capital cushions. This will allow banks to utilize spare capital to support the same level of financing when oil price changes or consumptions remain at low levels and allocate some of their surplus funds as cushions when oil price changes or consumptions fluctuate at high levels (considering the indirect effects of oil shocks).

Countries and banks may also take several necessary precautions in order to reduce the direct and indirect impact of oil shocks on bank performance. Firstly, as Guenichi (2014) pointed out, oil price shocks do not exert any influence on the agricultural and service sectors in Tunisia while discovering the significant association between oil prices and the industrial sector. This implies that countries can diversify the private sector by increasing the weight of agricultural and service sectors in the medium and long term to lessen dependence on oil as an input. Diversification of sectors will also allow the substitution of oil inputs for other factors of production, particularly labor in those sectors (Wesseh and Lin, 2018). This overall will help countries minimize the effect of oil on bank performance and maintain the financial soundness and stability of the banking system. Secondly, countries should diversify their energy production by raising the share of alternative energy sources. Diversification will help countries avoid a sole dependence on a single energy source and ensure energy security by relying on alternative energy sources to meet their demands when the supply of one energy source is interrupted. If the share of each energy source (oil in our case) in total demand is minimal, the impact of it on the banking sector and macroeconomic variables would be small-scale and more manageable. Finally, banks should be encouraged and guided to have greater

product and loan diversification so that they will not be exposed to the extreme pressure of specific sectors. This will allow banks to strike a balance between oil-related business lending and other sectors' lending and protect them from being vulnerable to oil market fluctuations.

Even though this study uses three distinct oil variables to have robust results, oil shock is not segregated by different types, such as oil supply, aggregate oil demand, and specific oil demand shocks. Hence, future research on the nexus between different types of oil shocks and bank performance from an oil-importing country perspective will be worthwhile. The current study could also be extended by segregating the data of different bank types instead of introducing a dummy variable for each.

In addition, alternative proxies for the response variable, such as net interest margin (NIM), can be introduced to provide broader insight into the issue. Finally, it would be interesting to apply advanced time series techniques to analyze a group of observations collected over a period of time. For instance, multivariate generalized autoregressive conditional heteroskedastic-dynamic conditional correlation (MGARCH-DCC) can be used to test dynamic conditional correlation and volatilities between bank performance and oil shocks; continuous wavelet transform (CWT) can be employed to observe the link between bank profitability and oil shocks on different investment horizons and their lead-lag relationship (Çıkıryel et al., 2022).

