Determinants of Financial Stability of the Banking Sector: Empirical Study

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ABSTRACT

The primary purpose of this thesis is to identify the main determinants of bank stability to build a practical framework for safeguarding financial stability by focusing on the two separate samples. Firstly, to investigate the bank stability determinants of Islamic banks and their conventional peers using a sample of 254 banks across the nine leading countries (QISMUT+3) dual banking systems over the period 2011-2017. Findings present a positive association between good governance, financial freedom, and bank stability. On the other hand, corruption and economic freedom have a damaging effect. The legal systems of countries do not show any enhancement effect over bank stability is one of the basic damaging effects. According to findings religiosity concentration improves stability, banks' religiosity does not provide any stability advantage. Among the macroeconomic and bank-specific indicators, GDP growth and cost efficiency are the major stability determinants. Secondly, it is aimed to find out the relationship between oil and gold prices and the financial stability of Islamic banks operating in the Gulf Cooperation Council countries for 2005-Q1 to 2018-Q1. For this purpose, first, it uses Johansen cointegration and VECM methodologies. employs the newly-developed Bayer–Hanck, Gregory–Hansen, Toda–Yamamato, and DOLS methodologies to test the robustness of the findings. Results reveal a cointegrating relationship and equilibrium-correcting mechanism between the two commodities prices and the bank stability. Both commodities prices have positive effects on bank stability in the short run. However, the oil price has a positive impact in the long run, while the gold price has a negative effect on the long run. The causality results confirm unidirectional causality from oil and gold prices to bank stability in the short run and oil price to bank stability in the long run.

Keywords: Bank Stability; Institutional Environment; Religiosity; Macroeconomics, Gold Price; Oil Price.

ÖZ

Bu tezin temel amacı finansal istikrarı korumak adına temel politikaların geliştirilmesi için banka istikrarının ana belirleyici etkenlerini iki farklı örnekleme dayanarak belirlemektir. İlk olarak İslami bankaların ve anlaşmalı şubelerinin, banka istikrar belirleyicilerini incelemek için 2011-2017 yılları arasında ikili bankacılık sisteminde önde gelen dokuz farklı ülkeden (QISMUT+3), 254 banka örnek olarak alınmıştır. Bulgular, iyi idare, finansal özgürlük ve banka istikrarı arasında pozitif bir ilişki olduğunu göstermektedir. Diğer yandan, yolsuzluk ve ekonomik özgürlüğün zarar verici bir etkiye sahip oldukları görüldü. Ülkelerin hukuk sistemlerinin, banka istikrarına, herhangi bir iyileştirme etkisinin olmadığı temel zarar verici etkenlerden biri olduğunu göstermemektedir. Sonuçlar, dindarlığın istikrarı geliştirdiğini gösterse de bankaların dindarlığı istikrar avantajı sağlamamaktadır. GSYİH büyümesi ve maliyet etkinliği, makroekonomik ve banka göstergeleri arasında istikrarın ana belirleyicileridir. İkinci olarak, 2005-Q1 ila 2018-Q1 için Körfez İşbirliği Konseyi ülkelerinde faaliyet gösteren İslami bankaların petrol ve altın fiyatları ile finansal istikrarı arasındaki ilişkiyi araştırmayı amaçlamıştır. Bu amaçla önce Johansen eş-bütünleşme ve VECM yöntemleri kullanılmıştır. Ardından, bu sonuçların doğruluğunu ölçmek için yeni geliştirilen Bayer–Hanck, Gregory–Hansen, Toda–Yamamato ve DOLS yöntemleri kullanılmıştır. Sonuçlar, iki emtia fiyatları ile banka istikrarı arasında bir eş-bütünleşme ilişkisi ve denge düzeltme mekanizması açığa çıktığını göstermektedir. Her iki emtia fiyatının da kısa vadede banka istikrarı üzerinde olumlu etkileri mevcuttur. Ancak petrol fiyatlarının uzun vadede olumlu etkisi varken bu vadede altının olumsuz etkileri vardır. Nedensellik sonuçlarına bakıldığında, kısa

dönemde petrol ve altın fiyatlarından banka istikrarına, uzun dönemde ise petrol fiyatından banka istikrarına doğru tek yönlü bir nedensellik olduğunu görülmektedir.

Anahtar Kelimeler: Banka Kararlılığı; Kurumsal Çevre; Dindarlık; Makroekonomi, Altın Fiyatı; Petrol Fiyatı.

DEDICATION

To my parents (mother and father)

To my wife and children

To all my brothers and sisters

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Chapter 1

INTRODUCTION

1.1 Introduction

This thesis investigates the Financial Stability Determinants of banks from different aspects by concentrating on two separate samples. First, it examines the impact of macroeconomic, institutional, and religious factors on bank stability across QISMUT+3 countries[1] over the period 2011–2017. Second, this thesis investigates the dynamic relationship between bank stability and significant commodity prices, namely oil and gold prices, which have not been analyzed in the previous literature.

This thesis's primary aim is to empirically discuss the significance of institutions, religion, and economic cycles concerning the financial stability within dual banking (IBs vs. CBs). In addition, roles played by bank-specific factors, market structure, and type of banks (Islamic vs. conventional) are also considered in the financial stability analyses. Additionally, the second part of the thesis investigates the short and long-term links among bank stability, oil, and gold prices and the causality dynamics of these variables. This section uses quarterly time-series data of Sharia-compliant banks operating in the GCC (Gulf Cooperation Council Countries) as input for our analyses.

[1] The QISMUT + 3 countries include Qatar, Indonesia, Saudi Arabia, Malaysia, UAE, Turkey, plus Pakistan, Kuwait, and Bahrain.

The rest of Chapter 1 is organized like this: the background and motivation are described in Section 1.2. Section 1.3 explains Aim of the study. Section 1.4 recounts the study contributions and implications. Section 1.5 highlights study limitations, section 1.6 presents methodologies. Section 1.7 displays data sources. Section 1.8 provides empirical results, and Section 1.9 displays the chapter summary.

1.2 Background and Motivation

During the past two decades, the banking sector's operating environment has witnessed significant transformations worldwide. Domestic and foreign factors have affected its structure and stability, which reinstated policymakers' interest in financial stability to mobilize and direct financial resources towards the real economy. For instance, the global Financial crisis in 2008 was a severe worldwide financial crisis and causing banks to lose money on mortgage defaults, interbank lending to freeze, and credit to consumers and businesses to dry up. In addition, the world stock markets have fallen, which prompted many governments to develop rescue packages and allocate vast sums of money to bail out banks, such as spawning new regulatory actions through Basel III and the Dodd-Frank Act in the U.S.

The financial system's stability is paramount for economic growth, as most transactions in the real economy take place through the financial system, of which the banking sector represents a significant share. Moreover, banks play an essential role in attracting more savings to create good sources of financing credit activity and assets operations to diversify risks in the loan portfolio and select contributive and secure investment projects for lending. Therefore, the robust and stable banking sector can withstand adverse shocks and contribute to the financial system's stability.

The Financial system's stability can describe as "the state in which the financial system can direct funds to their most efficient and profitable investment opportunities without significant disruptions. In other meaning, if the financial system can absorb shocks without disrupting the financial intermediation function, it is stable. Nonetheless, a sound banking system that fails to allocate economic resources efficiently fails to satisfy the stability criteria. (Babecky, Komarek, & Komarkova, 2013).

We define banking system stability as a stable condition in which the financial system efficiently executes its primary economic responsibilities, such as distributing resources and dispersing risk and settling payments, according to a description supplied by Deutsche Bundesbank (2003). In other words, we associate banking system stability with a sound banking system, which consists mainly of solvent financial institutions that perform the responsibilities mentioned above. The banking system's stability is the foundation for the financial sector's overall stability since banks perform a crucial function, especially in money creation, investment financing, economic growth, and payment system. Furthermore, central banks and other authorized organizations have a unique benefit in assessing the banking system's soundness to maintain economic and financial stability.

The banking industry performs a critical role in boosting economic activity and stability in the economy. Banks allocate funds efficiently, mitigate risks through diversification, and reduce informational asymmetries by monitoring economic units. The banking system also interacts with other institutions to perform intermediation functions and is interconnected with the country's institutional framework. As such, multilateral relationships with different institutions and multiple transactions with maturity gaps make banks complex, opaque, and economically critical economic

institutions. This complex and interconnected character requires banks to be resilient to adverse shocks, given the potential for systemic risks. Moreover, a resilient banking system enables the bank sector to perform efficient intermediation that aids economic growth. Thus, bank stability is an essential element helping economic prosperity in current economic systems (Bitar, Hassan & Walker, 2017; Kanagaretnam et al., 2015; Levine, Loayza & Beck, 2000).

Studies in the field of economics and finance have increasingly paid attention to the role of religion and its links to economic and financial behavior. There is a substantial discussion on the relationship between religion and risk-taking (Miller & Hoffmann,1995; Hilary & Hui, 2009; Noussair et al., 2013); on its impact on the economy and individuals (Miller & Hoffmann, 1995; Barro & McCleary 2003; Noland, 2005; Pryor 2007; Johnson, 2013; Bitar, Hassan & Walker, 2017); financial markets (La Porta, Silanes, & Shleifer, 1998; Kumar, Page, & Spalt, 2011); and banking systems (Levine, 1998; Houston et al., 2010; Johnson, 2013; Bitar, Hassan & Walker, 2017; Mollah, Hassan, & Al-Farooque, 2017). Zucker & Darby (1999) note that religious environments and economic structures are likely to be correlated in cross-country samples in ways that are difficult to disentangle. Noland (2005) indicates that Islamic religion promotes economic performance via the prohibition of interest and emphasis on profit-sharing contracts. Barro & McCleary (2003) suggest that the Muslim share of the population significantly and negatively affects economic growth. Nevertheless, Pryor (2007) finds that the Muslim share of the population has relatively little influence on most economic and social performance indicators. Imam & Kpodar (2016) assert that religious links that promote Islamic banking are associated positively with economic development.

Studies explaining bank behavior recognize that the macroeconomic environment is an essential factor. Widely, specified bank stability determinants include variables such as GDP growth, inflation rate, money supply, and trade openness. Countries with higher growth rates demand more finance. Banks operating in countries with higher gross domestic product growth are generally expected to be more efficient, better capitalized, lower credit risk, and have less return volatility. Therefore, banks in countries that have higher levels of GDP growth are expected to be more stable. Anginer, Demirguc-Kunt, & Zhu (2014) found a positive association between GDP volatility and bank systemic risk. Chakroun & Gallali (2015) find a similar link: consumption downturns, lower investment, and related credit falls add to risks. Rajhi & Hassairi (2013) show that the relationship between growth and stability may be affected by country/regional features and bank size. For instance, they find a significant positive association between growth and financial stability for large banks in Southeast Asia and MENA countries, but a negative relationship for small MENA banks. Also, Bitar, Hassan, & Walker (2017) found a positive association between economic growth and banks' stability.

Regarding the effect of inflation, according to Uhde & Heimeshoff (2009), the effect is dependent on whether banks anticipate inflation and if it corresponds with economic fragility. Rajhi & Hassairi (2013) support this mixed view, asserting a positive effect for small banks and an adverse impact for large banks operating in Southeast Asian countries. Also, the money supply is another critical macroeconomic variable that can impact banks since it can influence interest rates, inflation, exchange rates, and overall credit extension (Gertler & Gilchrist, 1994; Rajan, 2006; Borio & Zhu, 2012). Furthermore, Bofondi & Ropele (2011) and Chung & Ariff (2016) also show that the

money supply can affect a bank's ability to lend, influencing financial stability. Finally, Rajan & Zingales (2003) find that trade openness can promote countries' financial development, and Klomp & De Haan (2015) show that open economies make financial sectors more resilient. Furthermore, Baltagi, Demetriades, & Law (2009) find evidence that trade and financial openness are significant determinants of banking sector development.

The recent Global Financial Crisis (GFC) from 2007-09 has prompted regulators to reconsider the link between financial stability and Islamic banks, particularly the Islamic banking sectors' capacity during the crisis period. Academics and specialists in the Islamic finance business have observed tremendous growth in Islamic financing in recent years. The nature of Islamic banks, which focuses on assets and risk-sharing, has protected Islamic banks against the consequences of the global financial crisis. Some argue that Islamic banks, like their conventional counterparts, use leverage and take huge risks, leaving them vulnerable to the second GFC (Hasan & Dridi, 2010). For example, the GCC countries' systemic financial sector risks rose as oil prices rose in the years leading up to the GFC. As a result of higher oil prices and short-term capital inflows, the expansion of the high liquidity and deposit base led to a boom in credit and asset prices in the pre-GFC. For instance, Al-Hassan, Khamis, & Oulidi (2010) indicate that bursting the bubble of domestic real estate and tightening global liquidity conditions acted a function in the 2009 financial crisis of the United Arab Emirates. Whereas, defaults in 2008 put pressure on the Kuwaiti banking system by the two most prominent investment firms, with the recapitalization of the third-largest bank. Also, Bologna & Prasad (2010) documented a severe rise in households' leverage between 2004 -2008 in Oman.

During the recent global financial crisis, significant commodity prices descend simultaneously in the aftermath of the economic downturn. As the most widely traded commodities, oil, and gold have unique characteristics that underpin the global economy and are traded in vast quantities worldwide. For many decades, the oil market has been a crucial macroeconomic factor. It is a critical component of energy consumption and one of the most traded commodities globally, with its price passing through to the commodity markets (Baffes, 2007). In oil-exporting countries, the oil industry plays a vital role in production and exports. Therefore, fluctuations in oil prices have been the leading cause of turmoil in their economic activities, spreading through different transmission channels such as interest rate and exchange rate. The banking sector cannot be isolated from these fluctuations. Meanwhile, gold is considered the leader in the precious metals market as increases in its price appear to lead to parallel movements in other precious metals prices (Sari, Hammoudeh, & Soytas, 2010). In addition, gold has a storage feature, "safe haven," especially in economic instability, political instability, and averting financial risk. As it is known, investors in emerging and developed markets often switch between gold and oil or combine both to diversify their portfolios (Soytas, Sari, Hammoudeh, & Hacihasanoglu, 2009).

Accordingly, the primary motivation is to identify the determinants of the financial stability of banks. However, it is also equally important to understand what activities matter for bank stability—motivated by mixed evidence and the lack of prior studies of the interaction between religion and bank stability. In particular, whether religiosity enhances bank stability and whether the bank's type influences this interaction. Therefore, this thesis addresses two issues, first Issue; we investigate the theoretical

and empirical determinants of banks' financial stability, taking into account the dual banking systems (Islamic banks vs. conventional counterparts). In this regard, our study analyzes the effect of institutions and the macroeconomic factors concerning financial stability and the sensitivity of banks' financial stability to the religious environment. Furthermore, we are motivated to conduct this study, given the crucial role and substantial implications of oil and gold price movements on economies and financial systems. Nonetheless, previous literature has not mentioned the dynamic link between the previously mentioned variables and financial stability. Thus, this study is a novel one and reinforces the existing literature and will serve as a fascinating discussion for future research to develop and elaborate on this subject with further studies.

1.3 Aim of the Study

The first section of the work conducted in this dissertation is precisely related to the debate to better understand the financial stability of banks in Dual Banking Systems, especially in the QISMUT+3 countries. To achieve this, we asked the following research question: what are the determinants of banks' financial stability in the QISMUT+3 countries? Consequently, the following hypotheses have developed: the economic cycle in QISMUT+3 countries affects its financial stability. The QISMUT+ 3 countries' institutions promote their financial stability. The QISMUT+3 countries' Religiosity has a positive effect on its financial stability. Sharia-compliant banks are more financially stable than commercial counterparts. Finally, the QISMUT+3 countries' market structure has a positive impact on its bank stability. Thence, testing these hypotheses is the essential purpose of this study.

The second objective of this thesis is to gain a better knowledge of the dynamic link between bank stability, oil, and gold prices within Sharia-compliant banks operating in the GCC countries. To achieve this, we addressed the following research questions: do oil and gold prices affect stability together or separately? Which commodities are economic or statistical significance more critical? Do they affect stability in the short or long run? What is the causality direction? Hence, answer(s) to these questions will not solely contribute to the literature but also provide some implications to bankers and policymakers.

1.4 Study Contributions and Implications

Firstly, the current study adds to a literature that has yielded mixed results concerning the impact of the economic cycle, Institutions, and Religion on Bank Stability. This research promotes Islamic finance prosperity and progress by concentrating on the top nine Islamic finance-oriented countries in a new categorization known as the QISMUT+3 countries. Given the importance of these countries, we believe they act as a suitable laboratory to undertake a comparative analysis of Islamic and conventional bank stability determinants. Also, the results of the study have various managerial and policy implications. First, banks can improve stability by boosting operational efficiency and reducing income diversification. Second, having strong GDP growth enhances bank stability – something policymakers are likely aware. Third, tackling corruption is likely to have a post-impact on bank stability. Fourth, our findings also support the initiatives that encourage Islamic banking – especially in countries with relatively high Muslim populations.

Secondly, this study contributes to the Islamic banking and bank stability literature from several aspects by analyzing the combined effect of recent oil and gold price

changes on Islamic banks' stability operating in the GCC countries. First, this study will bring an important contribution to the economic literature because we will see a more detailed view of the influence of oil and gold on Islamic banks' financial stability, especially in the GCC during the financial crisis periods. To our knowledge, previous literature does not provide any conclusions on the link between bank stability with commodity prices. Though there are some new studies such as (Khandelwal, Miyajima, & Santos, 2016; Al-Khazali & Mirzaei, 2017; Ibrahim, 2019; Killins & Mollick, 2020), they concentrate on using loan losses ratios as stability measure, not the Z-score that is assumed a better measure of the banks' stability. Nonetheless, they focus solely on the oil price. Second, our contribution lies not only in adding to the literature that focuses specifically on the Gulf Cooperation Council countries, which is somewhat limited. But also contributing the literature on the impact of the most critical physical commodities such as oil and gold on Islamic bank stability into one cohesive framework where including oil and gold price changes into this framework is novel. Third, this study is the first to give a deep investigation into the transmission mechanisms between oil and gold price fluctuations and the banking sector using a Z-score as an index of financial stability. Using this standard score as a measurement of bank stability seems to be more appropriate since it is an overall stability measure with a higher predictive power of distress. Lastly, this study uses quarterly data instead of annual data to capture better short-and long-run impacts of oil and gold prices on Islamic bank stability. As such, this study will be the first to fill the research gap by analyzing the short-run and long-run relationships among bank stability, oil prices, and gold prices.

1.5 Study limitations

This study is not without limitations. The first is related to the studied sample period of QISMUT+3 countries, which is relatively short (7 years). Therefore, it is difficult to carry out our empirical analysis before 2011. Second, the lack of data regarding relevant financial indicators such as the ownership structure, stock indexes, Boone indicator, bank age, bank globalization, and experience level of banks prevented us from using these variables in our analysis. Therefore, this study ends by incorporating such variables, which are certainly more difficult to quantify and can be considered in the future. Also, the significant variation in religiosity across countries is one of the reasons we only focus on QISMUT+ 3 countries.

For the second sample of GCC countries, the main limitation is the studied period, which is relatively short (13 years). Therefore, it is difficult to carry out our empirical analysis before 2005, as well as it is difficult to access the Islamic banks' community data. Consequently, we used 36 banks out of 56 Islamic banks operating in the GCC countries. Second, the empirical method (linear Models) is also suitable for this research. We recognize that Nonlinear Models' role, such as a Nonlinear ARDL Framework, allows us to trace out the asymmetric adjustment patterns following positive and negative shocks to the explanatory variables to detecting asymmetric impacts in the short and long term. Nevertheless, we went in this direction beforehand, but we did some tests, and the results required us to be satisfied with our conventional methods. Third, our study is novel, and we could not find any previous literature on bank stability and commodity prices, particularly gold and bank stability. Hence to support and elaborate on the relationship between commodity prices and the financial

system's stability, our study refers to some existing literature about commodity prices and financial markets.

1.6 Methodology

The estimation model has a financial stability proxy as its dependent variable. Firstly, we choose to apply advanced statistical methodologies such as the dynamic system Generalized Method of Moments (GMM) estimation (Hansen, 1982) in the analyses where we investigate factors determining the financial stability of banks within the QISMUT+3 countries. Notably, we apply a two-step system GMM methodology to carry out our comparative analysis.

