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The Impact of the Recent Oil Price Decline on the GCC Banking System

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The Impact of the Recent Oil Price Decline on the GCC Banking System

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DECLARATION

I hereby declare that this thesis is entirely my own work and that it has not been submitted as an exercise for a degree at any other University.

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ABSTRACT

Purpose: The purpose of this thesis is to determine the impact of the recent oil price decline on the GCC banking system.

Design/methodology/approach: The econometric Chow model is used to test for structural breaks in the performance of selected sample GCC banks (Saudi, UAE, and Qatar banks) upon the occurrence of the recent oil price decline at the various aspects of bank performance (profitability, liquidity, credit quality, and capitalization).

Findings: While Qatar banks are found to be resilient showing continuous performance over time, the Saudi and UAE banks are found to be significantly impacted by the decline experiencing negative structural breaks at the credit quality level but positive breaks at the capitalization level. However, UAE banks are found to have also experienced negative breaks at the profitability level.

Research limitations/implications: One limitation derives from the fundamentals of the Chow test as it allows studying the impact of only one variable (time) on bank performance. Another limitation derives from the limited data availability for some GCC banks. However, the study contributes to the increasing efforts to fill a research gap identified in the literature investigating the impact of oil price shocks on bank performance in oil exporters.

Practical implications: The study provides GCC bank authorities with valuable insights about what bank aspects could be negatively impacted in the event of negative oil price shocks and what aspects could help mitigate the impact. This helps authorities introduce necessary changes and preventive actions to better absorb future shocks.

Originality/value: This study is the first to apply the Chow model to determine the impact of the recent oil price decline on the GCC banking system.

Keywords: recent oil price decline, Chow test, structural breaks, profitability ratios, liquidity ratios, credit quality ratios, capitalization ratios, Saudi banks, UAE banks, Qatar banks.

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CONTENTS

Chapter 1

Introduction

1.1 General Background

The plunge in oil prices in the second half of 2014 was one of several episodes of significant oil price declines which occurred over the past three decades. While certain episodes were mainly driven by weakening global demand following U.S. recessions (1990-91 and 2001); the Asian crisis (1997-98); and the global financial crisis (2008-09), the recent episode shares two key parallels with that of 1985-86 as both episodes followed a period of rapid expansion in the supply of oil from non-OPEC countries and an eventual shift in OPEC[1] policy to forgo price targeting and increase production (Baffes, Kose, Ohnsorge, & Stocker, 2015).
In time the net impact of the recent oil price decline on the global economy has been ambiguous, a wide range of macroeconomic and financial implications has been confronted by both oil-importing and oil-exporting economies. Accompanied by real income shifts from oil-exporting countries to oil-importing countries, the drop in oil prices has relaxed government budgets and raised growth in oil-importing countries, while oil-exporting countries have faced fiscal pressures and contracted activity which in turn have strained balance sheets of corporations and, by raising nonperforming loans, those of banks (Baffes et al., 2015).

Obviously, there exist regions and countries whose economies and, by extension, banking systems are more sensitive to oil market volatility. A perfect example would be the Gulf Cooperation Council (GCC)[2] economies which can be adversely affected by low oil prices. Indeed, the GCC economies are very dependent on oil and gas exports; a phenomenon which explains the fiscal dependence of these economies on hydrocarbon revenues, along with macro-financial linkages which increase the effects of oil price

[1] OPEC stands for the Organization of the Petroleum Exporting Countries which was founded in 1960, and currently comprises 14 member countries: Islamic Republic of Iran, Iraq, Kuwait, Saudi Arabia, Venezuela, Qatar, Libya, United Arab Emirates, Algeria, Nigeria, Ecuador, Gabon, Angola, and Equatorial Guinea (OPEC, 2018).
[2] The GCC, established in 1981, consists of six Arab states namely Saudi Arabia, United Arab Emirates, Qatar, Kuwait, Oman, and Bahrain and mainly aims at ensuring coordination, integration and inter-connection among its member states in order to achieve unity at all levels (GCC, 2018).

fluctuations over the financial cycle, where oil price fluctuations and government spending policies generate feedback loops between credit and asset prices, loops that can lead to the buildup of systemic financial sector vulnerabilities and hence adverse effects on the real economy (Khandelwal, Miyajima, & Santos, 2016).

Notwithstanding evidence that strong performance of business and financial variables in the GCC economies tends to be associated with oil price upturns, Khandelwal et al. (2016) make it clear that an oil price surge could boost systemic financial sector risks, as it was the case before the global financial crisis when oil price upturns resulted in credit and asset-price booms and, consequently, the burst of domestic bubbles in several GCC countries once the crisis hit. Besides, the authors claim that while fiscal stimulus and liquidity support helped cushion the impact of the global financial crisis on the GCC, strong banking sector soundness has provided an important buffer to the recent oil price decline in the region. However, they accentuate the serious strains on the GCC banking system as liquidity conditions have tightened mainly due to deposit withdrawals by governments and government-related entities.

Given the sensitivity of the GCC economies and banking sectors to oil price movements, this thesis attempts to determine the impact of the recent oil price decline on the GCC banking system through examining how diverse bank performance indicators have responded to the latest oil price shock.

1.2 Need for the Study

While the macroeconomic implications of oil price fluctuations on oil-exporting economies are well documented in the literature, the implications on their banking systems have not received as much attention. This highlights the originality of this study and its added value as it attends to investigate the impact of the recent oil price decline on the GCC banking system. However, the need for this study is manifested in its significance to measure the resilience of the GCC banking system to absorb sudden oil price shocks and more specifically, the recent oil price slump.

After determining the impact of the recent oil price decline on the GCC banking system using different categories of financial ratios, we will determine the banking components which have witnessed structural changes in their performance in response to the oil price shock and those which have remained robust. This in turn will provide us, and everyone concerned, with valuable insights about what bank performance indicators could be negatively impacted in the event of similar future shocks and what indicators could help mitigate the impact, hence provide GCC bank authorities with incentives to strengthen those indicators and grant them more attention as they contribute to the overall performance of the GCC banking system.

In gauging the sources of vulnerability and strength of the GCC banking system, we will enhance our understanding of how this system could respond to oil price movements, and hence recommend necessary changes and preventive actions to better deal with possible oil shocks and dampen the impact of future oil price movements on the GCC economies and banking sectors.

1.3 Purpose of the Study

The study aims at determining the impact of the recent oil price decline on the GCC banking system through detecting the response of the GCC banks to the latest supply-driven oil price shock. We will do this by applying the Chow test, a statistical and econometric model which will help test for structural breaks and trend changes in the overall performance of the GCC banks from the pre-shock period to the post-shock one. Qualitative data related to the shock, along with quantitative data such as financial ratios extracted from Orbis Bank Focus global database (formerly Bankscope) will help conduct this study and achieve its ultimate objectives.

1.4 Brief Overview of all Chapters

In order to determine the impact of the 2014 oil price shock on the GCC banking system, it would be crucial to first develop insights about the recurring phenomenon of oil price shocks and understand the underlying determinants of such shocks along with their macroeconomic implications. Besides, it would be of great essence to investigate in particular the recent oil price decline and assess its underlying sources and implications. Chapter 2 of this thesis serves in this direction as it reviews the related literature.

Afterwards, Chapter 3 presents and discusses the procedures and methodology we have chosen to conduct our study. Indeed, we have chosen to use the Chow test to determine the impact of the recent oil price decline on the GCC banking system. Chapter 3 dissects how this aim is to be achieved. The chapter introduces the Chow test, its concept, and process of implementation. This is followed by selecting the financial ratios that are assessed and the sample GCC banks representative of the GCC banking system.

The Chow test is then performed on each of the selected GCC banking sectors separately. Chapter 4 presents the Chow test results in a comparable framework which allows for a comparison of the different responses to the recent oil price decline across the different GCC banking sectors at the different aspects of bank performance.

Finally, Chapter 5 concludes the thesis and opens the way for further studies as to investigate the resilience of the GCC banking system to future negative oil price shocks, along with other economic shocks.

Chapter 2

Review of Literature

2.1 A Theoretical Exposition

a. Oil Price Shocks: A Recurring Phenomenon

Oil price shocks have been a recurring phenomenon since the emergence of a global market for crude oil in the 1970s, with the real price of crude oil being endogenously determined by the forces of supply and demand like other real industrial commodity prices. However, Kilian (2009) claims that not all oil price shocks are alike; a perspective which entails disentangling supply and demand shocks in the global crude oil market by distinguishing different structural shocks that drive the real price of oil and impose different dynamic effects on macroeconomic aggregates. These structural shocks include crude oil supply shocks that reflect shocks to the current physical availability of crude oil, global aggregate demand shocks that reflect shocks to the global demand for all industrial commodities driven by fluctuations in the global business cycle, and precautionary demand shocks that reflect shocks driven by shifts in the precautionary demand for crude oil which results from the uncertainty about shortages of expected supply relative to expected demand. But at first, what is an oil price shock?

An oil price shock is defined as the unanticipated or surprise component of a change in the oil price, it is the gap between the expected oil price and its actual outcome; however, the timing and magnitude of oil price shocks may vary with the definition of the oil price expectations measure where the same change in the oil price may be assessed differently by consumers, policymakers, financial market participants, and economists, depending on how they build their expectations (Baumeister & Kilian, 2016a). Although economic agents appear to be able to set accurate expectations about the future oil price for they comprehend the determinants of past oil price movements, this is not necessarily the case and oil price expectations remain subject to error. The reason to this, according to Baumeister and Kilian (2016a), is that oil price expectations are based on predicting the determinants of the oil price. They argue that the oil price will only be as predictable as its underlying determinants which comprise the global crude oil production affected either negatively due to unpredictable political events in oil-producing countries or positively in response to demand-driven oil price surges, the demand for crude oil associated with the global business cycle, and the demand for above-ground oil inventories driven by perceptions about the future scarcity of oil which may evolve in response to unforeseen geopolitical or economic crises. Hence, unless economic agents can predict the future path of these determinants which is difficult in practice, unexpected movements in the oil price caused by unexpected shifts in oil supply or oil demand will be inevitable.

In time oil price fluctuations are so difficult to anticipate, however, they can only be understood with the benefit of hindsight. In this context, Economou (2016) analyzes the key contributing factors of historical oil price shocks. The author highlights that throughout history oil price shocks were associated either with geopolitical events such as the 1990 Gulf war; the 2002-03 Venezuelan crisis and Iraq war; and the 2011 Arab uprisings, or with market-specific events such as the 1997-98 Asian financial crisis; the 1999-2000 strong global industrial growth; the 2003-08 great commodities surge; the 2008 global financial crisis; and the 2014-15 oil market imbalance. However, he argued that exogenous supply shocks originating from geopolitical events in oil-producing countries are of declining importance in explaining historical oil price shocks compared to supply and demand shocks arising from market-specific events as market imbalances (the case of strong demand confronted by stagnant supply or of strong supply confronted by stagnant demand) produced the most substantial oil price shocks over history. In their turn, Baumeister and Kilian (2016a) review the causes of the major oil price fluctuations over the last forty years. They comprehend that most major episodes dating back to 1973 are largely explained by shifts in the consumption demand for crude oil associated with the global business cycle (global aggregate demand shocks) and/or shifts in the demand for crude oil stocks reflecting changes to oil price expectations (precautionary demand shocks), rather than by disruptions of the flow of global oil production associated with exogenous political events in OPEC member countries (crude oil supply shocks). For example, the surge in the price of oil after 2003 was driven primarily by the cumulative effects of positive global aggregate demand shocks, and the increase in the real price of oil after the 1979 Iranian Revolution was driven by an unexpectedly booming world economy and a sharp increase in precautionary demand rather than by the reduction at the time in Iranian oil production.

Heterogeneity in the underlying determinants of oil price shocks certainly generates heterogeneity in their dynamic effects on macroeconomic aggregates. This allows for the fact that not all oil price shocks are the same. In fact, oil price increases differ even within themselves in terms of their macroeconomic implications, so do oil price decreases, depending on the underlying cause of the oil price increase or decrease. The instability of the response of macroeconomic aggregates to oil price shocks is expounded by Kilian (2009) who addresses in particular the U.S. oil-importing economy and its response to higher oil prices. The author initially argues that when assessing the macroeconomic implications of oil price shocks it is essential to control for two factors. The first is the reverse causality which exists from macroeconomic aggregates to oil prices as oil prices reversely respond to changes in macroeconomic aggregates. The second is the underlying determinant of the oil price shock where global aggregate demand shocks, in particular, may impose direct effects on the domestic economy as well as indirect effects working through the price of oil and the prices of other imported industrial commodities. For example, a positive innovation to the global business cycle which translates into positive global aggregate demand shocks will enhance the U.S. economy directly, but it will also increase the price of oil and other imported commodities thereby slowing U.S. domestic growth. Nevertheless, Kilian (2014) extends previous research and clarifies that a positive oil price innovation (increase) does not trigger a reduction in U.S. real output whenever this innovation reflects primarily positive global aggregate demand shocks. Such shocks are a symptom of unexpected global economic strength which results in positive impact on U.S. real output possibly offsetting the negative impact caused by higher prices of oil and other imported commodities. In contrast, the same oil price increase may have a negative real output impact if it reflects shocks to precautionary demand. Example on this is what happened during the 2003-2008 great surge in crude oil prices as this sharp increase did not cause a major recession in the United States being driven mainly by unexpected strong demand for crude oil caused by a booming world economy, rather than oil supply disruptions or unexpected increases in the precautionary demand for oil. However, this evidence that not all oil price increases cause a major economic recession in oil-importing countries, depending on the underlying determinant of the oil price increase, promotes the necessity to account for the deeper structural supply and demand shocks underlying oil price shocks when studying their transmission to the domestic economy.

Evidently, oil price shocks have marked the modern era of oil markets as substantial positive and negative fluctuations have struck the real price of crude oil since the 1970s. Researchers have made great strides in recent years in analyzing the historical episodes of major oil price fluctuations and the literature on the causes and consequences of oil price shocks has evolved considerably. However, major oil price increases comprising the 1970s' oil crises and the 2003-08 great surge are mostly attributed to increased demand for oil rather than reductions in oil supply, and significant oil price declines including the 1997/98 slide and the 2008/09 drop were largely associated with reduced demand for oil caused by the Asian financial crisis of 1997 and the global financial crisis of 2008, respectively; whereas the sharp fall in the oil price in 1986 was unique in the sense that it was mainly driven by positive supply shocks caused by the resumption of Saudi oil production as Saudi Arabia decided to reverse its policy of limiting oil production by the end of 1985 (Baumeister & Kilian, 2016a). The recent oil price decline, however, occurred between June 2014 and January 2015 when the Brent price of oil fell sharply from $112 to $47 per barrel constituting another significant episode of oil price declines. Indeed, the underlying sources of the recent oil price decline, along with its implications, have led to intensive debates. Accordingly, the next two parts of this theoretical exposition will review the related literature and involve an assessment of the sources and implications of the latest episode.

b. The Recent Oil Price Decline: Supply or Demand Driven?

The recent oil price decline constitutes a significant yet not unprecedented episode. After hitting deep lows following the global financial crisis of 2008, most commodity prices, including oil prices, reached their highs in the first quarter of 2011 (Baffes et al., 2015). Hereafter, prices of industrial and agricultural materials have decreased steadily in response to weak global demand and strong supply. In contrast, oil prices moved within a small range around $105 per barrel for softness in the global economy was offset at the time by pricing policies and production controls exercised by OPEC added to concerns about supply disruptions associated with arising geopolitical risks. Geopolitical risks arose with geopolitical developments in the Middle East and Eastern Europe such as the internal conflict in Libya, the advance of Islamic State for Iraq and Syria (ISIS), and the Russia-Ukraine conflict. As some of these factors unraveled, however, oil prices declined sharply in the second half of 2014, ending a four-year period of relative price stability and likely marking the end of the commodity super-cycle that began in the early 2000s. The 2000s commodity super-cycle refers to the time period when many commodity prices, including oil prices, boomed by the early 2000s due to the rising demand from emerging markets and as a result of increasing concerns about long-run supply availability, but sharply declined by 2008 due to the global financial crisis, then recovered with demand and reached their peaks by early 2011. Indeed, the recent decline in oil prices was much larger than the cumulative declines in non-oil commodity price indices since their early-2011 peaks (Arezki & Blanchard, 2014). This suggests that factors specific to the oil market, especially supply ones, have played an important role in explaining the drop in oil prices.

Undeniably, recent developments in the global oil market have occurred against a long-term trend of higher-than-anticipated supply and weaker-than-anticipated demand. However, Baffes et al. (2015) analyze the recent oil price decline based on the idea that underlying supply and demand conditions for oil, as for any storable commodity, determine the long-run trend in oil prices. While in the short run, movements in market sentiment and expectations about supply and demand can play a major role in driving oil prices which may respond rapidly to changes in expectations even before actual changes occur. Indeed, during the period preceding the decline, the global economic growth was weaker than expected. Besides, U.S. shale oil production increased significantly from less than 1 million barrels per day in 2010 to more than 3 million barrels per day in the second half of 2013 (EIA, 2014). Accordingly, this led to downward revisions of demand expectations and upward revisions of supply expectations in the second half of 2014 (Baffes et al., 2015). Nevertheless, the latter argue that these revisions to market expectations were not significantly large to cause the sharp fall in oil prices but they intensified when coincided with three major developments including i) unwinding of some geopolitical risks that had threatened production, ii) an appreciation of the U.S. dollar which weakened oil demand in countries experiencing at the time an erosion in the purchasing power of their currencies, and iii) a significant shift in OPEC policy to forgo price targeting, maintain oil production, and support market share. These developments together exerted a downward pressure on oil prices and were reinforced by longer-term shifts in supply and demand explained by many years of large increases in the production of unconventional oil and a long-term trend decline in the average of oil intensity of global activity, respectively. This analysis, however, implies that significant shifts in market expectations about both supply and demand played a major role in explaining the oil price decline in the second half of 2014. Nonetheless, Baffes et al. (2015) argue that the dominant factor in the price fall has been shocks to actual and expected supply. These shocks stemmed from the expansion of oil output in the United States, declining geopolitical concerns about supply disruptions, and OPEC's switch in November 2014 to a policy of maintaining market share which significantly deepened the drop in oil prices that was already underway.

Other observers analyze the revisions of International Energy Agency projections of supply and demand which occurred between June and December 2014 and point to significant roles for both, higher supply projections and lower demand projections, in explaining the oil price decline in the second half of 2014. Husain et al. (2015) argue that higher supply projections resulted mainly from an increase in U.S. shale oil production and better-than-expected OPEC crude oil production in Iraq, Libya, and Saudi Arabia, while lower demand projections resulted from weaker-than-expected demand stemming mainly from Europe and Asia. However, the authors analyze the drop in oil prices that occurred between June 2014 and January 2015 and claim that OPEC's decision in November 2014 to maintain its crude oil production at 30 million barrels per day sharpened the price decline as markets fundamentally increased expectations about future OPEC supply. In this context, Arezki and Blanchard (2014) argue that oil prices had stayed relatively high before November despite the steady increase in global oil production. This was due to the perception at the time of OPEC's prevailing policy to control production and target a price range of $100-110 per barrel. However, the intention of OPEC's swing producer (Saudi Arabia) not to counter the increasing supply of oil from other OPEC producers (mainly Libya and Iraq) and non-OPEC producers (mainly the United States, Canada, and Russia) and the eventual OPEC decision in November, increased expectations about the future global oil supply and exerted a further downward pressure on oil prices. These analyses, however, attribute the recent oil price decline to shocks to actual and expected market conditions, highlighting that a major shock to supply expectations occurred upon the OPEC November decision and deepened the price decline. Nonetheless, Husain et al. (2015) suggest that likely more than one half of the recent oil price decline was due to supply shocks. Besides, Arezki and Blanchard (2014) document that demand shocks contributed only 20-35 percent to the decline while supply shocks and OPEC's decision not to cut supplies were more important in driving the decline in oil prices.

It is by no means obscure, however, that the recent oil price decline followed a period of rapid growth in unconventional oil upon the US shale oil revolution which represents a dramatic increase in the U.S. crude oil production from tight oil and shale formations promoted by the identification of resources and technological advances (EIA, 2014). Unexpectedly, this significant transformation in oil markets coincided with a relative stability in oil prices and not a decline. Mănescu and Nuño (2015) address this point and claim that the shale oil revolution has exerted a relatively negligible impact on oil prices due the anticipated nature of the shale shock added to the expected contraction at the time in non-shale world oil supply, mainly from Saudi Arabia, which helped to moderate world oil production and stabilize prices until mid-2014. Indeed, most of the current and expected increase in oil supply due to the shale oil revolution has already been incorporated into oil prices and even large expected increases in shale production will have only a small effect on prices. This standpoint, however, underlines a weak correlation between the shale oil revolution and the recent collapse in oil prices, thus diverges from what others opine regarding the significant role of the expansion of U.S. oil output in explaining the recent oil price decline. But if this is really the case, how can the collapse in oil prices in the second half of 2014 hence be explained? Mănescu and Nuño (2015) answer this question and reveal that the recent oil price decline occurred against several unanticipated factors comprising (i) unanticipated positive supply shocks as several major non-US producers (Libya and Iraq as OPEC producers and Russia, Canada, Norway, and the UK as non-OPEC producers) experienced large increases in their production in the second half of 2014; the total increase in non-US oil supply from June to December was roughly 1.5 million barrels per day, compared to U.S. increase of 0.6 million barrels per day, (ii) unanticipated negative demand shocks due to the global economic slowdown explained by a number of negative surprises to the global economic growth rate during 2014; added to the strong appreciation of the US dollar which increased the real price of oil in other currencies and reduced the demand for oil, and (iii) the surprising deviation of Saudi Arabia from its profit maximizing strategy as it decided not to reduce production in response to the increase in supply by other producers. In fact, at its 166th meeting on the 27th of November 2014, OPEC decided to maintain their quotas as Saudi Arabia tried to avoid repeating the experience of the early 1980s, when it lost market share in order to defend prices amid a significant increase in non-OPEC oil production. Indeed, Mănescu and Nuño (2015) argue that each of the above factors was behind the recent oil price decline, but supply shocks were the major contributor. This analysis, however, clearly attributes the recent collapse in oil prices to changes in actual supply and demand conditions. Yet it corroborates that supply played the largest role for the price collapse was mainly due to positive unanticipated supply shocks caused by the large increase in oil production by non-US producers (OPEC and non-OPEC producers) against a background of negative demand surprises and unwillingness by Saudi Arabia to reduce production.