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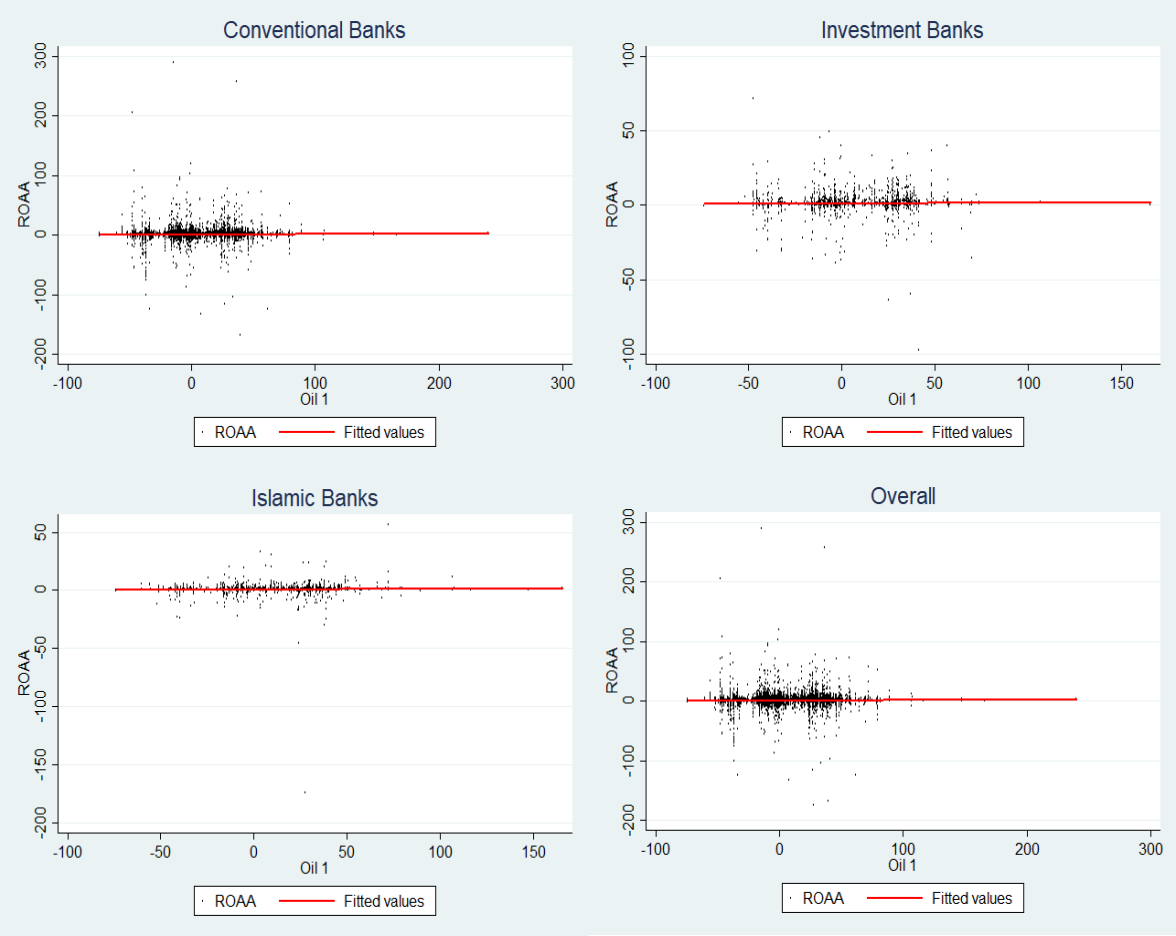
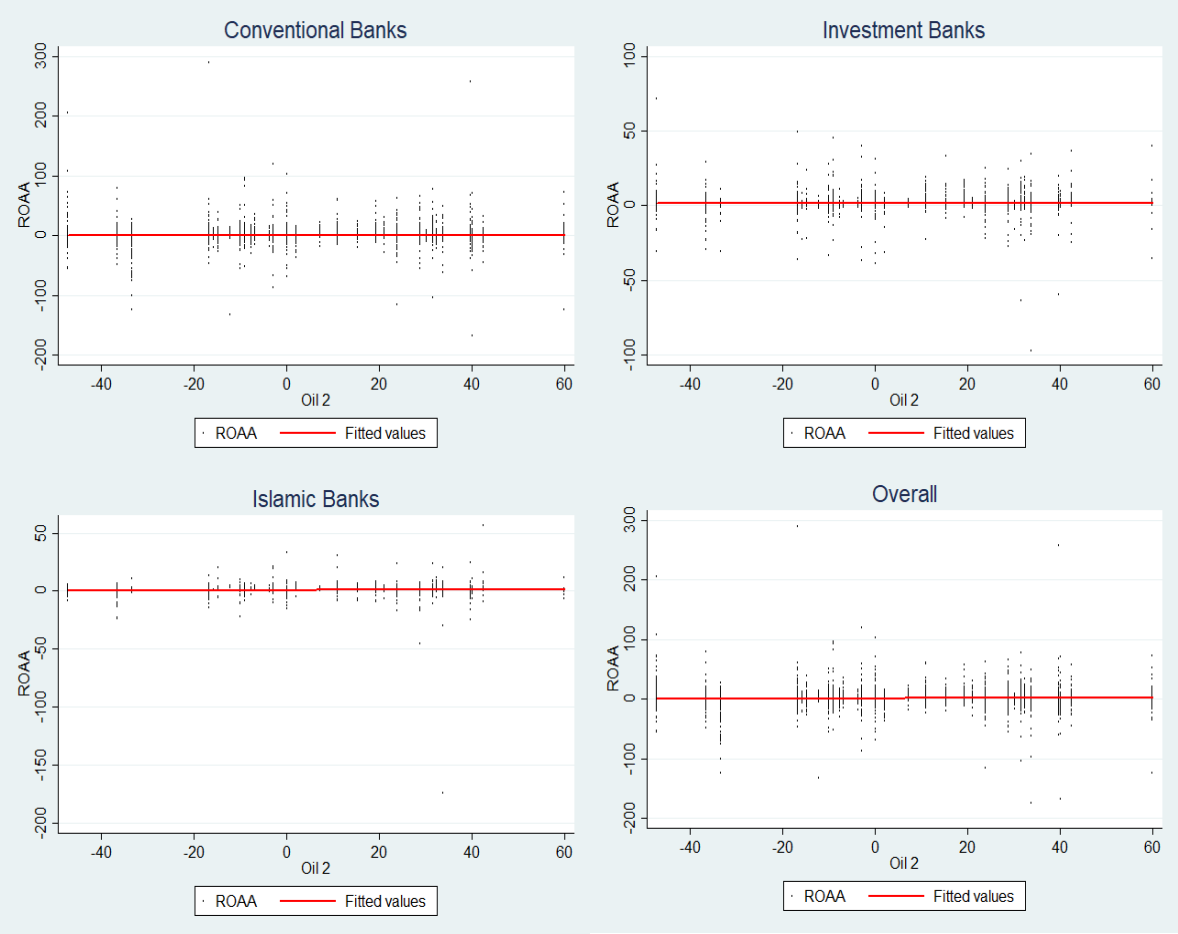
APPENDIX