Secondly, to study the influence of oil and gold prices on Islamic banks' stability in the Gulf Cooperation Countries (GCC). In a theoretical setting, the effects of oil prices on macroeconomic conditions and financial markets are explained in the literature by referring to four channels (business cycle, financialization of commodities, oil price shocks, and risk premium) (see, e.g., Henry, 1974; Bernanke, 1983; Hamilton, 1983; Brennan & Schwartz, 1985; Bernanke, Gertler, & Gilchrist, 1996; Jones & Kaul, 1996; Henry, 1974; Jones & Kaul, 1996; Lescaroux & Mignon, 2008; Cheng & Xiong, 2013; Tang & Xiong, 2012; Su et al., 2018). Though the literature concentrated on the stock markets, these channels can also be adopted for bank stability, as banks are crucial intermediaries in the economy and financial markets. Following the literature findings and transmission channels, it can be argued that OP and GP can potentially affect macroeconomic and financial market conditions through different transmission mechanisms. Therefore, financial stability, in general, and banks' stability, in particular, are expected to be altered by the changing oil and gold prices. Moreover, this is expected to be significant for the GCC countries, as they are oil-dependent

countries. Henceforth, we argue that there is a good foundation for investigating the relationship between oil and gold prices and bank stability. The thesis uses different analytical tools to ensure robust results. It begins searching for the long-run relationships by employing methodologies from Johansen & Juselius (1990), Gregory & Hansen (1996), Stock & Watson (1993), and Bayer & Hanck (2013). In addition, VECM and Toda & Yamamoto's (1995) methodologies are used to investigate causality in both the short and long term.

1.7 Data Sources

This thesis uses two separate samples. The first data set aims to analyze the determinants of and differences in bank stability of IBs and CBs operating in QISMUT+3 countries. This data set includes 254 banks across QISMUT+3 countries, of which 79 are IBs and 175 are CBs. The sample period is 2011–2017. Annual bank-specific and market structure data gathered from Orbis bank focus, macroeconomic variables, and governance indicators gathered from World development indicators. Financial freedom and economic freedom were obtained from the Heritage Foundation. Lastly, religiosity was collected from The World Factbook.

The second data set is deserved for understanding the impact of commodity prices on bank stability. It covers 36 banks operating in the GCC countries (major oil-exporting) for the period of 2005Q1-2018Q1. Bank stability measure is derived from the Orbis-Bank Focus database using the quarterly balance sheet and income statement information. Following previous studies (Altman, 2002; Pappas, Izzeldin & Fuertes, 2012; Ghassan & Fachin, 2016), we employ a z-score to measure bank stability. For OP and GP, we use the Organization of the Petroleum Exporting Countries (OPEC) Crude Oil Basket and London Bullion Market Association (LBMA) prices.

1.8 Empirical Results

Our results suggest that good governance, financial freedom have a positive influence on banking stability. Further, corruption and economic freedom have a damaging effect. The Legal Systems of Countries do not show any enhancement effect over the Bank Stability. Though findings suggest religiosity concentration improves stability, banks' religiosity does not provide any stability advantage. Among the macroeconomic and bank-specific indicators, GDP growth and cost efficiency are the major stability determinants. Also, the results of the study suggest cointegration and equilibrium-correcting mechanism between commodity prices and bank stability. In the short run, findings show the positive effect of commodity prices on bank stability. Nevertheless, the oil price has a positive long-term impact, while the gold price has a negative effect in the long term. Thus, there is unidirectional causality from oil and gold prices to bank stability in the short run, and oil prices to bank stability in the long run.

1.9 Summary

This chapter has identified the primary purpose of this thesis and addressed the thesis question for achieving this purpose. It outlined background, motivation, contributions, and implications. The following chapter supplies the literature review of financial stability and its main determinants in general, focusing on those related to macroeconomics, institutions, religiosity, market structure, and bank-specific factors. Chapter 2 also discusses the transmission channels between Oil and Gold prices and bank stability by referring to the literature.

Chapter 2

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature on issues concerning financial stability both from a theoretical and applied viewpoint. All studies in the literature distinguish between two classes of factors: bank-specific factors since they are mainly influenced by a bank's management decisions (for example, bank-specific financial ratios representing bank size and asset quality, income diversity, capital adequacy, cost efficiency, and credit risk), and external determinants, such as concentration, market share of Islamic banks, GDP growth, inflation, money supply, trade openness, financial freedom, economic freedom, governance, government effectiveness, voice and accountability, control of corruption, regulatory, the rule of law, political stability, Muslim share in population, the legal system, and oil and gold prices).

The beginning will be with understanding the main determinants of banks' financial stability, such as bank-specific factors, market structure, macroeconomics, Institutions, and Religion. Second, oil and gold prices and bank stability are a topic of concern for the academic world and policymakers worldwide. Although there is extensive research on oil prices and gold prices, scant research exists regarding the relationship between commodity prices and banking systems. That is why it is so essential to understand the full significance of these topics.

2.1.1 Theoretical Background of Banks

i) Liquidity Shortage Hypothesis:

A bank failure is the result of the bank runs. This occurs primarily due to a lack of knowledge of depositors, as they fail to distinguish between solvency and liquidity shocks.

ii) Weak Fundamentals Hypothesis (Asset Risks):

Bank collapse causes by weak bank fundamentals such as deterioration in loan quality, low liquidity, lower profits, and decrease in capital ratio.

iii) Too Big to Fail Theory:

Bank size encourages banks to take on greater risks. Bank size can exploit scale and scope efficiencies and improves stability.

iv) Income Diversification:

The dark side of diversification: over-diversification increases bank volatility.

Income diversification view: using different income sources enhances risk-sharing.

v) Market Structure:

Competition-stability hypothesis**:** Competition improves efficiency and decreases the cost of banking services. This leads to a lower risk of default for bank customers and improves bank stability.

Competition-fragility hypothesis: Competition creates banking system fragility by encouraging excessive risk-taking.

Quiet life hypothesis: Concentration makes banks have a quiet life. Therefore they may become more ineffective, leading to more instability

vi) Bank Type and Bank Stability:

Islamic banking is different concerning products, risk-sharing, and profit generation. For example, Islamic banking prevents interest and bases on Sharia Law**.**

vii) Macroeconomic Environment and Bank Stability:

Macroeconomic variables can have different implications for bank stability for different countries. For example, countries with higher growth are expected to have more stable banking than the lower growing economies.

viii) Institutional Development:

Good governance limits excessive risk-taking and enhances transparency and hence stability. Also, the level of supervision and regulation for capital requirements and other banking operations possibly affects banks' stability.

ix) Religiosity:

Generally, religion through customers and management religious beliefs play a role in bank behavior. The following sections review bank stability literature; section 2.3 presents views on the bank-specific factors and stability, while section 2.4 discusses the market structure, followed by section 2.5, which reviews the macroeconomic environments. Furthermore, sections 2.6 and 2.7 discuss institutional development and religiosity. Section 2.8 reviews the effect of oil and gold price on banking sectors. Finally, Section 2.9, the chapter summary.

2.2 The Bank Stability

A financial system is a network of financial institutions, financial markets, financial instruments, and financial services facilitating money transfer. It can be organized centrally by governments or by markets and institutions independently. Money, credit, and finance are used as a medium of exchange (Schinasi, 2006). In theory, banks are financial intermediaries with short-term deposits as liabilities and short- and long-term loans to consumers and businesses as assets (Demirgu-kunt & Detragiache, 1998). Banking systems perform essential functions in money creation, credit, payment systems, market stability, and consumer protection. Banking stability is critical for the

global financial system's stability. Financial system regulators understand that a confidence loss in the banking system may have devastating consequences for the financial system as a whole. For this reason, banking stability has always been a top regulatory and supervisory policy objective for regulators. Further, its stability is vital for overall economic development (Bhattacharya, Plank, & Strobl, 2002; Barth, Caprio & Levine, 2006; Barth, Jr, & Levine, 2008, 2013; Delis & Staikouras, 2011; Shukla, 2014)."

Traditionally, financial stability has always meant stopping and managing financial crises. It has more recently evolved to avoid systemic risk, particularly credit-driven asset price bubbles and busts that can lead to financial problems. The seamless functioning of the fundamental parts that make up the financial system is referred to as financial stability (Duisenberg, 2001). Financial stability on an individual level is a financial institution's capacity to speed up economic processes, manage risks, and absorb shocks (Schinasi, 2004). Financial instability is defined as the financial institutions' behavior as the refusal to channel funds to attractive investment possibilities, late payments, and asset values that differ from their fair value (World Bank, 2016). On the other hand, banking stability is defined as the lack of banking crises if all banks are independently stable (Brunnermeier et al., 2009). Segoviano & Goodhart (2009) describe banking stability as banks connected directly by participating in syndicated loans and interbank deposits market or indirectly by lending to common sectors and proprietary trading. Banking stability is viewed as the lack of abnormal disruption in payment systems, credit supply, and banking services (Peterson & Arun, 2018).

The Global Financial Crisis (GFC) is a term used to describe a specific extreme shock to the financial system that causes the financial system's operation to be disrupted. Such as banking crisis, debt crisis, currency crisis, speculative bubble and burst, and stock market crash. Over 1980–1996, three-quarters of IMF countries experienced banking distress (Lindgren, Garcia & Saal, 1996). Recently, the credit or subprime mortgage crisis in the United States from 2007 to 2009 is undoubtedly the most notable financial crisis episode that has expanded to the economies of the European Union and the United Kingdom. In addition, according to Mehl (2013), the failure of Lehman Brothers pushed risk aversion and global uncertainty to a new high, raising worldwide awareness of the banking crisis's severity.

Banking theory has recognized that bank assets and liabilities are jointly related to generating both credit risk and liquidity risk (Klein, 1971; Monti, 1972; Bryant, 1980; Diamond & Dybvig, 1983). The Banking crisis reflects the liquidity and insolvency of one or more banks in the financial system. Due to the bank's massive losses, the bank encounters severe liquidity shortages to the extent this has disrupted its ability to repaying the debt contracts and withdrawals requested by depositors. The banking crisis is also defined as “the emergence of banks' severely impaired capacity to execute their intermediation function. A localized crisis occurs when a few banks are restricted, whereas a systemic crisis occurs when the entire system collapses”(Davis & Karim, 2008).

After having the above different definitions, one can ask whether we should consider bank instability as solvency or a liquidity crisis? Recently, Thakor (2018) find that GFC was primarily an insolvency risk crisis that caused liquidity to flee the system. Also, Deyoung, Distinguin, & Tarazi (2018) view that the liquidity of a bank’s assets,

the stability of a bank's liabilities, and a bank's desired levels of equity capital are interrelated. Carletti, Goldstein, & Leonello (2020) find that capital and liquidity regulation are complements. Diamond & Rajan (2005) argue that bank liquidity shortages may cause solvency problems since banks' illiquid assets are funded through short-term debt, overall liquidity shortage. Fungacova, Turk, & Weill (2015) illustrated bank instability using liquidity Shortage and the Weak Fundamentals hypotheses. According to Liquidity Shortage Hypothesis (liability risks), banks fail arises when depositors scramble on the bank despite the sound fundamentals of the banks; this occurs mostly due to depositors' lack of knowledge, as they fail to distinguish between solvency and liquidity shocks. While, the weak fundamentals hypothesis (asset risks) suggests that imminent bank collapse is caused by weak bank fundamentals such as deteriorating loan quality, low liquidity, lower profits, and decreasing capital ratio. Therefore, a more comprehensive understanding of bank stability can be obtained by looking at their balance sheets (Fungacova, Turk, & Weill, 2015). Thus, the CAMELS components are often used as the basis for an early warning system.

There has been little literature highlighted the possible costs of banking system instability. The crises in all or part of the banking sector cause severe disruption in banking systems worldwide. It produced costs on the economy as a whole or part for the stakeholders (shareholders, depositors, other creditors, and borrowers) and taxpayers who bear the fiscal burden to solve the banking crisis (Ben S. Bernanke, 1983; Cecchetti, Kohler & Upper, 2009; Montagnoli & Moro, 2018). For instance, Hoggarth, Reis, & Saporta (2002) find that developed and emerging-market economies incurred losses in GDP. Friedman & Schwartz (1963) see a sharp and

unexpected contraction in the money supply that led to a recession. Bernanke (1983) finds widespread bank failure in the United States caused the Great Depression. Also, Bernanke (1983), Bernanke & James (1991), and Bernanke, Gertler, & Gilchrist (1996) support the credit crunch theory of the Great Depression. IMF (1998) and Bordo et al. (2001) find in single banking crises that output loss during crises on average 6–8% of annual GDP, while well over 10%, on average, when crisis accompanied by the currency crisis.

Montagnoli & Moro (2018) find that banking crises cause losses of personal income, job, and GDP and increase inflation and unemployment rates. Honohan & Klingebiel (2000) find an increase in budget expenditures that must be absorbed through higher taxes or spending cuts, open-ended liquidity support, costly unlimited deposit guarantees, repeated recapitalization, regulatory forbearance, and debtor bail-outs. Kashyap, Stein, & Wilcox (1993) & Hall (2002) find that shifts in loan supply affect investment. Lown, Morgan, & Rohatgi (2000) find a strong correlation between tighter credit standards and slower loan growth and output. Hoggarth & Thomas (1999) find a reduction in bank lending reflects a reduction in the supply of or demand for funds. Briefly, Bank crises could lead to disruption of credit intermediation, a contraction of credit supply, a large reduction in economic output and asset prices; unemployment rises, Housing and equity markets are severely hit. Also, those crises caused disrupted banking systems through losing money on mortgage defaults, interbank lending to freeze, and credit to consumers and businesses drying up, large financial institutions have collapsed or been bought out, and the world stock markets have fallen (Frankel & Rose, 1996; Barth, Caprio & Levine, 2001; Caprio & Klingebiel, 2003). Consequently, many governments were prompted to roll out rescue packages with

considerable sums to bail out banks. Internationally, issuing new regulatory actions, for example, the Dodd-Frank Act in the U.S. and Basel III (Honohan & Klingebiel, 2000; Hoggarth, Reis & Saporta, 2002; Prabha & Willett, 2005).

2.3 Bank-Specific Factors

The literature examining the determinants of bank stability regularly includes bank and market structure factors as key explanatory variables. The former are often accounting or financial variables calculated from bank balance sheets and income statements and mainly derived from the CAMELS methodology[2]. Some studies have partly or wholly used CAMELS indicators in their empirical analysis (Klomp & De Haan, 2012; Abedifar, Molyneux and Tarazi, 2013; Bitar, Hassan, and Walker, 2017). In addition, the role of bank capital as a cushion against unexpected risks and losses is essential. Among others, Berger et al., (2009) and Uhde & Heimeshoff (2009) show that well-capitalized banks are more stable. Another critical variable used in stability studies is credit risk measures (Abedifar, Molyneux & Tarazi, 2013; Kabir & Worthington, 2017; Doumpos, Hasan & Pasiouras, 2017).

As an asset quality indicator, credit risk can influence asset values and overall bank earnings and, as such, bank stability. Findings generally show a negative effect of credit risk on stability (Rajhi & Hassairi, 2013; Imbierowicz & Rauch, 2014; Chiaramonte & Casu, 2017; Alqahtani & Mayes, 2018). Bank efficiency has also been found to impact bank stability. Primarily the banking literature uses the cost to income as a proxy for managerial quality. Though the hypotheses generally suggest a negative influence on bank stability, the findings are ambiguous (Alqahtani & Mayes, 2018;

[2] CAMELS stands for capital adequacy, asset quality, management capability, earnings, liquidity and sensitivity respectively. As we use asset quality, capital adequacy , managemnt efficiency and earnings we solely refer these variables in this section.

Chiaramonte & Casu, 2017; Bitar, Hassan, & Walker, 2017).

Empirical confirmation on the stability factors of the bank-specific has a long history. Many studies identified variables for a single country or several countries and demonstrate the bank explanatory factors applying several methodologies to identify the main determinants of banks' stability. For example, according to Clark, Radić, & Sharipova (2018), Lee, Hsieh & Yang (2014), and Agoraki, Delis, & Pasiouras (2011), an increase in the stability level of the previous year (Lagged of Z-Score (Z (-1)) positively affect the future status of the bank stability.

In addition to CAMELS covariates, the literature typically incorporates other bank-specific variables - such as income diversification and bank size. Income diversification can be achieved by using different income sources and enabling banks to boost stability through enhanced risk-sharing. Although the literature posits that diversification should improve bank stability, the empirical results are mixed. Among others, Lepetit et al. (2008) and Chiaramonte & Casu (2017) find a positive effect of income diversification on bank stability. In contrast, Abuzayed et al. (2018), Alqahtani & Mayes (2018), and Elsas et al. (2010) show that it has a negative influence. Bank size can also exploit scale and scope efficiencies and lead to stability improvements (Berger, 1995). On the other hand, it may cause instability by encouraging banks to carry greater risk through 'too big to fail' incentives (Mishkin, 1999). The relationship between stability and bank size is ambiguous (Beck, Demirgüç-Kunt & Levine, 2006). For example, Chiaramonte & Casu, 2017 find a negative relationship, while Cihak & Hesse (2010) and Clark et al. (2018) assert a positive relationship.

2.4 Market Structure

There is also a plethora of theoretical and empirical research analyzing the effect of market structure on bank stability. Studies use market structure measures (such as concentration ratio or the Herfindahl index, or other indicators like the Lerner index, as proxies for competition) and typically examine competition-fragility and competition-stability hypotheses. According to the competition-fragility hypothesis (Keeley, 1990; Allen & Gale, 2000), higher competition creates banking system fragility by encouraging excessive risk-taking. The competition-stability view (Boyd & De Nicolo, 2005) maintains, on the other hand, that competition improves efficiency and decreases the cost of banking services. This leads to a lower risk of default for bank customers and thus improves the bank's stability. Anginer, Demirguc-Kunt, & Zhu (2014), Beck, Demirgüç-Kunt & Levine (2006), and Schaeck & Cihak (2014) provide support for the competition-stability view. Others (Soedarmono, Machrouh, & Tarazi, 2013; Kasman & Kasman, 2015; Kabir & Worthington, 2017) find evidence of the competition-fragility view. Berger et al. (2009) find support for both hypotheses.

2.5 Macroeconomic Environment

The macroeconomic environment is a significant determinant of bank behavior. According to previous studies, variables like GDP growth, inflation rate, money supply, and trade openness are well-stated bank stability predictors. Higher growth rates in countries necessitate additional financial resources. As such, banks in such countries are also likely to be better capitalized, more efficient, have lower return volatility, and have reduced credit risk. As a result, banks operating in countries with more robust gross domestic product growth are expected to be more stable. Anginer, Demirguc-Kunt, & Zhu (2014) found a positive correlation between GDP volatility

and banks' systemic risk. In downturns, Chakroun & Gallali (2015) find a similar link saying that consumption, investment, and related credit growth fall, adding to risks. According to Rajhi & Hassairi (2013), country/regional features and bank size may affect the relationship between growth and stability. For instance, they find growth positively and significantly affects bank stability for large banks in Southeast Asia and MENA countries, but a negative relationship for small MENA banks. Bitar, Hassan, & Walker (2017) also find a positive relationship between economic growth and banks' stability.

Inflation can hurt banking sector development. High inflation reduces the incentive for banks to provide a credit on a long-term basis harms real returns on loans leading to a misallocation of resources. Overall, the funding ability of banks to promote economic growth reduces. Huybens & Smith (1999) show that an increase in inflation encourages banks to ration credit, reducing the real return rate on equity, which leads to a decline in financial sector activity. However, according to Uhde & Heimeshoff (2009), the effect is dependent on whether banks anticipate inflation and if it corresponds with general economic instability. Rajhi & Hassairi (2013) support this mixed view, asserting an adverse effect for large banks and a positive effect for small banks operating in Southeast Asian countries. Rousseau & Wachtel (2002) indicate that when the inflation rate falls below 15%-20%, this mitigates banking sector development. On the other hand, Demirguc-kunt & Detragiache (1998) assert that high inflation threatens a banking crisis where economic growth is negative or low. However, Doumpos, Hasan, & Pasiouras (2017) find no significant relationship between inflation and overall bank financial strength.

The money supply is another crucial macroeconomic variable that can impact banks since it can influence interest rates, inflation, exchange rates, and overall credit extension (Gertler & Gilchrist, 1994; Rajan, 2006; Borio & Zhu, 2012). Friedman (1969) notes that money supply affects bank liquidity, which influences the credit creation ability of banks. Thakor (1996) also emphasizes the link between money supply, bank lending, and capital adequacy through long and short-term interest rates. Fofack (2005) suggests that broad money supply (BM) has a positive covariance structure with NPLs. Therefore, an increase in the aggregate stock of money contributes to a deterioration in bank portfolio quality. Bofondi & Ropele (2011) and Chung & Ariff (2016) also show that the money supply can affect a bank's lending ability, which influences financial stability.

Finally, various studies investigate whether trade openness (the level of integration of one economy with others) influence bank stability. For example, Rajan & Zingales (2003) find that trade openness can promote countries' financial development. Klomp & De Haan (2015) also show that open economies make financial sectors more resilient (by absorbing shocks through changes in import and export flows). Furthermore, Baltagi, Demetriades, & Law (2009) find evidence that trade and financial openness are significant determinants of banking sector development. Law (2009) reveals that trade openness and capital flows improve institutional quality and competition channels that positively aid financial sector development from a different perspective.

2.6 Institutional Development

Institutional features have for some time been recognized as essential elements that can influence bank behavior. Levine (1998), La Porta, Silanes, & Shleifer (1998),

Barth, Caprio & Levine, 2004 and Fernández & González (2005) are amongst the pioneers who note the importance of institutional development for the financial strength of the country. For example, a country lacking good governance, efficient enforcement of law, government effectiveness, and a legal rights system might have a weak banking sector.