In their turn, Baumeister and Kilian (2016b) provide a quantitative analysis of the $49 per barrel drop in the Brent price for crude oil between June and December 2014. Based on a vector autoregressive (VAR) model of the global oil market, the authors provide evidence that more than half of the observed decline in the price of oil ($27) was predictable in real time as of June 2014 and associated with economic shocks that occurred prior to July 2014, tracing $11 to the cumulative effects of adverse demand shocks that reflected an unexpected slowdown of the global economy, and $16 to the cumulative effects of positive oil supply shocks and to shocks to expected oil production. Afterwards, they show that $22 of the cumulative decline in the Brent price was unpredictable and associated with economic shocks that occurred only after June 2014. Moreover, they indicate that a $9 decline was explained by a negative shock to the storage demand for oil in July 2014 reflecting a negative shock to oil price expectations, and a further $13 decline was explained by a negative oil demand shock in December 2014 reflecting an unexpected weakening of the global economy. This analysis thus provides no evidence that positive oil supply shocks after June 2014 or the OPEC decision in late November 2014 played an important role in the observed oil price decline. However, it clearly attributes most of the price shock to negative oil demand shocks associated with the global business cycle against negative shocks to the demand for oil inventories, thus opposing what other analyses reveal regarding the dominant role played by supply shocks in explaining the recent oil price decline. In their study, Badel and McGillicuddy (2015) provide further quantitative evidence based on a structural VAR model of the global crude oil market. They decompose the fluctuations in the real price of oil and argue that between June 2014 and January 2015 the major share of the oil price decline was caused by negative oil-specific demand shocks which reflected negative changes in the demand for oil driven by precautionary motives and, to a lesser extent, by negative global aggregate demand shocks which reflected negative changes in global real economic activity. On the contrary, the contribution of the oil supply which stands for the current physical availability of crude oil was found to be small. Notwithstanding this exhaustive debate, it remains an open question what really caused most of the decline in the price of oil in the second half of 2014, the severity of which surprised even industry experts.

c. The Recent Oil Price Decline: Profound Implications

Acknowledged so far, is that the recent oil price decline was driven by a combination of oil supply and demand rather than by one side of the market. This complicates the task of investigating the macroeconomic implications of the latest oil price shock on the global economy. However, available in the literature are few analyses that identify the differential effects of supply- and demand-driven oil price shocks on oil-importing and oil-exporting countries. For example, Cashin, Mohaddes, Raissi, and Raissi (2014) employ a Global VAR model of the world economy. The authors highlight that a supply-driven oil price increase leads to different economic effects than a demand-driven increase associated with favorable changes in global economic activity. They also add that the effects of a supply-driven increase on oil-importing countries are different than those experienced by oil exporters. In time the shock of our interest involves a decline in oil prices, it is by all means beneficial to develop insights about the macroeconomic implications of oil price increases as we expect oil price decreases to have opposite effects. According to Cashin et al. (2014), oil importers, notably Euro Area and the United States, typically face a long-lived fall in economic activity in response to a supply-driven oil price increase. For China and Japan, nonetheless, the impact of such price increase on real GDP is positive. This is mainly due to their moderate dependence on oil for their energy consumption needs, and the composition of their export portfolios which fits well at the time the import demand of booming oil-exporting economies. Moreover, the impact on GDP is permanently positive for energy-exporting countries that possess large proven oil reserves and those for which the oil income to GDP ratio is expected to remain high over a prolonged period (for example, Canada, Ecuador, Iran, Libya, Nigeria, and Venezuela). For the GCC countries, the income effect of a supply-driven increase is initially positive but turns negative in the long run since the GCC, in particular Saudi Arabia, is a special case as it reacts to the market and uses its spare capacity to inject oil when global supply falls and withdraw oil when global supply increases. Indeed, following a supply-driven oil price increase, global aggregate demand falls because such shock is considered to be a tax on oil importers with a high propensity to consume, in favor of oil exporters with a high propensity to save. This is not to forget the additional downward pressure placed on growth in oil importers where central banks raise their policy interest rates in response to increased inflation. On the other hand, following a demand-driven oil price increase, almost all oil-importing and oil-exporting countries experience long-run inflationary pressures, along with an increase in real GDP either because the country itself is in a boom or because it indirectly gains from trade with the rest of the world.

Accordingly, one can derive that a supply-driven oil price decline will be a net plus for the global economy certainly hurting oil exporters but generating more-than-offsetting gains to oil importers, while a demand-driven decline will trigger a fall in global economic activity. When it comes to the recent oil price decline, however, it is far complicated. Obstfeld, Milesi-Ferretti, and Arezki (2016) highlight a perverse relationship between oil prices and the global economy during the recent episode. Indeed, while building on the evidence that the recent oil price decline was supply driven and thus expecting positive global income effects, the authors argue that falling oil prices were rather accompanied by slowing global growth. This observation raises the question about what factors could have impeded at the time an enhancement in the global economic growth. In this context, Obstfeld et al. (2016) suggest that no positive global spending effects were detected due to a weaker-than-expected growth in oil exporters (reflecting weaker consumption, weaker investment, and sharp government spending cuts), and a no better-than-expected growth in oil importers (reflecting less-than-expected consumption and less-than-expected investment growth). More importantly, they argue that many advanced economies had nominal interest rates at or near zero which impeded an enhancement in their growth. Indeed, falling oil prices coincided with a period of weak economic growth so the major central banks were unable to lower their monetary policy interest rates further, enhance growth, and face deflationary pressures. Thus, because the policy interest rates could not fall further, the decline in inflation resulting from lower production costs raised the real interest rates, reduced demand, and countered the positive income effect in such economies.

In time some observers argue that the recent oil price decline has not been good news for the United States and the global economy, others argue the contrary. In their turn, Mohaddes and Pesaran (2016) evaluate the effects of recent oil price falls on the U.S. real economic activity expressed in terms of real dividends. They base their work on the evidence that a stable negative relationship historically exists between oil prices and real dividends and the rationale that if the demand for companies' products does not increase they cannot make profits and pay dividends. Indeed, the authors claim that, as in previous episodes of oil price declines, recent price falls have improved profit opportunities and dividends in the United States. On the other hand, the recent oil price decline has hurt the major oil exporters and forced them to cut back on their welfare programs, withdraw from their oil funds, and attempt to diversify their economies. At the world level, nevertheless, the increase in spending by oil importers including the United States would have been expected to exceed the decline in expenditure by oil exporters, likely resulting in a net positive global income effect. On the supply side and despite falling oil prices, oil production has initially continued to rise worldwide, with OPEC countries (mainly Saudi Arabia and Iraq) and non-OPEC countries (Russia, Canada, Norway, and Mexico) perversely raising their production trying to compensate their loss of revenues. Only U.S. production from unconventional oil has been declining under pressure from lower oil prices as the production of the high cost unconventional oil has been the first to be negatively affected by lower oil prices. However, Krauss (2017) highlight that after following the policy of maintaining production to protect markets, especially in Asia; Saudi Arabia reversed action late 2016 under the pressure of low oil prices. Indeed, in November 2016, OPEC agreed to reduce production for six months starting in 2017 by 1.2 million barrels a day with Saudi Arabia alone agreeing to reduce production by 486,000 barrels a day. Then, Russia and other oil-producing countries also agreed to reduce their production by more than 550,000 barrels a day. OPEC then announced in May 2017 that it would cut oil production through March 2018. Moreover, Russia decided to do the same in time several OPEC members that have disrespected past accords, particularly Venezuela, have been unable to increase production significantly. This in turn implies that lower oil prices eventually lead to higher global demand and lower global supply, hence putting upward pressure on oil prices in the medium term and providing room for the oil market to equilibrate, though very slowly.

2.2 An Empirical Review

Studies investigating the impact of oil price shocks on the banking systems in oil-exporting countries are still emerging. This section provides an empirical review of the most relevant researches added recently to the literature, given the growing awareness of financial stability issues in many countries and the implied close link between the oil market and the financial sector.

A significant research by Kinda, Mlachila, and Ouedraogo (2016) studies how negative commodity price shocks affect financial sector fragility using a large sample of 71 commodity exporters among emerging and developing economies over the period 1997-2013. Despite the fact that the recent sharp decline in prices has disseminated to most commodities, this study focuses on non-renewable resources including hydrocarbons (oil and gas) and mineral raw materials. The authors employ the panel fixed effects method and the conditional fixed effects logit model to analyze the impact of negative commodity price shocks on financial soundness indicators and the impact on the probability of a banking crisis occurring, respectively. Controlling for a range of explanatory variables, they estimate the impact of commodity price declines on each of seven financial soundness indicators namely bank non-performing loans (NPLs), provisions to NPLs, return on assets (ROA), return on equity (ROE), cost to income ratio, liquid assets to deposits and short-term funding, and regulatory capital to risk-weighted assets. They also estimate the impact on a composite index measuring the stability of the financial sector, and a banking crisis variable indicating the probability of a banking crisis occurring. Based on the employed econometric models, the results reveal a combination of increasing NPLs and declining profits associated with negative commodity price shocks, thus raising the fragility of the financial sector and increasing the probability of a banking crisis occurring. Besides, the main transmission channels through which adverse commodity price shocks affect the financial sector are found to be the GDP growth, fiscal performance, savings, and debt in foreign currency. However, this strong evidence that negative commodity price shocks weaken the financial sector in commodity exporters as they are associated with higher financial sector fragility and increasing probability of systemic banking crises occurring, provides a solid foundation for our prospective study and supports the rationale it stems from.

The first empirical evidence of a systemic importance of oil price shocks on bank performance in oil-exporting countries has been provided by Poghosyan and Hesse (2009) in a remarkable study. The study quantitatively assesses the impact of oil price shocks on bank profitability using annual data on 145 banks in 11 oil-exporting countries in the Middle East and North Africa for the period 1994-2008. The authors initially distinguish between direct and indirect channels through which oil price shocks may affect bank profitability. They adopt the system Generalized Method of Moments (GMM) methodology to estimate bank profitability equations where the dependent variable is the return on assets (ROA) and the independent variable is a calculated measure of the oil price shock, added to different bank-specific and country-specific determinants of bank profitability. The findings show that there is no direct effect from oil price shocks on bank profitability and the detected positive impact of higher oil prices on bank profitability is indirect and channeled through macro variables (mainly the fiscal stance and inflation). Nevertheless, the estimated relationship between oil price shocks and bank profitability in MENA countries is found to be distorted by the global financial crisis, when positive oil price shocks coincided with declining bank profits in 2008. Although this study introduces the relationship between oil price shocks and bank performance as an appealing topic for further research, it can be criticized for using the return on assets as a sole indicator of bank performance, where in essence bank performance should be measured using multiple indicators which can respond to oil price shocks in a different significant way than bank profitability variables.

Another study by Idris and Nayan (2016) analyzes how bank non-performing loans are affected by the systemic risk factors of oil price volatility and environmental risks. Motivated by the persistent and rising levels of bank NPLs globally and amongst the Organization of the Petroleum Exporting Countries, the authors study the determinants of bank NPLs using annual panel data of 12 OPEC member states for the period spanning 2000-2014. The ordinary least squares (OLS), the random effect, and the fixed effect models are used employing aggregate bank NPL ratio data of the OPEC member states as the dependent variable. Based on these models, the NPL ratio is found to be significantly affected by the systemic risk factors of oil price volatility and environmental risks added to a chosen baseline model of macroeconomic determinants of NPLs (real GDP, inflation rate, lending interest rate, and unemployment rate). Indeed, the results indicate a statistically significant inverse relationship between oil price volatility and NPLs and a statistically positive relationship between environmental risks and NPLs. While this study provides clear evidence that the recent decline in oil prices and the increasing vulnerability to both local and global environmental risks have fueled the current deterioration of credit quality among OPEC member states, it lacks evidence on the impacts these systemic risk factors have imposed on bank balance sheet variables other than the ratio of non-performing loans to gross loans.

A recent study conducted by Bidder, Krainer, and Shapiro (2017) scrutinizes how a shock to U.S. banks' net worth affects their portfolio decisions. The authors perceive the shock as being derived from variation across banks in their loan exposure to industries adversely affected by the precipitous oil price decline of 2014, which has led many firms in the oil and gas (O&G) industry to delay or cease payment on their loans. They employ the fixed effects regression to ascertain if the shock induced a credit supply shift (bank lending channel) in the largest U.S. bank holding companies (BHCs) and whether this influenced U.S. firm borrowing and caused a borrower credit channel. The study finds significant evidence of a bank lending channel in the post-shock period where banks more exposed to the shock have tightened corporate lending as evidenced by tightening lending standards and reductions in lending to firms, and tightened credit on mortgages that they would ultimately hold in their portfolios. However, no significant evidence of a borrower credit channel is found and the effect of the tightening of credit on firms' scale has been minimal since firms have been able to substitute to alternative financing sources. Thus, the impact of the oil shock on the U.S. economy is found to be apparently limited. This study, however, indicates that an oil shock can drill into bank balance sheets and cause significant shifts in bank lending practices from the pre-shock period to the post-shock one.

Khandelwal et al. (2016) analyze the links between oil price changes and macroeconomic and financial developments in the GCC region. They use a multivariate model to assess the impact of macroeconomic outcomes on bank asset quality (NPLs) and a panel vector autoregression (VAR) model to investigate oil-macro-financial linkages. Their empirical analysis relies on macroeconomic and bank-level annual data for 42 GCC banks spanning 1999-2014. Khandelwal et al. (2016) first assess the determinants of NPLs in the GCC using a multivariate model of NPLs which employs the NPL ratio as the dependent variable and the U.S. Fed funds rate, real growth rate of oil prices, real growth rate of nonoil private sector GDP, real growth rate of equity prices, and real credit growth rate as explanatory variables. The results show that the growth rates of oil prices and nonoil private sector GDP are significant, suggesting that an increase in oil prices or nonoil private sector GDP leads to a decline in the NPL ratio. The authors then estimate the panel VAR model of oil-macro-financial linkages using five macroeconomic and bank-level variables (real growth rate of oil prices, real growth rate of equity prices, NPL ratio, real credit growth rate, and real deposit growth rate).

The results affirm that oil price movements affect bank balance sheets in a significant way where a drop in the growth rate of oil prices result in a rise in the NPL ratio and a reduction in bank credit and deposit growth rates. This triggers a feedback effect within bank balance sheets as a higher NPL ratio also leads to lower bank credit and deposit growth rates. In addition, a reduction in the growth rate of oil prices leads to a decline in the rate of equity price inflation, which in turn leads to a reduction in bank credit and deposit growth rates, further depressing equity price performance. As this study identifies a positive feedback loop between oil price movements, bank balance sheets, and asset prices in the GCC, it preeminently highlights the GCC banking system's sensitivity to oil price fluctuations which can adversely affect the GCC banks' balance sheets and most probably the region's wider economy. This, however, grants a firm confirmation to our willingness to adopt the GCC case in the proposed study.

Abusaaq et al. (2015) assess the resilience of Saudi banks to weak economic conditions. Their paper first analyzes the determinants of bank NPLs in Saudi Arabia employing a system GMM estimation approach and relying on publicly available bank-by-bank data on balance sheets and profit/loss accounts for 9 Saudi Arabian banks spanning 1999-2014. The dependent variable is the NPL ratio and the independent variables are the growth rate of real oil prices, growth rate of nonoil private sector GDP, real government spending growth rate, domestic and U.S. interest rates, real equity price growth rate, real credit growth rate, and the 2008/09 time dummy variable. The results suggest that the growth rates of real oil prices and nonoil private sector GDP are key determinants of bank NPL ratios. By contrast, real government spending growth rate and domestic and U.S. interest rates are not found to directly affect NPL ratios in a systematic way. However, the 2008/09 time dummy variable is found to be significant reflecting events other than oil price declines that potentially led to an increase in NPL ratios in Saudi banks around the time of the global financial crisis. Using the parameter estimates and projections of oil prices and nonoil private sector GDP growth rates, the future path of bank-level NPLs for 2015-19 has then been estimated under alternative macro-financial scenarios to revisit the possible impact of lower oil prices and weaker nonoil private sector GDP growth on Saudi banks. Consequently, balance sheets and profit/loss accounts have been simulated for the individual banks. Besides, the paper assesses the ability of Saudi banks to manage a large deposit withdrawal by analyzing the impact of severe scenarios of significant deposit withdrawals on banks' liquidity positions. Overall, scenario analyses and simulation results suggest that Saudi banks have been strong to deal with an increase in nonperforming loans (NPLs), lower profits, and weaker deposit inflows that have come with an extended period of lower oil prices and weaker nonoil private sector GDP growth. Moreover, bank capital and liquidity would only be pressed in case of sustained very low oil prices, a very sharp economic downturn, and huge deposit withdrawals. The analysis provided in this paper, however, breaks ground for further analyses to explore the preparedness of Saudi banks to absorb shocks of sustained oil price declines and the subsequent fragile economic conditions that can adversely affect Saudi banks' balance sheets and profit/loss accounts.

Martinez, Santos, Toure, and Flores (2016) analyze the financial stability implications of high short-term interest rates and low oil prices on the UAE banking system. Their paper first assesses the determinants of liquidity buffers for a sample of 17 UAE domestic banks for the period 2005:Q1-2015:Q4 employing unbalanced panel data regression with fixed effects and cluster robust standard errors. The inverse of the loan-to-deposit ratio, the interbank loans-to-interbank deposits ratio, and the liquid assets-to-customer deposits and short-term debt ratio are proxies for liquidity buffers. Their determinants include the macroeconomic variables of the percentage change in oil prices, changes in the three-month Libor rate, and the real nonoil GDP growth rate within the UAE, added to other bank-specific variables. The results indicate that higher oil prices lead to higher liquidity buffers but higher short-term interest rates lead to lower liquidity as they encourage lending. The paper then assesses the solvency of the UAE corporate sector by analyzing probabilities of default (PDs) based on a forward intensity model developed by the National University of Singapore (NUS) in collaboration with the International Monetary Fund (IMF). The NUS intensity model, customized to the UAE, is employed using monthly data for the period 1990-2015 for 74 UAE listed firms of which 17 are banks, 47 are private firms, and 10 are government-related entities. PDs are explained by common and firm-specific independent variables driven by the macroeconomic risk factors of oil price changes, changes in the three-month EIBOR (UAE interbank rate), real nonoil GDP growth rate, and consumer price inflation. Projections for the PDs for the period 2016-21 are then undertaken under different scenarios for the macroeconomic risk factors. Under lower oil price and higher interest rate scenarios, PDs for UAE firms including banks have been expected to largely increase. Besides, under an adverse oil shock scenario with economic slowdown, PDs have been forecasted to reach their highest levels since the 2009 financial crisis. As this paper presents the UAE banking sector as a sector of high sensitivity to stressed macroeconomic conditions where lower oil prices and higher short-term interest rates have been expected to put further pressures on bank liquidity and solvency, it highlights the essence of conducting more studies to assess the readiness of UAE banks and their stamina to survive sudden economic shocks which can pose serious challenges to the UAE banking system.

Based on the above empirical review, we comprehend a research gap in the empirical literature where studies delving into the impact of oil price shocks on bank performance in oil-exporting countries are still scarce. Despite this scarcity, the aforementioned studies lead the way for further studies as they constitute rigid bedrock for the hypothesis of a systemic role played by oil prices in upgrading or downgrading the financial stability of oil-dependent exporters. However, this thesis tries to add empirical evidence to the existing literature as it aims to determine the impact of the recent oil price decline on various aspects of the GCC banking system by applying the Chow test. Indeed, a pioneering study by Naimy and Karayan (2016) applies the Chow test to determine the impact of the 2007-2008 financial crisis on both the Lebanese and the U.S. banking sectors through testing for structural breaks and trend changes in the entire performance of selected sample banks from the pre-crisis period to the post-crisis one using divergent categories of financial ratios (profitability, liquidity, credit quality, and capitalization ratios). However, while their study seems to be irrelevant as it falls beyond the scope of our study, it remains reliable and analogous in terms of the model employed, the financial ratios selected, and the direction pursued to detect the response of a specific banking sector to a sudden economic shock. Inspired by Naimy and Karayan (2016), therefore, we choose to employ the Chow test in the impending study to detect the response of the GCC banks to the latest oil price shock through testing for statistical differences in the banks' overall performance from the pre-shock period to the post-shock one. Eventually, this helps determine what bank performance indicators have been affected negatively in response to the 2014 oil price shock and what indicators have proven to be robust.

Chapter 3

Procedures and Methodology

3.1 Introduction

Recall that the ultimate objective of this thesis is to determine the impact of the recent oil price decline on the GCC banking system. We will try to achieve this objective by applying the Chow test. The Chow test is a statistical and econometric model proposed by econometrician Gregory Chow in 1960 and has been commonly used to test for break points or structural changes in a model (SAS, 2013). In our thesis, the model will be applied to test for structural breaks and trend changes in the overall performance of the GCC banks upon the occurrence of the 2014 oil price shock. To make sure that our study covers the various aspects of the GCC banking system, we will apply the model on a broad range of financial ratios selected from divergent categories (profitability, liquidity, credit quality, and capitalization ratios). For a selected sample of GCC banks, the ratios are extracted from Orbis Bank Focus global database to be inputted into EViews statistical package through which we will efficiently perform the test. The test results will enable us to test for statistical differences in the overall performance of the GCC banks from the pre-shock period to the post-shock one. Hence, we will determine what bank performance indicators have been affected negatively in response to the 2014 oil price shock and what indicators have proven to be robust.

This chapter consists of different sections which together present a discussion of the procedures and methodology we have chosen to conduct our study. First, we state the statistical hypotheses that are being investigated. Second, we introduce the Chow test, its concept, and process of implementation. Third, we select the variables (financial ratios) and present a brief explanation for each of them. Finally, we select the GCC countries representative of the GCC region along with the sample banks for each selected country to be followed by cleansing the collected raw sample data.