Appendix 1: Scatterplots (ROAA vs. Oil Spending)



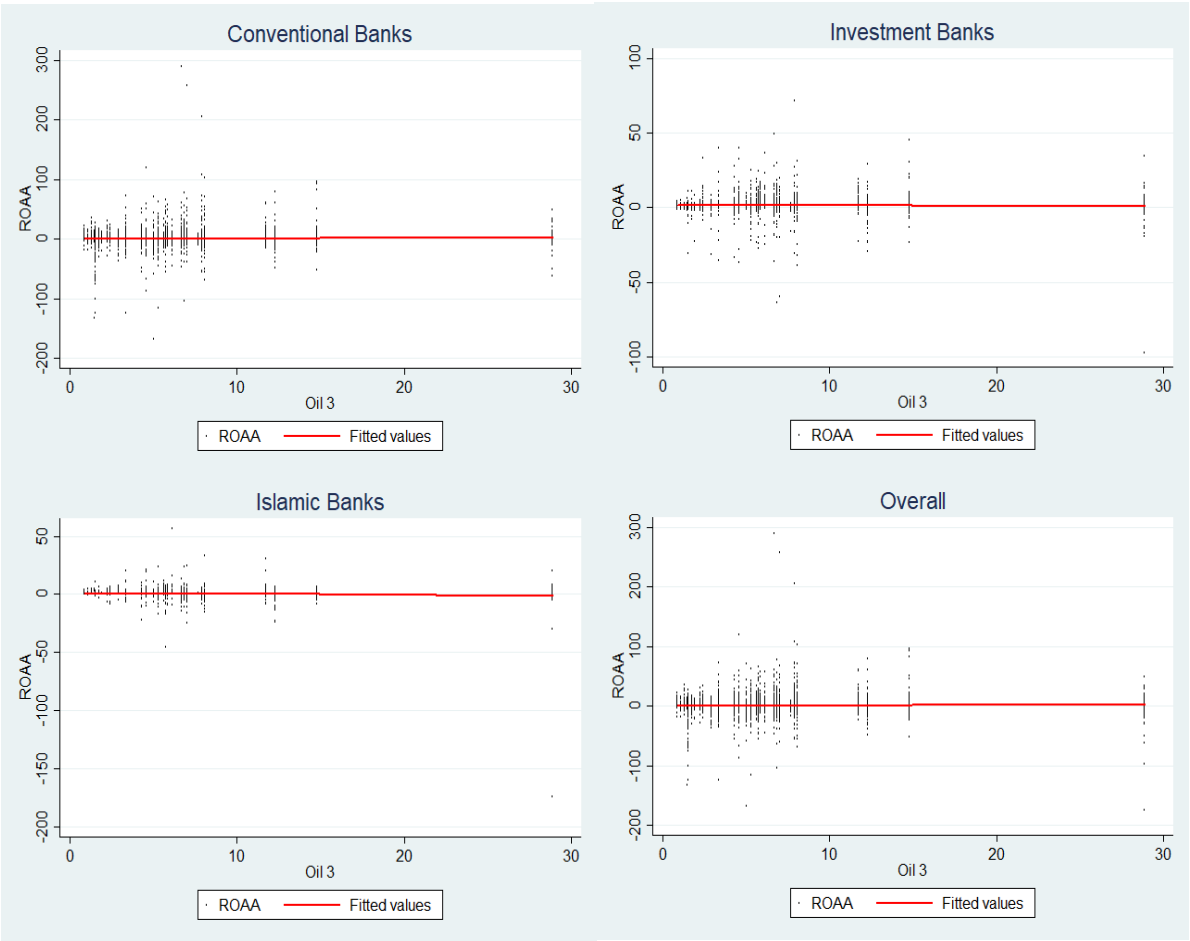
Source: Created by the author.