Studies on bank regulation and its influence on stability are, however, somewhat contradictory. One strand of literature argues that stricter regulations and supervision improve bank stability. In contrast, the other claims the opposite and suggests that more liberal regulations allow banks to benefit from diversification, enhancing banks' resilience against risks. For example, Beck, Demirgüç-Kunt & Levine (2006) indicate that regulatory policies and institutions that 'thwart' competition are associated with greater banking system fragility, and activity restraints increase the probability of banking crisis due to limiting the opportunities to diversify risk. In addition, Agoraki et al. (2011) and Barth, Caprio, & Levine (2004) found restraints on bank activities do not necessarily reduce financial fragility. On the other hand, Klomp & De Haan (2015) found stricter supervision and regulation for capital requirements and supervisory control increases bank Z-scores (stability). Tabak et al. (2016) also suggest that more substantial supervision contributes to banking stability. Nevertheless, Klomp & De Haan (2012 &2015) and Uhde & Heimeshoff (2009) assert that these findings can change depending on the regulatory measures used.

Besides the impact of regulation, the stability of banks can also be influenced by the nature of legal systems. These reveal the amount to which agents must trust and follow society's laws, including - property rights, the quality of contract enforcement, the role of the courts and police. According to La Porta, Silanes, and Shleifer (1998), the origin

of a country's legal system is crucial in determining the rules that govern financial transactions, such as accounting standards, contract enforcement, and credit use and allocation laws. Fang, Hasan, and Marton (2014) show that better institutional development leads to higher banking stability. Also, banks' financial stability increases substantially after countries reform their legal institutions, liberalize banking, and restructure corporate governance. After improving the institutional environment, Fang, Hasan, & Marton (2014) find these changes lead to lower return-on-assets volatility and fewer non-performing loans.

Furthermore, institutional development linked to promoting economic and financial freedom may have a diverse effect on stability. Economic freedom reflects the country's institutional quality concerning the size of government, security of property rights, freedom to trade internationally, access to money, labor and trade, and regulation of credit. Financial freedom measures the banking sector's independence from government control and intervention in the financial system. Concerning economic freedom, Baier, Clance, & Dwyer (2012) find that countries with relatively lower levels of regulation - more economic freedom - are less likely to face a financial crisis in the short run (compared to countries with more regulated systems). Beck, Demirgüç-Kunt, & Levine (2006) find similar results about financial crises.

Furthermore, according to Hafer (2013), countries with greater degrees of initial economic freedom show more developed financial intermediaries. This is an essential concern for policymakers as financial development is expected to engender faster economic growth. Lower financial freedoms linked to banking sector dependence on government (predominantly through state ownership and a solid political influence) are generally believed to limit competition, resource allocation, and service quality

(Chortareas, Girardone, and Ventouri, 2013; Sufian, 2014; Bjørnskov, 2016). This can feed through into lower efficiency as well as more significant financial exclusion. Chortareas, Girardone, & Ventouri (2013) suggest that bank efficiency is linked to financial freedom. They assert that lower constraints faced by financial institutions enable them to have better cost control and more efficient resource allocation processes. Beck, Demirgüç-Kunt, & Levine (2006) find that countries with greater bank freedom are less vulnerable to experience crises. Sufian (2014) also showed that financial freedom is positively related to bank profitability in MENA (the Middle East and North Africa) countries.

From above, one can see that characteristics of the institutional environment can have different implications for bank stability. For instance, Fang, Hasan, & Marton (2014) look at transition economies and find that financial stability is greater for domestic than foreign banks after the reform of the institutional environment. Demirguc-kunt & Detragiache (1998), Fernández & González (2005), and Klomp & De Haan (2015) note that a country with better institutional development has a healthier banking system as they suffer less from corruption and bureaucracy and have enhanced legal systems. Doumpos, Hasan, & Pasiouras (2017) compare conventional banks (CBs), Sharia-compliant counterparts (IBs), and Islamic windows banks (IW) operating in the Asia and GCC countries. They suggest that financial strength is affected by institutional development, such as government effectiveness and control of corruption.

Generally, the impact of a wide array of institutional features has not (as far as we know) been examined in countries where Islamic banking is essential. Thus, for example, we do not know how financial freedom, economic freedom, control of corruption, political stability, regulatory quality, the rule of law, government

effectiveness, voice & accountability impact bank stability in these countries. Hence, we use a sample of QISMUT+3 countries to investigate such matters in this study.

2.7 Religiosity

Studies in economics and finance have increasingly paid attention to the role of religion and links to economic and financial behavior. There is a substantial discussion on the relationship between religion and risk-taking (Miller & Hoffmann,1995; Hilary & Hui, 2009; Noussair et al., 2013); on its impact on the economy and individuals (Miller & Hoffmann, 1995; Barro & McCleary 2003; Noland, 2005; Pryor 2007; Johnson, 2013; Bitar, Hassan, & Walker, 2017); financial markets (La Porta et al., 1998; Kumar et al., 2011); and banking systems (Levine, 1998; Houston et al., 2010; Johnson, 2013; Abedifar, Molyneux & Tarazi, 2013; Mollah & Zaman, 2015; Mollah, Hassan, & Al-Farooque, 2017; Bitar, Hassan, & Walker, 2017). Zucker & Darby (1999) note that religious environments and economic structures are likely to be correlated in cross-country samples in ways that are difficult to disentangle. Noland (2005) indicates that Islamic religion promotes economic performance via the prohibition of interest and emphasis on profit-sharing contracts. Barro & McCleary (2003) suggest that the Muslim share in the population has a significantly negative impact on economic growth. However, Pryor (2007) finds that the Muslim share in the population has relatively little influence on most economic and social performance indicators. Imam & Kpodar (2016) assert that religious links that promote Islamic banking are associated positively with economic development.

It is generally accepted that the religious environment and Muslim percentage of the population play a role in bank behavior. For instance, Johnson (2013) finds that the Muslim share in the population is the most significant determinant of the diffusion of

Islamic banks. Also, religion can have an impact on bank risk-taking. According to Abedifar, Molyneux, & Tarazi (2013) and Mollah, Hassan, & Al-Farooque (2017), the conventional banks were more profitable and stable than Sharia-compliant counterparts in countries with Sharia-based legal systems and the Muslim majority. In contrast, Mollah & Zaman (2015) found that conventional banks operating in Muslim-majority countries were less profitable. According to Bitar, Hassan, & Walker (2017), Muslim culture and identity, beliefs and loyalty, and the implementation of Sharia principles may help improve Islamic banks' reputation, confidence, and public trust, hence their financial soundness. Beck, Demirgüç-Kunt, & Merrouche (2013) found sharia-compliant banks were lower cost-effective but have a greater asset quality and intermediation ratio and better capitalization. During a crisis, they are less inclined to disintermediate. Baele et al. (2014) find that Islamic loans have a reduced default rate due to customer religious beliefs. In general, the majority of the literature suggests that the Muslim share in the population and Sharia-based legal systems generally enhance bank stability.

2.8 Oil and Gold Prices and Banking Systems

Although there is extensive research on oil prices and gold prices, scant research exists regarding the relationship between commodity prices and banking systems. The relevant literature is summarized as follows.

Hamilton’s (1983) watershed study that shows Granger causality running from oil prices to GDP (negative) and unemployment (positive) has been followed by many other studies. Most of these studies asserted that oil prices via the Granger causality test affect other macroeconomic variables, such as GDP, inflation, unemployment, and productivity (Brown & Yücel 2002; Lescaroux & Mignon 2008). Thus, as explained

by the above literature, increasing oil prices negatively affect economies, which is usually greater than the positive effects of falling oil prices (Brown & Yücel 2002; Lescaroux & Mignon 2008).

The limited research on the relationship between financial markets and oil prices mainly analyzes this relationship through the stock markets. According to Lescaroux & Mignon (2008), the fundamental asset value, which is the discounted sum of the expected dividend, can be used to understand the link between the stock markets (share prices) and the oil price. Jones & Kaul (1996) and Lescaroux & Mignon (2008) are among those researchers who confirmed the effects of oil prices on stock prices. Narayan & Gupta (2015) and Wang et al. (2018) find that oil prices change had predictive power over US stock returns. From the exchange rates aspect, Cologni & Manera (2008) and Sari, Hammoudeh, & Soytas (2010) found a long-term correlation between oil prices and exchange rates. However, Chang et al. (2013) found a short-term relationship, which supports the findings of Nikos (2006) that suggests exchange rate fluctuations are country-specific. Concerning the interest rates, Ioannidis & Ka (2018) find that oil demand and supply shocks demonstrate a considerable amount of variation in the interest rates' term structure in industrialized countries. Le & Chang (2016) also asserted that in the short run, oil prices provide useful information to predict fluctuations of the macro-financial variables in the Japanese economy.

Historically, gold is considered a safe haven and a hedging instrument by all economic units, particularly during crisis periods. Previous studies have documented that gold can be used as a dollar hedge (e.g., Sjaastad, 2008; Joy, 2011) to protect investors from dollar fluctuations. In addition to currency hedging, gold is used as a hedging instrument to avoid the adverse effects of inflation (Blose, 2010; Worthington &

Pahlavani, 2007). Studies have also shown that gold can serve as a safe haven during a crisis (Baur & Lucey 2010; Ciner et al., 2013; Kanjilal & Ghosh, 2017). Baur & Lucey (2010) and Reboredo (2013) asserted that gold could perform this role during extreme market volatility. Some other studies found that gold improves portfolio performance (Baur & Lucey, 2010; Sari, Hammoudeh, & Soytas, 2010). The above features of gold make it an alternative and reserve asset (Narayan et al.,2010) and insurance against the economic turmoil (Shafiee & Topal, 2010). In addition to the above fiduciary duties, Le & Chang (2016) showed that GP provides information to forecast the fluctuations of the macro-financial variables in Japan. To sum up, gold is expected to affect bank stability.

Few studies have attempted to explore the oil prices, stock market, and banking relationship regarding Gulf Cooperation Council countries. Among these studies, Arouri & Rault (2012) and Maghyereh & Al-Kandari (2007) found a cointegration and a positive effect of increasing OP on stock prices. Regarding the banking sector, the impact of OP is generally researched through nonperforming loans (NPLs). Alodayni (2016) pointed out that OP and changing interest rates are significant determinants across the GCC banks. Similarly, Al-Khazali & Mirzaei (2017) also found that oil price changes significantly affect the NPLs. The effect is asymmetric and higher for the large banks. Khandelwal, Miyajima, & Santos (2016) and Ibrahim (2019) for the GCC countries, and Killins & Mollick (2020) for Canada find a significant link between oil price swings and loans loss ratio. In other words, existing feedback loops between oil prices and macroeconomic variables cause a negative effect to bank loans when oil price decreases in oil-exporting countries. Concerning the impact of economic growth on NPLs, Espinoza & Prasad (2010) found that lower

economic growth worsens the NPLs among the GCC countries. This finding also suggests negative implications of decreasing oil prices on NPLs in the GCC countries since decreasing oil prices could be one of the reasons for lower economic growth.

Though a few studies exist regarding gold and the stock market, we could not find any study on the relationship between banking and gold prices. However, among the gold and stock market studies, Mensi et al. (2015) found that GCC investors can diversify and reduce risk by including gold into their portfolios during quiet and downturn periods. Regarding the GP effect, Mensi et al. (2017) found that increased GP reduced the stock market performance, while Maghyereh, Awartani, & Tziogkidis (2017) suggested an insignificant effect of gold price changes on GCC stock markets.

2.9 Summary

This chapter contains a literature review on determinants of the financial stability of banks. In addition, it details the deliberations on the stability of banks through the factors affecting them, particularly bank-specific factors, market structure, macroeconomic environment, Institutional development, and religiosity. Furthermore, an overview of the relationship between bank stability and the most widely traded commodities is provided with particular attention to oil and gold prices and their correlation with other factors such as the stock market and business cycles.

Empirical evidence on the stability factors of the bank-specific has a long history. Many studies identified variables for a single country or several countries and demonstrate the bank explanatory factors applying several methodologies to identify the main determinants of banks' stability. The literature examined the determinants of bank stability included bank-specific factors as key explanatory variables. Often

accounting or financial variables calculated from bank balance sheets and income statements, the empirical results are mixed.

Indecisive evidence was collected in earlier studies on the effect of market structure on bank stability, which examined competition-stability and competition-fragility hypotheses. The competition-fragility hypothesis (Keeley, 1990; Allen & Gale, 2000) argues that higher competition causes fragility in the banking system by encouraging excessive risk-taking. The competition-stability view (Boyd & De Nicoló, 2005), on the other hand, claims that competition improves efficiency and lowers the cost of banking services. As a result, bank clients' default risk reduces and improves bank stability.

Further, through analysis of the available literature and the works of other authors, we gained a better insight into the state of research in macroeconomic determinants of bank stability. Previous studies have used macroeconomic factors (e.g., GDP growth rate, inflation, money supply, and trade openness) as the control variables. Namely, they found banks in countries with higher GDP growth are also generally expected to be better capitalized, more efficient, have lower volatility in earnings, and have less credit risk. High inflation reduces the incentive for banks to provide a credit on a long-term basis harms real returns on loans leading to a misallocation of resources. Overall, the funding ability of banks to promote economic growth reduces. In addition, the money supply can influence interest rates, inflation, exchange rates, and overall credit extension. Finally, trade openness can make financial sectors more resilient, and capital flows improve institutional quality and competition channels that positively aid financial sector development.

Institutional development has been a widely researched topic due to its effects on diversification, competition, banking system fragility, capital requirements (i.e., bank behavior), and economic growth. Generally, the impact of a wide array of institutional features has not (as far as we know) been examined in countries where Islamic banking is essential. For example, we do not know how factors such as regulatory quality, control of corruption, financial freedom, economic freedom, voice & accountability, political stability, the rule of law, and government effectiveness affect bank stability in these countries. In addition, studies in the field of economics and finance have increasingly paid attention to the role of religion and links to economic and financial behavior, such as risk-taking, economy, and individuals, financial markets, banking systems. In general, most of the literature suggests that the Muslim share in the population and Sharia-based legal systems generally enhance bank stability.

Although there is extensive research on oil prices and gold prices, scant research exists regarding the relationship between commodity prices and banking systems. Generally, the effect of oil price is researched through nonperforming loans (NPLs). On the other hand, though a few studies exist regarding gold and the stock market, we could not find any study on the relationship between banking and gold prices. However, the region of GCC countries has a high degree of financial and economic homogeneity, as they have common characteristics (language, culture, history, religion, oil, and gas-dependent). Moreover, the GCC has set up comprehensive Islamic financial infrastructures and is considered the center of Islamic economies, and it is subject to the same principles of Islamic Shariah. Hence, it has unique characteristics, and therefore a study investigating this phenomenon is under-researched.

Chapter 3

THE IMPACT OF MACROECONOMIC, INSTITUTIONAL DEVELOPMENT, AND RELIGIONSITY ON BANK STABILITY IN DUAL BANKING SYSTEMS

3.1 Introduction

The onset of the Global Financial Crisis (GFC) not only triggered a major debate about bank stability (Kanagaretnam et al. 2015; Baier, Clance, & Dwyer, 2012; Beck, Demirgüç-Kunt & Levine, 2006) but also encouraged comparative studies investigating risk factors for conventional and Islamic banking (Bourkhis & Nabi, 2013; Altaee, Talo, & Adame, 2013). Thomson Reuters's 'State of the Global Islamic Economic Report 2018/2019' notes that the resilience of Islamic countries over the 2007-2009 crisis increased policy makers and researchers' attention to better understand the Islamic economy and its ecosystem, particularly Islamic banking. The rapid growth rate of Islamic banking is considered a promising alternative to the conventional banking system as it can potentially provide a more stable economic environment. In addition, the Standing Committee for Economic and Commercial Cooperation of the Organization of Islamic Cooperation (COMCEC) notes that "Islamic finance is equity-based, asset-backed, ethical, sustainable, environmentally- and socially-responsible finance " (Financial Outlook of the OIC Member Countries 2017). Given these principles, Islamic banking can potentially contribute to

sustainable development, shared prosperity, and financial inclusion in OIC countries (World Bank and Islamic Development Bank Report 2016).

According to Thomson Reuters (2019), the size of the total Islamic finance market was $2.4 trillion in 2017 and is expected to increase to $3.8 trillion in 2023 - a 7.7% growth rate. Islamic banking assets constitute the bulk of these assets reaching $1.7 trillion in 2017 and expecting to grow to $2.4 trillion by 2023. Ernst & Young (EY) (2016) identify QISMUT countries as the nine most important Islamic banking markets. According to EY (2016), QISMUT and QISMUT+3 countries own 83% and 93% of industry assets, respectively. The report expects the majority of growth in Islamic banking and finance will come from these nine countries. QISMUT+3 countries are all high-income or upper-middle-income countries. Given the importance of these countries, we believe they act as a suitable laboratory to undertake a comparative analysis into the determinants of Islamic and conventional bank stability.

There is substantial literature that examines bank stability issues relating to Islamic banks and their traditional counterpart (Cihak & Hesse, 2010; Abedifar, Molyneux & Tarazi, 2013; Altaee, Talo, & Adam, 2013; Kabir & Worthington, 2017; Bourkhis & Nabi, 2013; Bitar, Hassan & Walker, 2017; Narayan & Phan, 2017). This work primarily finds that the financial soundness of Islamic banks outperforms conventional counterparts in countries that have Sharia-based legal systems but underperform them in countries where Islamic law is not used to describe the legal system. Using the GMM set-up, our study advances this literature by focusing on the impact of institutions, religion, and the economic cycle on bank stability in QISMU+3 countries.

First, institutional development is linked to business culture, and this is expected to influence bank behavior. For instance, Houston et al. (2010) found more creditor protection linked to increased bank risk-taking. Second, Demirguc-Kunt & Huizinga (1999) suggest that legal and institutional indicators explain differences in bank profitability. Chortareas, Girardone, & Ventourie (2013) confirm that higher financial freedom provides cost advantages that boost bank efficiency, and Gungoraydinoglu & Öztekin (2011) state that institutional arrangements matter for capital structure decisions. Finally, Demirguc-Kunt & Maksimovic (2002) posit that the quality of banks depends on the legal system's ability to enforce contracts. Our study uses different institutional and political indicators, covering the level of corruption, nature of legal systems, and governance to take into account how country institutional features impact bank stability.

A substantial body of work also considers the influence of religion on bank behavior (Houston et al., 2010; Agoraki, Delis & Pasiouras, 2011; Kanagaretnam et al. 2015; Adhikari & Agrawal 2016). In addition, economists have long recognized the significance of religion in determining the financial conduct of individuals and structures of institutions and markets (Miller & Hoffmann, 1995; Barro & McCleary 2003; Noland, 2005). Following this strand of literature, our analysis examines the possible influences of religion on bank stability using the Muslim population and Sharia law as indicators of religiosity (Miller & Hoffmann, 1995 & Hilary & Hui, 2009). First, for example, Sharia law may lead investors to place more value on Islamic instruments. Second, if there are a larger proportion of Muslims in the population and these are particularly keen to hold deposits in Islamic banks and not withdraw them in

time of volatility then such actions can lead to greater stability (Barro & McCleary, 2003; Pryor, 2007; Johnson, 2013; Abedifar et al.,2013).

Macroeconomic cycles can cause financial fluctuations and policy challenges. As such, we study the effects of the macroeconomy on bank stability. The theoretical and empirical findings that support the effect of macroeconomic factors over the banking sector can be traced in Demirgu-kunt & Detragiache (1998), Uhde & Heimeshoff (2009), Cihak & Hesse (2010), and Delis & Kouretas (2011). These studies indicate that there is an interaction between macroeconomic, financial, and institutional fragility during banking crises. For instance, Uhde & Heimeshoff (2009) show that real GDP growth, GDP per capita, inflation, and real interest rates significantly affect European banks' financial stability. Likewise, Demirgu-kunt & Detragiache (1998) study the causes of banking crises in developed and developing economies and find adverse economic conditions, such as damaging or low growth with high inflation, high interest rates, and high levels of unemployment, cause banking crises. Therefore, our analysis investigates whether GDP growth rate, inflation, financial development, and trade openness affect bank stability in QISMUT+3 countries.

3.2 Empirical Specification and Data

Our modeling approach investigates the influence of institutional, religious, macroeconomic, and bank- and market-specific variables on the stability of Islamic and commercial banks operating in QISMUT+3 nations over 2011–2017. The analysis includes 254 banks across QISMUT+3 countries, of which 79 are IBs and 175 are CBs. Country origin, types, and the number of banks are shown in appendix A, and appendix B provides definition and data sources of the variables.