3.2 Statistical Hypotheses

Statistical hypothesis testing is the decision-making process for testing claims about a population, based on data collected from selected samples (Bluman, 2009). In hypothesis testing, researchers begin with some belief regarding what the value of a population parameter is or should be, and then use sample data to either refute or support their initial belief (Groebner, Shannon, Fry, & Smith, 2008). This involves formulating two statistical hypotheses (the null hypothesis and the alternative hypothesis) such that one identifies the claim and the other reflects the opposite position. The null hypothesis, denoted by H_0, involves the statement about the population parameter that will be tested; it will be rejected only if the sample data provide substantial contradictory evidence, and the alternative hypothesis, denoted by H_A, includes all population values not included in the null hypothesis; it is considered to be true if the null hypothesis is rejected (Groebner et al., 2008).

In our study, the hypotheses to be tested for each financial ratio of the selected sample GCC banks using the Chow test are stated as follows:

- H_0: Parameters are stable over the whole sample period.
- H_A: Parameters are not stable over the whole sample period.

Thus, the null hypothesis contains the claim that there is no significant statistical difference between the pre-shock and the post-shock performance of a specific ratio of the selected sample GCC banks. The alternative hypothesis, however, states the opposite.

3.3 Methodology Used

a. The Chow Test

The Chow test for structural break was developed as a test of equality between sets of parameters in two linear regression models on different data sets (Chow, 1960). The test has been commonly used to figure out whether an economic relationship represented by a linear regression model remains stable in two periods of time, or whether the same relationship holds for two different groups of economic units. This involves testing whether two sets of observations can be regarded as belonging to the same regression model or should be defined through two separate regressions to better fit the tested data. The concept of the Chow test can be illustrated through the following figure:

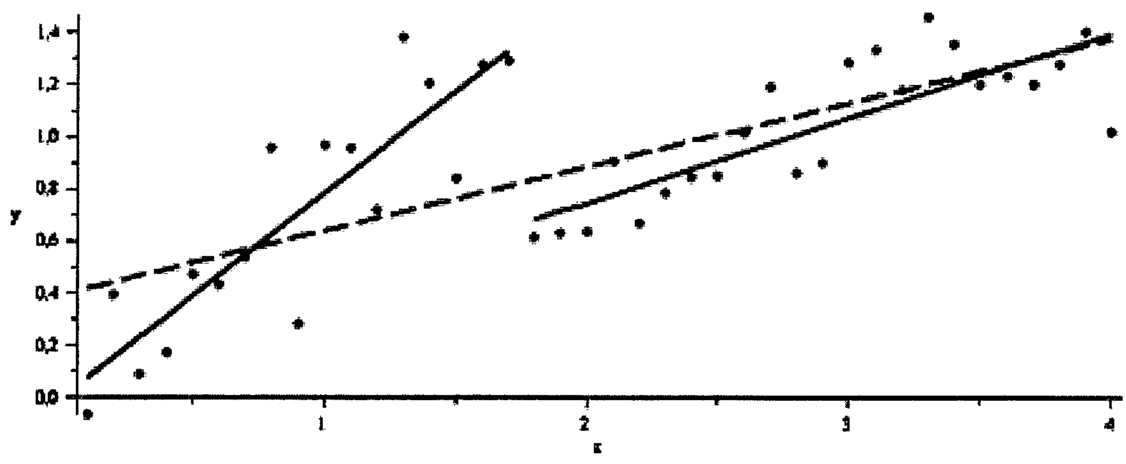


Figure 1: Chow Test for Structural Break

Figure 1 presents a relationship between two variables x and y. The figure displays a structural break in the data series at a particular value of x thus dividing the data into two sub-samples defined through two separate regressions. This implies that the regression on the two sub-samples delivers a better model than the combined (dashed) regression over the whole sample. In our study, however, we are interested in testing parameter stability over time particularly testing the stability of the performance of a specific financial ratio (y) over time (x). We will use the Chow test to detect whether the performance of each ratio of the selected sample GCC banks remained stable over the whole sample period or alternatively, that performance witnessed a structural break upon the occurrence of the recent oil price decline. The first case, however, indicates that the ratio performance is better determined through one single regression line, whereas the alternative one implies that the tested ratio is better fitted through dividing the whole sample period into two sub-periods and performing two separate regressions.

The Chow test is a straightforward application of the F-test (Brooks, 2008). The F-test is used to test multiple hypotheses, i.e. to test multiple parameters simultaneously where the number of tested parameters represents the number of restrictions stated in the null hypothesis. This framework is employed to determine whether a restriction should be imposed on a regression model to better fit the tested data; where rejecting the null hypothesis implies that the restriction is not supported by the test results and thus should not be imposed on the model, while having no evidence against the null hypothesis implies that the restriction is supported and thus should be imposed.

In our study, the Chow test is performed for each financial ratio of the selected sample GCC banks. The test is carried out at a 10% significance level (α)[3] and involves the following steps:

Step 1: Estimate the regression over the whole sample period (Brooks, 2008). This is the restricted regression in which the restriction that the parameters are equal across sub-periods is imposed. In our study, the whole sample period extends from 2011 to 2017.

Step 2: Split the data into two sub-periods at the time of a particular incident (Brooks, 2008). In our study, the data is split at the year 2014 during which oil markets witnessed the recent oil price decline.

Step 3: Estimate the regression over the two sub-periods separately (Brooks, 2008). These two regressions together make up the unrestricted regression in which the restriction of parameter equality is not imposed.

Step 4: Obtain the residual sum of squares (RSS) to each regression (Brooks, 2008). RSS is the sum of the squared residuals, i.e. the sum of the squared vertical distances from the actual data points to their corresponding values estimated by a regression model.

Step 5: Compute the Chow test statistic which is simply an F-test statistic based on the difference between the RSSs (Brooks, 2008):

$$F - test\ statistic = \frac{RSS - (RSS_1 + RSS_2)}{RSS_1 + RSS_2} \times \frac{T - 2k}{k}$$

Where:

[3] Significance level (α) is the maximum probability of committing the statistical error of rejecting the null hypothesis when it is true (Groebner et al., 2008).

RSS = residual sum of squares for the whole sample period (restricted residual sum of squares)

RSS_1 = residual sum of squares for sub-period 1

RSS_2 = residual sum of squares for sub-period 2

RSS_1+ RSS_2 = unrestricted residual sum of squares

T = number of observations

2k = number of regressors (parameters) in the unrestricted regression (since it comes in two parts, each with k regressors)

k = number of regressors in each regression

Step 6: Determine the degree of freedom of the numerator and the degree of freedom of the denominator for the F test (Wooldridge, 2012), where:

$$\textit{Degree of freedom of the numerator} = d.f.N = k$$
$$\textit{Degree of freedom of the denominator} = d.f.D = T\text{-}2k$$

Step 7: Applying the P-value[4] method for hypothesis testing, find the P-value interval for the calculated F-test statistic (Bluman, 2009). First, find the F critical values[5] for the above determined degrees of freedom at different α values in their corresponding F-distribution tables. Second, draw a table as follows:

α	0.10	0.05	0.025	0.01	0.005
$F_{d.f.N,d.f.D}$	v	w	x	y	z

Third, locate the two F critical values that the calculated F-test statistic falls between, so that their corresponding two α values constitute the P-value interval for the calculated F-test statistic. For example, if the calculated F-test statistic falls between x and y critical

[4] P-value is the probability of obtaining a test statistic greater than or equal to the test statistic calculated from a sample (assuming the null hypothesis is true); it is also known as the observed significance level (Groebner et al., 2008).

[5] Critical value is the value corresponding to a significance level that indicates the test statistics that lead to rejecting a null hypothesis and those that lead to the alternative decision (Groebner et al., 2008).

values, then the corresponding P-value falls between 0.01 and 0.025, i.e. 0.01<P-value<0.025.

Step 8: Compute the exact P-value. This can be done automatically using econometrics packages which have a built-in feature for testing multiple parameters (Wooldridge, 2012). In our study, we will use EViews.

Step 9: Analyze the test results based on the following conceptual framework (Wooldridge, 2012):

If the P-value is less than the chosen significance level (α), then reject the null hypothesis that the parameters are stable over time. On the contrary, if the P-value is greater than the chosen α, then do not reject the null hypothesis.

In our study, rejecting the null hypothesis implies that the tested ratio has experienced a structural break upon the recent oil price decline. However, having no statistical evidence against H_0 implies that the tested ratio has been continuous over time and has not experienced any structural break by the year 2014.

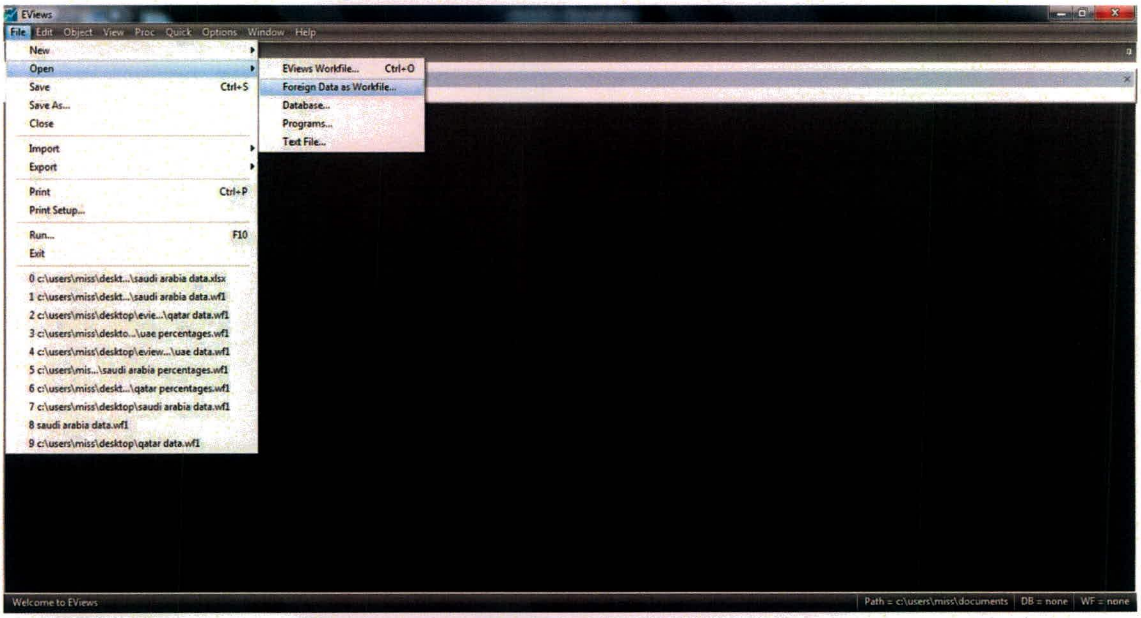
b. Model Application on EViews

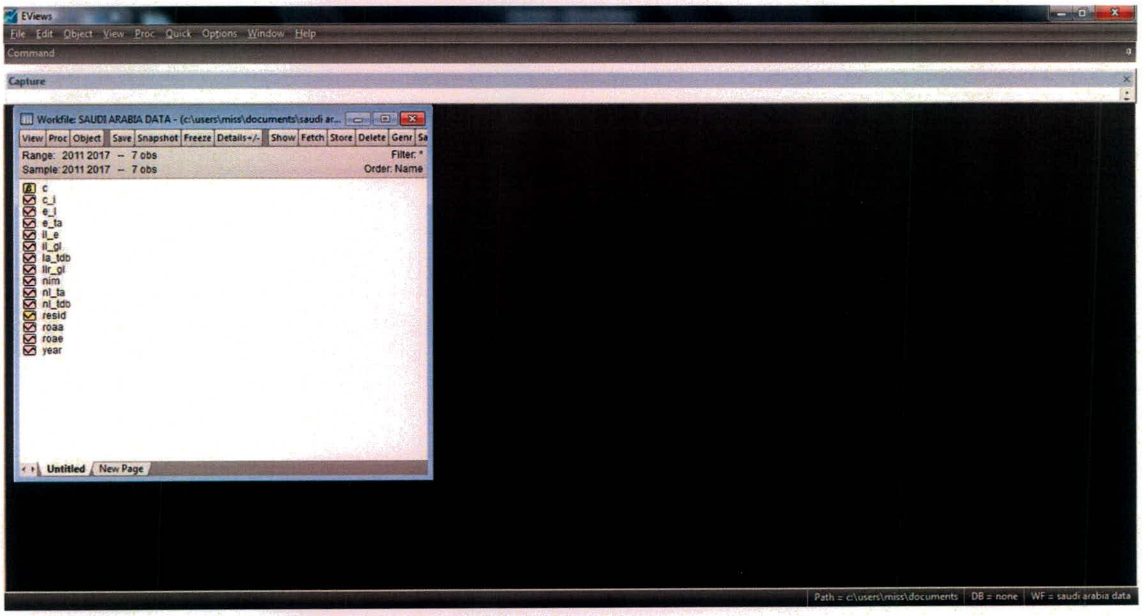
As previously mentioned, the Chow test is to be performed for each ratio of the selected sample GCC banks. Thus the above steps should be implemented multiple times as we are investigating twelve ratios for the sample. This appears to be a complicated and a time-consuming process. For this, we choose to use EViews modern package to quickly and efficiently apply the model.

EViews provides students and academic researchers with access to powerful analytical, statistical, modeling, and forecasting tools through an innovative, flexible, and easy-to-use interface (EViews, 2018). The software allows researchers working with longitudinal, cross-sectional, or time series data to manage their data, carry out statistical and econometric analysis, produce forecasts and simulations, and create high quality tables and graphs.

Below is a description of the steps followed to perform the Chow test on EViews:

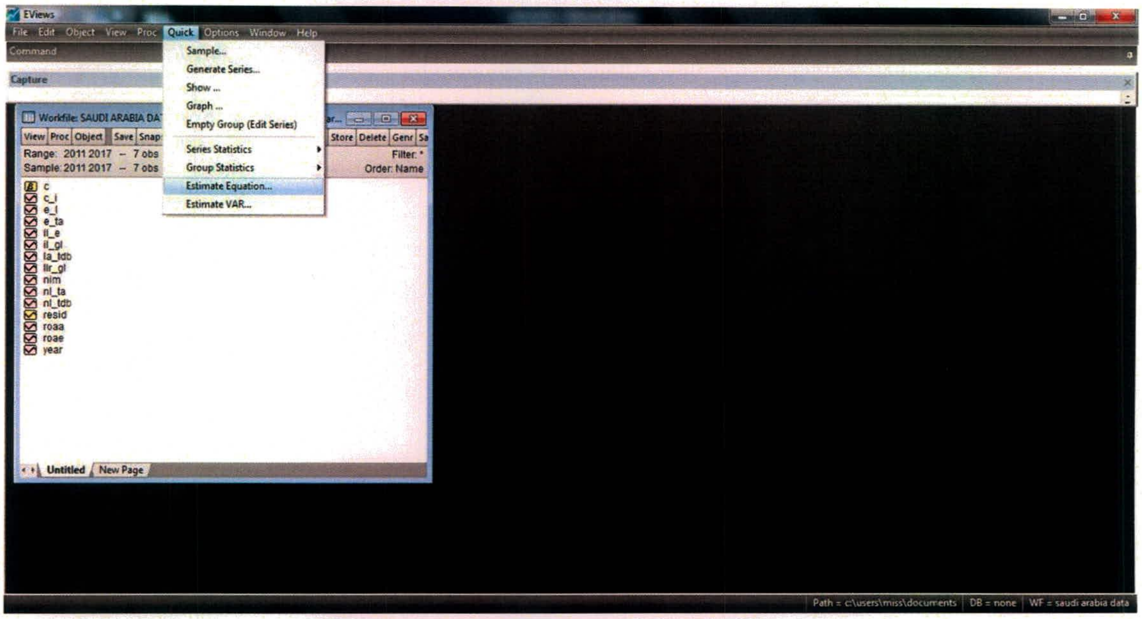
Step 1: Create an EViews workfile (IHS, 2017). This can be done through opening and reading data from a foreign data source by clicking **File/Open/Foreign Data as Workfile**. EViews will automatically analyze the data source, create a workfile, and import the data (financial ratios).

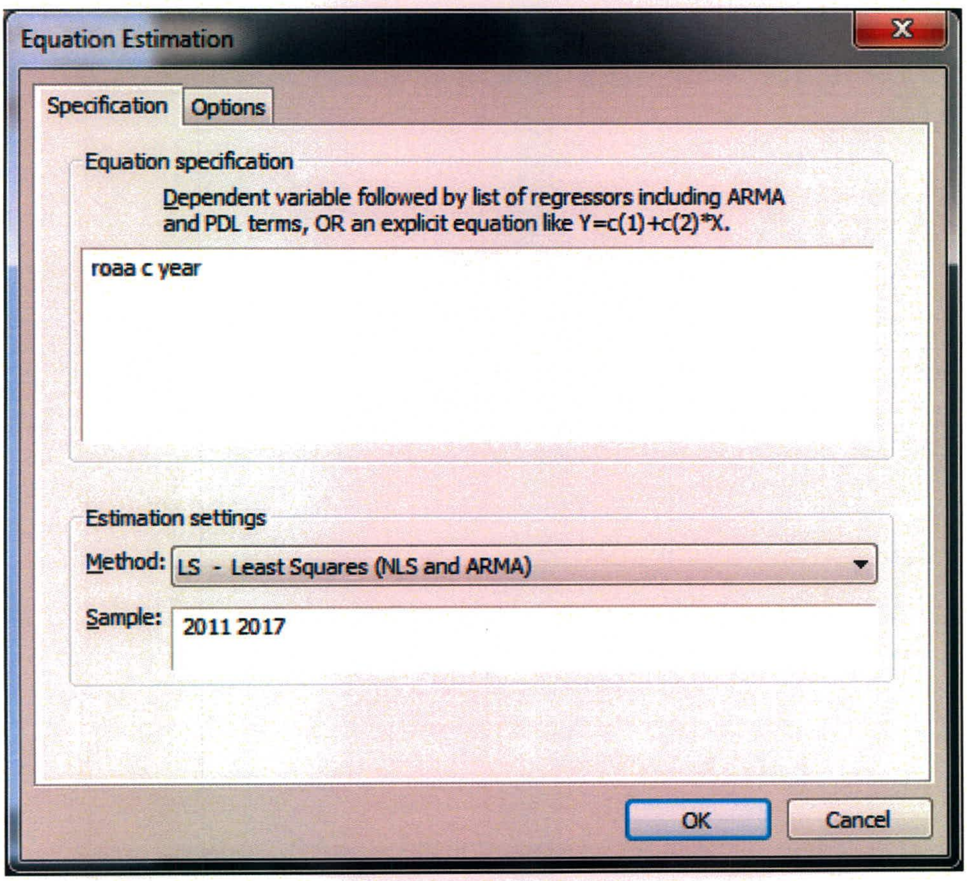


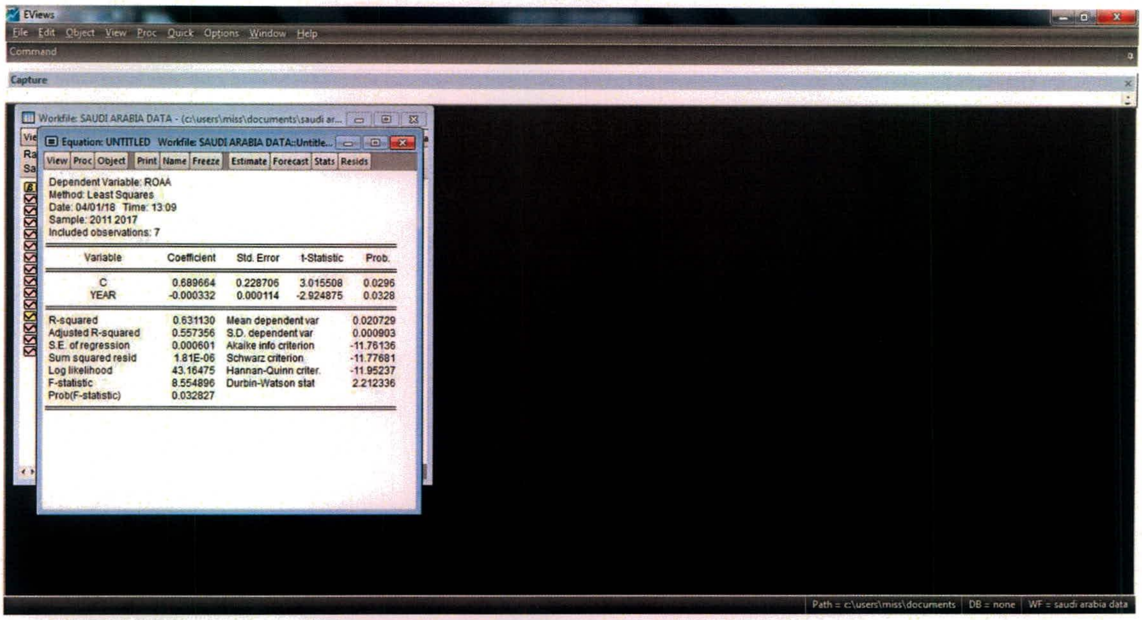


Step 2: Estimate a regression model for each ratio being the dependent variable (IHS, 2017). This can be done by selecting **Quick/Estimate Equation** and thus opening the

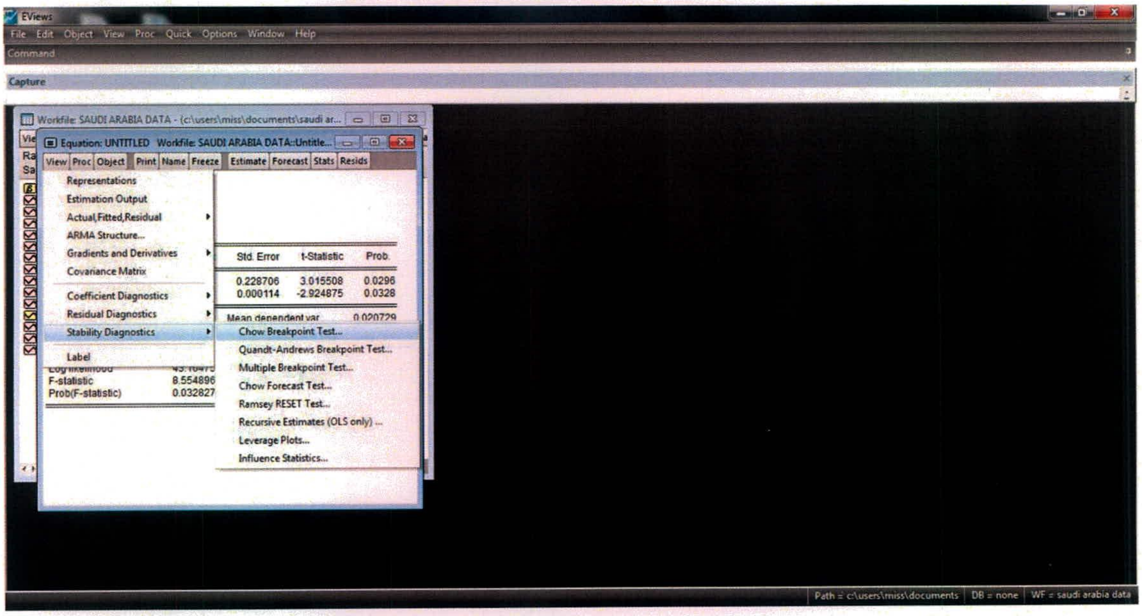
estimation dialog to which the dependent variable (ratio) is entered, followed by the independent variables (the constant and the year), separated by spaces.