Appendix 2: Scatterplots (ROAA vs. Oil Price Changes)



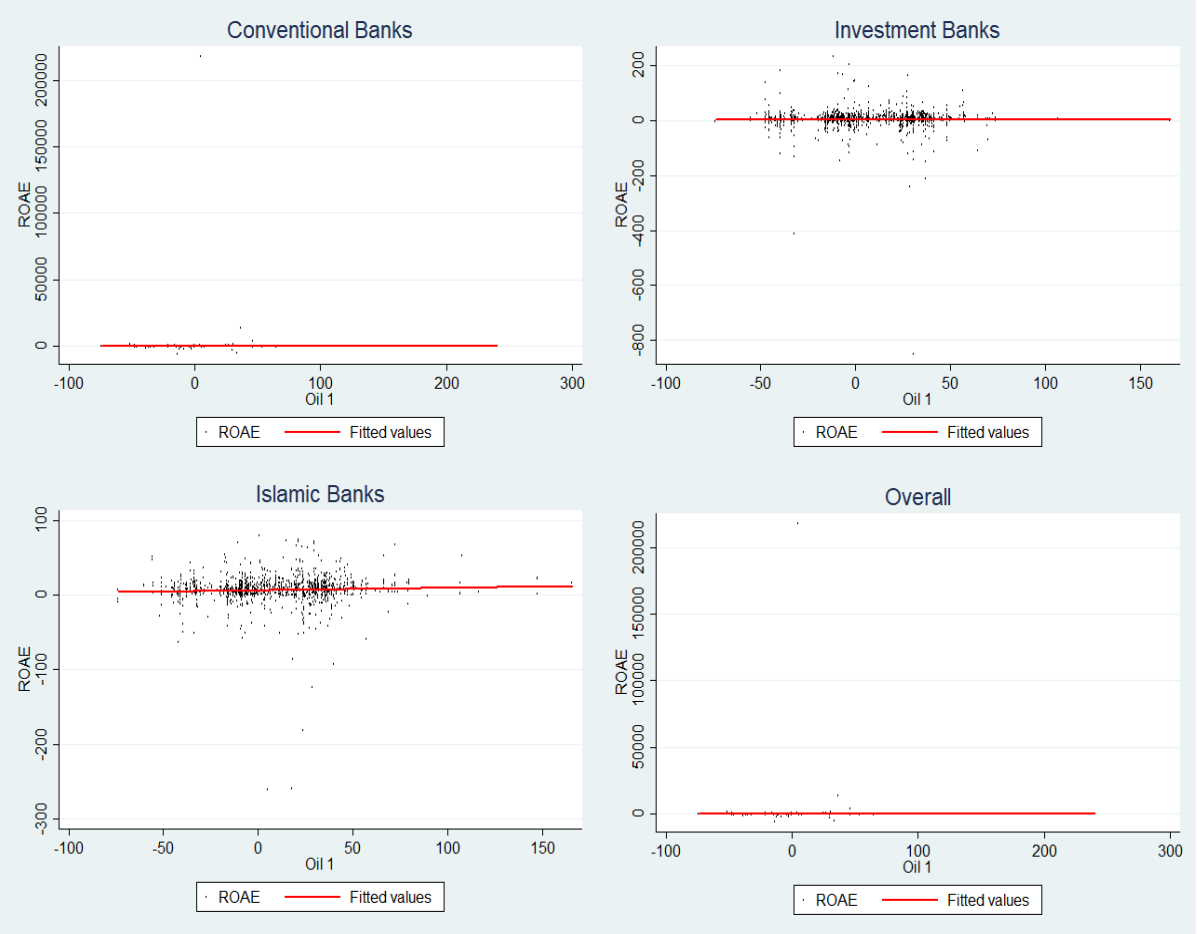
Source: Created by the author.