Given the previous literature on bank stability, we follow Kabir & Worthington (2017), Beck, Demirgüç-Kunt & Merrouche (2013), Cihak & Hesse (2010), Uhde & Heimeshoff (2009), and use the solvency risk measure (Z-score) as our explained variable. We estimate the following models:

Model I: Macroeconomic Model:

$$Z_{ij,t} = \alpha_t + \delta Z_{i,t-1} + \sum_{i=1}^{k1} \beta_1 BSV_{it}^{j} + \sum_{i=1}^{k2} \beta_2 BMV_{it}^{j} + \sum_{i=1}^{k3} \beta_3 MV_{it}^{j} + \varepsilon_{ij,t} \quad (1)$$

Model II. Institutional Development Model:

$$Z_{ij,t} = \alpha_t + \delta Z_{i,t-1} + \sum_{i=1}^{k1} \beta_1 BSV_{it}^{j} + \sum_{i=1}^{k2} \beta_2 \ BMV_{it}^{j} + \sum_{i=1}^{k3} \beta_3 \ MV_{it-1}^{j} + \sum_{i=1}^{k4} \beta_3 \ IEV_{it}^{j} + \varepsilon_{ij,t} \quad (2)$$

Model III. Religiosity Model:

$$Z_{ij,t} = \alpha_t + \delta Z_{i,t-1} + \sum_{i=1}^{k1} \beta_1 BSV_{it}^{j} + \sum_{i=1}^{k2} \beta_2 \ BMV_{it}^{j} + \sum_{i=1}^{k3} \beta_3 \ MV_{it-1}^{j} + \sum_{i=1}^{k5} \beta_5 \ REV_{it}^{j} + \varepsilon_{ij,t} \quad (3)$$

Where $Z_{ij,t}$ denotes the bank stability indicator for bank i working in country j at year t. $\delta Z_{ij,t-1}$ used to treat the dynamic nature of banks' stability and also to reflect the inertia term. We employ bank-specific variables BSV_{it}^{j} and bank market structure variables BMV_{it}^{j} as control variables in all our model set-ups. Model 1 focuses on the impact of macroeconomic variables MV_{it-1}^{j} ; model 2 on the influence of the institutional environment IEV_{it}^{j}, and model 3 religiosity REV_{it}^{j}. These are also treated as the leading independent variables under investigation in our study. The coefficients $\beta_1, \beta_2, \beta_3, \beta_4$ and β_5 show the marginal effect of the explanatory variables. *k1*, *k2*, *k3*, *k4*, and *k5* represent the number of bank-specific, market-specific, macroeconomic, institutional, and religiosity variables. t denotes time and $\varepsilon_{ij,t}$ is the error term.

To account for persistency in our risk term, we specify a dynamic model and propose using the dependent variable's lag as an explanatory variable. However, using lagged values as an explanatory variable causes 'dynamic panel bias' (Nickell, 1981) by inflating lagged coefficients as part of the firm's fixed effects. In addition to the 'dynamic panel bias', there could also be reverse causality among some of the bank-specific explanatory variables and bank stability. Hence, our analysis would be exposed to endogeneity issues. To account for this and our model's dynamic structure, we choose to apply the Generalized Method of Moments (GMM) estimator (Hansen, 1982) in our analyses. Notably, we use Arellano & Bover's (1995) and Blundell & Bond's (1998) two-step system GMM methodology, instead of Arellano & Bond's (1991) difference GMM approach, which treat lags of the explanatory variables as instruments and causes the difference estimator to be biased due to serial correlation between the error term and lagged dependent variable. The System GMM approach combine regressions in differences as well as levels. As this approach uses forward orthogonal deviation transformations, it maintains the size of the sample in panels with gaps in unbalanced panels, as in our data set. And, it also allows the use of more instruments and hence can produce superior estimators than the first-difference transformation. The system GMM method employs the untransformed level equation and the difference equation, which minimizes potential bias via utilizing lags of pre-determined variables (at the levels equation) as instrumental variables (Blundell & Bond, 1998). Consequently, it eliminates possible correlation bias of the variables with the error term.[3] Furthermore, this method allows us to treat bank-specific variables as endogenous and market-specific variables as exogenous. Two-step system GMM is

[3] In addition to these issues, other assumptions related to the data- generating process that covers the use of difference and system GMM estimators are documented in Roodman (2009).

also more efficient than the one-step as it corrects for finite-sample through Windmeijer (2005) sample correction.

The significance of the system GMM results depends on the absence of autocorrelation and the validity of the instrument matrix. Therefore, we perform Arellano & Bond's (1991) AR (1) and AR (2) autocorrelation tests. In this test, residuals obtained from the estimations are expected to be correlated with order (1) but not order (2). For the instruments matrix's validity, we execute Hansen tests. For this test, we pay attention to P-values in the range of .10 and .25, as suggested by Roodman (2009).

3.2.1 Measuring the Stability of Banks

In the previous literature, the Z-score is a commonly used bank stability index (e.g., Lepetit et al., 2008; Laeven & Levine, 2009; Berger, Klapper, & Turk-Ariss, 2009; Cihak & Hesse, 2010; Chakroun & Gallali, 2015). Moreover, Chiaramonte et al. (2015) asserted that it is less data demanding and more effective in dealing with solvency risk for banks with relatively complex business models. The theoretical underpinning of the Z-score relates to the insolvency (failure) concept of Roy (1952) and Altman (1968). It is also defined as the inverse probability of failure. Boyd & Runkle (1993) define it as the number of standard deviations that are required to fall from the mean return to deplete the bank's equity capital. The equation for the Z-score is given by the $Z=ROA+(E/TA)/\sigma_{ROA}$, where ROA is the net profit after tax divided by total asset, E/TA is the equity-to-asset ratio. Lastly, σ_{ROA} as a proxy for return volatility is the standard deviation of return to assets (σ_{ROA} is calculated over the full sample [1 . . . T] relative to current period t values of ROA and E/TA). As it can be seen from the equation, higher profitability and capitalization increases the Z-score, and therefore, stability. A higher standard deviation of profits reduces bank stability

(as makes lower equity capital and profits).

3.2.2 Institutional Development

This study uses the economic freedom (EF), financial freedom (FF), and a disaggregated governance index of Kaufmann et al. (2011) to control for institutional factors. In general, economic freedom (EF) can be defined as the freedom of economic choice of units involved with economic and financial transactions. It is argued that greater economic freedom can improve allocative and cost efficiencies, transparency, and risk diversification. It has been shown to enhance competition and improve bank stability (Baier, Clance, & Dwyer, 2012; Pieroni & D'Agostino, 2013; Kabir & Worthington, 2017). On the other hand, greater economic freedom (EF) may allow banks to take on more risks, particularly in a weakly regulated banking system (Uhde & Heimeshoff, 2009). In addition, we also use the financial freedom index (FF) following Schaeck & Cihak (2014) and Kabir & Worthington (2017). This index considers government involvement in regulation, ownership of banks, credit allocation, financial market development, and openness to competition (Heritage Foundation, 2019)[4]. Greater government involvement in the financial sector may lead to skewed competition and lower efficiency. It can also lead to increased risk-taking if governments force banks to lend on unviable projects for political purposes (Barth, Caprio, & Levine, 2004; Johnson, 2013).

Finally, a governance indicator (GI) enables us to investigate the effect of governance mechanisms on stability in the banking systems of QISMUT+3. Good governance mechanisms should limit excessive risk-taking and enhance transparency. Following Altaee, Talo, & Adam (2013) and Kabir & Worthington (2017), we use the overall

[4] Heritage Foundation, 2019. Index of Economic Freedom. https://www.heritage.org/index/

governance indicator (a composite measure of governance indicators, compiling the Average of six governance measures constructed by Kaufmann, Kraay, & Mastruzzi (2011). In addition, similar to Doumpos, Hasan, & Pasiouras (2017), disaggregated components of the governance indicator from Kaufmann, Kraay, & Mastruzzi (2011), which comprise: (i) government effectiveness (GE), (ii) regulatory quality (RQ), (iii) the rule of law (RL), (iv) political stability (PS), (v) voice and accountability (VA), and (vi) control of corruption (CC) are also employed to give a more detailed analysis of the components of governance on bank stability.

3.2.3 Religiosity

As this study compares conventional and Islamic bank stability, it is a prerequisite to consider religiosity factors. This comparison is essential especially for Islamic banks since decisions of management and customers are determined by Sharia principles (in particular, the prohibition of interest and risk-sharing, among other things) can feed through into bank behavior. Following Kanagaretnam et al. (2015) Baele, Farooq, & Ongena. (2014), and Abedifar, Molyneux, & Tarazi (2013), we include country-level variables introduced to control the degree of religiosity. These include i) Muslim share (MSH), which is the Muslims Percentage in the population of each country; ii) Legal system is an indicator representing each country's legal system to control for common (LSD1), hybrid (LSD2), and Sharia (LSD3) legal systems; and iii) Muslim share dummy (MSHD), a variable that takes the value one when more than 85% of the population in a country is Muslim and zeroes otherwise. In addition, we include two interaction terms to analyze the sensitivity of IBs and CBs to the religious environment. These include the Islamic dummy interacted with the Muslim share in the population (IBD× MSH); and the interaction of the Islamic and legal system

dummies (LSD1× IBD, LSD2× IBD, and LSD3× IBD). We expect a positive effect of these variables on stability in the case of Islamic banks.

3.2.4 Macroeconomic Variables

As documented by Quagliariello (2008), macroeconomic factors can impact bank stability through different channels. A positive GDP growth rate (GDP) is expected to improve financial stability as it enhances the country's general economic and financial conditions (Soedarmono, Machrouh & Tarazi, 2013; Doumpos, Hasan & Pasiouras, 2017). Of course, this relationship can be damaging during economic recessions because of lower consumption, investment, and lending (Soedarmone et al., 2013; Chakroun & Gallali, 2015). Some, however, have found no link to bank stability and economic growth (Bourkhis & Nabi, 2013). Inflation (INF) can also have a damaging effect on aggregate economic activity and the banking sector. Demirguc-Kunt & Huizinga (1999) find that high inflation causes systemic problems, and Horvath & Vaško (2016) also state that inflation hurts financial stability. To evaluate the effect of the country's economic openness on bank stability, we consider trade openness (TRADE), namely, the total of goods and services exports and imports expressed as a percentage of GDP. Money supply (BM) can also affect bank stability via lending and liquidity channels as changing money supply influences inflation and interest and exchange rates. As such, we use broad measures of the money supply to investigate the impact on bank stability. The direction of the relationship is uncertain. Expansionary money supply can encourage risk-taking as well as higher profits, whereas contractionary policies reduce bank lending and may lower profitability and risk-taking. Bucur & Dragomirescu (2014) indicate that a range of studies found an adverse association between broad money supply and credit risk in Malaysian, Austrian, Romanian, and Nepalese banking sectors. Other studies by Fofack (2005)

and Bofondi & Ropele (2011) detect a positive relationship between money supply and credit risk in Italian and CFA (franc zone countries in West African) banking sectors. We use lagged values to show that the link between macro variables and bank stability is unlikely to be contemporaneous.

3.2.5 Bank- and Market-Specific

There is extensive literature looking at the determinants of bank stability, and these include a wide variety of bank- and market-specific variables in their model set-ups. Studies focus on a range of themes linked to stability, including competition and market structure (Berger, Klapper & Turk-Ariss, 2009; Beck, Demirgüç-Kunt & Merrouche, 2013; Kabir & Worthington, 2017); efficiency (Chortareas, Girardone, & Ventouri, 2013); macro-prudential and macroeconomic measures (Tabak et al., 2016; Rubio & Carrasco-Gallego, 2014) and institutional and religious issues (Abedifar, Molyneux, & Tarazi, 2013; Köhler, 2015; Toader et al., 2018). All of the studies, as mentioned above, employ similar bank- and market-specific. As such, we use identical control variables in all our models, and all these come from (or constructed with) data from the Orbis Bank Focus database.

The first bank-specific variable is the Lagged Z-Score (Z (-1)). This variable is used to account for the dynamic structure of bank stability. In other words, we use it to measure the persistence of financial stability. Bank size is a crucial variable in banking studies as it reflects the potential for realized scale and scope economies, market power, and 'Too Big to Fail' risk-taking. As such, we use the total assets after taking their natural logarithm to measure the size of a bank (SIZE). To evaluate the role of credit risk (CR) on bank stability, our models use the loan loss provisions to gross loans ratio as a proxy. Cost inefficiencies (CI) can reduce profitability and lead to

greater instability. Here we use the simple ratio of cost to income as our measure of cost-efficiency. The literature also shows that income diversity (DIV) is an important determinant of bank stability. It is measured as one minus the absolute value of the net interest income minus other operating income, divided by total income from operations. Values can range from zero to one. The extreme value zero indicates an absence of income diversity and implies banks rely on a single source to obtain total operating income. One of the principal policy instruments of regulators to boost bank stability are capital requirements. Bank capital can offset volatility in returns and other risks. This study uses the bank's capital to risk-weighted assets ratio as our capital adequacy indicator (CAD).

In addition to the aforementioned bank-specific characteristics, our study also includes a variety of banking market variables. We account for market concentration using the Herfindahl–Hirschman Index (HHI) – a more concentrated system may lead to greater stability if banks do not take on excessive risks if competition is low and collusive profits are earned. However, if concentration leads banks to have a ‘‘quiet life’’[5], they may become more inefficient, which could feed through into greater instability. To investigate how Islamic banks impact stability in QISMUT+3 countries, we use a dummy variable (IBD) to distinguish the impact of bank type. This variable takes a value of 1 for IBs, and 0 otherwise. Finally, the overall effect of Islamic banking development on bank stability is analyzed through the market share of Islamic banks (SHIB).

[5] John R. Hicks' ‘‘quiet life’’ hypothesis that firms in monopolistic markets will be more risk-averse than firms in competitive markets (Hicks, 1935).

3.3 Empirical Evidence

Table 3.1 reports the descriptive data of our variables adopted in the panel analysis from 2011 to 2017. It presents the mean, standard deviation, number of observations, min and max values for each variable. Following the previous literature (see, e.g., Abedifar, Molyneux, & Tarazi, 2013; Schaeck & Cihak, 2014), we use the log-transformation of the Z-score to control for outliers and skewness of the distribution. Appendix C provides the correlation matrix of the variables.

First, we confine our analysis to the bank- and market-sector variables to see their influence on bank stability. The results of the baseline estimation are shown in Table 3.2, and Model (1) reports regression results concerning only these variables. To account for the effect of macroeconomic variables on bank stability and the economic and statistical significance of the baseline regression, we add macroeconomic variables to model (1) and build Model (2). As we follow the GMM estimation methodology, we include the lagged dependent variable $\delta Z_{i,t-1}$ in all models, where the coefficient δ measures the persistence of bank stability. Model (1) demonstrates that at the 1% level, the lagged Z-score is significantly positive, implying that a rise in the previous year's stability has positively affected future stability. This result is consistent with the theoretical literature and generally confirms empirical findings (Agoraki, Delis & Pasiouras, 2011; Lee, Hsieh & Yang, 2014; Kasman & Kasman, 2015; Clark, Radić & Sharipova, 2018). The positive and significant value of the stability parameter at 0.610 suggests persistence in bank stability.

Table 3.1: Descriptive Statistic

Variables	No.	Mean	Standard Deviation	Min	Max
Z-Score	1,775	3.48	1.04	-1.34	6.20
SIZE	1,778	15.05	2.02	7.87	19.22
CR	1,778	0.01	0.04	-0.46	0.67
CI	1,778	0.59	0.34	0.11	6.41
DIV	1,778	0.59	0.27	-0.02	1.00
CAD	1,778	0.22	0.18	0.00	2.13
IBD	1,778	0.31	0.46	0.00	1.00
HHI	1,778	0.11	0.05	0.06	0.33
SHIB	1,778	0.14	0.12	0.01	0.39
GDP	1,778	0.05	0.02	-0.03	0.13
INF	1,778	0.04	0.03	-0.01	0.12
BM	1,730	0.68	0.32	0.37	1.40
TRADE	1,778	0.89	0.53	0.25	1.92
GI	1,778	-0.11	0.46	-1.18	0.68
FF	1,778	54.92	10.83	40.00	80.00
EF	1,778	64.13	6.64	52.80	77.70
VA	1,778	-0.54	0.56	-1.91	0.18
GE	1,778	0.28	0.61	-0.82	1.51
RL	1,778	0.01	0.51	-0.90	0.96
RQ	1,778	0.19	0.49	-0.72	1.11
CC	1,778	-0.04	0.61	-1.08	1.28
PS	1,778	-0.55	0.94	-2.81	1.22
MSH	1,778	0.82	0.13	0.61	0.99
MSHD	1,778	0.27	0.44	0	1
LSD1	1,778	0.42	0.49	0	1
LSD2	1,778	0.54	0.50	0	1
LSD3	1,778	0.05	0.21	0	1

Notes: No is the number of observations from 254 banks across QISMUT+3 countries over 2011 to 2017. S.D is the standard deviation. We use a z-score after taking their natural logarithm as a proxy for banks' stability, and as a proxy for bank size, the total asset after taking their natural logarithm is used.

In Table 3.2, the size variable's (SIZE) positive but insignificant coefficient does not delegate any role to bank size in this restricted model. Cost efficiency (CI) with a negative and significant relationship is consistent with Alqahtani & Mayes (2018) and Abedifar, Molyneux, & Tarazi (2013), suggests that banks have cost inefficiency are less stable. The negative coefficient on the credit risk variable (CR) is also in line with expectations. Income diversification (DIV) with a negative sign suggests an adverse effect on bank stability. This finding implies that better-diversified banks take excessive risk leading to greater fragility (Abuzayed et al., 2018; Alqahtani & Mayes, 2018). This result is also supported by Stiroh & Rumble's (2006) 'dark side' of diversification hypothesis that states over-diversification increases volatility. Finally, the capital adequacy variable CAR takes on a positive value but is insignificant.

The negative sign of the İslamic bank dummy IBD shows that the IBs are relatively less stable than the CBs. This result supports Alqahtani & Mayes (2018) and Bitar, Hassan, & Walker (2017). On the other hand, Alqahtani & Mayes (2018) find no significant differences between the IBs and CBs during the GFC and significantly lower stability of IBs after the crisis. They attribute these results to different banking practices in the post-crisis era. This argument is also supported by our study period, which covers the post-crisis period. The lower stability of IBs may be reflected in the more risky products they offer, such as *Musharaka* and *Mudaraba,* and immature legal frameworks under which they operate, together with a divergence from Islamic rules (Bitar, Hassan, & Walker, 2017). Nevertheless, the IBs market share variable (SHIB) shows a positive effect of increasing the market share of IBs to bank stability. This result is similar to Beck, Demirgüç-Kunt, & Merrouche's (2013) findings assert that markets with above-median Islamic bank shares are less risky. In the baseline model,

banking market concentration as measured using the HHI implies that market structure has no impact on bank stability.

Table 3.2: Banks' Stability and the Macroeconomy (Eq. 1): Dynamic Panel-Data Estimation, Two-Step System GMM

Dep. Var.:Z-SCORE	(1)		(2)	
	Coefficient	t. Statists.	Coefficient	t. Statists.
Lag of Z-Score	0.610***	(8.880)	0.701***	(12.76)
SIZE	0.033	(1.090)	0.054***	(2.610)
CR	-1.121**	(-2.27)	-0.763*	(-1.88)
CI	-0.269***	(-2.92)	-0.235***	(-3.52)
DIV	-0.376**	(-1.97)	-0.116**	(-0.48)
CAD	0.616*	(1.660)	0.839	(1.690)
IBD	-0.410**	(-1.96)	-0.194	(-1.31)
HHI	-1.838	(-1.44)	-2.075**	(-2.04)
SHIB	1.799***	(2.650)	1.872***	(2.700)
GDP (-1)			2.390**	(2.200)
INF(-1)			-0.209	(-0.18)
BM (-1)			0.213***	(3.060)
TRADE (-1)			-0.230***	(-2.64)
Intercept	1.211**	(2.020)	0.249	(0.640)
AR(1) test	0.000		0.000	
AR(2) test	0.315		0.411	
Hansen test	0.170		0.169	
No. of obs.	1496		1496	
No. of groups	254		254	
No. of IV	50		86	

Note: the table estimates the financial stability models, including bank-specific, market-specific, and independent macroeconomic variables. Z-score and total assets variables after taking their natural logarithm (SIZE). *, **, *** significant at 10, 5, and 1 percent respectively. t-statistics are reported in parentheses.

To check the results' robustness for model (1), we extend the baseline model. Following the established literature (Cihak and Hesse, 2010; Horvath & Vaško, 2016; Abedifar, Molyneux and Tarazi, 2013) and assuming macroeconomic cycles have occurred during the study period, we include one year lagged values of the macroeconomic variables. In model (2), we find that most baseline variables keep their sign and statistical significance. Nevertheless, we find that under model (2), the bank size (SIZE) coefficient becomes positive and significant, indicating that larger banks are more stable. Nevertheless, the statistical significance of the bank size (SIZE), credit risk (CR), capital adequacy (CAD), Islamic bank dummy (IBD), and market structure variables (SHIB and HHI) have changed. This suggests that macroeconomic variables can influence bank- and market-specific variables. The highly significant positive value of bank size (SIZE) indicates the positive and important effect of potential scale and scope efficiencies on bank stability. On the other hand, the decreasing significance of the credit risk, capital risk, and Islamic bank dummy suggest that the macroeconomic environment is more important than these variables in explaining bank stability.