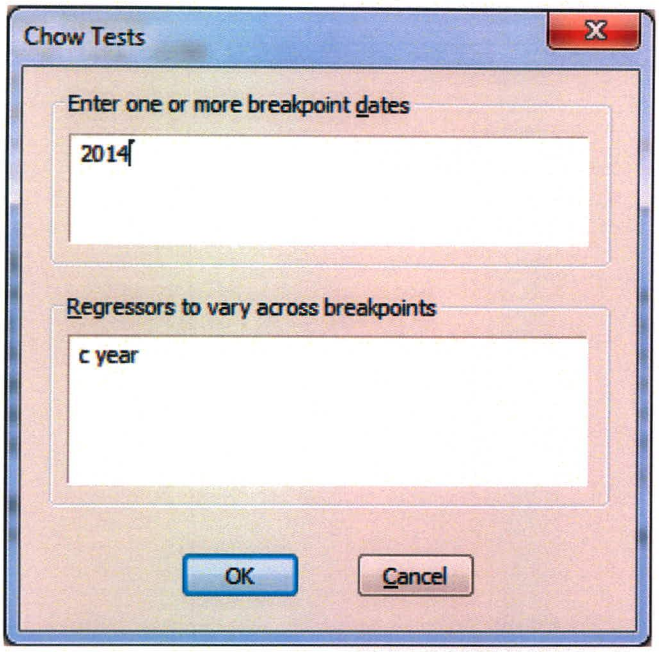




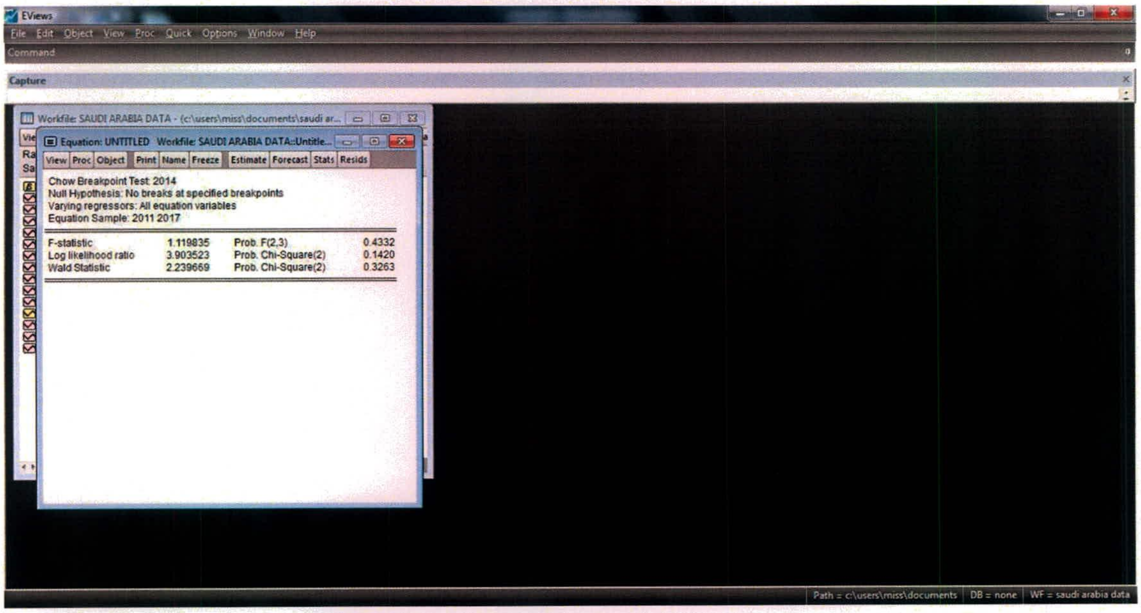


Step 3: Perform the Chow test for each ratio by pushing **View/Stability Diagnostics/Chow Breakpoint Test** on the corresponding equation toolbar (IHS, 2017). In the dialog that appears, enter the assumed breakpoint date. In our study, we enter 2014 thus splitting the whole sample period into two sub-periods where the first one extends from 2011 to 2013 and the second extends from 2014 to 2017.





Step 4: The Chow test results for each ratio will be presented in a table displaying the F-test statistic and the exact P-value among other values (IHS, 2017). In our study, the test results will be analyzed by comparing the obtained P-value with the 10% chosen significance level (α) based on the conceptual framework presented in Step 9 in the previous part.



3.4 Selected Variables

a. Selection of Ratios

Recall that the purpose of our study is to determine the impact of the recent oil price decline on the overall performance of the GCC banking system by applying the Chow test. This, however, urges the need to select a broad range of financial ratios representative of the various aspects of the GCC banks. The ratios are selected from divergent categories and are tested individually for any trend change in their performance which will make it possible, at later stages, to determine what bank ratios/aspects have been affected negatively in response to the recent oil price decline and what ratios/aspects have proven to be robust.

The divergent categories to which the selected ratios belong are as follows:

- Profitability Ratios
- Liquidity Ratios
- Credit Quality Ratios
- Capitalization Ratios

These ratio categories together reflect the overall performance of a banking system. Profitability ratios represent a well-known class of financial metrics used to assess a bank's ability to generate earnings; the ratios allow analysts to measure how efficient a bank is in utilizing its assets and equity along with running its operations. However, liquidity ratios are used to assess a bank's ability to meet its debt obligations and thus assess its margin of safety not to fall illiquid; they generally focus on the amount of liquid assets held by a bank. On the other hand, credit quality ratios are self-explanatory; they intend to assess the quality of a bank's credit portfolio through analyzing its non-performing loans which could affect the bank's earnings and capital. Finally, capitalization ratios provide information about the cushion provided by a bank to absorb potential losses and thus protect depositors' funds.

The ratios selected from each of the above categories are presented in the following table to be discussed later:

Profitability Ratios		
Ratio Name	**Symbol**	**Equation**
Return on Average Assets	ROAA	Return on Average Assets = Net Income/Average Total Assets
Return on Average Equity	ROAE	Return on Average Equity = Net Income/Average Total Equity
Cost to Income Ratio	C_I	Cost to Income Ratio = Non-Interest Operating Expense/(Net Interest Income + Non-Interest Operating Income)
Net Interest Margin	NIM	Net Interest Margin = Net Interest Income/Average Earning Assets
Liquidity Ratios		
Ratio Name	**Symbol**	**Equation**
Liquid Assets to Total Deposits and Borrowing	LA_TDB	Liquid Assets to Total Deposits and Borrowing = Liquid Assets/Total Deposits and Borrowing
Net Loans to Total Assets	NL_TA	Net Loans to Total Assets = Net Loans/Total Assets
Net Loans to Total Deposits and Borrowing	NL_TDB	Net Loans to Total Deposits and Borrowing = Net Loans/Total Deposits and Borrowing
Credit Quality Ratios		
Ratio Name	**Symbol**	**Equation**
Loan Loss Reserves to Gross Loans	LLR_GL	Loan Loss Reserves to Gross Loans = Loan Loss Reserves/(Net Loans + Loan Loss Reserves)
Impaired Loans to Gross Loans	IL_GL	Impaired Loans to Gross Loans = Impaired Loans/(Net Loans + Loan Loss Reserves)
Impaired Loans to Equity	IL_E	Impaired Loans to Equity = Impaired Loans/Total Equity
Capitalization Ratios		
Ratio Name	**Symbol**	**Equation**
Equity to Total Assets	E_TA	Equity to Total Assets = Total Equity/Total Assets
Equity to Liabilities	E_L	Equity to Liabilities = Total Equity/(Total Liabilities and Equity – Total Equity – Hybrid Capital – Subordinated Debt)

Table 1: Selected Ratios

The ratios are extracted from Orbis Bank Focus. Orbis Bank Focus (previously Bankscope) is a database of banks which offers a recognized and contemporary solution for researching and comparing banks worldwide (Orbis Bank Focus, 2018). The database currently contains detailed information on 43,000 banks. The information is sourced from Bureau van Dijk from a combination of regulatory sources, information providers, and annual reports.

The ratios are extracted for the selected sample GCC banks for the period extending from 2011 to 2017. This period covers two stages through which oil prices behaved differently as can be seen in Figure 2 below. Indeed, oil prices peaked for the first time after the global financial crisis in early 2011 and remained relatively stable until mid-2014. By mid-2014, however, oil prices fell sharply to reach their trough in early 2016 constituting the recent episode of oil price declines. This implies that the year 2014 represents a breaking point in oil price performance. Thus, conducting our study and performing the Chow test for each of the selected financial ratios will help indicate whether the year 2014 also represents a breaking point in GCC bank performance.

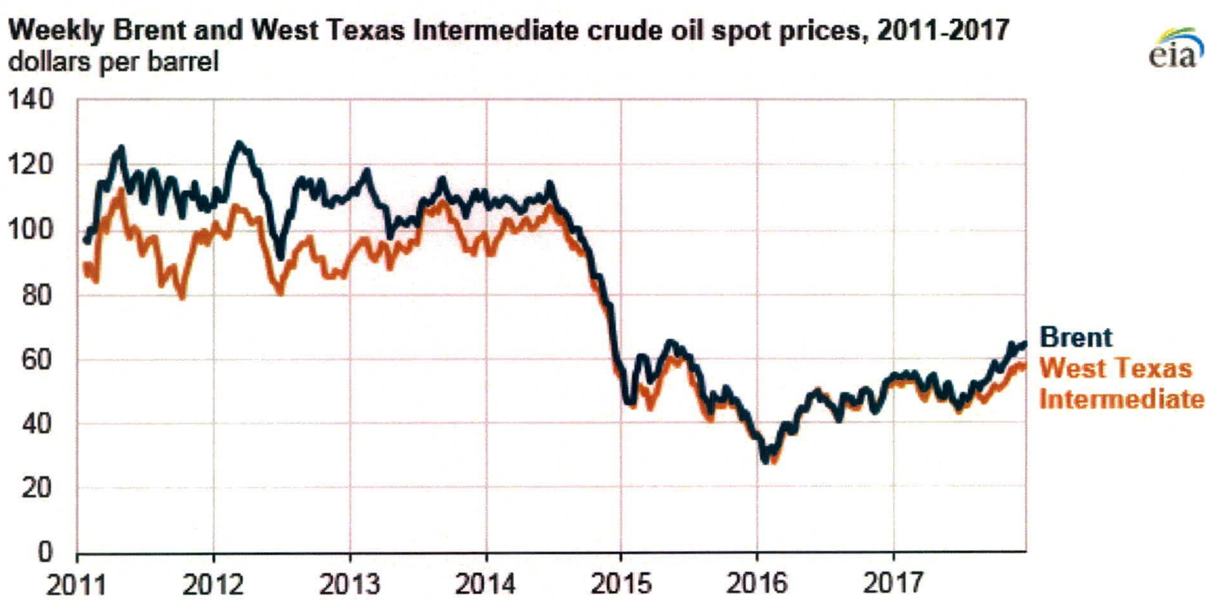


Figure 2: The Recent Oil Price Decline

<u>Source:</u> U.S. Energy Information Administration (EIA).

b. Ratio Definitions

Again, the Chow test will present results for each tested ratio so we can analyze them and assess the impact of the 2014 oil price shock on each ratio separately. To do so, it would be important to first comprehend the definition and interpretation of each financial ratio being tested. For this, the next will present each of the selected ratios along with a brief explanation:

- Return on Average Assets (ROAA):

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

Return on Average Assets has been widely used as an indicator of bank performance. As its equation explains, the ratio measures how efficient a bank is in managing its total assets to generate profits (Fitch, 2009). *ROAA* represents the number of cents earned on each dollar invested by a bank in total assets, where total assets are averaged over the term of a financial year by dividing the sum of the beginning and ending-year values by two (Popovici, 2014). The higher this ratio is, the more efficient and profitable a bank is.

- Return on Average Equity (ROAE):

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

Another common indicator used to analyze bank performance is the *Return on Average Equity*. The indicator is an adjusted version of the *Return on Equity (ROE)* as it provides a more accurate figure of a bank's profitability especially in years during which the value of shareholders' equity changes significantly (Popovici, 2014). *ROAE* is the amount of net income returned as a percentage of average shareholders' equity; the ratio is more useful to shareholders than *ROAA* because a bank's ability to earn a strong return on capital is an indicator of dividend capacity and stock price performance (Fitch, 2009). Thus, a higher *ROAE* which indicates higher profitability makes a bank more attractive for investors.

- Cost to Income Ratio (C_I):

$$\text{Cost to Income Ratio} = \frac{\text{Non} - \text{Interest Operating Expense}}{(\text{Net Interest Income} + \text{Non} - \text{Interest Operating Income})}$$

Cost to Income Ratio assesses the operational cost efficiency of a bank as it measures non-interest operating expense as a percentage of operating income; the ratio gives investors a clear idea about how efficiently a bank is being run and thus how profitable it will be (Hussain, 2014).

Below is a breakdown of each of the items which make up this ratio (Fitch, 2009):

Non-Interest Operating Expense includes personnel expenses (wages and salaries, social security costs, and pension expenses) and other operating expenses (depreciation, operating lease rentals, and other administrative expenses).

Net Interest Income is the total interest income received by a bank on its loans and other earning assets such as advances to banks and trading securities less the total interest expense paid on total customer deposits (current, savings, and term)[6] and other interest-bearing liabilities such as deposits from banks, money market instruments, Federal funds purchased and other short-term funding, and bank capital notes and other long-term funding. The equation of the *Net Interest Income* is as follows:

$$\begin{aligned}&\text{Net Interest Income}\\&= (\text{Interest Income on Loans} + \text{Other Interest Income})\\&-(\text{Interest Expense on Total Customer Deposits} + \text{Other Interest Expense})\end{aligned}$$

Non-Interest Operating Income includes net income on trading and derivatives, net insurance income, net fees and commissions, and other operating income such as rental income or ongoing revenue from non-banking businesses.

- Net Interest Margin (NIM):

$$\text{Net Interest Margin} = \frac{\text{Net Interest Income}}{\text{Average Earning Assets}}$$

This profitability ratio expresses the net interest income of a bank as a percentage of its average earning assets; it reflects the bank's ability to manage its interest-earning activities (Fitch, 2009). Maintaining the same quantity and quality of average earning

[6] Current accounts are deposit accounts subject to unlimited withdrawal upon the demand of the account holder; savings accounts impose limitation on the frequency of cash withdrawals but provide higher interest than current accounts; term accounts have a determined maturity date (Fitch, 2009).

assets, achieving a higher margin indicates lower interest expense incurred on funding sources thus higher bank profitability.

- Liquid Assets to Total Deposits and Borrowing (LA_TDB):

$$Liquid\ Assets\ to\ Total\ Deposits\ and\ Borrowing = \frac{Liquid\ Assets}{Total\ Deposits\ and\ Borrowing}$$

This liquidity ratio measures the percentage of a bank's total deposits and borrowing that could be met with liquid assets, noting that *Liquid Assets* comprise trading assets and loans and advances having a maturity of less than three months (Fitch, 2009). A higher ratio indicates higher liquidity.

- Net Loans to Total Assets (NL_TA):

$$Net\ Loans\ to\ Total\ Assets = \frac{Net\ Loans}{Total\ Assets}$$

This ratio indicates the percentage share of net loans in total assets (Fitch, 2009). A lower percentage share indicates higher bank liquidity. *Net Loans* consist of *Gross (Total) Loans* (residential mortgage loans, consumer or retail loans, corporate and commercial loans, and other loans) less *Loan Loss Reserves*[7] (Fitch, 2009):

$$Net\ Loans = Gross\ (Total)\ Loans - Loan\ Loss\ Reserves$$

- Net Loans to Total Deposits and Borrowing (NL_TDB):

$$Net\ Loans\ to\ Total\ Deposits\ and\ Borrowing = \frac{Net\ Loans}{Total\ Deposits\ and\ Borrowing}$$

This ratio measures a bank's net loans as a percentage of its total deposits and borrowing (Fitch, 2009). It shows the proportion of total deposits and borrowing that is invested in net loans. A lower percentage indicates higher liquidity.

- Loan Loss Reserves to Gross Loans (LLR_GL):

$$Loan\ Loss\ Reserves\ to\ Gross\ Loans = \frac{Loan\ Loss\ Reserves}{(Net\ Loans + Loan\ Loss\ Reserves)}$$

[7] *Loan Loss Reserves* are reserves set aside by a bank to cover potential losses on impaired or non-performing loans, where impaired loans are doubtful loans on which full repayment is uncertain due to deterioration in the creditworthiness of borrowers (Fitch, 2009).

This credit quality ratio measures loan loss reserves as a percentage of gross loans (Fitch, 2009). The ratio represents the proportion of total loans that has been provided for with reserves. A lower ratio indicates better credit portfolio quality.

- Impaired Loans to Gross Loans (IL_GL):

$$Impaired\ Loans\ to\ Gross\ Loans = \frac{Impaired\ Loans}{(Net\ Loans + Loan\ Loss\ Reserves)}$$

This ratio indicates the percentage share of impaired loans in gross loans (Fitch, 2009). The ratio measures the quality of a bank's loans and thus the soundness of its credit portfolio. A higher ratio implies deterioration in the credit portfolio quality which has a negative effect on bank profitability.

- Impaired Loans to Equity (IL_E):

$$Impaired\ Loans\ to\ Equity = \frac{Impaired\ Loans}{Total\ Equity}$$

This ratio measures impaired loans as a percentage of a bank's total equity (Fitch, 2009). It presents the riskiness of a bank's credit portfolio relative to its equity. A lower ratio implies better credit quality.

- Equity to Total Assets (E_TA):

$$Equity\ to\ Total\ Assets = \frac{Total\ Equity}{Total\ Assets}$$

This capitalization ratio measures total equity as a percentage of total assets (Fitch, 2009). It shows the proportion of total assets that is being financed by shareholders. The ratio reflects the cushion provided by a bank's equity against possible losses on its assets. A higher ratio indicates a better financial position.

- Equity to Liabilities (E_L):

$$Equity\ to\ Liabilities = \frac{Total\ Equity}{(Total\ Liabilities\ and\ Equity - Total\ Equity - Hybrid\ Capital - Subordinated\ Debt)}$$

This ratio measures a bank's total equity as a percentage of its total liabilities (Fitch, 2009). Where *Total Equity* mainly comprises common shares, *Hybrid Capital* includes financial instruments which have debt and equity characteristics such as preference shares. On the other hand, *Subordinated Debt* is a long-term debt used by banks to raise additional external funds; this debt is subordinated as it is of second priority to be repaid compared to deposit claims in the event of bank failure (Gup & Kolari, 2005).

3.5 Selection of the Sample

a. Selected Countries and Sample Banks

Recent studies investigate the impact of the recent oil price decline on major oil-exporting economies and banking sectors. In our study, however, we have chosen to investigate the GCC case. The GCC comprises six states namely Saudi Arabia, United Arab Emirates (UAE), Qatar, Kuwait, Oman, and Bahrain which are located in close proximity to each other in the Middle East with different sizes of territories and populations (Vohra, 2017). Indeed, a key similarity among these six states is that they are all rich in oil reserves and a significant part of their economy and gross domestic product (GDP) depends on their ability to export oil at competitive prices, where four of these states (Saudi Arabia, UAE, Qatar, and Kuwait) are full members of the Organization of the Petroleum Exporting Countries (OPEC).

To enhance our understanding about the GCC states' oil-based economies, it would be beneficial to go through the following tables and figures:

Country	**GDP (PPP)** ***(in billions of $)***	**World Rank**	**GCC Rank**	**GCC Percentage Share**
Saudi Arabia	1,789	16	1	52.89 %
UAE	691.9	33	2	20.45 %
Qatar	341.7	53	3	10.10 %
Kuwait	302.5	57	4	8.94 %
Oman	187.9	68	5	5.55 %
Bahrain	69.77	99	6	2.06 %
Total GCC	3,382.77	-	-	100 %

Table 2: GCC GDP (PPP) (2017)

Data Source: Central Intelligence Agency (CIA).

Table 2 lists the GCC states along with the size of their economies as measured by the estimated GDP (PPP) for the year 2017. GDP (PPP) is a country's gross domestic product at purchasing power parity (PPP) exchange rates; it is the sum value of all goods and services produced within the country in a given year valued at prices prevailing in the United States in the same year (The CIA World Factbook, 2018). As shown in the table above, Saudi Arabia, UAE, and Qatar comprise the three largest economies by GDP (PPP) in the GCC region and together compose 83.44 % of the total GCC GDP (PPP), noting that the Saudi economy ranks number 16 when compared to the world. Figure 3, however, shows the contribution of the six GCC states to the total GDP (PPP) of the GCC region in the year 2017.