Appendix 3: Scatterplots (ROAA vs Oil Volatility)



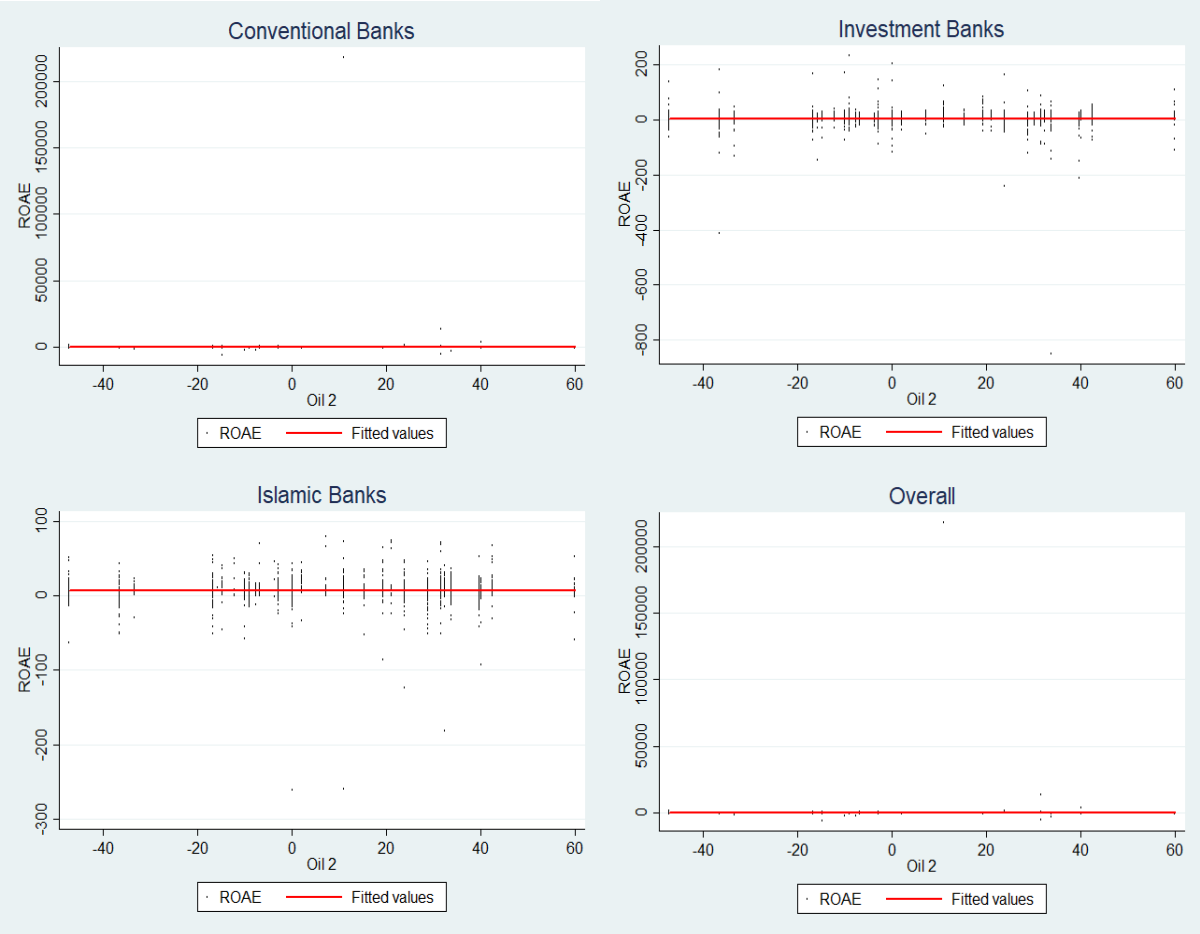
Source: Created by the author.

Appendix 4: Scatterplots (ROAE vs. Oil Spending)