Model (2) shows that macroeconomic variable contributes to the significance of the market structure variable HHI. The negative and significant value of the HHI suggests that concentrated banking systems in QISMUT+3 feed through into lower stability. In other words, this result provides support for the competition-stability view for the banks operating in QISMUT+3 countries (Mishkin, 1999; Uhde & Heimeshoff, 2009; Abedifar, Molyneux & Tarazi, 2013; Beck, Demirgüç-Kunt & Merrouche, 2013; Kabir & Worthington, 2017)[6]. However, in most of the extended model's competition

[6] Also, see. Lensink et al., 2008; Cihak & Hesse, 2010; Altaee et al., 2013; Laeven et al., 2014; Chakroun & Gallali, 2015; Pawlowska, 2016; Ibrahim and Rizvi, 2017)

is not significant. This result suggests that the effect of competition on bank stability can be weakened by other variables, likely they are more important than the competition. Though Beck, Demirgüç-Kunt, & Merrouche (2013) and Cihak & Hesse (2010) did not found any significant association between bank stability and the market share of Islamic banks (SHIB), our findings suggest a positive contribution of Islamic bank market share to bank stability in QISMUT+3 countries.

3.3.1 The Macroeconomy and Bank Stability

Model (2) of Table 3.2 presents the results for bank stability, including macroeconomic variables. Model (2) shows that the lagged GDP growth variable's coefficient is positive and significant. Higher growth feeds through into greater bank stability. The coefficient implies that a one percentage point improvement in GDP growth transforms into roughly a 2.390 rise in the financial stability of banks operating in QISMUT+3 countries. Our results align with earlier empirical findings (Rajhi & Hassairi, 2013; Kabir & Worthington, 2017; Uhde & Heimeshoff, 2009; Bitar, Hassan, & Walker, 2017).

The bank stability literature documents conflicting findings concerning the impact of inflation (INF). Cihak & Hesse (2010) find it does not affect bank stability, whereas Rajhi & Hassairi (2013) and Kabir & Worthington (2017) find that inflation reduces bank stability. Uhde & Heimeshoff (2009) argue that the effect is dependent on whether banks anticipate inflation and if it coincides with general economic fragility. Blot et al. (2015) find a positive and adverse link between financial stability and price stability in the US and Eurozone countries. Though our inflation result posits a negative effect for the QISMUT+3 countries, it is not significant.

The impact of broad money (BM) on bank stability is also reported in model (2). The literature that examines the link between money supply and bank liquidity (Fofack, 2005, Bofondi & Ropele, 2011, and Chung & Ariff, 2016) generally finds a negative influence of greater liquidity risk. Greenwood-Nimmo & Tarassow (2016) also show that a contractionary monetary shock causes a reduction in financial stability. Our positive and significant coefficient on the money supply measure (BM) is consistent with Greenwood-Nimmo & Tarassow's (2016) findings. Regarding trade openness (TRADE), Table 3.2 shows a statistically significant and negative relation. Surprisingly, our result contradicts the earlier empirical results of Creel et al. (2015) and Law (2009).

Theoretically, the financial development's openness theory claims that a country's inclusion in global goods (trade openness) promotes financial development (Rajan & Zingales, 2003). An open economy makes the financial sector more resilient and better able to absorb adverse shocks through flexible trade and exchange rate adjustment (Klomp & De Haan, 2015). Also, by compelling countries to adopt financial sector liberalization changes, openness can help to boost financial sector development (Law, 2009; Baltagi, Demetriades, & Law, 2009; Hauner, Prati, & Bircan, 2013). Our contradictory result may be related to country characteristics where various negative terms of trade shocks could be linked to bank fragility (Beck et al., 2006). This negative effect can be attributed to the effect of trade openness on other macroeconomic variables, such as exchange rates, inflation, or economic growth (Kim (2011), Keho and Wang (2017)).

3.3.2 Institutional Development and Bank Stability

Table 3.3 reports the estimates derived from (Eq. 2), focusing on the link between bank stability and institution development.To identify the effects of the different institutional variables, we prefer to use step-wise regressions in our estimations through models (1)–(4).[7] We find a negative and significant result for economic freedom (EF), suggesting that greater economic freedom leads to bank instability in QISMUT+3 countries. This finding differs from those of Baier, Clance, & Dwyer (2012), Hafer (2013), Chortareas, Girardone, & Ventouri (2013), Kabir & Worthington (2017). Nevertheless, Uhde & Heimeshoff (2009) find a similar relationship in Eastern European banking. In contrast, results show that financial freedom (FF) significantly and positively affects bank stability. The positive implications of greater financial freedom on the banking sector are also found in Beck, Demirgüç-Kunt & Levine (2006), Chortareas, Girardone, & Ventouri (2013), and Sufian (2014). This suggests that relaxation of banking independence from government control and state interference can enhance stability, while the general freedom in economic activities can damage bank stability.

As shown in model (1) in table 3.3, governance (GI) positively and significantly affects bank stability. This is expected, and reflects the positive role of good governance over the banking sector in these countries. These results are also consistent and confirm earlier empirical findings (Cihak & Hesse, 2010; Altaee, Talo and Adam, 2013; Mollah, Hassan, & Al-Farooque, 2017; Toader et al., 2018). In a further analysis, we disaggregate the governance variable into components to evaluate the effect of each indicator. In these estimations, we expect to find a positive effect of each governance

[7] The institutional development variables are not as highly correlated as one may expect; variance inflation factor (VIFs) tests show that values are all less than the critical value of 10 (Neter, Wasserman, & Kutner, 1990).

dimension on bank stability, excluding the corruption dimension. As illustrated in table 3.3 (models 2-4), the results align with our expectations for four of the governance components. Namely, the rule of law (RL), voice and accountability (VA), political stability (PS), and control for corruption (CC) appear to have the expected influence on bank stability. In sum, our findings are in line with some literature (Doumpos, Hasan, & Pasiouras, 2017; Toader et al., 2018).

The second and third models in table 3.3 show some surprising results. In contrast to the hypothesis and the bulk of the institutional development literature, government effectiveness (GE) significantly and negatively impacts bank stability. The third model also presents a negative effect of regulatory quality (RQ) on bank stability. Indeed, the extant literature also finds mixed results on the link between regulation and stability (see Barth, Caprio & Levine, 2004; Beck, Demirgüç-Kunt & Levine, 2006; Uhde & Heimeshoff, 2009; Ibrahim & Rizvi, 2017; Alam, 2013). Chortareas, Girardone, & Ventouri (2013), assert that the type of regulation determines the effectiveness of the bank regulation. It could be that greater government effectiveness (GE) and regulatory quality (RQ) give banks more confidence in taking considerable risks as they feel there will be greater political and regulatory redress if things go wrong. In line with the existing literature (Toader et al., 2018; Park, 2012, Bougatef, 2016), corruption feeds through into heightened instability. A model (4) presents, corrupt behavior (CC) encourages bank risk-taking, while political stability (PS) improves bank stability in QISMUT+3 countries. Also, note that results feedthrough with lower significance to the bank- and market-specific and macroeconomic variables in all institutional models than the baseline regression results. However, the role of capital is strengthened in these models.

Table 3.3: Bank Stability and Institutional Development (Eq. 2): Dynamic Panel-Data Estimation, Two-Step System GMM

Dep. Var.: Z-Score	(1)		(2)		(3)		(4)	
	Coefficient	t. Statists.	Coefficient	t. Statists.	Coefficient	t. Statists.	Coefficient	t. Statists.
Lag of Z-Score	0.639***	(8.420)	0.662***	(8.450)	0.689***	(11.72)	0.697***	(12.08)
SIZE	0.089*	(1.770)	0.076*	(1.860)	0.078*	(1.920)	0.066*	(1.670)
CR	-1.365**	(-2.20)	-1.045*	(-1.81)	-0.685	(-1.48)	-0.960*	(-1.78)
CI	-0.283***	(-2.94)	-0.230***	(-3.34)	-0.247***	(-2.80)	-0.260***	(-2.75)
DIV	-0.143	(-1.12)	0.107	(0.510)	-0.117	(-1.45)	0.094	(0.400)
CAD	0.771**	(2.240)	0.753**	(2.480)	0.892**	(2.030)	0.915**	(2.260)
IBD	-0.154	(-0.36)	-0.195	(-0.98)	-0.191	(-1.42)	-0.201	(-1.29)
HHI	-0.233	(-0.20)	0.871	(0.940)	-1.696*	(-1.69)	-0.092	(-0.10)
SHIB	0.217	(0.220)	0.788	(1.180)	0.482	(0.740)	0.680	(0.970)
GDP (-1)	3.994	(-1.53)	0.889**	(2.000)	2.309*	(1.890)	2.062***	(2.600)
INF (-1)	-2.092*	(-1.77)	-0.547	(-0.44)	1.063	(1.100)	-1.142	(-0.89)
BM (-1)	0.273**	(2.160)	0.151	(1.470)	0.280*	(1.890)	0.277*	(1.670)
TRADE (-1)	-0.089	(-0.63)	0.170*	(1.890)	0.108	(0.810)	0.020	(0.130)
EF	-0.029***	(-2.58)	-0.001	(-0.18)	0.007	(0.840)	0.001	(0.040)
FF	0.006**	(2.440)	0.003	(1.300)	0.002	(0.780)	0.001	(0.760)
GI	0.327***	(2.780)						
VA			0.151**	(2.330)				
GE			-0.263***	(-3.12)				
RL					0.397**	(2.280)		
RQ					-0.658***	(-3.53)		
CC							-0.320***	(-2.56)
PS							0.081**	(2.330)
Intercept	1.774***	2.640	-0.394	-0.660	-0.768	(-1.40)	-0.366	(-0.61)
AR(1) test	0.000		0.000		0.000		0.000	
AR(2) test	0.510		0.374		0.321		0.412	
Hansen test	0.120		0.105		0.116		0.121	
No. of obs.	1218		1472		1496		1496	
No. of groups	254		254		254		254	
No. of IV	62		71		86		87	

Note: this table shows the estimation of the financial stability model, including bank-specific, market-specific, macroeconomic, and institutional development as dependent variables. Z-score and total assets (SIZE) variables after taking their natural logarithm. *, **, *** significant at 10, 5, and 1 percent respectively. t-statistics are reported in parentheses.

3.3.3 Religiosity and Bank Stability

Table 3.4, model (1)– (4) presents the influence of religiosity on bank stability. Like in previous models, we bring the religiosity variables over the bank-specific, market-specific, and macroeconomics variables. In addition, we use the share of Muslims in the population (MSH) and a legal system (LSD) proxy for religiosity in the models. The Muslim share (MSH) variable is added to the model to identify the possible effects of religion on customer behavior. We assume Islam discourages excessive risk-taking; therefore, we expect a positive relationship.

As illustrated by the Muslim share dummy (MSHD) in table 3.4, models (1) and (2), this is only identified for countries with more than 85% Muslim population (as determined by the Muslim dummy variable). This finding suggests that beyond a certain level of the Muslim population, religiosity can affect bank stability in QISMUT+3 countries. This finding is supported by Adhikari & Agrawal (2016), who find that banks headquartered in more religious areas take on less risk. Kanagaretnam et al. (2015) also support this view by stating that banks in more religious countries had more robust capital rates, lower loan defaults, and were more resilient during the 2007-2009 global financial crisis. On the other hand, the significant adverse influence for the Muslim share (MSH) in the population in all models is also found by Abedifar, Molyneux, & Tarazi (2013) and Mollah, Hassan, & Al-Farooque (2017). These different findings of religiosity can be attributed to the hypotheses that religion can influence political and economic systems, and in some instances (but by no means all), distort financial markets (Landes, 1998; Stulz & Williamson, 2003).

Further analysis is carried out to verify the role of clients' religiosity. Following Abedifar, Molyneux, & Tarazi (2013), we employ an interaction term created by

multiplying the Muslim share variable with the Islamic bank dummy (IBD × MSH). Here we intend to test whether IBs religious customers contribute to bank stability through religious beliefs. The insignificant result of the interaction term reported in the model (2) does not show any stability gain or sensitivity of Islamic banks through customer religiosity.

As some of the sample countries in this study use religious rules in their legal system, we employ this variable to reflect the religiosity factor in the legal system. For this reason, three dummies are employed to represent the civil law (LSD1), hybrid systems (LSD2), and pure sharia (LSD3). To avoid Multicollinearity, we drop the constant term in models 3 and 4. Results suggest that the legal systems do not possess any comparative advantage over each other concerning bank stability. Nevertheless, the sharia system (LSD3) has the highest economic significance (most significant coefficients). These findings are different from that of Mollah, Hassan, & Al-Farooque (2017), who find mixed results for the effects of legal systems on bank stability. Similar to Abedifar, Molyneux, and Tarazi (2013), the interaction term that is used to evaluate the sensitivity of IBs to legal systems (MSH × IBD) (do not suggest any stability advantage for IBs in any legal system. In these religiosity models, the Islamic bank dummy variable, with negative and significant values, indicates that Sharia-compliant banks are less stable in the QISMUT + 3 countries than conventional banks. However, countries with a larger market share of Islamic banks appear to be more stable. This implies that the competitive threat of Islamic banks helps to boost stability in the respective banking systems.

Table 3.4: Bank Stability and Religiosity (Eq. 3): Dynamic Panel-data Estimation, Two-Step System GMM

Dep. Var:	(1)		(2)		(3)		(4)	
Z-Score	Coefficient	t. Statists.	Coefficient	t. Statists.	Coefficient	t. Statists.	Coefficient	t. Statists.
Lag of Z-Score	0.629***	(6.190)	0.636***	(6.370)	0.703***	(8.770)	0.684***	(7.960)
SIZE	0.029	(0.690)	0.035	(0.850)	-0.005	(-0.21)	-0.009	(-0.32)
CR	-0.285	(-0.87)	-0.285	(-0.90)	-0.552*	(-1.72)	-0.542	(-1.64)
CI	-0.290**	(-2.28)	-.310***	(-2.70)	-.354***	(-3.19)	-.360***	(-3.10)
DIV	-0.190*	(-1.69)	-0.164	(-1.48)	-0.245**	(-2.10)	-0.249**	(-2.04)
CAD	0.305*	(1.860)	0.305*	(1.870)	0.184*	(1.670)	0.154	(1.110)
IBD	-0.562***	(-2.63)	-1.570	(-1.33)	-0.311*	(-1.87)		
HHI	1.553	(1.290)	1.623	(1.350)	-0.083	(-0.10)	-0.001	(-0.90)
SHIB	0.695***	(2.720)	0.661***	(2.740)	1.105*	(1.760)	1.219*	(1.740)
GDP (-1)	1.456***	(2.640)	1.651***	(2.540)	1.433**	(2.260)	1.583**	(2.570)
INF (-1)	-0.758	(-0.90)	-0.623	(-0.80)	0.720	(0.760)	0.680	(0.740)
BM (-1)	0.134	(1.100)	0.170	(1.300)	0.239	(1.600)	0.264*	(1.660)
TRADE (-1)	0.156	(0.880)	0.184	(1.110)	-0.212**	(-2.14)	-0.188*	(-1.80)
MSH	-2.086**	(-2.49)	-2.421***	(-2.66)	-0.981**	(-2.11)	-1.100**	(-1.97)
MSH×IBD			1.330	(0.870)				
MSHD	0.784**	(2.080)	0.821***	(2.360)				
LSD1					2.196***	(3.800)	2.430***	3.540)
LSD1×IBD							-0.596	(-1.49)
LSD2					1.943***	(3.540)	2.127***	(3.290)
LSD2×IBD							-0.407	(-1.58)
LSD3					2.422***	(3.780)	2.375***	(3.480)
LSD3×IBD							1.802	(0.710)
Intercept	1.967***	(3.100)	2.035***	(3.360)				
AR(1) test	0.005		0.005		0.003		0.003	
AR(2) test	0.277		0.278		0.344		0.358	
Hansen test	0.187		0.227		0.141		0.164	
No. of obs.	1515		1515		1515		1515	
No. of groups	253		253		253		253	
No. of IV	73		73		88		88	

Note: this table shows the estimation of the financial stability model and bank-specific, market-specific, macroeconomic, and religiosity as independent variables. In estimates (2) and (3), the interaction terms MSH × IBD, and LSD × IBD, are added to illustrate the impact of clients' religiosity and legal on the financial stability of IBs. The three legal system dummies are civil law (LSD1), hybrid systems (LSD2), and pure sharia (LSD3). Z-score and total assets variables after taking their natural logarithm. *, **, *** significant at 10, 5, and 1 percent respectively. t-statistics are reported in parentheses

Finally, the comprehensive model (model 4) results in table 3.5 enable us to evaluate all our variables' comparative strength and significance in a general setting. These suggest that bank-specific, macroeconomic conditions and religiosity are more important than market structure and the institutional environment in determining bank stability.

Table 3.5: Bank Stability and Religiosity: Dynamic Panel-Data Estimation, Two-Step System GMM

Dep Vari: Z-Score	(1)		(2)		(3)		(4)	
	Coefficient	t. Statists.	Coefficient	t. Statists.	Coefficient	t. Statists.	Coefficient	t. Statists.
Lag of Z-Score	0.649***	(9.680)	0.671***	(10.99)	0.761***	(10.17)	0.510***	(4.440)
SIZE	0.052**	(2.030)	0.050***	(2.380)	0.066***	(3.140)	-0.018	(-0.24)
CR	-1.060*	(-1.85)	-0.950**	(-1.90)	0.215	(0.580)	-1.243*	(-1.72)
CI	-0.270**	(-3.40)	-0.271***	(-3.54)	-0.241*	(-1.71)	-0.340*	(-1.78)
DIV	-0.084	(-0.65)	-0.099	(-0.46)	-0.049	(-0.72)	-0.162	(-0.70)
CAD	0.828*	(1.890)	0.764**	(2.100)	0.656*	(1.750)	1.237*	(1.800)
IBD	-0.323*	(-1.73)	-0.276*	(-1.68)	-0.478	(-0.47)		
HHI	0.386	(0.460)	0.324	(0.360)	0.158	(0.260)	-0.198	(-0.23)
SHIB	0.972**	(2.040)	0.283	(0.570)	-0.465	(-0.48)	0.038	(0.030)
GDP (-1)	0.811	(1.140)	0.692**	(2.130)	1.376**	(2.320)	1.956*	(1.880)
INF (-1)	-1.288**	(-2.03)	-0.913**	(-2.12)	1.541	(1.150)	-0.554	(-0.78)
BM (-1)	0.394**	(2.070)	0.200	(1.180)	-0.230	(-1.13)	0.103	(0.510)
TRADE (-1)	0.099	(0.820)	-0.089	(-1.02)	-0.220	(-1.51)	-0.245*	(-1.67)
EF	-0.050	-0.690	-0.005	(-0.90)	0.005	(0.790)	-0.006	(-0.67)
FF	0.001	(0.060)	0.001	(0.710)	0.002	(0.950)	0.006*	(1.770)
GI	-0.053	-0.590	-0.100	(-0.91)	-0.187	(-1.58)	-0.114	(-0.69)
MSH	-1.086**	(-2.18)	-1.073***	(-2.42)	-2.463**	(-2.36)	-1.974	(-1.56)
MSH×IBD					0.627	(0.480)		
MSHD	0.498**	(2.080)						
LSD1			1.590***	(3.150)	1.586*	(1.670)	3.838**	(2.200)
LSD1×IBD							-1.135	(-1.50)
LSD2			1.553***	(2.910)	1.727*	(1.760)	3.945**	(2.180)
LSD2×IBD							-0.318	(-0.80)
LSD3			1.835***	(3.150)	1.917*	(1.770)	4.153*	(1.680)
LSD3×IBD							0.955	(0.190)
Intercept	1.065**	(2.340)						
AR(1) test	0.000		0.000		0.000		0.002	
AR(2) test	0.391		0.381		0.420		0.254	
Hansen test	0.149		0.206		0.227		0.142	
No. of obs.	1496		1496		1472		1472	
No. of groups	254		254		254		254	
No. of IV	76		90		85		85	

Note: this table shows the estimation of the financial stability model and bank-specific, market-specific, macroeconomic, institutional development, and religiosity as independent variables. In estimates (2) and (3), the interaction terms MSH × IBD, and LSD × IBD, are added to illustrate the impact of clients' religiosity and legal system on the financial stability of IBs. The three legal system dummies are civil law (LSD1), hybrid systems (LSD2), and pure sharia (LSD3). Z-score and total assets variables after taking their natural logarithm. *, **, *** significant at 10, 5, and 1 percent respectively. t-statistics are reported in parentheses

3.4 Conclusion

The GFC triggered the debate over the importance of bank stability and the comparative strengths and weaknesses of two banking models, namely conventional and Islamic. Following the GFC, many researchers have attempted to examine the bank stability of IBs and CBs. This study diverges from the previous literature by concentrating on QISMUT+3 countries that constitute the bulk of global Islamic bank business. For these countries, policymakers need to understand the determinants of both types of bank's stability. In particular, this chapter focuses on macroeconomic, institutional, and religious factors that may influence bank stability. We use a sample covering 254 banks across QISMUT+3 countries, of which 79 are IBs and 175 CBs, over 2011–2017. A two-step GMM estimation methodology is used to mitigate issues linked to endogeneity and reverse causality.