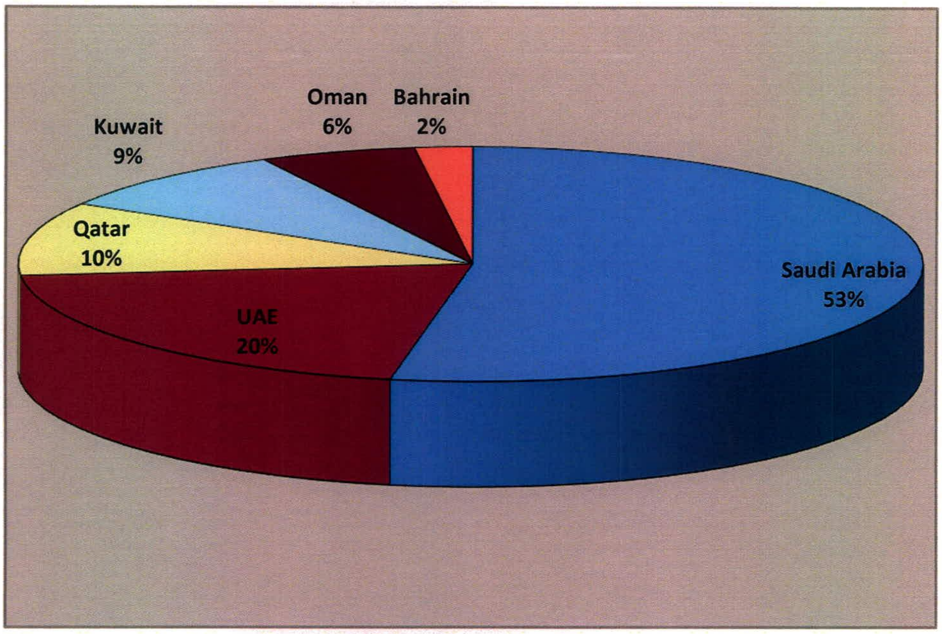


Figure 3: Contribution of the GCC States to the Total GCC GDP (PPP) (2017)

Data Source: Central Intelligence Agency (CIA).

Country	Crude Oil Production *(in million bbl/day)*	World Rank	GCC Rank	GCC Percentage Share
Saudi Arabia	10.46	2	1	54.85 %
UAE	3.106	8	2	16.29 %
Kuwait	2.924	9	3	15.33 %
Qatar	1.523	17	4	7.99 %
Oman	1.007	20	5	5.28 %
Bahrain	0.05	53	6	0.26 %
Total GCC	19.07	-	-	100 %

Table 3: GCC Crude Oil Production (2016)

Data Source: Central Intelligence Agency (CIA).

Table 3 lists the GCC states along with the level of their crude oil production as estimated for the year 2016. Crude oil production stands for the total amount of crude oil produced by a country for a given year, in barrels per day (bbl/day) (The CIA World Factbook, 2018). It is clear from the table above that the GCC region contributes to a major share of the world crude oil production as three of its states (Saudi Arabia, UAE, and Kuwait) rank among the first ten crude oil producers in the world. When it comes to the GCC region, Saudi Arabia alone produces 54.85 % of the total GCC crude oil production. Figure 4 displays the level of crude oil produced by each of the six GCC states in the year 2016 along with their world rank.

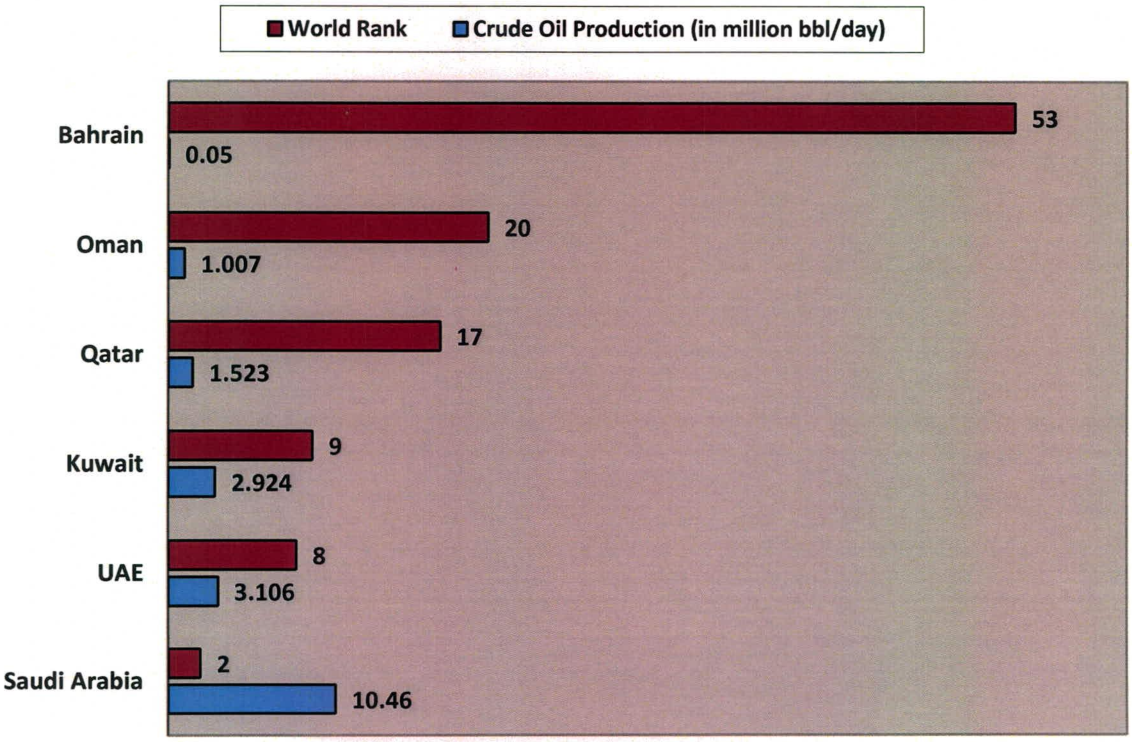


Figure 4: Crude Oil Production by the GCC States and their World Rank (2016)

Data Source: Central Intelligence Agency (CIA).

Country	**Crude Oil Exports *(in million bbl/day)***	**World Rank**	**GCC Rank**	**GCC Percentage Share**
Saudi Arabia	7.273	1	1	53.42 %
UAE	2.684	4	2	19.72 %
Kuwait	1.656	9	3	12.16 %
Qatar	1.255	14	4	9.22 %
Oman	0.7458	17	5	5.48 %
Bahrain	0	91	6	0 %
Total GCC	13.6138	-	-	100 %

Table 4: GCC Crude Oil Exports (2014)

Data Source: Central Intelligence Agency (CIA).

Table 4 lists the GCC states along with the level of their crude oil exports as estimated for the year 2014. Crude oil exports refer to the total amount of crude oil exported by a country for a given year, in barrels per day (bbl/day) (The CIA World Factbook, 2018). The table above highlights the global role played by the GCC region when it comes to exporting crude oil as the four largest GCC economies (Saudi Arabia, UAE, Qatar, and Kuwait) occupy high world ranks with Saudi Arabia ranking number 1 and exporting 53.42 % of the total GCC crude oil exports. Figure 5 below schematizes the total amount of crude oil exported by each GCC state in the year 2014.

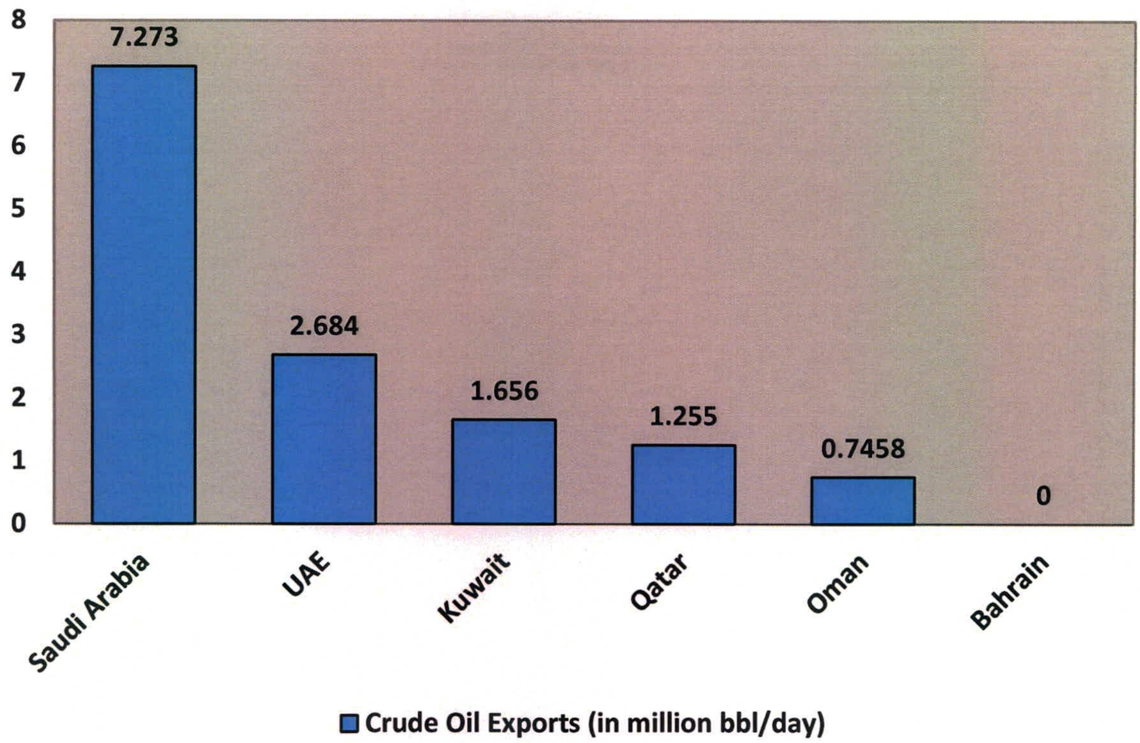


Figure 5: Crude Oil Exports by the GCC States (2014)

Data Source: Central Intelligence Agency (CIA).

Country	Crude Oil Proved Reserves *(in billion bbl)*	World Rank	GCC Rank	GCC Percentage Share
Saudi Arabia	266.5	2	1	53.67 %
Kuwait	101.5	6	2	20.44 %
UAE	97.8	7	3	19.70 %
Qatar	25.24	14	4	5.08 %
Oman	5.373	23	5	1.08 %
Bahrain	0.1246	70	6	0.03 %
Total GCC	496.5376	-	-	100 %

Table 5: GCC Crude Oil Proved Reserves (as of 1 January 2017)

Data Source: Central Intelligence Agency (CIA).

Table 5 lists the GCC states along with the level of their crude oil proved reserves estimated as of 1 January 2017. Crude oil proved reserves represent the stock of proved reserves of crude oil possessed by a country as of a specific date, in barrels (bbl) (The CIA World Factbook, 2018). The table above shows that Saudi Arabia, Kuwait, and UAE rank among the first ten countries in the world when it comes to possessed crude oil proved reserves. At the GCC level, Saudi Arabia alone possesses 53.67 % of the total GCC crude oil proved reserves. Figure 6 represents the distribution of the GCC crude oil proved reserves across the region's six states as of 1 January 2017.

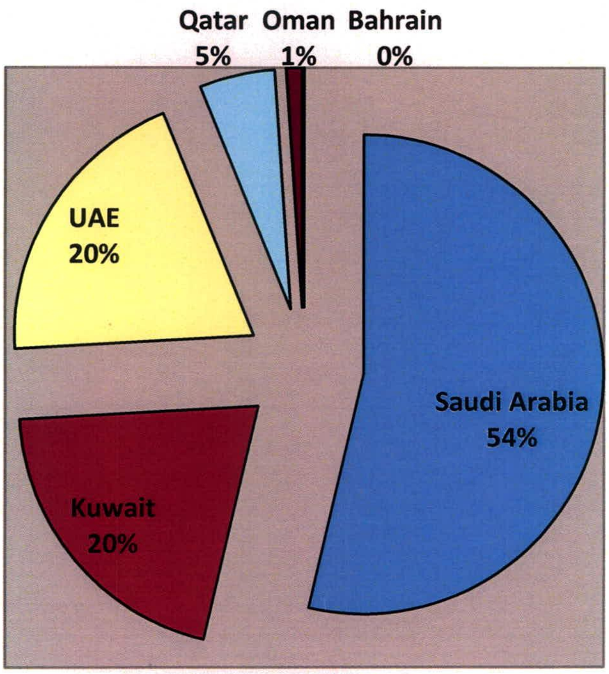


Figure 6: Distribution of the GCC Crude Oil Proved Reserves (as of 1 January 2017)

Data Source: Central Intelligence Agency (CIA).

Tying all together, we can recognize how much oil is vital to the GCC economies. However, concerning our study, we have selected Saudi Arabia, UAE, and Qatar to be representative of the GCC region. Indeed, these three countries represent the three largest economies in the GCC and together compose 83.44 % of the total GCC GDP (PPP). Besides, they constitute 79.13 % of the total GCC crude oil production, export

82.36 % of the total GCC crude oil exports, and possess 78.45 % of the total GCC crude oil proved reserves (see Tables 2, 3, and 4 above). As we have selected the Saudi, UAE, and Qatar economies to be representative of the six GCC economies, the Saudi, UAE, and Qatar banking sectors are selected to be representative of the GCC banking system. For comparison purposes, we will apply the Chow test for each selected banking sector separately.

For each country, we have selected the sample banks from the total population banks provided by Orbis Bank Focus database (see Table 6 below). The sample banks constitute all banks having available reported accounts for the whole sample period under study (2011-2017). However, the sample banks of each country are representative of its banking sector as they constitute its largest banks in terms of the size of their total assets, as per their latest reported accounts.

For Qatar, fourteen banks selected out of seventeen banks represent 88.95 % of the total assets of Qatar banking sector.

For UAE, thirty two banks selected out of forty four banks represent 98.58 % of the total assets of the UAE banking sector.

For Saudi Arabia, however, thirteen banks selected out of twenty one banks represent only 50.74 % of the total assets of the Saudi banking sector. This is because we have excluded the largest Saudi bank (Saudi Arabian Monetary Agency) when selecting the sample Saudi banks due to limited data availability. Indeed, the Saudi Arabian Monetary Agency presents no available reported accounts for the year 2017. Moreover, the bank presents no available reported data almost for all ratios over the whole sample period under study, noting that this bank alone constitutes 48.69 % of the total assets of the Saudi banking sector.

Country	Number of Total Population Banks	Number of Selected Sample Banks	Percentage Share of Total Assets
Qatar	17	14	88.95 %
UAE	44	32	98.58 %
Saudi Arabia	21	13	50.74 %

Table 6: Selected Sample GCC Banks

Data Source: Orbis Bank Focus.

b. Data Cleansing

After selecting the sample banks for each selected GCC banking sector, the sample data is exported from Orbis Bank Focus database as raw data. Preparing it for EViews, the data is cleansed through the following process so we get for each ratio an annual weighted average for each of the seven sample years under study (2011-2017):

Step 1: For each ratio, select the sample banks which present a value for this specific ratio.

Step 2: Compute the annual weighted average of the ratio. This is done using a weighted-average method based on the size of total assets of each sample bank presenting a value for this ratio. This method assigns the considered sample bank a weight which reflects its percentage share of total assets in total assets of the total sample banks and thus its impact on the overall performance of the country's banking sector.

The weighted-average method is illustrated through the following formula:

$$Weighted\ Average\ of\ Ratio\ y_{Year\ x} = \frac{\sum_{i=1}^{n}(TA_i \times Ratio\ y_i)}{\sum_{i=1}^{n} TA_i}$$

Where:

n = number of sample banks presenting a value for Ratio y in Year x

TA_i= Total Assets of Bank i in Year x

$\sum_{i=1}^{n} TA_i$= sum of Total Assets of all sample banks presenting a value for Ratio y in Year x

The annual weighted averages of each ratio for the selected sample GCC banks (Saudi banks, UAE banks, and Qatar banks) are presented in the following tables:

Year	Profitability Ratios				Liquidity Ratios			Credit Quality Ratios			Capitalization Ratios	
	ROAA	ROAE	C_I	NIM	LA_TDB	NL_TA	NL_TDB	LLR_GL	IL_GL	IL_E	E_TA	E_L
2011	2.12	15.14	37.19	3.09	16.52	55.05	63.27	3.36	2.75	11.10	14.72	17.87
2012	2.20	15.92	35.26	3.00	17.89	58.01	67.04	2.92	2.23	9.89	14.21	16.84
2013	2.15	15.84	35.34	2.93	12.98	59.67	69.08	2.12	1.47	6.64	14.07	16.61
2014	2.05	15.18	36.09	2.82	10.93	59.93	69.73	2.05	1.30	5.99	13.92	16.45
2015	2.03	14.73	36.43	2.75	9.97	62.32	73.74	1.96	1.30	5.94	14.55	17.25
2016	1.93	13.02	37.35	2.94	13.28	63.01	75.76	2.15	1.39	6.15	15.49	18.56
2017	2.03	13.04	35.95	3.20	15.86	61.72	73.19	2.32	1.35	5.42	16.13	19.43

Table 7: Calculated Weighted Ratios for the Sample Saudi Banks (%)

Data Source: Orbis Bank Focus.

Year	Profitability Ratios				Liquidity Ratios			Credit Quality Ratios			Capitalization Ratios	
	ROAA	ROAE	C_I	NIM	LA_TDB	NL_TA	NL_TDB	LLR_GL	IL_GL	IL_E	E_TA	E_L
2011	1.35	11.07	38.82	2.97	21.06	62.65	76.50	5.03	8.70	47.18	13.17	15.17
2012	1.51	11.38	36.90	3.00	22.66	61.35	74.68	5.26	8.15	44.01	13.83	16.22
2013	1.71	12.34	37.15	3.06	21.29	61.35	74.87	5.44	7.27	37.39	14.18	16.53
2014	1.91	14.09	33.56	2.76	21.09	60.93	73.74	5.07	5.49	26.71	13.06	15.09
2015	1.84	13.52	34.57	2.90	21.66	54.33	73.71	5.24	4.98	25.29	13.61	15.78
2016	1.51	10.54	34.41	2.56	26.45	52.44	62.64	5.28	4.91	25.17	13.28	17.79
2017	1.53	10.73	34.18	2.50	26.85	52.32	62.78	5.21	4.83	23.57	13.58	17.61

Table 8: Calculated Weighted Ratios for the Sample UAE Banks (%)

Data Source: Orbis Bank Focus.

Year	Profitability Ratios				Liquidity Ratios			Credit Quality Ratios			Capitalization Ratios	
	ROAA	ROAE	C_I	NIM	LA_TDB	NL_TA	NL_TDB	LLR_GL	IL_GL	IL_E	E_TA	E_L
2011	2.42	15.77	22.69	2.65	17.97	60.67	75.30	1.37	1.36	5.71	15.93	19.26
2012	2.39	15.81	25.25	2.70	15.83	63.33	77.65	1.45	1.51	6.44	15.30	18.33
2013	2.20	15.55	27.65	2.81	11.08	64.52	78.40	1.79	1.84	8.73	14.40	17.72
2014	2.10	15.62	29.37	2.70	14.30	65.91	79.01	1.82	1.77	8.88	13.57	16.56
2015	2.00	15.32	29.32	2.50	11.12	68.36	81.47	1.69	1.65	8.63	13.29	15.84
2016	1.67	14.21	34.26	2.61	13.97	68.74	80.73	1.99	2.06	11.61	12.18	14.17
2017	1.52	13.71	32.81	2.38	12.40	68.82	81.03	2.09	2.08	12.15	12.09	14.04

Table 9: Calculated Weighted Ratios for the Sample Qatar Banks (%)

Data Source: Orbis Bank Focus.

Step 3: Input the above cleansed data into EViews in order to perform the Chow test.

At this stage, the Chow test is performed for the sample banks of each selected GCC banking sector. The test results and findings are presented and discussed in the following chapter.

Chapter 4

Findings

4.1 Introduction

After cleansing the sample data in the preceding chapter, the data is inputted into EViews in order to perform the Chow test. Recall that the Chow test aims at detecting structural breaks and trend changes in the overall performance of the GCC banking system upon the occurrence of the 2014 oil price shock. As we have selected Saudi Arabia, UAE, and Qatar to be representative of the GCC region, the Chow test is performed for the sample banks of each selected GCC country separately. This allows for assessing the impact of the recent oil price decline on each of the three GCC banking sectors and thus investigating the individual response of each selected GCC country to such negative oil price shock as explained by the response of its banking sector. This chapter, however, presents the Chow test results for the sample Saudi, UAE, and Qatar banks and serves for a comparison of the different responses of the three GCC banking sectors at the different aspects of bank performance.

The chapter thus involves a presentation of the Chow test results and a discussion of the main findings of our study. First, we present the Chow test results for the sample Saudi, UAE, and Qatar banks in separate tables. This comes after recapitulating how the Chow test is performed and how the statistical decisions are reached. Second, we discuss the main findings of our study in a comparative framework for the purpose of comparing the impact of the recent oil price decline on bank profitability, liquidity, credit quality, and capitalization across the three GCC banking sectors. This comes after grouping the Chow test comparable results in one table in which each statistical decision is interpreted as to indicate whether a particular financial ratio corresponding to a particular GCC banking sector has experienced a structural break or has been continuous over time. Finally, we conclude the chapter.

4.2 Chow Test Results

The Chow test is efficiently performed on EViews statistical package. For each selected GCC country (Saudi Arabia, UAE, and Qatar), the test is performed for each financial ratio of the country's sample banks. This aims at testing for statistical differences in the performance of each bank ratio from the pre-shock period to the post-shock one. Testing for statistical differences is illustrated through testing the statistical hypotheses which have been stated earlier in the preceding chapter:

- H_0: Parameters are stable over the whole sample period.
- H_A: Parameters are not stable over the whole sample period.