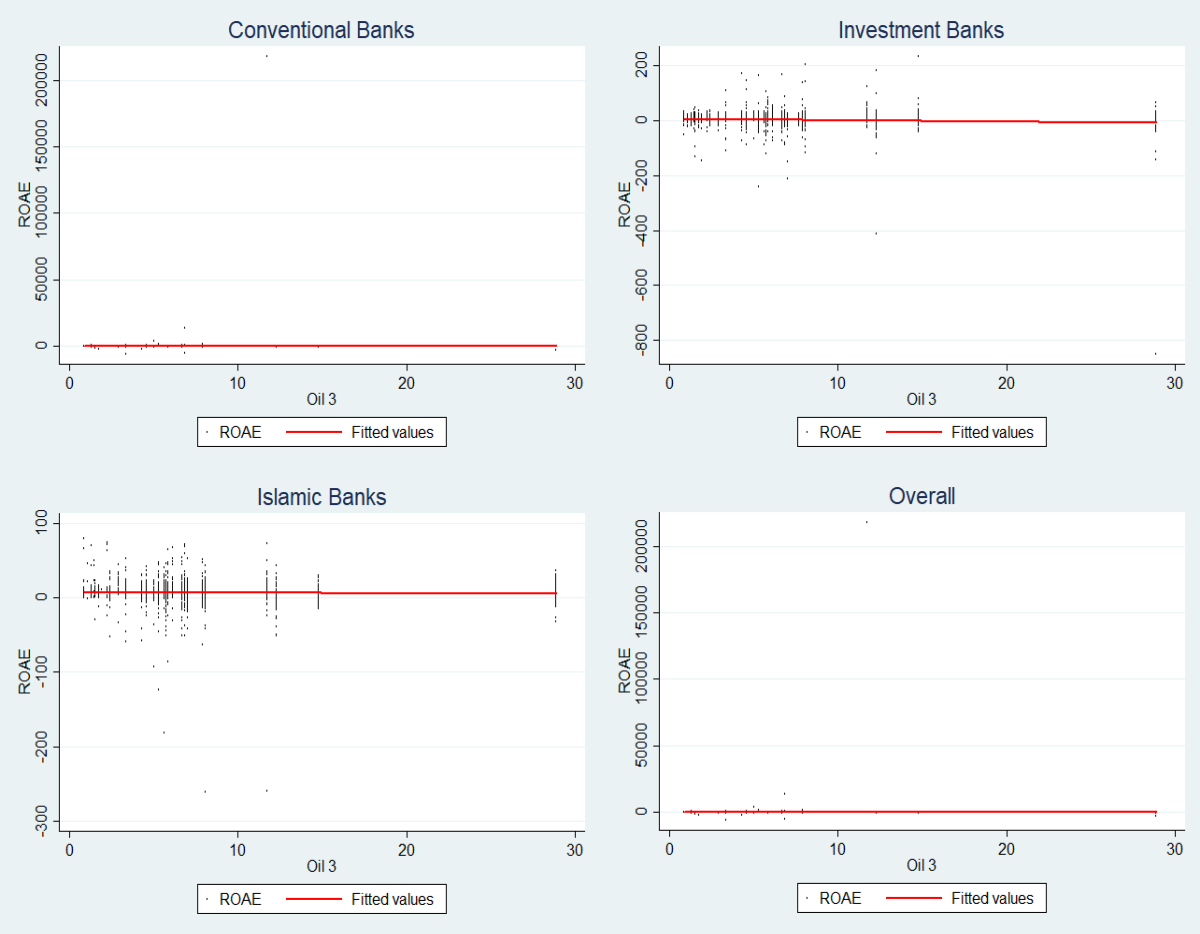
Source: Created by the author.

Appendix 5: Scatterplots (ROAE vs. Oil Price Changes)



Source: Created by the author.

Appendix 6: Scatterplots (ROAE vs. Oil Volatility)



Source: Created by the author.

Appendix 7: Robustness Test, Pooled OLS Regression Models (ROAA)

	Oil1	Oil2	Oil3
ROAA (lagged)	0.494**	0.498**	0.496**
	(0.025)	(0.024)	(0.024)
Capitalization	0.032**	0.032**	0.032**
	(0.005)	(0.005)	(0.005)
Asset Quality	-0.022**	-0.023**	-0.022**
	(0.005)	(0.005)	(0.005)
Efficiency	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Liquidity	0.005**	0.005**	0.005**
	(0.002)	(0.002)	(0.002)
Bank Size	0.091**	0.093**	0.094**
	(0.034)	(0.034)	(0.034)
Inflation	0.007*	0.007*	0.007*
	(0.004)	(0.004)	(0.004)
Economic Growth	0.099**	0.102**	0.108**
	(0.010)	(0.010)	(0.010)
Exchange Rate	-0.003	-0.002	-0.003
	(0.008)	(0.008)	(0.008)
Oil Spending	0.004**		
	(0.001)		
Oil P. Changes		0.004**	
		(0.001)	
Oil Volatility			-0.004
			(0.003)
Constant	-1.026**	-1.043**	-1.013**
	(0.383)	(0.382)	(0.378)
Observations	10643	10705	10705
R2	0.363	0.364	0.363
R2_a	0.362	0.364	0.363
F	97.520	99.352	99.284
AIC	45935.157	46245.216	46266.942