First, of the macroeconomic factors we consider, GDP growth, broad money supply, and the terms of trade significantly positively affect bank stability (the role of GDP growth is more prominent relative to other macroeconomic indicators). Second, our analyses highlight a positive association between good governance, financial freedom, and bank stability in the institutional environment. On the other hand, corruption and economic freedom have a damaging effect on stability. Third, concerning religiosity, our findings indicate that countries with a high (more than 85%) Muslim population seem to boost bank stability, even though Sharia-compliant banks are no more stable than conventional counterparts overall. Also, the legal systems of QISMUT+3 countries do not appear to enhance the stability of IBs or CBs. Finally, other findings highlight the persistence of bank stability, greater inefficiency, higher credit risk, and income diversification, leading to greater instability.

Chapter 4

DYNAMIC RELATIONSHIP AMONG THE BANK STABILITY, OIL, AND GOLD PRICES: EVIDENCE FROM THE GCC COUNTRIES

4.1 Introduction

The global crisis triggered by the burst of the real estate bubble in the United States motivated both academics and policymakers to search for the causes of the financial crisis and propose a way to build resilient systems sheltering financial institutions, particularly banks. Among other factors, banks are exposed to risk originated by commodity price changes, directly or indirectly.

Oil and gold are among the two most important commodities traded extensively in commodity and financial markets. Moreover, prices of both commodities react to economic and political fluctuations immediately and create imbalances in general economic conditions. The new regulatory reforms launched in the US[8] and EU[9] to improve financial stability by regulating the commodity derivative markets asserts the role of commodity price changes in financial stability.

[8] H.R. 4173: Dodd-Frank Wall Street Reform and Consumer Protection Act, signed by US President Obama on July 21, 2010.

[9] Proposal for a Regulation of the European Parliament and of the Council on OTC derivatives, central counterparties, and trade repositories (COM (2010) 484 final 2010/0250 (COD)), approved by the European Parliament on March 29, 2012.

Nevertheless, changing commodity prices have different economic implications on exporting and importing countries of these commodities. When it comes to the Gulf Cooperation Council (GCC) countries, this is more important as they are among the major oil exporters, and a feedback mechanism exists between oil prices and macroeconomic conditions. For these countries, increasing oil prices stimulates both government and private sector spending, leading to improved economic performance and banking activities, including increased bank stability (IMF, 2015).

On the other hand, decreasing oil prices will hurt these countries' economies and bank stability, leading to lower-income and diminishing private and public sector spending. For this reason, GCC countries' banks are considered a convenient laboratory to research to understand the implications of changing oil prices on bank stability. As Islamic bank stability studies are rare relative to conventional bank studies in the literature, and GCC countries have been promoting Islamic banking, this study focuses on Islamic banks. The significant change in oil prices, i.e., approximately $120 per barrel during the study period (2005q1-2018q1), is expected to affect the bank stability of the GCC countries. The OPEC report lists the daily average trade volume of oil at $3.79 billion, showing the significance of oil in the world commodity markets[10]. Moreover, oil futures and options contracts reached $1,218.7 million and $103.5 million, respectively[11]. As such, these values are expected to have considerable implications for bank balance sheets, income statements, and stability.

[10] Source: Annual Statistical Bulletin of the Organization of the Petroleum Exporting Countries in 2017.

[11] Source: FIA Global Reach. Regional Expertise. FIA is the leading global trade organization for the futures, options, and centrally cleared derivatives markets, with offices in London, Singapore, and Washington, DC.

Gold has historically been the measure of value and medium of exchange functions in economic transactions. In addition, it is also a backup source for the financial stability of central banks and commercial banks as well. Previous studies showed that gold negatively correlates with some of the financial assets (Ciner et al., 2013; Baur & Lucey, 2010). As such, particularly during the financial crisis, it provides a safe haven and acts as a hedging tool for investors, including banks. The London Bullion Market Association (LBMA) statistics reported that $26.8 billion in gold was cleared on average each day in December 2017. In fact, this value reflects the significance of gold as a commodity asset[12]. Owing to these attributes, gold is also expected to affect bank portfolios and hence their stability.

In the meantime, due to rising debates about the stability of banks, Islamic finance has been arising as an alternative, attracting the interest of researchers, policymakers, and the financial industry. Islamic banking, as a prominent section of Islamic finance, has also been drawing interest, and it is one of the promising topics in the contemporary financial research area. Narayan & Phan (2017) and Hassan & Aliyu (2018) provide an excellent survey of Islamic banking literature. As in conventional banking studies, researchers have been analyzing Islamic banking from different aspects. The performance dimension is examined in terms of profitability, efficiency, asset quality, capitalization, and liquidity. Results of these studies are generally mixed and suggest that study period, country origin, and regions are among the factors that can influence the findings.

[12] O'Connor et al. (2015) provide an excellent literature review for gold as an investment.

The other two research areas relevant to our study are financial soundness and solvency risk. Some findings show that Islamic banks are more flexible than their commercial counterparties against the crisis (Hasan & Dridi, 2010; Cihak & Hesse, 2010; Fakhfekh et al., 2016). However, other researchers argue that their post-crisis performance during the economic downturn was worse than the conventional banks (Beck, Demirgüç-Kunt, & Merrouche, 2013; Olson & Zoubi, 2017). Stability studies also had mixed results. Among others, Hasan & Dridi (2010) and Pappas, Izzeldin & Fuertes (2012) assert that commercial banks are less stable than their Islamic counterparties. However, Beck, Demirgüç-Kunt, & Merrouche (2013) suggest contradictory findings.

4.2 Theoretical Framework and Data

4.2.1 Theoretical Framework

In a theoretical setting, the relationship between oil prices, gold prices, and financial stability can be attributed to different transmission channels. The effects of oil price on macroeconomic conditions and financial markets are explained in the literature by referring to four channels. Though the literature is concentrated on the stock markets, these channels can also be adopted for bank stability, as the banks are crucial intermediaries in the economy and financial markets. These channels include business cycle, financialization of commodities, oil price shocks, and risk premium.

4.2.1.1 The Business Cycle Channel

The business cycle channel characterizes the significance of oil price as a determinant of the economic fluctuations (Hamilton, 2013; Brown & Yücel, 2002). Following this channel, it can be argued that oil's unique character as basic raw material (input) provides a significant potential to affect the whole economy and the banks' stability through the business cycles.

4.2.1.2 The Financialization of Commodities Channel

The second channel works through the *financialization of commodities* (Tang & Xiong, 2012; Cheng & Xiong, 2013). Oil and gold futures and options contracts are among the most important financial instruments traded in the financial markets. The volume of oil futures and options contracts reached $1,218.7 million and $103.5 million, while gold futures and options increased to $127.3 million and $43.3 million, respectively, in 2017. Moreover, the total number of futures and options traded on the top 40 exchanges worldwide reached $1.493 billion in contracts in 2017[13]. Therefore, the financialization of oil and gold is expected to have direct implications on banks' balance sheet/income statement and hence stability.

4.2.1.3 The Oil Price Shocks Channel

The third transmission channel works through the *oil price shocks*. This transmission channel can affect real economic activity (Hamilton, 1983; Lescaroux & Mignon, 2008), current and future cash flows (Jones & Kaul, 1996), and monetary policy (Bernanke, Gertler, & Gilchrist, 1996). Therefore, the effect of oil price shocks on bank stability is inevitable.

4.2.1.4 The Risk Premium Channel

The fourth channel is about the *risk premium*, and it is the product of the theory of investment under uncertainty and real options. According to this theory, uncertainty in current oil prices depresses future investment and consumption (Henry, 1974; Bernanke, 1983; Brennan & Schwartz, 1985). Hence the repercussions on bank activities will be unavoidable. News-based uncertainty plays a critical part in the investment and consumption behavior of economic units, including banks. Following

[13] Source: FIA Global Reach. Regional Expertise. FIA is the leading global trade organization for the futures, options, and centrally cleared derivatives markets, with offices in London, Singapore, and Washington DC.

this idea, Su et al. (2018) used news-implied volatility (NVIX) as a critical variable and showed that oil prices play statistically and economically significant roles regarding the NVIX. Hence, they suggest the *news channel* as the fifth transmission mechanism of oil price.

Following the literature findings and transmission channels, it can be argued that OP and GP can potentially affect macroeconomic and financial market conditions through different transmission mechanisms. Thus, financial stability in general and banks' stability in particular are expected to be altered by the changing oil and gold prices. Moreover, this is expected to be significant for the GCC countries, as they are oil-dependent countries. Henceforth, we argue that there is a reasonable foundation to investigate the relationship between bank stability, oil prices, and gold prices.

Following the above discussions, we construct the bank stability function as;

$$BS_t = f\,(OP_t, GP_t) \tag{1}$$

As descriptive statistics show, our data set has significant differences. Therefore, the log-linear form of the data is used to reduce the variability of the data. Then, the empirical equation for the estimation will be in the following form:

$$lnBS_t = \beta_1 + \beta_2\, lnOP_t + \beta_3\, lnGP_t + \mu_t \tag{2}$$

Where lnBS_t is the bank stability indicator after taking their natural logarithm, $lnOP_t$ and $lnGP_t$ are oil and gold prices respectively after taking their natural logarithm, and μ_t is the residual term.

4.2.2 Data

The study data set covers 36 banks operating in the GCC countries during 2005Q1-2018Q1 (See Appendix D, which displays the list of countries and the names of banks).

Bank stability measure is derived from the Orbis-Bank Focus database using the quarterly balance sheet and income statement information. Following previous studies (Altman, 2002; Pappas, Izzeldin & Fuertes, 2012; Ghassan & Fachin, 2016), we employ a z-score to measure the bank stability. The basic idea of the z-score is to assert the relationship between bank profitability and equity and their implications for bank failure. Thus, higher values are preferable as they indicate lower failure probability. The z-score is calculated as follows:

$$Z_t = (K_t+\mu_t) /\sigma_t \quad (3)$$

Where K_t is the equity-to-asset ratio (*E/A*), μ_t is the profitability, measured by the net profit after tax divided by total assets *(ROA),* and σ_t is the standard deviation of the *ROA* computed over the sampling horizon. We create time series (quarterly) by calculating the average z-score of the sample banks for the corresponding period. As such, k_t and μ_t reflect the average values of *E/A* and *ROA*, respectively, and σ_t is also calculated by using the average value of the *ROA*.

For OP and GP, we use the Organization of the Petroleum Exporting Countries (OPEC) Crude Oil Basket and London Bullion Market Association (LBMA) prices. Though the quarterly values for the OP and GP are available in the database, they are not applicable to our analysis in their simple form because so-called quarterly data correspond to the last month's values of that quarter. However, we conjecture that banks closely monitor and respond immediately to the price changes in the financial markets. In other words, banks do not wait for three months to respond to market fluctuations. As such, quarterly calculated z-score reflects the average product of the banks' daily decision-making and strategic management procedures over three months. Moreover, daily or monthly data of z-score are not available. Therefore, quarterly

values of OP and GP are calculated as three months' daily average prices to reflect daily decision-making and strategic management procedures related to bank stability. The descriptive statistics of the variables used are summarized in Table 4.1.

Table 4.1: Descriptive Statistics

Variables	Z-score	Oil Price	Gold Price
Mean	12.094	75.043	1113.85
Maximum	13.352	121.68	1728.91
Minimum	9.909	31.190	428.967
Std. Dev.	0.683	25.878	361.012
Observations	53	53	53

Regarding the correlation between the Financial stability of Islamic banks and Oil and Gold prices (See Appendix E), the correlation coefficient between Oil price and Gold price is only +0.52, which means the variables have a solid or sizeable positive correlation. While, the correlation coefficient between the Financial stability of Islamic banks and the Oil price is +0.11, which represents a small positive association. However, the correlation coefficient between the Financial stability of Islamic banks and Gold prices (only -0.09) is weak.

4.3 Methodology

This section discusses the model used to empirically investigate the research question: what is the dynamic relationship among the bank stability, oil, and gold prices in the Islamic banks operating in the Gulf Cooperation Council countries? Therefore, this section details the methodology employed in this thesis for this purpose. Section 4.3.1 discussed the unit root test and section 4.3.2 displays the lag length selection methodology. Section 4.3.3 has shown cointegration test tools. Section 4.3.4 the

VECM [14] to analyze the short and long-term relationship in our time series model. Section 4.3.5 shown Causality Test. Section 4.3.6 Dynamic Ordinary Least Squares Estimator (DOLS) provides further evidence for the long-run relationship between our variables. Lastly, Section 4.3.7 explains the robustness checks used.

4.3.1 The Unit Root Tests

Before setting up the econometric model, it is required to understand the time-series properties of variables in the regression analysis. Therefore, the unit root test was performed to check for stationarity and integration order. For this purpose, the most widely used tests in the literature, namely the ADF test of Dickey & Fuller (1979) and the PP test of Phillips & Perron (1988), are used in this study. However, traditional unit root tests fail to deal with structural changes in unit-roots, and the null hypothesis can be ambiguously accepted or rejected when time series suffer structural breaks (Perron, 1989). As the study period covers significant market distortions that can cause structural breaks, the ZA test (Zivot & Andrews, 1992) is also employed to verify the

[14] We use different cointegration tests for robustness purposes. However, but we did not miss a special feature of macroeconomic and financial data (non-linearity and the asymmetries). We recognize that the role of Nonlinear Models, such as a Nonlinear ARDL Framework, that allows us to trace out the asymmetric adjustment patterns following positive and negative shocks to the explanatory variables to detecting the asymmetric effects in the short and long run. Nevertheless, we went in this direction beforehand, but we did some tests, and the results required us to be satisfied with our conventional methods. We used Nonlinear and asymmetries tests (See appendixes F and G, our findings, unlike much of the empirical literature, indicate that the Wald test is unable to reject long-run symmetry between BS and OP changes as well as between BS and GP. As well, using stepwise regression under ECM. The results show that the two partial sums for OP and GP (positive and negative) carries the same coefficient in sign and almost in size; this means that the effects are symmetric. This is not strange, as some studies have reached the same results regarding the non-linearity and the asymmetries. For instance, Herrera et al. (2011) find that there is no evidence against the hypothesis of symmetric responses to oil price innovations of typical magnitude at the aggregate level of U.S. industrial production. Nevertheless, there is strong evidence of asymmetries at the disaggregated level. Also, Kilian & Vigfusson (2011a, 2011b) and Herrera, Lagalo, & Wada (2015), they find little evidence of an asymmetric response of output to the sign of oil price shocks. Among the explanations of these studies are that they have used a shorter sample, different oil price measures, different price adjustments, the inclusion of contemporaneous terms, longer lags, and asymmetries may be obscured in the aggregate data. In addition, Kilian & Vigfusson (2009) demonstrate that if the true relation is linear and one mistakenly estimates a nonlinear specification, the resulting estimates are asymptotically biased.

results. Accordingly, the decision on the unit root test is carried out via ADF, PP, and ZA tests.

4.3.2 Lag Length Selection

Appropriate lag length selection is another essential requirement of the model specification since it determines the autoregressive order of the VAR. It is also vital as short lags may lead to spurious results, and long lags lead to poor and inefficient parameter estimation in the short time series. The Optimal lag length can be chosen by employing different criteria, such as FPE, AIC, SBC, and HQ. Nevertheless, lag selection methodology is an opaque issue in the econometric literature. For example, Kilian (2001) criticized the information-based lag order selection and suggested AIC, especially for the IRF analysis. On the other hand, Ivanov & Kilian (2005), referring to the accuracy of the impulse response functions, recommended AIC for monthly data and HQ for quarterly data. However, for sample sizes less than 120 quarters, they suggested SBIC. Due to the opaqueness of the issue, Enders (2014) and Lutkepohl & Kratzig (2004) suggested using other diagnostic checks to assure the white noise process of the model. Therefore, this study determines the optimal lag length by considering the autocorrelation, normality, serial correlation, heteroscedasticity, and stability of the residuals in addition to the above conventional criteria.

4.3.3 Cointegration Test

If unit root tests suggest that BS, OP, and GP variables integrated order unity (i.e., I(1)), this conjectures a cointegration relationship among these variables. Therefore, it is required to specify a cointegrating rank for the VECM.

4.3.3.1 Johansen & Juselius (1990) Method

This study investigates the cointegration relationship using Johansen & Juselius (1990) as a conventional tool. As such, maximum eigenvalue and trace tests are

executed to define the number of cointegrating vectors (r). Furthermore, Sjö (2011) suggested that the trace test is robust against skewness and excess kurtosis and is also adjusted for small samples. Therefore, this study employs the trace test as the primary and maximum eigenvalue as the secondary test statistic.

Though the cointegration literature began with the pioneering study of Engle & Granger (1987), their residual-based test has since been criticized due to low explanatory power. Following Engle & Granger (1987), Johansen (1991) introduced a system-based test (Johansen maximum eigenvalue test) that is preferable as it allows more than one cointegration among the variables. Boswijk (1994) and Banerjee, Dolado, & Mestre (1998) developed the error-correction mechanism for cointegration tests. Nevertheless, as they use different nuisance parameters, they suggested different results. This study uses relatively two new cointegration test methodologies to corroborate the Johansen cointegration results. We do this by employing Gregory & Hansen's (1996) residual-based cointegration test and Bayer & Hanck's (2013) combined cointegration test.

4.3.3.2 Gregory and Hansen's Residual-Based Cointegration Test

When there is a shift in parameters, a standard test for cointegration can lead to misleading results and reject the long-run relationship among the variables. Gregory & Hansen's (1996) residual-based cointegration test allows the cointegrating vector to change at a single unknown period of the data and considers such regime shifts. Concerning this study's data characteristics and period, it is conjectured that the Gregory-Hansen test is the appropriate tool to avoid the erroneous conclusion of no cointegration. The Gregory & Hansen (1996) test's null hypothesis assumes there is no cointegration, against the alternative that there is cointegration.

The Gregory and Hansen's (1996) regime shifts models to the following forms:

Model 2: Level shift (C)

$$y_{1t}=\mu_1+ \mu_2\varphi_{t\tau}+\alpha^T y_{2t}+e_t \qquad t=1\ldots\ldots\ldots\ldots, n. \qquad (4)$$

Model 3: Level shift with trend (C/T)

$$y_{1t}=\mu_1+ \mu_2\varphi_{t\tau}+ \beta t +\alpha^T y_{2t}+e_t \qquad t=1\ldots\ldots\ldots\ldots, n. \qquad (5)$$

Model 4: Regime shift (C/S)

$$y_{1t}=\mu_1+ \mu_2\varphi_{t\tau}+ \alpha_1^T y_{2t} + \alpha_2^T y_{2t}\, \varphi_{t\tau} +e_t \qquad t=1\ldots\ldots\ldots\ldots, n. \qquad (6)$$

As indicated in their article, the level shift (C) model allows only the intercept (μ) to change and keeps the slope coefficients (α) constant. Here, μ_1 represents the intercept before the shift, and μ_2 represents the change in the intercept at the time of the shift. Model 3 represents the level shift model where the time trend (βt) is added. The regime shift model (model 4) is the most general model and allows both the intercept and slope to shift in the same model. For the cointegration test, the above models (1-3) are estimated sequentially, allowing the breakpoint to change between the $|0.15T| \leq \tau \leq |0.85T|$, where T is the sample size. The test's null hypothesis is verified by the smallest values of ADF and Phillips (1987) Z_α and Z_t statistics, relative to the ADF^*, Z_α^*, and Z_t^* test statistics.

4.3.3.3 Bayer and Hanck (2013) Method

To mitigate complex results of the different cointegration tests and facilitate the empirical application for researchers, Bayer & Hanck (2013) developed a combined cointegration test that uses Fisher's (1932) Chi-squared test. The Bayer & Hanck (2013) combined cointegration test requires series to be integrated of the same order, i.e., I(1). This test has the null hypothesis that there is no cointegration against the alternative hypothesis that there is cointegration.

The Fisher statistic of the test is calculated by using the following equations:

$$EG\text{-}JOH = -2[\ln(P_{EG}) + \ln(P_{JOH})] \quad (7)$$

$$EG\text{-}JOH\text{-}BO\text{-}BDM = -2[\ln(P_{EG}) + \ln(P_{JOH}) + \ln(P_{BO}) + \ln(P_{BDM})] \quad (8)$$

Where P_{EG}, P_{JOH}, P_{BO}, and P_{BDM} represent the probability values of Engle & Granger (1987), Johansen (1991), Boswijk (1994), and Banerjee Dolado, & Mestre (1998), respectively. Suppose the statistic of Fisher (1932) is larger than the estimated combined cointegration statistics (Bayer & Hanck's (2013) statistics). In that case, the null hypothesis of no cointegration is rejected, favoring the cointegration between the series.