For each tested ratio, EViews automatically computes the corresponding F-statistic and the exact P-value. These values are presented in Tables 10, 11, and 12 which correspond to the Chow test results for the sample Saudi, UAE, and Qatar banks, respectively. In addition to the Chow test results, each of the following tables presents the statistical decision reached for each ratio. The decision, however, is reached by comparing for each ratio the corresponding P-value to the 10% chosen significance level (α). When the P-value is less than 10%, we reject the null hypothesis that the parameters are stable over the whole sample period. On the contrary, when the P-value is greater than 10%, we do not reject the null hypothesis. However, rejecting the null hypothesis implies that the tested ratio has experienced a structural break upon the recent oil price decline. On the other hand, having no statistical evidence against H_0 implies that the tested ratio has been continuous over time and has not experienced any structural break by the year 2014.

Ratio Name	Acronym	F-statistic	P-value	Decision
Return on Average Assets	ROAA	1.119835	0.4332	Do not reject H_0
Return on Average Equity	ROAE	4.635481	0.1209	Do not reject H_0
Cost to Income Ratio	C_I	1.710479	0.3194	Do not reject H_0
Net Interest Margin	NIM	5.771636	0.0937	Reject H_0
Liquid Assets to Total Deposits and Borrowing	LA_TDB	4.648528	0.1205	Do not reject H_0
Net Loans to Total Assets	NL_TA	1.715471	0.3186	Do not reject H_0
Net Loans to Total Deposits and Borrowing	NL_TDB	0.531782	0.6343	Do not reject H_0
Loan Loss Reserves to Gross Loans	LLR_GL	27.27060	0.0119	Reject H_0
Impaired Loans to Gross Loans	IL_GL	78.92745	0.0025	Reject H_0
Impaired Loans to Equity	IL_E	10.90948	0.0420	Reject H_0
Equity to Total Assets	E_TA	72.49410	0.0029	Reject H_0
Equity to Liabilities	E_L	43.59621	0.0061	Reject H_0

Table 10: Chow Test Results for the Sample Saudi Banks

Ratio Name	Acronym	F-statistic	P-value	Decision
Return on Average Assets	ROAA	14.98904	0.0274	Reject H_0
Return on Average Equity	ROAE	8.397482	0.0590	Reject H_0
Cost to Income Ratio	C_I	6.570082	0.0801	Reject H_0
Net Interest Margin	NIM	1.501949	0.3532	Do not reject H_0
Liquid Assets to Total Deposits and Borrowing	LA_TDB	3.151341	0.1831	Do not reject H_0
Net Loans to Total Assets	NL_TA	0.897492	0.4949	Do not reject H_0
Net Loans to Total Deposits and Borrowing	NL_TDB	1.631053	0.3316	Do not reject H_0
Loan Loss Reserves to Gross Loans	LLR_GL	9.371233	0.0513	Reject H_0
Impaired Loans to Gross Loans	IL_GL	34.21035	0.0086	Reject H_0
Impaired Loans to Equity	IL_E	43.20213	0.0061	Reject H_0
Equity to Total Assets	E_TA	8.05280	0.0622	Reject H_0
Equity to Liabilities	E_L	4.587787	0.1223	Do not reject H_0

Table 11: Chow Test Results for the Sample UAE Banks

Ratio Name	Acronym	F-statistic	P-value	Decision
Return on Average Assets	ROAA	2.137324	0.2648	Do not reject H_0
Return on Average Equity	ROAE	9.088894	0.0533	Reject H_0
Cost to Income Ratio	C_I	0.280073	0.7735	Do not reject H_0
Net Interest Margin	NIM	2.704686	0.2131	Do not reject H_0
Liquid Assets to Total Deposits and Borrowing	LA_TDB	3.362396	0.1713	Do not reject H_0
Net Loans to Total Assets	NL_TA	1.427103	0.3668	Do not reject H_0
Net Loans to Total Deposits and Borrowing	NL_TDB	0.973015	0.4724	Do not reject H_0
Loan Loss Reserves to Gross Loans	LLR_GL	0.706332	0.5606	Do not reject H_0
Impaired Loans to Gross Loans	IL_GL	1.251975	0.4024	Do not reject H_0
Impaired Loans to Equity	IL_E	0.592859	0.6068	Do not reject H_0
Equity to Total Assets	E_TA	0.744233	0.5464	Do not reject H_0
Equity to Liabilities	E_L	0.187442	0.8381	Do not reject H_0

Table 12: Chow Test Results for the Sample Qatar Banks

4.3 Discussion of the Findings

After presenting the Chow test results for the sample Saudi, UAE, and Qatar banks along with the statistical decision reached for each tested ratio, the results are grouped in one table to allow for a comparison of the response of each bank ratio to the recent oil price decline across the three GCC banking sectors (see Table 13 below).

Profitability Ratios						
Acronym	Saudi Banks		UAE Banks		Qatar Banks	
	Decision	Interpretation	Decision	Interpretation	Decision	Interpretation
ROAA	Do not reject H_0	No structural break	Reject H_0	Structural break	Do not reject H_0	No structural break
ROAE	Do not reject H_0	No structural break	Reject H_0	Structural break	Reject H_0	Structural break
C_I	Do not reject H_0	No structural break	Reject H_0	Structural break	Do not reject H_0	No structural break
NIM	Reject H_0	Structural break	Do not reject H_0	No structural break	Do not reject H_0	No structural break
Liquidity Ratios						
Acronym	Saudi Banks		UAE Banks		Qatar Banks	
	Decision	Interpretation	Decision	Interpretation	Decision	Interpretation
LA_TDB	Do not reject H_0	No structural break	Do not reject H_0	No structural break	Do not reject H_0	No structural break
NL_TA	Do not reject H_0	No structural break	Do not reject H_0	No structural break	Do not reject H_0	No structural break
NL_TDB	Do not reject H_0	No structural break	Do not reject H_0	No structural break	Do not reject H_0	No structural break
Credit Quality Ratios						
Acronym	Saudi Banks		UAE Banks		Qatar Banks	
	Decision	Interpretation	Decision	Interpretation	Decision	Interpretation
LLR_GL	Reject H_0	Structural break	Reject H_0	Structural break	Do not reject H_0	No structural break
IL_GL	Reject H_0	Structural break	Reject H_0	Structural break	Do not reject H_0	No structural break
IL_E	Reject H_0	Structural break	Reject H_0	Structural break	Do not reject H_0	No structural break
Capitalization Ratios						
Acronym	Saudi Banks		UAE Banks		Qatar Banks	
	Decision	Interpretation	Decision	Interpretation	Decision	Interpretation
E_TA	Reject H_0	Structural break	Reject H_0	Structural break	Do not reject H_0	No structural break
E_L	Reject H_0	Structural break	Do not reject H_0	No structural break	Do not reject H_0	No structural break

Table 13: Chow Test Comparable Results for the Selected Sample GCC Banks

Table 13 summarizes the Chow test comparable results for the sample Saudi, UAE, and Qatar banks. As the table shows, the recent oil price decline has impacted the selected GCC banking sectors differently. On the profitability level, UAE banks have experienced a structural break in the performance of most of their profitability ratios. Concerning liquidity, the three GCC banking sectors reveal strong liquidity positions as neither liquidity ratio has experienced any structural break across the three GCC countries. On the other hand, both Saudi and UAE banks have been affected on the credit quality level as their credit quality ratios have experienced structural breaks and trend changes upon the 2014 oil price shock. Finally, capitalization ratios of Saudi banks and only one capitalization ratio of UAE banks have also experienced structural breaks.

The section now proceeds with a discussion of the main findings of the conducted study and analyzes the Chow test results across the three GCC banking sectors for the purpose of investigating which banking sectors have been impacted the most by the recent oil price decline and on what particular levels.

a. Impact on Bank Profitability

An objective of our thesis has been to assess the impact of the recent oil price decline on bank profitability in the GCC region. Recall that bank profitability has been measured by four profitability ratios (the Return on Average Assets, the Return on Average Equity, the Cost to Income Ratio, and the Net Interest Margin). As we have applied the Chow test for each profitability ratio across the three GCC banking sectors selected to be representative of the GCC banking system, the test results presented in Table 13 obviously reveal that the recent oil price decline has had different impacts on the different profitability ratios across the three GCC banking sectors.

For Saudi Arabia, the 2014 oil price shock has not exerted significant impacts on the country's banking sector at the profitability level. Indeed, neither ratio of the Return on Average Assets, the Return on Average Equity, and the Cost to Income Ratio has experienced any structural break upon this shock. This is illustrated through Figures 7, 8, and 9 which together show that the performance of these ratios does not reveal any change in its trend from the period preceding the shock to the period following it, indicating that Saudi banks have stood resilient against the shock without surviving any negative structural break on the profitability level. This observation, however, does not imply that the profitability of the Saudi banking sector was at its best performance in the past seven-year period. Figures 7, 8, and 9 clearly show that this profitability was in a continuous declining trend since 2012, i.e. two years before the 2014 oil price shock. Indeed, the ROAA and the ROAE decreased from their highs in 2012 to their lows in 2016 by 12.27 % and 18.22 % respectively, and the Cost to Income Ratio increased from its low in 2012 to its high in 2016 by 5.93 %. This means that the profitability of Saudi banks started to decline in 2012 and this decline deepened upon the oil price decline as profitability reached its lowest level in 2016, the year in which oil prices reached their trough over the whole sample period under study. However, profitability started to recover in 2017 as oil prices started to increase. On the other hand, the Net Interest Margin has experienced a structural break as its performance shows a significant trend change upon the shock (see Figure 10). Figure 10 shows that the NIM declined from 2011 to 2015 by 11.00 % after which a positive trend change is detected in the ratio's performance as it increased by 16.36 % reaching its highest level in 2017.

Regarding UAE banks, the situation is quite different. The Chow test results reveal that the recent oil price decline has significantly impacted the UAE banking sector at the profitability level. Indeed, structural breaks are detected for the Return on Average Assets, the Return on Average Equity, and the Cost to Income Ratio. This result is illustrated through Figures 7, 8, and 9 which together show that the performance of these ratios does reveal a significant change in its trend upon the 2014 oil price shock. As can be seen in Figures 7, 8, and 9, the above mentioned ratios were performing well before the shock which has caused a reverse performance once occurred. The ROAA and the ROAE had an inclining trend from 2011 to 2014 with growth rates of 41.48 % and 27.28 %, respectively; these ratios then declined by 20.94 % and 25.20 % and reached new lows by the year 2016 thus showing no resilience against the shock (negative structural breaks). Besides, the Cost to Income Ratio had a declining trend from 2011 to 2014 with a growth rate of – 13.55 % which indicates increasing bank efficiency during that period; this ratio inclined again by 3.01 % and reached a new high by the year 2015 in response to the oil shock (positive structural break for the ratio but negative implication on bank profitability). This implies that UAE banks' profitability reached its maximum levels over the whole sample period in year 2014 after which the situation turned around. However, the ROAA and the ROAE have experienced an improved performance by the year 2017 as oil prices started to recover, whereas the Cost to Income Ratio has improved earlier as it started to decrease by the year 2016. Conversely, the Net Interest Margin has not experienced any structural break as its performance shows no trend change upon the recent oil price decline (see Figure 10). Figure 10, however, indicates that this ratio had a general continuous declining trend since 2011 until it reached its lowest level by the year 2017 with a growth rate of – 15.82 %.

The recent oil price decline has not exerted significant impacts on Qatar banks' profitability. Indeed, the Chow test results reveal that no structural breaks are detected for the Return on Average Assets, the Cost to Income Ratio, and the Net Interest Margin. These results are illustrated through Figures 7, 9, and 10 which together show that neither performance of these ratios appears to have experienced any trend change by the year 2014. This implies that these ratios have been robust against the 2014 oil price shock. However, Qatar banks' profitability was in a continuous declining trend throughout the whole sample period. The ROAA decreased by 37.19 % from 2011 to 2017, indicating lower profitability. The Cost to Income Ratio increased by 51.00 % from 2011 to 2016, indicating lower bank efficiency. The Net Interest Margin, however, decreased from 2011 by 10.19 % reaching its minimum in 2017. On the contrary, the ROAE has experienced a structural break as its performance shows a significant trend change upon the shock (see Figure 8). Figure 8 clearly shows that the ROAE slightly declined by 0.95 % over the pre-shock period after which it had a steeper decline of 12.23 % until 2017, thus marking a negative structural break in response to the shock.

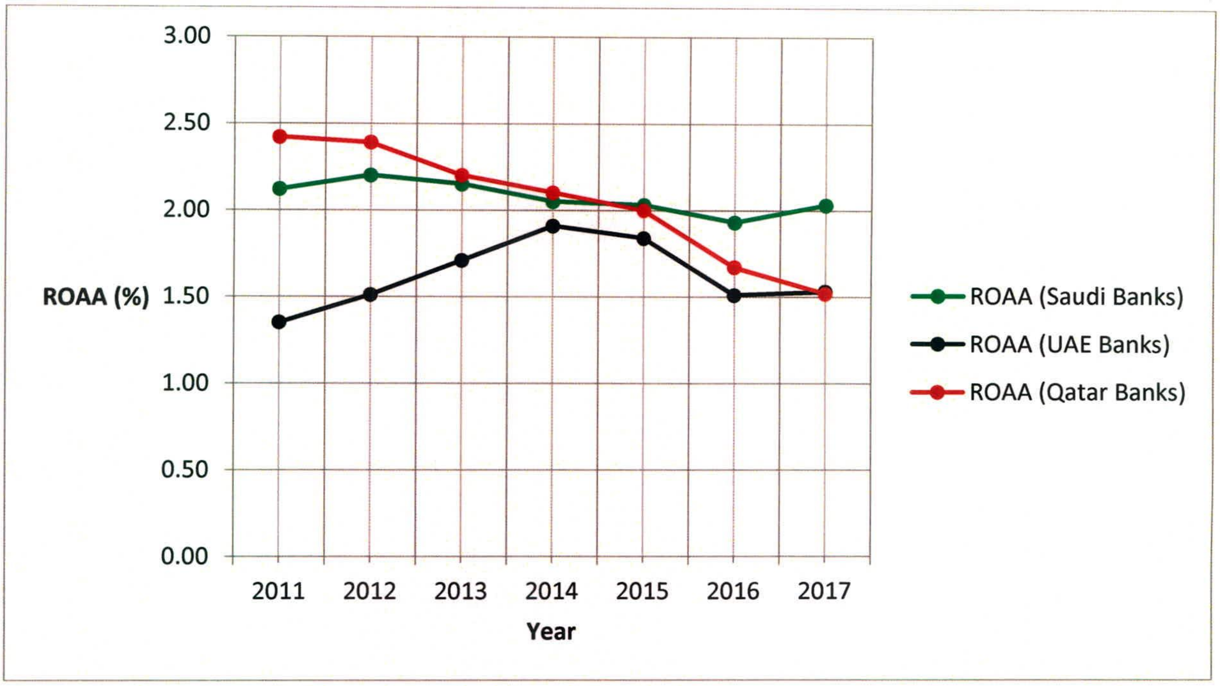


Figure 7: Trend of the Return on Average Assets for the Sample Saudi, UAE, and Qatar Banks

Data Source: Orbis Bank Focus.

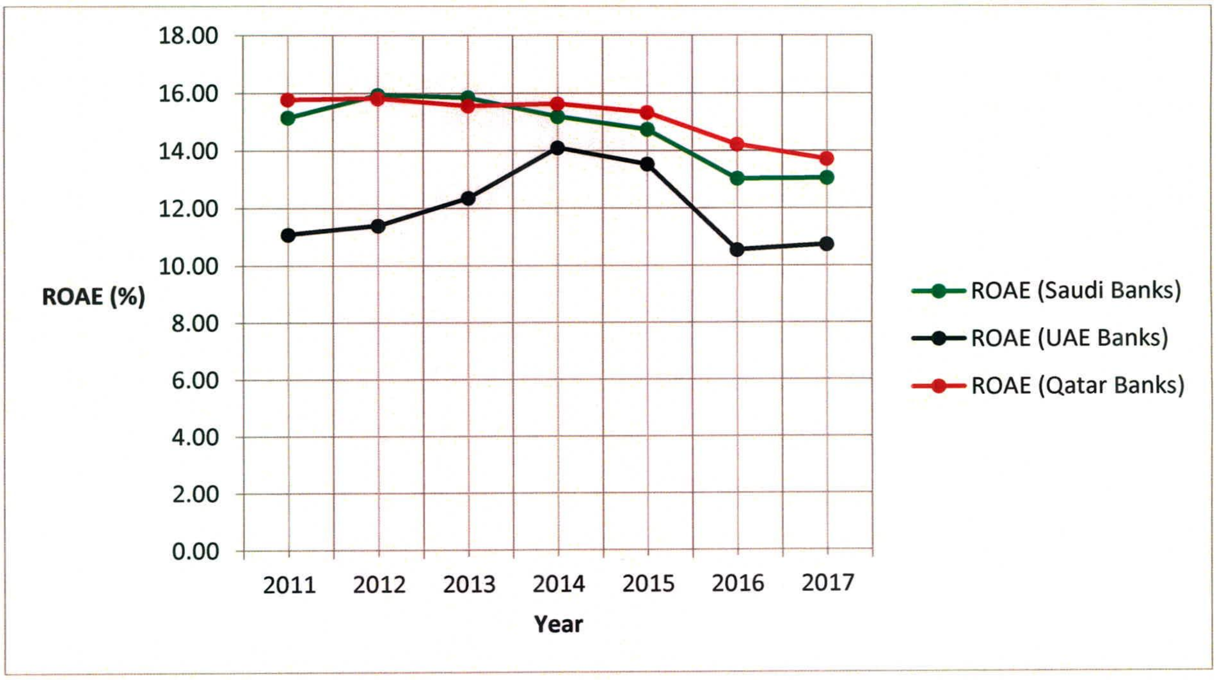


Figure 8: Trend of the Return on Average Equity for the Sample Saudi, UAE, and Qatar Banks

Data Source: Orbis Bank Focus.

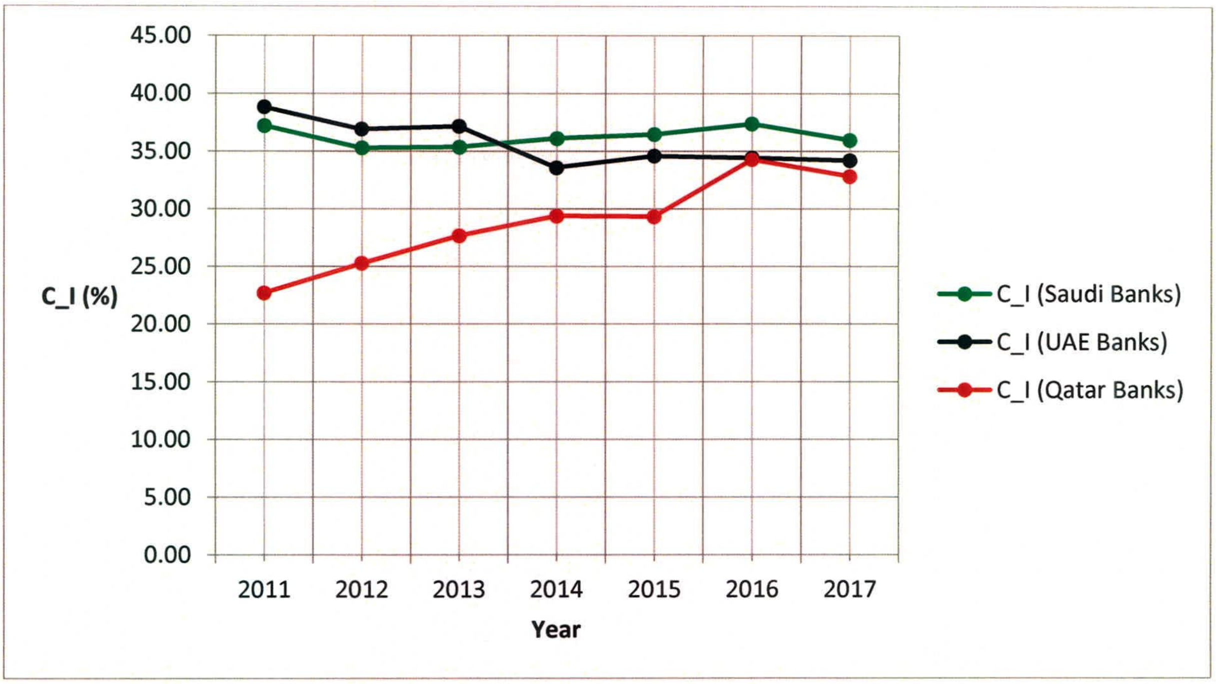


Figure 9: Trend of the Cost to Income Ratio for the Sample Saudi, UAE, and Qatar Banks

Data Source: Orbis Bank Focus.