Source: Created by the author.
Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$

Appendix 8: Robustness Test, Fixed Effects Regression Models (ROAA)

	Oil1	Oil2	Oil3
ROAA (lagged)	0.244**	0.245**	0.244**
	(0.009)	(0.009)	(0.009)
Capitalization	0.056**	0.055**	0.055**
	(0.002)	(0.002)	(0.002)
Asset Quality	-0.036**	-0.036**	-0.036**
	(0.002)	(0.002)	(0.002)
Efficiency	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Liquidity	0.006**	0.006**	0.006**
	(0.002)	(0.002)	(0.002)
Bank Size	-0.054	-0.051	-0.068
	(0.067)	(0.067)	(0.069)
Inflation	-0.003	-0.003	-0.002
	(0.003)	(0.003)	(0.003)
Economic Growth	0.105**	0.106**	0.112**
	(0.007)	(0.007)	(0.007)
Exchange Rate	-0.244**	-0.253**	-0.253**
	(0.058)	(0.059)	(0.059)
Oil Spending	0.003**		
	(0.001)		
Oil P. Changes		0.002**	
		(0.001)	
Oil Volatility			0.002
			(0.004)
Constant	1.178*	1.176*	1.317**
	(0.606)	(0.605)	(0.617)
Observations	10643	10705	10705

Source: Created by the author.
Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$

Appendix 9: Robustness Test, Pooled OLS Regression Models (ROAE)

	Oil1	Oil2	Oil3
ROAE (lagged)	0.562**	0.564**	0.563**
	(0.008)	(0.008)	(0.008)
Capitalization	0.030**	0.030**	0.031**
	(0.011)	(0.011)	(0.011)
Asset Quality	-0.112**	-0.113**	-0.113**
	(0.013)	(0.013)	(0.013)
Efficiency	-0.001**	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)
Liquidity	0.039**	0.039**	0.039**
	(0.008)	(0.008)	(0.008)
Bank Size	0.899**	0.905**	0.941**
	(0.170)	(0.169)	(0.170)
Inflation	0.087**	0.088**	0.087**
	(0.013)	(0.013)	(0.013)
Economic Growth	0.615**	0.631**	0.646**
	(0.045)	(0.045)	(0.044)
Exchange Rate	0.004	0.005	0.002
	(0.042)	(0.041)	(0.041)
Oil Spending	0.019**		
	(0.005)		
Oil P. Changes		0.014**	
		(0.005)	
Oil Volatility			-0.064**
			(0.025)
Constant	-7.017**	-7.044**	-6.892**
	(1.746)	(1.739)	(1.738)
Observations	10492	10554	10554
r2	0.370	0.372	0.372
r2_a	0.369	0.371	0.371
F	615.801	624.744	624.564
aic	85100.706	85594.937	85596.069

Source: Created by the author.
Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$

Appendix 10: Robustness Test, Fixed Effects Regression Models (ROAE)

	Oil1	Oil2	Oil3
ROAE (lagged)	0.001**	0.001**	0.001**
	(0.000)	(0.000)	(0.000)
Capitalization	0.196**	0.193**	0.195**
	(0.021)	(0.021)	(0.021)
Asset Quality	-0.309**	-0.311**	-0.311**
	(0.019)	(0.019)	(0.019)
Efficiency	-0.001**	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)
Liquidity	0.014	0.015	0.014
	(0.013)	(0.013)	(0.013)
Bank Size	-2.315**	-2.332**	-2.172**
	(0.497)	(0.496)	(0.512)
Inflation	0.129**	0.130**	0.131**
	(0.022)	(0.022)	(0.022)
Economic Growth	0.905**	0.913**	0.906**
	(0.054)	(0.053)	(0.052)
Exchange Rate	-1.546**	-1.581**	-1.603**
	(0.431)	(0.431)	(0.431)
Oil Spending	0.004		
	(0.005)		
Oil P. Changes		-0.002	
		(0.005)	
Oil Volatility			-0.033
			(0.027)
Constant	32.218**	32.476**	31.281**
	(4.523)	(4.511)	(4.605)
Observations	10492	10554	10554

Source: Created by the author.
Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$

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