4.3.4 Vector Error Correction Model (VECM)

This study proposes that OP and GP maintain the potential to affect bank stability within a specific time period. Therefore, understanding their effect should be a priority for policymakers and bank managers. Thus, time series analysis of these variables is essential. However, this analysis can be exposed to unit root and spurious regression problems. Hendry & Juselius (2000) asserted that non-stationarity is a natural feature of economic life and attributes it to different economic events, such as changes in law, economic growth, and technology.

Since the invention of cointegration by Granger (1981) and Engle & Granger (1987), researchers have been confidently dealing with the unit root problems of the series, which have a common stochastic trend. Cointegration suggests that non-stationary series at levels which deviate from the equilibrium can be integrated into their differences. Together with the error correction, it provides a tool to analyze the short and long-term relationship in the multivariate time series models. Though the stationarity can be achieved by differencing the series, this process causes information

loss in the analysis, and error correction helps to reload this information back to the analysis (Engle & Granger, 1987).

On the other hand, Lutkepohl & Kratzig (2004) suggest that in the cointegrated multivariate systems, VECM is better since it considers specific parametrization. Therefore, the VECM form of the VAR model, as in equation (9), is more appropriate. For this reason, VECM and Granger causality are considered convenient tools to analyze the short and long-run lead and lag mechanism and causality among OP, GP, and bank stability.

$$\Delta y_t = \alpha\beta y_{t-1} + \Gamma_1 \Delta y_{t-1} + \cdots + \Gamma_{p-1} \Delta y_{t-p+1} + u_t \quad (9)$$

In the above equation, α represent the speed of adjustment to the long-run equilibrium, $\alpha\beta y_{t-1}$ is the error correction term, and β contains the cointegrating vectors. The larger α implies a greater response of Δy_t to the previous period's deviation from the long-run equilibrium.

Nevertheless, our concern is also exploring the causality relationship among the BS, OP, and GP. This relationship is particularly crucial for the banking system's overall financial stability, as they have potential contagious effects that trigger systemic crises in the economy. Though the study uses Granger causality to make inferences on the time-precedence of the BS, OP and, GP, this methodology confronts some weaknesses due to the pre-testing requirements of stationarity and cointegration as they are sensitive to nuisance parameters. Therefore, Toda & Yamamoto's (1995) causality test is also used to improve the robustness of the causality test.

4.3.5 Causality Test (Toda and Yamamoto Test)

Toda & Yamamoto (1995) developed a causality test relaxing stationarity and cointegration assumptions by allowing the test to be conducted at level VARs.

4.3.6 Dynamic Ordinary Least Squares Estimator (DOLS)

In addition to the VECM, the long-run relationship of the variables is also analyzed using the Stock & Watson (1993) DOLS regression. In this estimation, the dependent variable is regressed to the explanatory variables at levels, leads, and lags of their first differences. According to Stock & Watson (1993), the DOLS estimator outperforms other estimators, including the non-parametric FMOLS estimator. To achieve the DOLS results, we estimate Eq. (2) using the DOLS estimator.

4.3.7 Diagnostic Checks

Concerning the results of the VECM, a series of diagnostic checks are also carried out for reliability. For this purpose, autocorrelation, serial correlation, heteroscedasticity, normality, and stability of the residuals are tested by using Jarque-Bera, White, Breusch-Godfrey- LM, CUSUM, and CUSUM square tests.

4.4 Empirical Results

Since a theoretical framework has not been developed on the relationship between bank stability, OP, and GP, we argue that long and short-run relationships can be hypothesized from the transmission mechanism role of these variables. Therefore, cointegration and VECM techniques are well suited to analyze these relationships as they provide information based on short and long-run analysis and causality.

As the first step in our analyses, unit root tests are conducted to check for stationarity and possible integration order of the series. First, traditional unit root tests of Dickey & Fuller (1979) and Phillips & Perron (1988) are executed. However, the global crisis period (2007-2009) in the time horizon of the data requires testing for possible structural breaks. As such, in addition to the ADF and PP tests, the study applies structural breaks unit root tests of Zivot & Andrews (1992).

Results of the Phillips and Perron (PP) and Augmented Dickey-Fuller (ADF) tests presented in Table 4.2 suggest that variables have unit roots in their levels (Panel A). Therefore, variables' first differences are created to examine stationarity. The ADF and PP tests in first differences I (1) show that series are stationary (Panel B).

Table 4.2: Unit Root Test Results

Variables	ADF Test			PP Test		
	A	B	C	A	B	C
Panel A: at levels						
BS	(-2.154)	(-3.782)*	(0.015)	(-5.021)**	(-5.732)**	(0.293)
OP	(-2.462)	(-2.529)	(-0.050)	(-2.238)	(-2.246)	(0.118)
GP	(-2.793)	(-1.461)	(2.076)	(-2.737)	(-1.464)	(1.793)
Panel B: at First Difference						
BS	(-8.155)**	(-8.077)**	(-8.258)**	(-16.995)**	(-17.151)**	(-17.577)**
OP	(-5.926)**	(-5.899)**	(-5.989)**	(-5.872)**	(-5.856)**	(-5.943)**
GP	(-5.926)**	(-6.548)**	(-5.523)**	(-5.917)**	(-6.534)**	(-5.522)**

Note: **, * denote statistical significance at 1% and 5% levels, respectively. The figure in the parenthesis ( ) denotes t-statistic. A B and C indicate the model with Intercept, intercept and Trend, and without intercept and trend, respectively.

However, ambiguous test results of BS suggest further analysis by using the structural break test of Zivot & Andrews (1992). Table 4.3 presents the results of this test and indicates that all variables have unit roots at levels. Therefore, stationary series is created by taking their first differences. As the ZA unit root test confirms the stationarity of series at I (1), it is determined that our series are integrated in the same order, i.e., I(1).

Table 4.3: Zivot-Andrews Unit root Test Results.

	At level			At first difference		
	ZAB	ZAT	Conclusion	ZAB	ZAT	Conclusion
BS	-4.297 (2015Q3)[4]	-4.180 (2016Q1)[4]	**I(1)**	-5.550* (2009Q4)[4]	-4.608* (2008Q4)[4]	**I(0)**
OP	-3.189 2014Q4[2]	-2.778 2012Q2[2]	**I(1)**	-6.913** 2014Q4[1]	-6.336** 2015Q4[1]	**I(0)**
GP	-3.460 (2013Q1)[0]	-3.222 (2011Q3)[0]	**I(1)**	-7.522 ** (2013Q1)[0]	-6.934** (2014Q1)[0]	**I(0)**

Note: All the variables are in their logarithmic forms. ZAB indicates the model with a break in both the trend and intercept; ZAT is the model with a break in the trend. **, and * are referred to 1% and 5% significance. The figure in the parenthesis ( ) denotes break quarter, and [ ] denotes Lag length. For ZAT 1% and 5% critical value are -4.80, -4.42 respectively. Fore BAT 1% and 5% critical value are -5.57, -5.08 respectively.

Table 4.4: Results of Selecting the Optimal Lag-Lengths

Lag	Log-L	LR	FPE	AIC	HQ	SC
0	50.48733	NA	2.89e-05	-1.938258	-1.894314	-1.822432
1	167.1201	214.2234	3.58e-07	-6.331431	-6.155654*	-5.868128*
2	175.0355	13.56941	3.76e-07	-6.287165	-5.979556	-5.476385
3	177.9490	4.637810	4.87e-07	-6.038736	-5.599295	-4.880479
4	202.8835	36.63838*	2.60e-07*	-6.689122*	-6.117848	-5.183387

Where: Sequential modified LR test statistic (LR), Akaike information criterion, (AIC), Final prediction error (FPE), Hannan Quinn information criterion (HQ), Schwarz information criterion (SC).

As lag length affects efficient estimates of parameters for the VAR, the lag length selection process is carried out with caution. As such, we follow Enders (2014) and Lutkepohl & Kratzig's (2004) suggestions, and the study is not confined to the below lag length selection criteria. Other diagnostic checks, such as autocorrelation, heteroscedasticity, normality, linearity, and stability, are considered in this process. Accordingly, Table 4.4 suggests using four lags in the estimation.

The prerequisite of the VECM model is the existence of the cointegrating vectors in the VAR model. Therefore, the cointegration of variables is tested by using the Johansen test methodology. Table 4.5 (Panels A and B) present the eigenvalue and trace test results for the BS, OP, and GP. In the cointegration analysis, we assume intercept and no trend in the Johansen methodology.[15]

Table 4.5: Johansen Cointegration Test

H0	H1	Eigenvalue	Statistics	5% Critical Value	Prob
Panel A: Trace Statistics					
r = 0	r =1	0.532	47.764	29.797	0.000***
r ≤ 1	r = 2	0.125	11.283	15.494	0.1946
r ≤ 2	r =3	0.097	4.887	3.842	0.0271
Panel B: Max-Eigen Statistics					
r = 0	r =1	0.532	36.481	21.132	0.0002***
r ≤ 1	r = 2	0.125	6.397	14.265	0.5629
r ≤ 2	r =3	0.097	4.887	3.841	0.0271

Note: *** means that the null hypothesis is rejected at a significant level of 1 percentage.

Table 4.5 (Panels A and B) shows that Johansen's trace statistic value is greater than the critical value at a 1% significance level. Hence, the null hypothesis that there is no-cointegrating vector (r=0) is rejected, favoring the alternative hypothesis that supports the cointegrating relationship among the variables. Also, Johansen's Max-Eigen statistics are greater than the critical value at a 1% significance level. Then the null hypothesis that there is no-cointegrating vector (r=0) is rejected in favor of the alternative hypothesis. Accordingly, trace and max-eigen statistics suggest

[15] For the BS and OP line graphs do not show any trend and GP has a very weak trend structure.

cointegration and a long-term relationship among BS, OP, and GP in the GCC countries at lag 4 level.

To furnish the findings of the conventional cointegration test results, this study also uses Gregory & Hansen's (1996) residual-based cointegration, and Bayer & Hanck's (2013) combined cointegration tests. The ADF* values of co-integrating residuals in all models of Gregory and Hansen, seen in Table 4.6, corroborate the long-run relationship among BS, OP, and GP. Furthermore, according to the results, the breakpoints take place mainly in 2008Q3 and 2008q4.

Table 4.6: Gregory and Hansen Cointegration Test

Gregory -Hansen Models	ADF		Z_t		Z_α	
	Statistic	Breakpoint	Statistic	Breakpoint	statistic	Breakpoint
(1) Intercept shift	-6.33***	2008q4	-6.39***	2008q4	-45.81*	2008q4
(2) Intercept shift with trend	-6.57***	2008q3	-6.63***	2008q3	-47.26	2008q3
(3) Intercept shift with slope	-6.57***	2008q3	-6.63***	2008q3	-47.93	2008q3

Note: ***. * denotes significance at 1% and 10% levels. The ADF (and Zt) have critical values at 1% are 5.44, -5.80, and -5.97 for models 1, 2, and 3, while the Zα for the same models is -57.01, -64.77, and -68.21, respectively. The 10% critical values for ADF (and Zt) are -4.69, -5.03, and -5.23 for models 1, 2, and 3, respectively, while the Zα for the same models is -42.49, -48.94, and -52.85, respectively.

In addition to Gregory and Hansen's cointegration test, to confirm the findings, a new combined cointegration test of Bayer and Hanck (2013) is used in the study. The results of the combined cointegration test, EG-JOH, and EG-JOH-BO-BDM were presented in Table 4.7. The EG-JOH and EG-JOH-BO-BDM tests have larger Fisher statistics than the critical statistical values at 1%, 5%, and 10%, respectively. Hence, we are rejecting the null hypothesis that there is no cointegration. Because the results

of both methodologies agree with Johansen's findings, it demonstrates a long-term link between the variables. These empirical findings support the theoretical approaches that oil price swings affect real GDP, inflation, unemployment, uncertainty, and monetary policy (Bernanke, Gertler, & Gilchrist, 1996; Hamilton, 2009; Kilian, 2014). Due to the changing macroeconomic and monetary conditions, banks' stability and gold prices will also be affected. Hence, a cointegrating relationship will be established between oil prices, gold prices, and bank stability.

Table 4.7: Bayer–Hanck Cointegration Test Results

Model specification	EG–JOH	EG–JOH–BO–BDM	Cointegration
fBS = f(BS/ OP, GP)	23.827***	56.063***	Exists
Critical values:			
at 1%	16.679	32.077	
at 5%	10.895	21.106	
at 10%	8.479	16.444	

Note: *** represents the significance level at 1%. And Lag order is 4.

Following the cointegration analyses, the study continues with the VECM analysis. The results of the VECM analysis provide two insights for the researcher, as seen in Table 4.8. In the first section, the cointegration equation presents the long-run relationships at the level form. The second section offers the error correction term (the residuals of cointegrated series) and speed of adjustment. In addition, it represents the departures of the cointegrated variables from their long-run equilibrium (Fanchon & Wendel, 1992). This section also presents the findings of the short-run parameters in the first differences.

As suggested by the cointegration test, significant coefficients of OP and GP in the VECM support a long-run relationship among BS, OP, and GP. According to the results, in the long run, OP positively affects bank stability. This result suggests a 1% increase in OP raises Islamic bank stability operating in the GCC countries by approximately 3%. As we hypothesize a positive effect of OP on BS through a transmission mechanism, this result is consistent. It is also supported by the economic structure of the GCC countries as they are among the major oil-exporting/dependent countries.

As it is well explained by Hamilton (2009), Ebrahim et al. (2014), and Kilian (2014), oil price changes alter actual economic activities by direct and indirect channels, simply affecting consumption investment and unemployment. One can also argue that Bernanke et al. (1996) financial accelerator principle is expected to work positively as credit market conditions improve due to increasing oil prices. Therefore, increasing OP is expected to benefit these countries by strengthening economic growth, per capita income, and credit market conditions due to higher consumption, investment, fiscal spending, and unemployment. These developments will improve the balance sheet of both firms and households, which creates a positive feedback effect on the banking sector in the form of stability. Under these economic circumstances, the projected profitability of banks and bank capitalization—which are the components of stability measures—are also expected to rise. As such, the positive and statistically significant coefficient of OP asserts that higher OP improves bank capital ratio (equity/total assets) and lowers the variation in profitability (standard deviation of profitability) due to increasing economic activities and bank profits.

Table 4.8: Vector Error Correction Estimates

Dependent variable: BS	Coefficient	Standard errors	t-statistics	P-value
Long run analysis:				
OP	0.029**	0.014	-2.068	0.043
GP	-0.047***	0.013	3.457	0.001
Constant	2.699			
Short run analysis:				
$-ECM_{t-1}$	-0.935***	0.220	-4.251	0.002
ΔOP (-1)	-0.060*	0.031	-1.954	0.059
ΔOP (-2)	0.031	0.033	0.949	0.349
ΔOP (-3)	0.156***	0.033	4.756	0.000
ΔOP (-4)	-0.027	0.043	-0.635	0.530
ΔGP (-1)	0.207**	0.078	2.639	0.013
ΔGP (-2)	-0.038	0.084	-0.454	0.652
ΔGP (-3)	0.003	0.084	0.037	0.970
ΔGP (-4)	0.139	0.087	1.599	0.119
Constant	-0.009	0.006	-1.459	0.153
Diagnostic tests:				
R2	0.815			
F-statistic	11.502***			
Test:	F-statistic	P.value		
χ^2 NORMAL	0.062	0.970		
χ^2 SERIAL	1.345	0.277		
χ^2 ARCH	0.280	0.890		
χ^2 HETERO	9.876	0.704		
χ^2 RAMSEY	0.019	0.891		

***, **, * denotes the significant at 1%, 5% and 10% levels. χ^2 NORM is for normality test, χ^2 SERIAL for LM serial correlation test, χ^2 ARCH for autoregressive conditional heteroskedasticity, χ^2 HETERO for white heteroskedasticity and χ^2 RAMSEY for Ramsey Reset test.

On the other hand, the negative and statistically significant coefficient of GP asserts that increasing GP (1%) deteriorates BS (5%). This finding can be attributed to the economic conditions that cause higher GP. It is an economic phenomenon that GP usually increases during crisis times. Adverse shocks created by the crisis worsen the balance sheet conditions for businesses and households, leading to a decline in consumption and investment. Hence impair the economic conditions through the financial accelerator principle (Bernanke et al. 1996). Under these circumstances, banks' balance sheets and stability are negatively affected by the risk exposures created by the crisis. Moreover, increasing GP negatively affects the values of other financial instruments banks hold as investors substitute gold for the other assets due to its safe heaven character (this can also attribute to investors' flight to quality). As a result, the liabilities cannot react to a decrease in assets value in the short run, diminishing bank stability during these periods.

Results from the DOLS estimation of Eq. (2) in Table 4.9 provide further evidence for the long-run relationship between OP and GP. Statistically and economically significant coefficients of variables are in line with the VECM cointegrating equation and support the long-run relationship.

Table 4.9: DOLS Results

Dependent variable: BS	Coefficient	t-statistics	P-value
OP	0.028 ***	3.470	0.010***
GP	-0.053***	-6.26	0.000***
Constant	2.740***	47.02	0.000***
R2	0.786		
Adj. R2	0.667		

Note: *** represents the significance level at 1%.

The second part of Table 4.8 provides information about the long-run equilibrium by error-correction term (ECT) and short-run dynamics by the lagged differences of the variables. The ECT has also been used to check for long-run causality in the VECM analysis (Filis 2010; Masih et al. 2011; Chen & Groenewold 2013). Statistically, significant ECT confirms the presence of long-run causality and also shows that the adjustment process in the short run is at work to adjust long-run disequilibrium.

The coefficient of the ECT indicates that deviation from the long-run equilibrium caused by short-run shocks from the previous periods is corrected with a 93% speed of adjustment in each subsequent quarter. The negative sign of the ECT also suggests that BS is above its long-run equilibrium relative to OP and GP in the previous period. Henceforth, to satisfy the long-run equilibrium, it converges toward the equilibrium in period *t* with a -0.93 speed of adjustment. Though 93% is very high, it is an economic phenomenon that banks and bank stability are susceptible to economic fluctuations, including OP and GP. As these countries own one-third of the world's total crude oil reserves and export more than 15 million oil barrels a day (GCC-STAT, 2017) [16], this commodity is crucial for their economies. (IMF, 2015) empirically show the feedback effect of oil price changes, bank balance-sheet, and asset prices in the GCC. IMF (2015) and Khandelwal, Miyajima, & Santos (2016) also assert the negative effect of declining and lower growth rates in oil prices on these countries' nonperforming loans rate. Therefore, this high speed of adjustment should not be a surprising result. [17] At the 5% significance level, the findings in this section also reveal a positive association between the OP, GP, and BS.

[16] GCC-STAT is the GCC Statistical Centre. Available at: https://gccstat.org/en
[17] As we concentrate on BS, we do not provide results for OP and GP.

Table 4.10: VEC Granger Causality/Block Exogeneity Wald Tests

Null Hypothesis	Df	Chi-sq	P-value	Inference
OP doesn't Granger Cause BS	4	33.391	0.000***	YES
GP doesn't Granger Cause BS	4	8.898	0.064*	YES
BS doesn't Granger Cause OP	4	1.591	0.811	NO
GP doesn't Granger Cause OP	4	7.007	0.136	NO
BS doesn't Granger Cause GP	4	1.129	0.890	NO
OP doesn't Granger Cause GP	4	5.281	0.260	NO

Note: *** represents the significance level at 1%.

Following the cointegration analysis that identified a long-run relationship, we employed the VECM and Toda & Yamamoto's (1995) causality analyses to search for the short-run and long-run causal relationships. The short-run causality test results of the VECM also support the relationship between BS, OP, and GP. The results of short-run causality tests are presented in Table 4.10. Chi-square values indicate a short-run unidirectional causality running from OP and GP to BS, but the impact of GP is statistically lower than the OP. This result delegates a more significant role to OP in the forecast of bank stability. Concerning the long-run causal relationship, the ECT value of the VECM in Table 4.8 suggests a long-run causality, running from OP to BS. Though we did not report the results for the sake of space, findings do not support long-run causality between GP and BS.

This study also uses Toda & Yamamoto's (1995) causality test To confirm the VECM long-run causality results. Since the lag length is 4, we use the 5th (k+1) order VAR as Toda and Yamamoto (1995) suggested. Results of the TY causality test presented in Table 4.11 are in line with the VECM model. They imply long-run bidirectional causality between OP and BS. Nevertheless, causality from OP to BS is statistically more significant, as economic phenomena suggest. This finding is quite

understandable and expected as OP determines the economic conditions in the GCC countries. In sum, causality results suggest OP has a stronger causal relationship with bank stability in the short and long run.