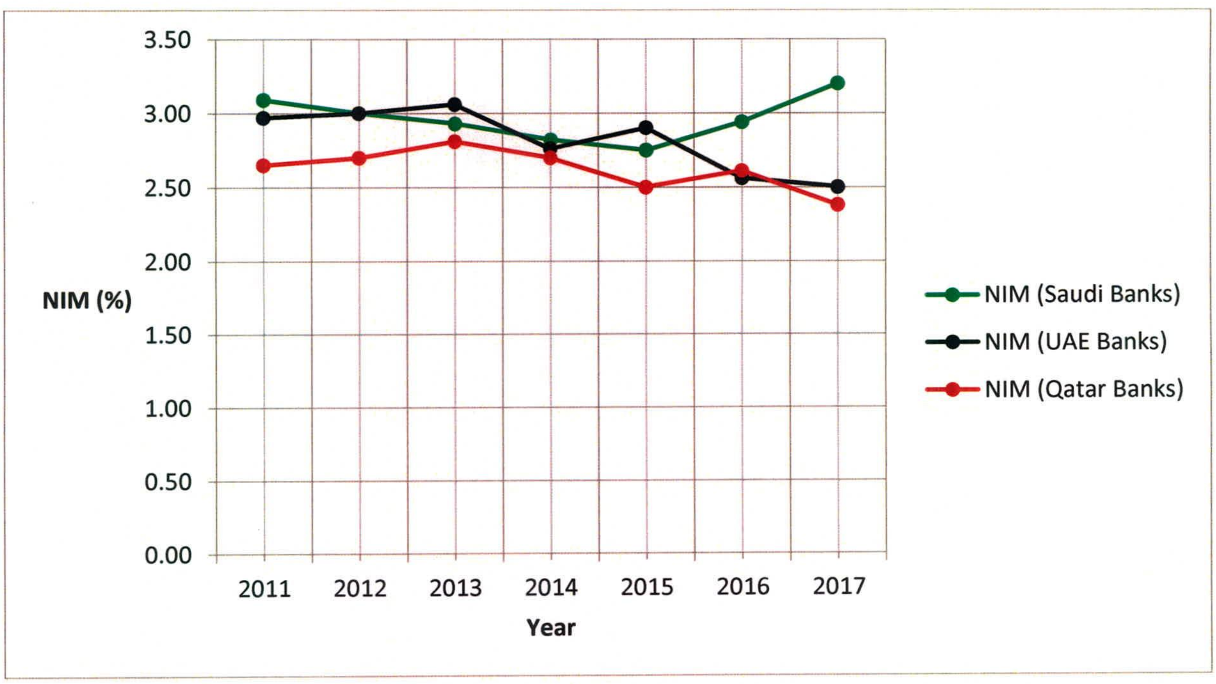


Figure 10: Trend of the Net Interest Margin for the Sample Saudi, UAE, and Qatar Banks

Data Source: Orbis Bank Focus.

b. Impact on Bank Liquidity

Another objective of our thesis has been to investigate the impact of the recent oil price decline on bank liquidity in the GCC region. We recall that bank liquidity has been measured by three liquidity ratios (Liquid Assets to Total Deposits and Borrowing, Net Loans to Total Assets, and Net Loans to Total Deposits and Borrowing). As we have performed the Chow test for each of these ratios across the selected GCC banking sectors, the test results presented in Table 13 clearly reveal that the recent oil price decline has had no significant impact on either liquidity ratio across the three GCC banking sectors.

The 2014 oil price shock thus has not affected the liquidity of the Saudi banking sector in a significant way. Indeed, neither ratio of Liquid Assets to Total Deposits and Borrowing, Net Loans to Total Assets, and Net Loans to Total Deposits and Borrowing has experienced any structural break upon this shock. This result is illustrated through Figures 11, 12, and 13 which together show that the performance of neither liquidity ratio does reveal any trend change by the year 2014. This indicates that Saudi banks have had strong liquidity positions which helped them absorb such negative oil price shock and stand resilient at the time against any possible negative structural break on the liquidity level. However, Saudi banks' liquidity was in a continuous declining trend since few years before the occurrence of the recent oil price decline. For instance, Liquid Assets to Total Deposits and Borrowing decreased by 44.27 % from 2012 to 2015 after which it started to recover (see Figure 11). Besides, Net Loans to Total Assets and Net Loans to Total Deposits and Borrowing increased respectively by 14.46 % and 19.74 % from their lows in 2011 to their highs in 2016 when oil prices reached their trough over the whole sample period (see Figures 12 and 13). This implies that the declining trend of bank liquidity in Saudi Arabia was continuous since 2011 and supported by the recent oil price decline as bank liquidity and oil prices coincidentally reached their lowest performance levels in year 2016.

For UAE, the recent oil price decline has had no significant impact on the country's banking sector at the liquidity level. Indeed, no structural breaks are detected for Liquid Assets to Total Deposits and Borrowing, Net Loans to Total Assets, and Net Loans to

Total Deposits and Borrowing. This is illustrated through Figures 11, 12, and 13 which together show that the performance of these ratios does not reveal any change in its trend from the period preceding the oil price decline to the period following it. This observation indicates that UAE banks have had strong liquidity buffers which helped them absorb the 2014 oil price shock and stand robust at the time against any possible negative structural break on the liquidity level. However, UAE banks' liquidity had a continuous inclining trend throughout the whole sample period under study. As can be seen in Figures 11, 12, and 13, Liquid Assets to Total Deposits and Borrowing increased by 27.49 % from its low in 2011 to its high in 2017, Net Loans to Total Assets decreased by 16.49 % from its high in 2011 to its low in 2017, and Net Loans to Total Deposits and Borrowing decreased by 18.12 % from its high in 2011 to its low in 2016. This implies that UAE banks' liquidity continued to increase even after the shock as its performance reached its maximum levels by years 2016 and 2017.

Regarding Qatar, the Chow test results reveal that the recent oil price decline has had no significant impact on the country's banking sector at the liquidity level. Indeed, no structural breaks are detected for Liquid Assets to Total Deposits and Borrowing, Net Loans to Total Assets, and Net Loans to Total Deposits and Borrowing. This result is illustrated through Figures 11, 12, and 13 which together show the absence of any trend change in the performance of these liquidity ratios by the year 2014. This observation implies that Qatar banks have been in strong liquidity positions which allowed them to survive the 2014 oil price shock without experiencing any negative structural break on the liquidity level. However, Qatar banks' liquidity had a continuous declining trend throughout the whole sample period under study. While Liquid Assets to Total Deposits and Borrowing showed unstable performance, Net Loans to Total Assets increased since 2011 and peaked in 2017 with a growth rate of 13.43 %, and Net Loans to Total Deposits and Borrowing increased since 2011 and peaked in 2015 with a growth rate of 8.19 %. This indicates decreased bank liquidity in Qatar especially in the years that followed the shock (see Figures 11, 12, and 13).

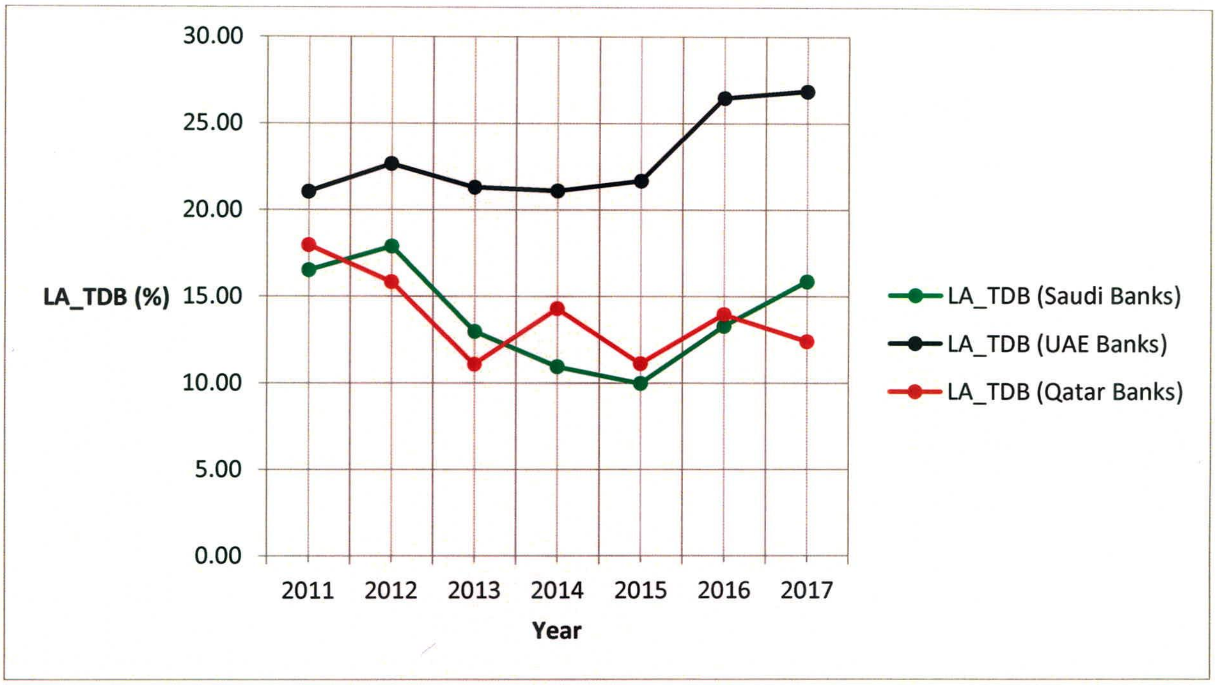


Figure 11: Trend of Liquid Assets to Total Deposits and Borrowing for the Sample Saudi, UAE, and Qatar Banks

Data Source: Orbis Bank Focus.

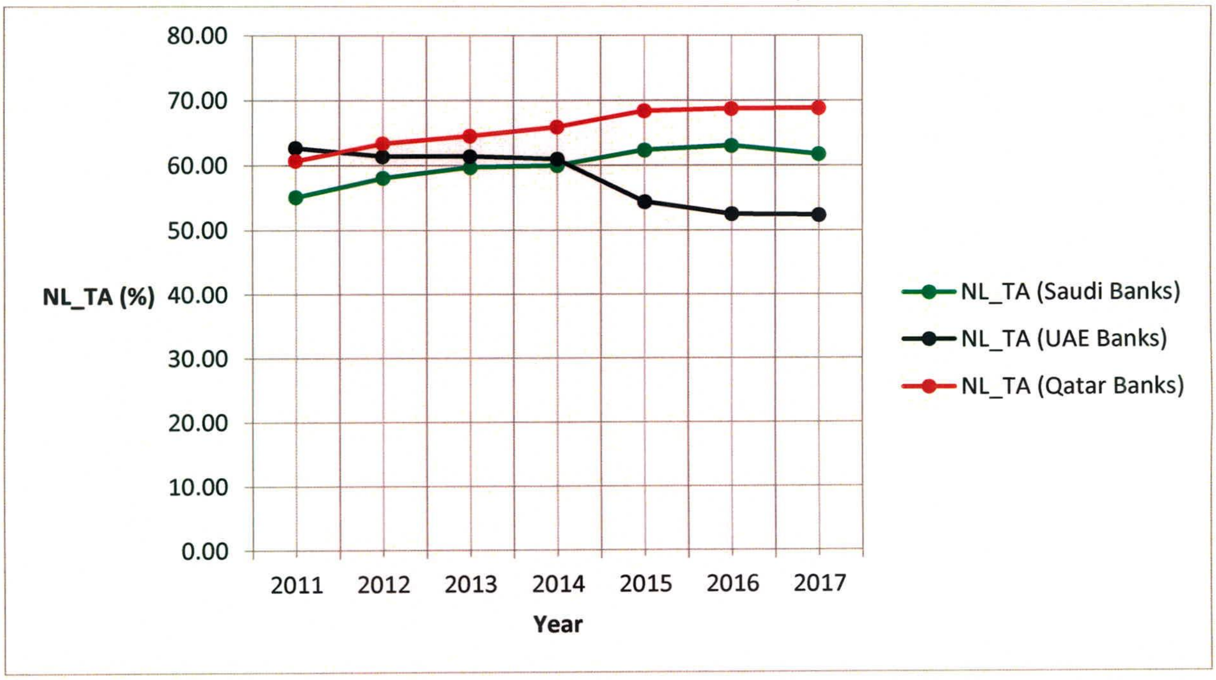


Figure 12: Trend of Net Loans to Total Assets for the Sample Saudi, UAE, and Qatar Banks

Data Source: Orbis Bank Focus.

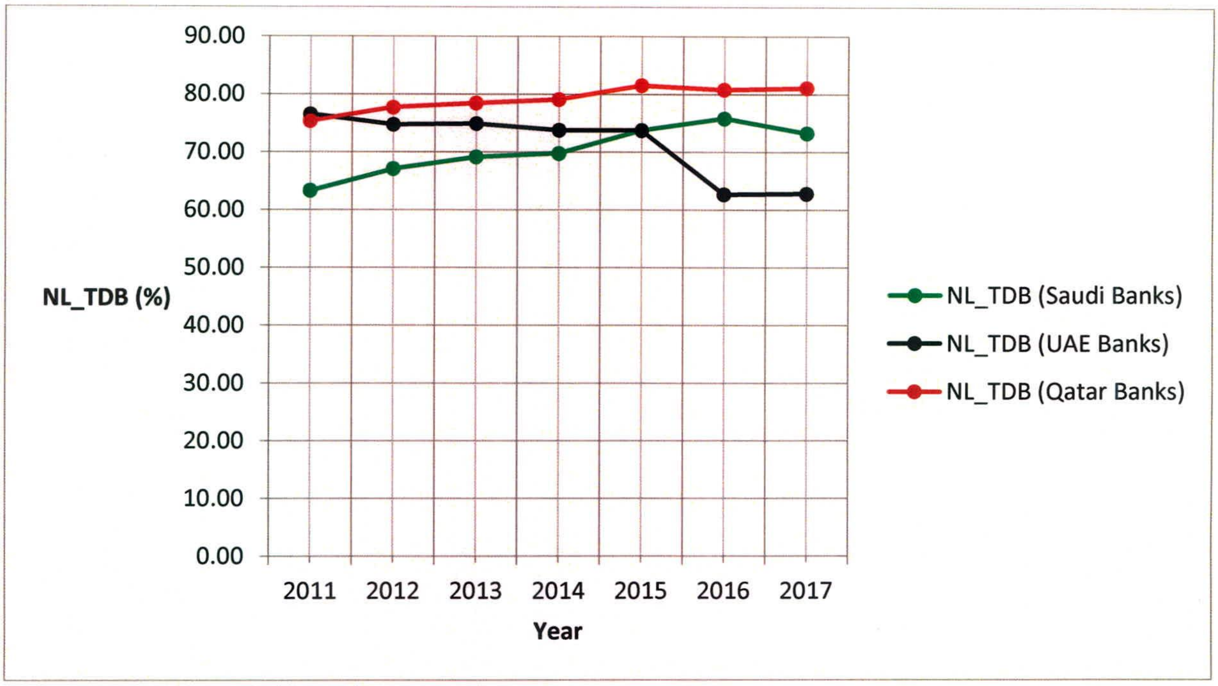


Figure 13: Trend of Net Loans to Total Deposits and Borrowing for the Sample Saudi, UAE, and Qatar Banks

Data Source: Orbis Bank Focus.

c. Impact on Bank Credit Quality

After investigating the impact of the recent oil price decline on bank profitability and liquidity in the GCC region, we now move on to investigate the impact on bank credit quality. For this purpose, we have employed three credit quality ratios (Loan Loss Reserves to Gross Loans, Impaired Loans to Gross Loans, and Impaired Loans to Equity). Applying the Chow test for each of these ratios across the selected GCC banking sectors allows us to deduce a significant impact exerted by the 2014 oil price shock on the three ratios across both the Saudi and the UAE banking sectors (see Table 13). Conversely, the test results reveal that neither credit quality ratio has been significantly impacted across Qatar banking sector.

Concerning Saudi Arabia, the recent oil price decline has significantly impacted the country's banking sector at the credit quality level. Indeed, structural breaks are detected for each of Loan Loss Reserves to Gross Loans, Impaired Loans to Gross Loans, and Impaired Loans to Equity. This result is illustrated through Figures 14, 15, and 16 which together show that the performance of these credit quality ratios does reveal a significant trend change upon the occurrence of the recent oil price decline. This implies that Saudi banks have not been resilient at the credit quality level. As can be seen in Figures 14, 15, and 16, the quality of Saudi banks' credit portfolios has experienced negative structural breaks upon the 2014 oil price shock. Loan Loss Reserves to Gross Loans decreased by 41.67 % from 2011 to 2015 after which this ratio increased until 2017 by 18.37 %. Besides, Impaired Loans to Gross Loans and Impaired Loans to Equity decreased from 2011 to 2015 by 52.73 % and 46.49 % after which these ratios significantly changed their trends and increased in 2016 by 6.92 % and 3.54 %, respectively. This, however, indicates some deterioration in Saudi banks' credit quality in response to the recent oil price decline particularly after the year 2015.

Not unlike Saudi banks, UAE banks have been significantly impacted by the recent oil price decline at the credit quality level. Each of Loan Loss Reserves to Gross Loans, Impaired Loans to Gross Loans, and Impaired Loans to Equity has experienced a structural break. This result is illustrated through Figures 14, 15, and 16 which together show a significant trend change in the performance of these ratios upon the year 2014. This implies that UAE banks' credit quality ratios have not been robust against the 2014 oil price shock. As can be seen in Figures 14, 15, and 16, UAE banks' credit quality has experienced a negative structural break upon this shock. Indeed, Loan Loss Reserves to Gross Loans decreased by 6.80 % from 2013 to 2014 after which this ratio reversed its performance and increased by 4.14 % until 2016, indicating some deterioration in credit quality upon the year 2014. On the other hand, and while Impaired Loans to Gross Loans and Impaired Loans to Equity decreased from their highs in 2011 to their lows in 2017 indicating a general improvement in credit quality, the performance of these ratios was not continuous over the whole sample period. Indeed, Impaired Loans to Gross Loans and Impaired Loans to Equity declined from 2011 to 2014 by 36.90 % and 43.39 % respectively. This performance was broken by the oil shock after which these two ratios show less steep declines of 12.02 % and 11.76 % thus a slowed improvement in UAE banks' credit quality in response to the shock.

For Qatar, the Chow test results reveal that the 2014 oil price shock has had no significant impact on the country's banking sector at the credit quality level. Indeed, neither credit quality ratio of Loan Loss Reserves to Gross Loans, Impaired Loans to Gross Loans, and Impaired Loans to Equity has experienced any structural break upon this shock. This is illustrated through Figures 14, 15, and 16 which together show that the performance of neither credit quality ratio does reveal any change in its trend by the year 2014. This observation indicates that Qatar banks have been resilient at the credit quality level and bank credit quality has not survived any negative structural break upon the oil shock. However, Qatar banks' credit quality had a continuous declining trend over the whole sample period under study. As can be seen in Figures 14, 15, and 16, Loan Loss Reserves to Gross Loans, Impaired Loans to Gross Loans, and Impaired Loans to Equity increased from their lows in 2011 to their highs in 2017 by 52.55 %, 52.94 %, and 112.78 %, respectively, thus indicating a declining credit quality over this period. Nevertheless, Qatar banks' credit quality reached its lowest performance levels in the years that followed the oil price decline, particularly in years 2016 and 2017.

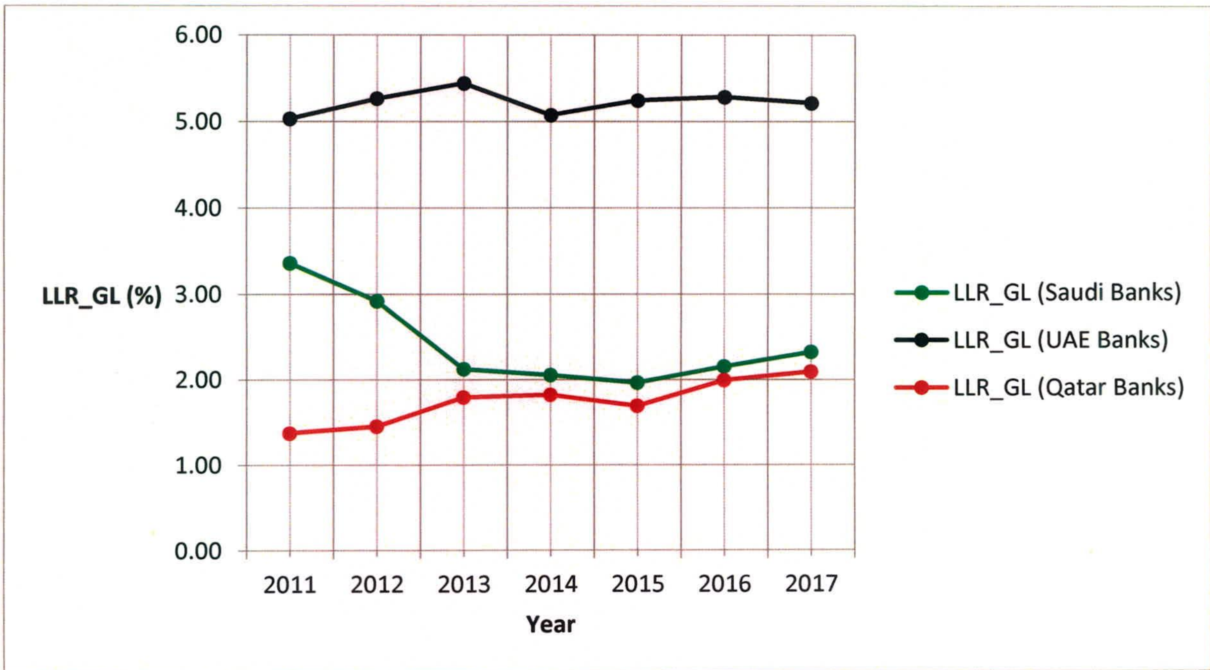


Figure 14: Trend of Loan Loss Reserves to Gross Loans for the Sample Saudi, UAE, and Qatar Banks

<u>Data Source:</u> Orbis Bank Focus.

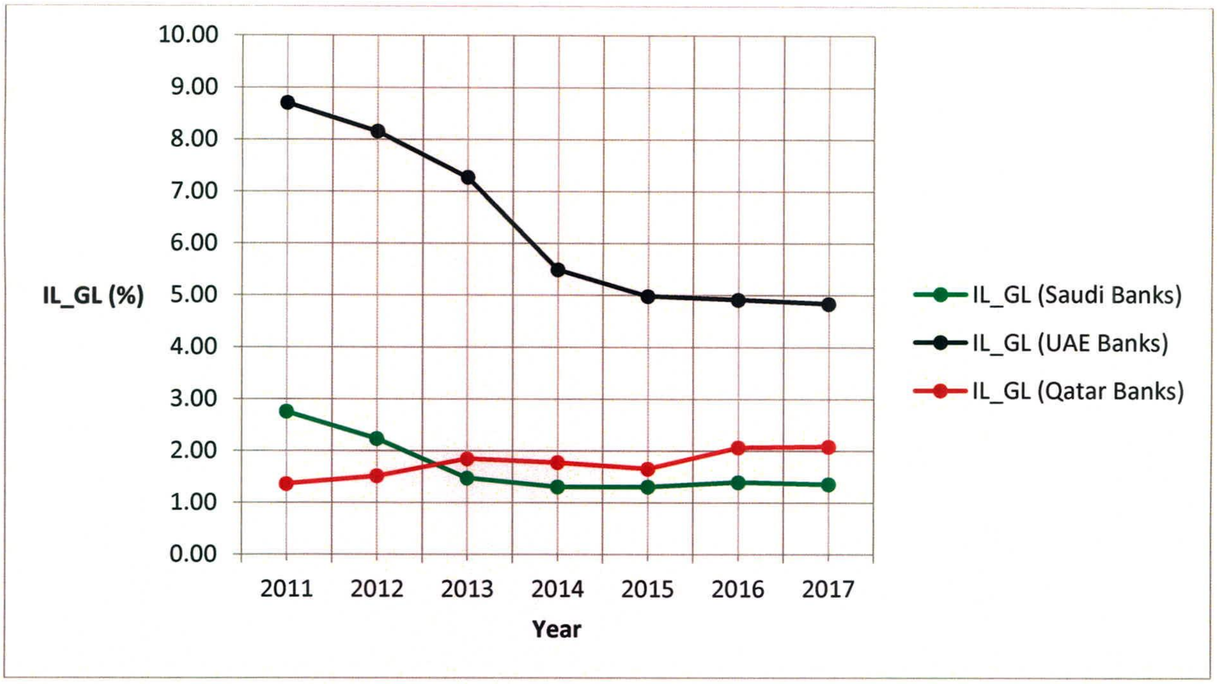


Figure 15: Trend of Impaired Loans to Gross Loans for the Sample Saudi, UAE, and Qatar Banks

Data Source: Orbis Bank Focus.

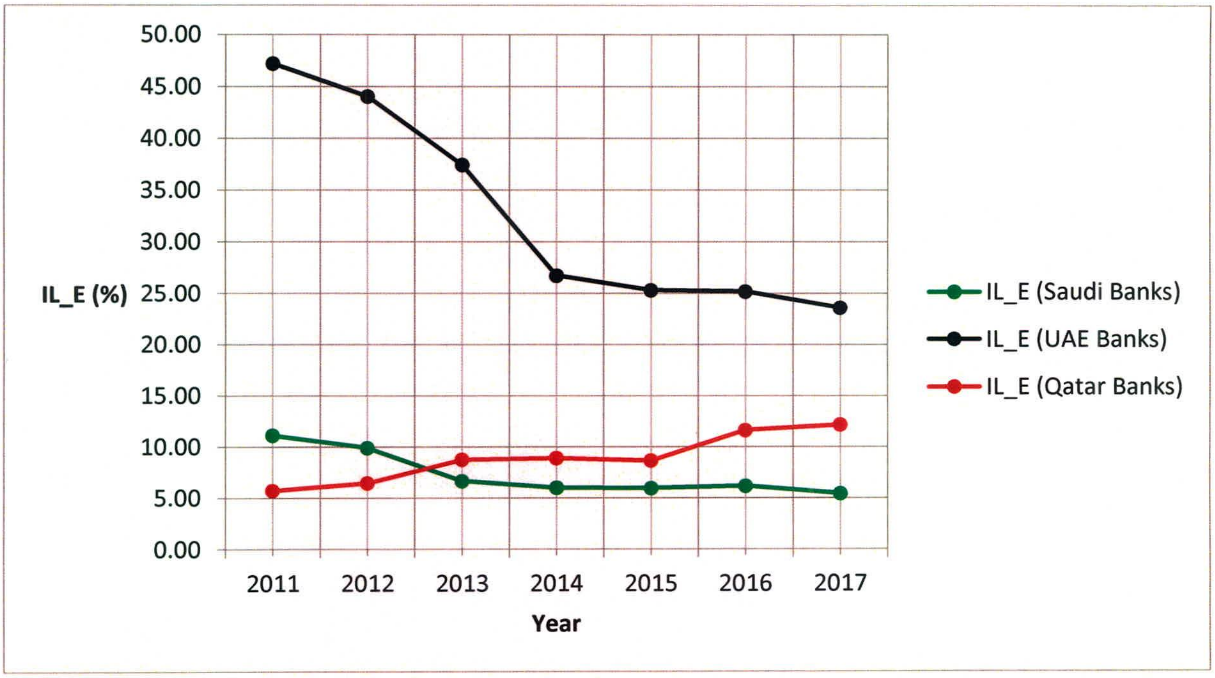


Figure 16: Trend of Impaired Loans to Equity for the Sample Saudi, UAE, and Qatar Banks

Data Source: Orbis Bank Focus.

d. Impact on Bank Capitalization

In order to assess the impact of the recent oil price decline on bank capitalization in the GCC region, we have employed two capitalization ratios (Equity to Total Assets and Equity to Liabilities). The Chow test results presented in Table 13 clearly reveal that the recent oil price decline has exerted significant impacts on both ratios across the Saudi banking sector and only on one ratio across the UAE banking sector. However, neither capitalization ratio has been significantly impacted across Qatar banking sector.

For Saudi Arabia, the 2014 oil price shock thus has significantly impacted the country's banking sector at the capitalization level. Structural breaks are detected for both Equity to Total Assets and Equity to Liabilities. This result is illustrated through Figures 17 and 18 which together show a significant trend change in the performance of these ratios upon the year 2014. Indeed, Saudi banks' capitalization ratios have experienced positive structural breaks indicating increased capitalization in response to the shock. As can be seen in Figures 17 and 18, Equity to Total Assets and Equity to Liabilities decreased by 5.43 % and 7.95 % respectively from their levels in 2011 to their lows in 2014 after which both ratios increased by 15.88 % and 18.12 % until 2017 when they reached their highs over the whole sample period.

Regarding UAE, the 2014 oil price shock has exerted different impacts on the two different capitalization ratios of the country's banking sector. A structural break is detected only for Equity to Total Assets. This is illustrated through Figure 17 which indicates a significant trend change in the performance of this ratio upon the shock. Conversely, no structural break is detected for Equity to Liabilities. This is illustrated through Figure 18 which shows no trend change in this ratio's performance upon the year 2014. Indeed, after reaching its minimum over the whole sample period in 2014, Equity to Total Assets reversed its performance and took an increasing trend over the post-shock period with a growth rate of 3.98 % compared to a growth rate of – 0.84 % over the pre-shock period, indicating a positive structural break in bank capitalization in response to the shock (see Figure 17). On the other hand, Equity to Liabilities had a general continuous inclining trend over the whole sample period with a growth rate of

16.08 % (see Figure 18). This indicates increased bank capitalization especially in the years that followed the oil shock.

For Qatar, the 2014 oil price shock has had no significant impact on the country's banking sector at the capitalization level. Neither ratio of Equity to Total Assets and Equity to Liabilities has experienced any structural break upon this shock. This result is illustrated through Figures 17 and 18 which together indicate the absence of any trend change in the performance of both capitalization ratios by the year 2014. This implies that Qatar banks have been resilient at the capitalization level and bank capitalization has been robust to absorb such shock without experiencing any negative structural break. However, Qatar banks' capitalization had a continuous declining trend over the whole sample period. As can be seen in Figures 17 and 18, both capitalization ratios decreased by 24.11 % and 27.10 % respectively from their highs in 2011 to their lows in 2017, indicating lower bank capitalization especially in the years that followed the oil shock.

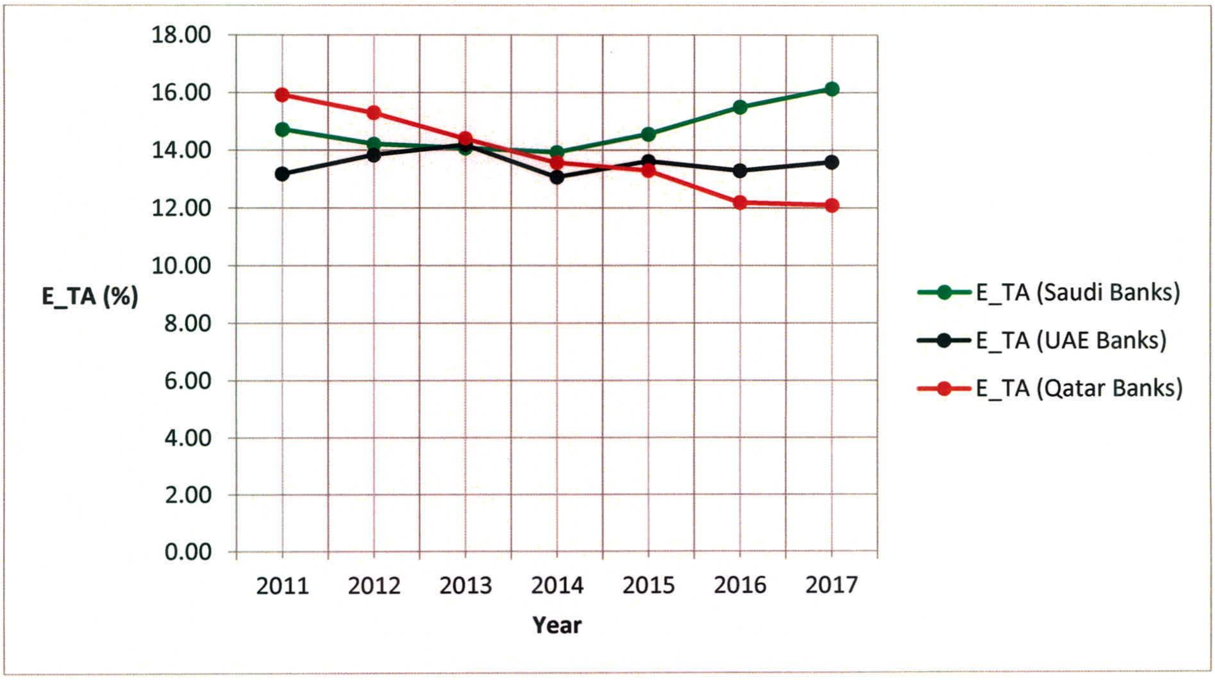


Figure 17: Trend of Equity to Total Assets for the Sample Saudi, UAE, and Qatar Banks

<u>Data Source:</u> Orbis Bank Focus.

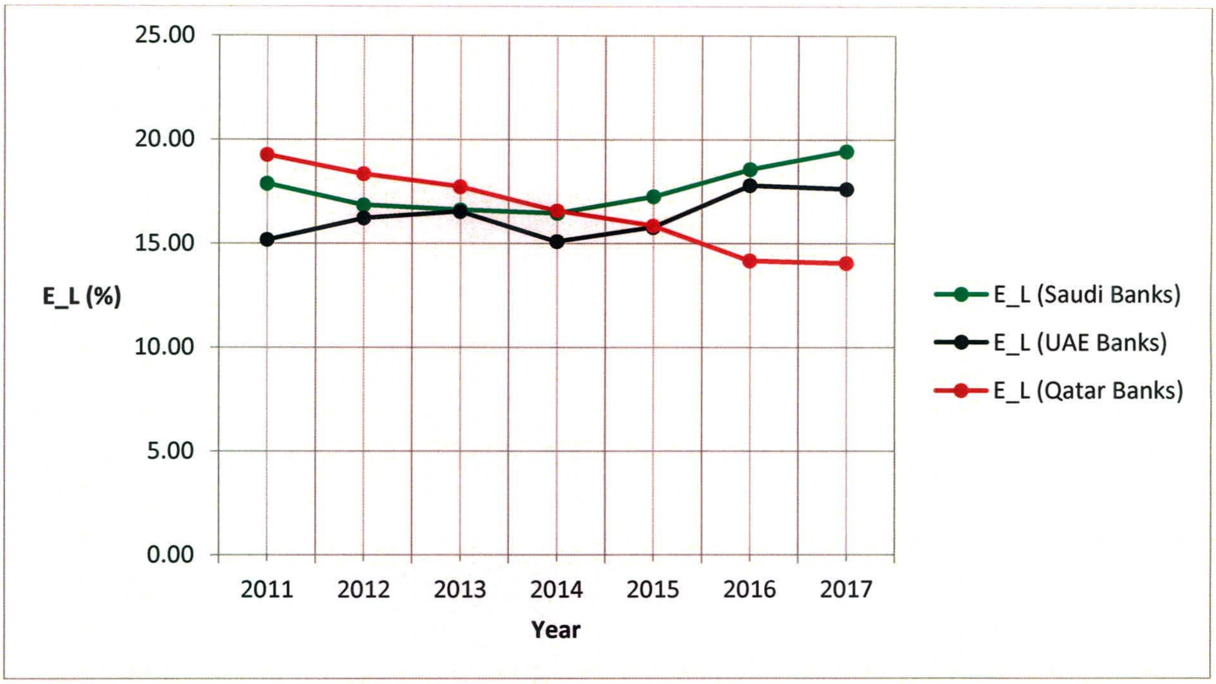


Figure 18: Trend of Equity to Liabilities for the Sample Saudi, UAE, and Qatar Banks

Data Source: Orbis Bank Focus.

4.4 Conclusion

As we have performed the Chow test for each financial ratio of the selected sample GCC banks, we have been able to determine the impact of the recent oil price decline on the various aspects of GCC bank performance. However, the test has been performed for the sample Saudi, UAE, and Qatar banks separately and the results have been presented in a comparable framework. Comparing the results thus reveals a variation in the response to the recent oil price decline across the three GCC banking sectors at the different aspects of bank performance. Indeed, Qatar banking sector has been resilient against the decline as most of its financial ratios have shown continuous performance over time. Yet, Qatar banks have been in a continuous declining trend at the profitability, liquidity, credit quality, and capitalization levels. In its turn, the Saudi banking sector has shown a different response to the decline as it has experienced negative structural breaks at the credit quality level but positive structural breaks at the capitalization level. However, the Saudi banks have been in a continuous declining trend at both the profitability and liquidity levels. For the UAE banking sector, the response has been much significant as the UAE banks have experienced negative structural breaks at both the profitability and credit quality levels yet positive structural breaks at the capitalization level. However, the UAE banks have been in a continuous inclining trend at the liquidity level.

Chapter 5

Conclusions and Recommendations

5.1 Introduction

The ultimate objective of our thesis has been to determine the impact of the recent oil price decline on the GCC banking system. This has involved examining how diverse bank performance indicators of the GCC banks have responded to the 2014 oil price shock. To achieve this objective, we have used the Chow model to test for structural breaks and trend changes in the overall performance of the GCC banks from the pre-shock period to the post-shock one. For this, we have exploited twelve financial ratios belonging to four divergent categories which reflect the different aspects of bank performance (profitability, liquidity, credit quality, and capitalization). Besides, we have selected the Saudi, UAE, and Qatar banking sectors to be representative of the GCC banking system. For each banking sector, we have selected a representative sample of banks for which we have exported raw data from Orbis Bank Focus global database for the period spanning 2011-2017. The sample data has been cleansed and then inputted into EViews statistical package through which we have performed the Chow test.

After performing the Chow test for the sample Saudi, UAE, and Qatar banks separately, the test comparable results have been presented and discussed. This allows us to recognize a variation in the response to the recent oil price decline across the three GCC banking sectors at the different aspects of bank performance. This chapter, however, concludes the thesis and opens the way for further studies as to investigate the resilience of the GCC banking system to absorb sudden negative oil price shocks, along with other economic shocks.

The chapter thus concludes the study by first presenting its main findings in light of the findings of previously conducted studies which handle the impact of oil price shocks on the banking sectors in oil-exporting countries. Second, the limitations of the study are highlighted. Third, research implications are discussed. Finally, recommendations for further research are suggested.

5.2 Main Findings

Comparing the Chow test results across the three GCC banking sectors allows us to realize that each GCC banking sector has responded to the recent oil price decline in a different significant way. While Qatar banking sector has been robust against the 2014 oil price shock as its financial ratios have shown continuous trends over time, the Saudi and UAE banking sectors have survived significant impacts in response to the shock. Indeed, both banking sectors have experienced negative structural breaks at the credit quality level due to the increasing impaired loans at the time of declining oil prices. Besides, positive structural breaks have been detected at the capitalization level for both banking sectors. This observation, though surprising, reflects the fact that the Saudi and UAE banks have been prudent and proactive as they have quickly responded to the oil shock by increasing their capitalization levels. Such reaction implies that the Saudi and UAE banks have tried to ensure at the time of the shock that they could absorb the prospective negative impacts and cover the potential losses on their loans by increasing their capitalization levels by the year 2014. However, the UAE banking sector appears to be the most impacted GCC banking sector as it has also experienced negative structural breaks at the profitability level by the year 2014.

The Chow test results thus put our study in alignment with the growing literature on the impact of oil price shocks on the banking systems in oil-exporting countries. Indeed, Khandelwal et al. (2016) investigate this topic building on the rationale that oil price shocks propagate within oil-based economies and transmit to their banks' financial statements. Our study, however, provides a confirmation to this rationale as it indicates that lower oil prices have significant impacts on major aspects of bank performance in the GCC oil-exporting economies. In fact, the findings of our study do corroborate the findings reached by Khandelwal et al. (2016) which highlight the significant role played by oil prices in impacting various aspects of bank performance in the GCC oil-dependent exporters.

In their turn, Poghosyan and Hesse (2009), Idris and Nayan (2016), and Kinda et al. (2016) provide empirical evidence that negative oil price shocks mainly lead to a combination of increasing bank nonperforming loans and declining bank profits in major oil-exporting countries. This outcome has been reached in our study as negative structural breaks have been detected at the credit quality level for the sample Saudi and UAE banks in response to the 2014 oil price shock, added to the negative structural breaks which have been detected at the profitability level for the sample UAE banks. However, Abusaaq et al. (2015) and Martinez et al. (2016) highlight that the GCC banks and in particular the Saudi and UAE banks have been strong to deal with the latest oil shock and the resulting increasing nonperforming loans, declining profits, and weakening deposit inflows due to the robust liquidity and capital buffers these banks have possessed. This has been also revealed in our study as it indicates a complete absence of any negative structural break at both the liquidity and capitalization levels across the selected sample GCC banks by the year 2014. Nevertheless, positive structural breaks have been detected at the capitalization level in Saudi Arabia and UAE indicating that both countries have followed proactive strategies which have helped them withstand such negative oil price shock at the banking level.

5.3 Limitations of the Study

The Chow test is considered to be an indicative test we have used in our study to fulfill its main objective. This objective has been to determine the impact of the recent oil price decline on the GCC banking system. The test has helped us test for structural breaks and trend changes in the overall performance of a selected sample of GCC banks from the period preceding the decline to the period following it. This allows us to add some empirical evidence to the existing literature which handle the implied close link between oil prices and bank performance in oil-exporting countries. However, two key limitations can be identified as being faced while conducting our study.

One limitation lies in the fundamentals of the test itself. Indeed, the Chow test allows for studying the impact of one variable on another. In our study, the test has allowed us to study the impact of time on the performance of a specific financial ratio. However, a financial ratio is a function of multiple country-specific and bank-specific factors which have not been considered in our study but could simultaneously affect the ratio performance, along with the time variable.

Another limitation stems from the limited availability of some data. Indeed, conducting our study over the sample period 2011-2017 has required us to select for each country the banks which present reported accounts for the seven years under study so we ensure consistency across the sample banks. This has obliged us to exclude those banks which have missing reported accounts for one year or more. Fortunately, this has caused no impact on the results of the study when it comes to UAE and Qatar as the excluded banks are small banks relative to the countries' banking sectors. However and in regards to Saudi Arabia, we have excluded the largest Saudi bank (Saudi Arabian Monetary Agency) when selecting the sample Saudi banks. This bank in particular presents no reported accounts for the year 2017 and even limited reported data for the other years, yet it constitutes around 50 % of the Saudi banking sector and thus exerts a major impact on the country's overall bank performance.

5.4 Managerial Implications

As we have conducted this study, we have contributed to the increasing efforts being employed to fill a research gap identified in the literature. Indeed, studies delving into the impact of oil price shocks on the banking systems in oil-exporting countries have been still emerging. In our study, we have chosen to address this topic by investigating the impact of the recent oil price decline on the GCC banking system. The study's added value has been manifested in its originality to employ the Chow test on a selected sample of GCC banks to detect their response to the 2014 oil price shock at the different aspects of bank performance. Moreover, the study has allowed for a comparison among the different responses of the selected GCC banking sectors by the year 2014.

In addition to the research implications, the results of our study have practical implications. Indeed, oil price shocks have been a recurring phenomenon since the early 1970s. This highlights the essence that oil-exporting economies and banking sectors should be prepared to absorb such shocks once they happen. Our study does serve in this direction as it gauges the sources of vulnerability and strength of the GCC banking system in response to a negative oil price shock. The study provides valuable insights about what bank performance indicators could be negatively impacted in the event of negative oil price shocks and what indicators could help mitigate the impact, hence provide GCC bank authorities with incentives to strengthen those indicators and grant them more attention as they contribute to the overall performance of the GCC banking system. Indeed, the GCC banks and in particular the Saudi and UAE banks have been found to be fragile at the credit quality level. This observation should motivate the Saudi and UAE bank authorities to review their banks' credit portfolios and ensure that loans are granted to the several economic sectors and not concentrated in the oil sector which could be adversely impacted by low oil prices. Besides, the strong liquidity and capital positions have constituted the buffers which have helped the GCC banks stand resilient against the shock. This implies that the GCC banks should continue to build liquidity and capital buffers in the good times, especially in the times of high oil prices for these buffers could act against any negative oil price shock in the future.

5.5 Recommendations for Further Research

Our study has determined the impact of the recent oil price decline on the various aspects of bank performance in the GCC region. Nevertheless, this study opens the way for further studies as to investigate the GCC oil-based economies, along with their banking sectors. Indeed, further studies should be conducted to assess the impact of negative oil price shocks on the GCC macroeconomic variables and identify the transmission channels through which such shocks could transmit into the GCC banking sectors. On the other hand, further studies should investigate the macroeconomic and bank-specific variables which could together contribute to the performance of bank financial ratios. This would help GCC banks strengthen their financial statements and increase their readiness to absorb future negative oil price shocks, along with other economic shocks.

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