Table 4.11: Toda and Yamamoto Causality Tests Results

Null Hypothesis	Df	Chi-sq	P-value	Inference
OP doesn't Granger Cause BS	4	37.051	0.000***	YES
GP doesn't Granger Cause BS	4	4.584	0.333	NO
BS doesn't Granger Cause OP	4	9.127	0.058*	YES
GP doesn't Granger Cause OP	4	7.253	0.123	NO
BS doesn't Granger Cause GP	4	1.159	0.885	NO
OP doesn't Granger Cause GP	4	4.768	0.312	NO

Note: *** represents the significance level at 1%.

The various diagnostic tests are used to confirm the robustness of the model. The results in Table 4.8 confirm the absence of serial correlation and normal distribution of the error term. They also suggest no autoregressive conditional and white heteroscedasticity. The Ramsey reset test also confirms the functional form of the model. The stability of the parameters and the error correction mechanism is vital in VECM estimations. Therefore the CUSUM tests are also performed. The plots of CUSUM and CUSUMsq in Figs. 1 and 2 show that both tests lie in between the critical bounds at a 5 percent significant level. These results confirm the model's stability.

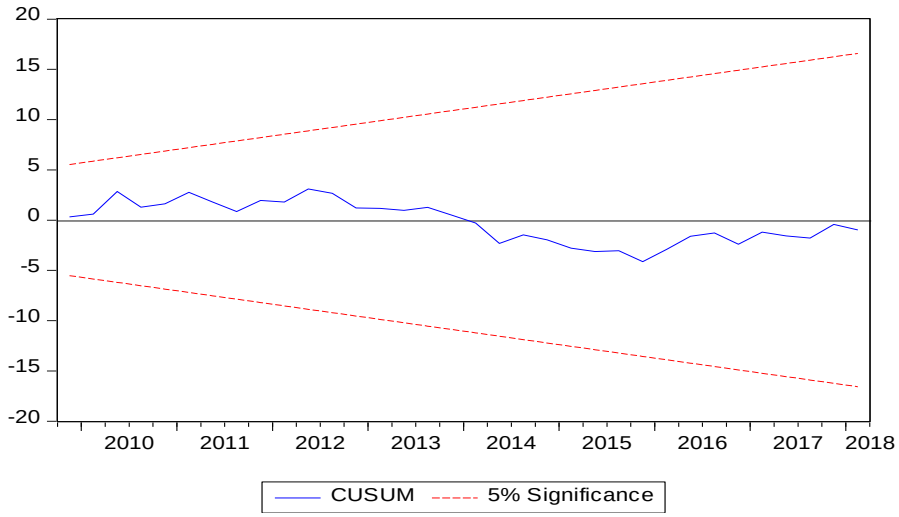

Figure 4.1: Cumulative Sum of Recursive Residual

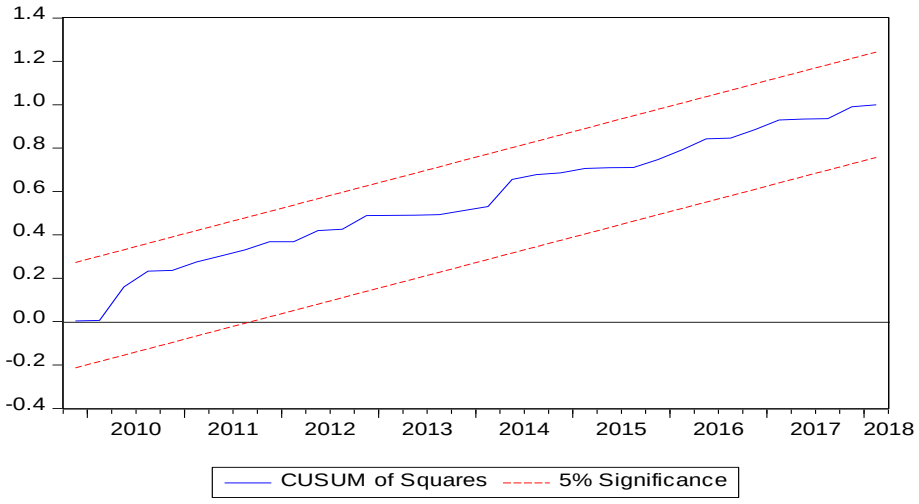

Figure 4.2: Cumulative Sum of Square of Recursive Residual

4.5 Conclusion

The relationship among bank stability, OP, and GP has not much been analyzed in the literature. Hence, the primary purpose of the thesis is to investigate both short-and long-term relationships and also identify the causality dynamics of these variables. For this purpose, quarterly data (2005-Q1 to 2018-Q1) of 36 Islamic banks operating in the GCC countries were analyzed.

The unit root properties of our variables are investigated using Dickey & Fuller (1979), Phillips & Perron (1988), and Zivot and Andrews (1992) unit root tests. Results show that the series is not stationary at levels and are stationary at their first differences. Therefore, cointegration tests are used to investigate the long-run relationships. The study employs the cointegration methodologies of Johansen (1991), Gregory & Hansen (1996), and Bayer & Hanck (2013) to search for the long-run relationship. All methods confirm the cointegration among the BS, OP, and GP.

Then, the vector error correction model and Toda and Yamamoto (1995) test are applied to analyze the short, long-run, and causality relationship. Results concerning the error correction model show that the speed of adjustment of banks towards the equilibrium bank stability is very high. Findings also demonstrate that OP and GP affect BS in both the short and the long term. But the impact of GP has statistically insignificant in the short run, which suggests it takes time for the banks to adjust stability during the crisis period. The unidirectional causality runs from the OP and GP to BS, implying OP and GP precede BS in the GCC countries. Hence, OP and GP can forecast the BS. The long-run analysis results suggest a positive effect of OP and the adverse impact of GP on the Islamic bank stability operating in the GCC countries.

Chapter 5

CONCLUSION

5.1 Introduction

This final chapter reviews the main findings of this thesis, which aims mainly to understand better the financial stability of banks in Dual Banking Systems and obtain a better knowledge of the dynamic link between financial stability, oil, and gold prices within the Islamic banks' industry. The banking sector's role is crucial to promote economic activity and stability in the economy. The robust and stable banking sector can withstand adverse shocks and contribute to the stability of the financial system. Section 5.2 abstracts the empirical results, and section 5.3 shows the main findings' contributions and implications.

5.2 Summary and Conclusions

This thesis investigates the financial stability determinants of banks from different aspects by concentrating on two separate samples. First, it examines the impact of macroeconomic, institutional and, religious factors on bank stability in dual banking systems, especially in the QISMUT+3 countries over 2011–2017. In particular, we estimate empirical models using the two-step system GMM approach of Arellano & Bover (1995) and Blundell & Bond (1998) to carry out our comparative analysis. Second, it examines the dynamic relationship between bank stability and major commodity prices, namely oil and gold prices which have not been analyzed in the previous literature, using a sample of the Islamic banks operating in the GCC countries during the period 2005-Q1 to 2018-Q1. In particular, we use different analytical tools

to ensure robust results. It begins searching for the long-run relationships by employing methodologies from Johansen and Juselius (1990), Gregory and Hansen (1996), Stock and Watson (1993), and Bayer and Hanck (2013). In addition, VECM and Toda and Yamamoto's (1995) methodologies were used to investigate the short and long-term causation.

Results for the QISMUT+3 countries present a positive association between good governance, financial freedom, and bank stability. On the other hand, corruption and economic freedom have a damaging effect. The legal systems of countries do not show any enhancement effect over bank stability. Though findings suggest religiosity concentration improves stability, banks' religiosity does not provide any stability advantage. Among the macroeconomic and bank-specific indicators, GDP growth and cost efficiency are the major stability determinants.

In the GCC countries, Results reveal a cointegrating relationship and equilibrium-correcting mechanism between the two commodities prices and the bank stability. Both commodities prices have positive effects on bank stability in the short run. However, the oil price has a positive effect in the long run, while the gold price has a negative effect in the long run. The causality results confirm unidirectional causality from oil and gold prices to bank stability in the short run and oil price to bank stability in the long run.

5.3 The Contributions and Implications

The results of the study have various managerial and policy implications. Our findings suggest that banks can improve stability by boosting operational efficiency and reducing income diversification (particularly in higher risk areas - an approaching

post-GFC bank regulation has emphasized). Efforts for alleviating informational frictions may also be useful to minimize credit risks. Having strong GDP growth enhances bank stability – something policymakers are likely aware of – other macroeconomic factors seem to have a more negligible effect. Also, tackling corruption is likely to have a post-impact on bank stability. Our findings also support the initiatives in the QISMUT+3 countries that encourage Islamic banking – especially in countries with relatively high Muslim populations.

The main message that arises from this chapter is that, like other resource-rich commodity-exporting countries, GCC countries' economies heavily rely on oil exports. Therefore, there is a feedback loop from oil prices to equity markets, credit markets, and non-oil GDP. Therefore, OP changes have a significant effect on their economies, and this will be indispensable for banks as they play an intermediary role in the economy. The study results confirm this event and provide some policy implications to bank managers, regulators and policymakers, and researchers.

For the bank managers, results suggest that OP and GP should be a significant concern in strategic management regarding risk-and-return decisions. By considering expected commodity price changes in their strategies, they may get a substantial advantage over their competitors for risk diversification and profit maximization.

Findings also suggest that OP and GP are related to bank stability as they affect the safety and soundness of the banking system. Therefore, these two commodity prices should be considered in the policy decisions of the regulators and policymakers since there is a need for a safe and sound banking system to provide efficient and effective services. Though GCC countries' bank regulators, like other commodity-exporting

countries regulators, initiated the countercyclical capital buffer application as a macroprudential toolkit to minimize the effect of the oil price risk to the banking system (IMF, 2015), this can be improved by considering the impact of the gold price as well.

Our study findings also provide empirical support for the new implementation of the regulatory reforms launched in the US and EU to improve financial stability following the subprime crisis and commodity price swings. In addition, results may also recall a need to calculate a commodity-based index in regulatory capital calculations that contribute to the calibration of the capital ratios. This study is a novel one concerning the researchers as it searches for the OP and GP relationship with bank stability. As such, there is research potential to develop and elaborate on this subject with further studies.

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APPENDICES

Appendix A: Sample Distribution

Country	Islamic banks	Commercial banks	All Banks
Qatar	4	5	9
Turkey	3	29	32
Kuwait	8	6	14
Bahrain	16	8	24
Pakistan	6	18	24
Malaysia	18	19	37
Indonesia	11	63	74
Saudi Arabia	4	8	12
Unite Arab Emirates	9	19	28
Total	79	175	254

Appendix B: Definition of Variables

Name	Abbreviations	Definitions & Source
Financial stability	Z-Score	Measure of individual bank stability. For brevity, we use the label ‘‘Z-score’’ in referring to the logged Z-score. Authors' calculation based on Orbis Bank Focus data.
Bank specific:		
Bank size	SIZE	Logarithm of total assets to control for size. Source: Orbis Bank Focus
Credit risk	CR	Loan-loss provisions to gross loans. Source: Orbis Bank Focus
Cost efficiency	CI	Cost to income ratio. Source: Orbis Bank Focus
Income diversity	DIV	1-|(Net interest income - Other operating income) / (Total operating income)|. Authors' calculation based on Orbis Bank Focus data.
Capital adequacy	CAD	Bank’s capital to risk-weighted assets ratio. Source: Orbis Bank Focus
Islamic Bank Dummy	IBD	Equals 1 for Islamic banks, 0 otherwise.
Market structure:		
Herfindahl-Hirschman Index	HHI	Concentration measure. $HHI = \sum_{i=1}^{n}(MS_i)^2$, where MSi represents the market share of bank i, and there are n banks in the market. It has a value between zero and one. Higher values show that the market is more concentrated. Authors' calculation based on Orbis Bank Focus data.
Market Share of IBs	SHIB	Market share of Islamic banks total assets in each country. Authors' calculation based on Orbis Bank Focus data.
Macroeconomic variables:		
GDP	GDP	Annual GDP growth rate by country. Source: WDI.
Inflation	INF	Inflation rates by country. Source: WDI.
Broad money	BM	Broad money (sum of currency outside banks) expressed as a % GDP. Source: IFS.
Trade openness	TRADE	Sum of exports and imports of goods and services measured as a share of gross domestic product. Source: WDI.

Name	Abreviation	Definitions & Source
Institutional development		
Financial freedom	FF	Index of banking independence ranges between 0 (no independence) to 100. Source: Heritage Foundation (2019).
Economic freedom	EF	Index of economic freedom ranges between 0 (no freedom) to 100 (maximum freedom). Source: Heritage Foundation (2019).
Governance indicator	GI	Overall indicator of institutional development, calculated as the average of six indicators accounting for: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, the rule of law, and control of corruption. Authors' calculation based on Kaufmann (2011) and WGI.
Voice & accountability	VA	To capture perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and free media. It takes values from -2.5 to 2.5, with higher scores corresponding to better outcomes. Source: Kaufmann (2011) and WGI.
Government effectiveness	GE	To capture perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. It takes values from -2.5 to 2.5, with higher scores corresponding to better outcomes. Source: Kaufmann (2011) and WGI.
Rule of law	RL	To capture perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. It takes values from -2.5 to 2.5, with higher scores corresponding to better outcomes. Source: Kaufmann (2011) and WGI.

Name	Abreviation	Definitions & Source
Regulatory quality	RQ	To capture perceptions of the ability of the government to formulate and implement sound policies and regulations that permits and promotes private sector development. It takes values from -2.5 to 2.5, with higher scores corresponding to better outcomes. Source: Kaufmann (2011) and WGI.
Control of corruption	CC	To capture perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. It takes values from -2.5 to 2.5, with higher scores corresponding to better outcomes. Source: Kaufmann (2011) and WGI.
Political stability	PS	Indicator of political stability and absence of violence/terrorism, measuring perceptions of the likelihood of political instability and/ or politically motivated violence, including terrorism. It takes values from -2.5 to 2.5, with higher scores corresponding to better outcomes. Source: Kaufmann (2011) and WGI.
Religiosity:		
Muslim share	MSH	Share of the Muslim population in the total population of each country. Source: World Factbook.
Muslim share dummy	MSHD	A dummy variable which takes the value of one when a country has more than 90% Muslim population and zero otherwise. Source: World Factbook.
Legal system Dummies	LSD1	It takes the value of one if a country uses civil law to define its legal system and zero otherwise.
	LSD2	It takes a value of one if the country uses a hybrid law to define its legal system and zero otherwise.
	LSD3	It takes a value of one if the country uses the Shariá law to define its legal system and zero otherwise. Source: World Factbook.
<u>Instrumental variable:</u> (Property rights)	PR	An index that takes a value from 0 to 100 indicating the level to which laws protect private property rights. A higher score indicates more economic freedom and strong protection of property rights of the individuals. Source: Heritage Foundation (2019).

Notes: World Development Indicators and Worldwide Governance Indicators (WDI & WGI), International Financial Statistics (IFS).

Appendix C: Correlation Matrix

	Z-score	SIZE	CI	CR	CAD	DIV	IBD	SHIB	HHI	GDP	IF	BM	TRADE	GI	EF	FF	MSH	MSHD	LSD1	LSD2	LSD3
Z-score	1																				
SIZE	0.37	1																			
CI	-0.37	-0.41	1																		
CR	-0.19	-0.17	0.10	1																	
CAD	0.01	-0.38	0.03	0.02	1																
DIV	0.13	0.40	-0.11	-0.03	-0.10	1															
IBD	-0.07	-0.10	0.20	0.09	-0.02	0.13	1														
SHIB	0.18	0.23	-0.10	0.07	0.01	0.35	0.35	1													
HHI	0.10	0.19	-0.13	0.06	-0.02	0.17	0.22	0.62	1												
GDP	-0.03	-0.04	0.00	-0.12	0.02	-0.12	-0.13	-0.40	-0.23	1											
IF	-0.18	-0.16	0.14	-0.01	0.01	-0.25	-0.25	-0.66	-0.35	0.28	1										
BM	0.21	0.23	-0.08	0.00	-0.03	0.33	0.28	0.65	0.19	-0.21	-0.50	1									
TRADE	0.14	0.16	-0.10	0.00	0.05	0.29	0.30	0.76	0.33	-0.20	-0.65	0.71	1								
GI	0.19	0.24	-0.21	-0.02	0.04	0.25	0.16	0.52	0.28	-0.01	-0.59	0.58	0.76	1							
EF	0.14	0.22	-0.12	-0.01	0.08	0.31	0.27	0.68	0.41	-0.16	-0.54	0.63	0.88	0.78	1						
FF	-0.01	0.03	0.06	0.01	0.14	0.08	0.13	0.28	0.04	-0.19	-0.16	0.15	0.39	0.32	0.59	1					
MSH	-0.19	-0.11	0.09	0.01	0.01	-0.25	-0.30	-0.66	-0.31	0.16	0.65	-0.80	-0.77	-0.72	-0.66	-0.22	1				
MSHD	-0.15	-0.17	0.10	-0.04	-0.02	-0.33	-0.34	-0.84	-0.51	0.25	0.67	-0.79	-0.91	-0.75	-0.83	-0.29	0.89	1			
LSD1	-0.15	-0.19	0.08	-0.03	0.06	-0.37	-0.32	-0.77	-0.52	0.35	0.57	-0.67	-0.68	-0.30	-0.54	0.03	0.56	0.75	1		
LSD2	0.06	0.07	-0.02	0.04	-0.04	0.32	0.31	0.69	0.48	-0.29	-0.49	0.69	0.69	0.35	0.55	0.01	-0.67	-0.82	-0.90	1	
LSD3	0.21	0.26	-0.13	-0.04	-0.04	0.11	0.02	0.18	0.09	-0.12	-0.17	-0.04	-0.05	-0.11	-0.04	-0.09	0.27	0.19	-0.20	-0.24	1

Appendix D: The List of GCC Countries and Bank Names

No	Country	Bank Name
1	BAHRAIN	Bahrain Islamic Bank B.S.C.
2	BAHRAIN	GFH Financial Group B.S.C.
3	BAHRAIN	Kuwait Finance House
4	BAHRAIN	Albaraka Banking Group B.S.C.
5	BAHRAIN	Khaleeji Commercial Bank
6	BAHRAIN	Bank Alkhair BSC
7	BAHRAIN	Venture Capital Bank BSC (c)-VCBank
8	BAHRAIN	Ibdar Bank BSC
9	BAHRAIN	Citi Islamic Investment Bank EC
10	BAHRAIN	Al-Salam Bank-Bahrain B.S.C.
11	BAHRAIN	First energy bank
12	KUWAIT	A'Ayan Leasing & Investment Company
13	KUWAIT	Ahli United Bank KSC
14	KUWAIT	Boubyan Bank KSCP
15	KUWAIT	First Investment Company K.S.C.C.
16	KUWAIT	Kuwait Finance House
17	KUWAIT	Warba Bank
18	KUWAIT	Kuwait International Bank
19	OMAN	Bank Nizwa SAOG
20	OMAN	Alizz Islamic Bank S.A.O.G
21	QATAR	Qatar Islamic Bank SAQ
22	QATAR	Masraf Al Rayan (Q.S.C.)
23	QATAR	Qatar International Islamic Bank
24	QATAR	Barwa Bank
25	QATAR	Qatar First Bank LLC
26	SAUDI ARABIA	Al Rajhi Bank Public Joint Stock Company
27	SAUDI ARABIA	Bank AlBilad
28	SAUDI ARABIA	Bank AlJazira JSC
29	SAUDI ARABIA	Alinma Bank Public joint-stock company
30	UNITED ARAB EMIRATES	Abu Dhabi Islamic Bank-Public Joint Stock Co.
31	UNITED ARAB EMIRATES	Amlak Finance PJSC
32	UNITED ARAB EMIRATES	Dubai Islamic Bank PJSC
33	UNITED ARAB EMIRATES	Sharjah Islamic Bank
34	UNITED ARAB EMIRATES	Tamweel PJSC
35	UNITED ARAB EMIRATES	Al Hilal Bank PJSC
36	UNITED ARAB EMIRATES	Noor Bank

Appendix E: Correlation Matrix

Variables	Z-score	Oil price	Gold price
Z-score	1		
Oil price	0.11	1	
Gold price	-0.09	0.52	1

Note: 1. Z-score measures the Financial stability of Islamic banks.
2. Correlation does not imply causation, which means that a similar pattern observed between movements of two variables does not necessarily mean one causes the other.

Appendix F: The Wald Test of Long-Run Symmetry

	Test Statistic	Value	Df	Probability
OP	F-statistic	0.396165	(1, 33)	0.5334
GP	F-statistic	1.191546	(1, 33)	0.2829

Note: The Wald statistics for the null hypothesis of long-run symmetry

Appendix G: Symmetry Test, Method: Stepwise Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOP_POS(-1)	-0.13	0.04	-3.05	0.000
LOP_NEG(-1)	-0.11	0.02	-5.17	0.000
LGP_POS(-1)	0.06	0.05	1.08	0.286
LGP_NEG(-1)	0.13	0.04	3.23	0.002

Note: 1. Dependent Variable: D(FS).

2. The effects are symmetric if the two partial sums carry the same coefficient in sign and size. Otherwise, they are asymmetric.

3. the null hypothesis of symmetry in the long-term against the alternative of asymmetry.