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Financial stability of Islamic and conventional banks

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Abstract:

This paper examines the stability of Islamic banks and conventional banks during and after the recent global crisis by determining the impact of the crisis on the banks' stability. This was accomplished by measuring the z-score (the stability measure) for both types, with 96 observations of 12 banks in 4 countries where both types of banks have significant market share. This analysis suggests that Islamic banks performed differently during the last financial crisis, but that conventional banks are more stable overall. Islamic laws prevent Islamic banks to get affected in the first stages of the crisis because those laws encourage banks to invest in real assets, but the banks were affected by the subsequent stages, which indicates the relationship between Islamic banks and the real economy. Panel data was used as an econometrics technique and determined a negative relationship between stability and the leverage.

Keywords: Z-score, Return on assets, assets, leverage, Panel model

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Chapter 1: Introduction

Islamic finance has become an important sector in particular after the financial crisis of 2008-09. Investors started to care about stability, performance of banks, therefore, there was more interest in understanding the stability and performance in Islamic banks and conventional banks.

1.1: Background

Islamic banking is growing at a remarkable pace. Since its inception four decades ago, the number of Islamic financial institutions has risen worldwide from one bank, the Dubai Islamic bank, in 1975, to over 375 banks today (El Qorachi, 2005; Abdul Rehman, 2016). In 2015, the Islamic finance industry reached a gross value of USD 1.88 trillion, growing at a rate of 17.6% over the years between 2009 and 2013, in spite of the economic challenges such as low energy prices, the decrease in the economic growth and geopolitical conflicts (Islamic financial services board, 2016). Islamic banking has also increased in non-Islamic countries, such as the UK and France. In addition, China has developed special regulations to facilitate Islamic banking, and many conventional banks such as HSBS and Standard Chartered bank have opened Windows (i.e. small sections) to offer Islamic banking services to their Muslim clients. Therefore, it is important to know about the Islamic banking system, how it differs from conventional banking, whether it is more safe than conventional banking, and if it would be profitable for conventional banks to use some Islamic financial methods (Awan, 2009).

Like conventional banking (CB), Islamic banking (IB) is a trustee and mediator of people's money. Conventional banking follows conventional interest-based principles, whereas Islamic banking follows Sharia laws, which includes a series of prohibitions (Jaffar & Manarvi, 2011) including: paying or receiving interest rate (called *riba*), gambling or speculating (*maysir or gharar*), and involvement with or working in industries who deal with products related to alcohol, pork, weapons and pornography (Gheeraert, 2014). This is in contrast to conventional banking, which does not forbid interest rates or working with products such as alcohol, weapons etc. Therefore, there is more interest today in understanding both types (IB vs CB) and the risk management for both types (Čihák & Hesse, 2008).

Since the financial crisis of 2008-09, banking stability has become vital to investors who want to keep their money in a safe bank. It is therefore important to research this area and understand whether or not Islamic banking is more stable than conventional banking, as well as if it would be possible for conventional banks to use Islamic finance methods to eliminate the weaknesses in their contracts and methods. Islamic banking offers products and goods that are similar to conventional banking products by replacing interest rates and discounting with fees and a contingent payment structure (Beck, Demirgüç-Kunt & Merrouche, 2013; Trad, Trabelsi & Goux, 2017).

Previously, several aspects of the differences between Islamic banking and conventional banking, such as profitability, risk, stability, efficiency and performance, have been researched to determine which bank type is safer and has better performance theoretically. Studying the comparative banking structure is important in light of the significant number of banks in the economy. Furthermore, the increase in the number of Islamic banks and Islamic windows inside conventional banks all over the world makes it more interesting to investigate in this area (El Massah & Al-Sayed, 2015; Islam & Kozokov, 2009). However, there are not many empirical studies available comparing conventional banking and Islamic banking. This study therefore attempts to fill the gap in the empirical literature on conventional and Islamic banks by examining the comparative stability of Islamic banking and conventional banking during and after the last financial crisis.

1.2: Aim and objectives

The aim of this study is to determine whether Islamic banks are more stable than conventional banks by addressing the following research questions: 1) Is there sufficient stability in such that they can remain strong during a crisis? and 2) Which elements, such as assets, leverage, return on assets (ROA) etc. add quality to the z-score? In order to answer these questions, the present study will compare five IBs with seven CBs and measure the stability of both types, during the period 2006-15 for the z-score. Also, the regression covers the period 2008-15 by using Panel model for Islamic and conventional banks, which covers the time during and after the crisis. Country-level variables will also be added to the bank variables in the regression to determine

the impact of each element on the z-score. The first comparison will provide a full picture of which type is more stable, after which the regression will elicit the significant variables.

Overall, the present study finds that Islamic banks performed better during the last financial crisis, while conventional banks performed better and were more stable overall, and that there was no significant difference in stability between IB and CB. Moreover, leverage had a strong effect on overall stability regardless of the type of bank. In addition, Islamic banks were observed to be more affected after the first stage of the crisis, suggesting that Islamic banks are related to the real economy and invest in real products and services. The leverage of IB in this sample was also observed to be lower than the leverage of CB. Furthermore, when leverage was included into the regression, the assets (i.e. bank size) were found to be significant at 1% and strongly related to stability, suggesting a strong relationship between these two variables (when using z-score as a measure) and indicating the effect of assets which are financed by debt. Assets were found to be significant at 10% when leverage was excluded.

1.3: Limitations

Due to the lack of access to databases, especially for Islamic banks, the main source of data in the present study is annual reports for each bank available on the banks' website. Financial data was not available for many banks. Therefore, this study covers 12 banks in four countries: UAE, Jordan, USA and Sweden, providing a diverse sample which includes different governance systems and regulations. Moreover, the regression covers the period 2008-15, which covers the crisis period and after the crisis.

1.4: Thesis Outline

The structure of this thesis is as follows: Chapter 1 covers the introduction to the study. Chapter 2 lays out the theoretical framework, while Chapter 3 discusses risks in Islamic and conventional banking. Chapter 4 will outline methodology and data, after which chapter 5 will present the

empirical analysis and results. Chapter 6 is the conclusion and Chapter 7 contains a list of references.

Chapter 2: Theoretical review

In terms of financial models, investment modes and contracts, Islamic banks are different from conventional banks. Therefore, governance structures, agency conflicts, and overall accountability are affected significantly by those differences (Abdelsalam et al. 2016).
There are only a few financial studies that use empirical analysis of Islamic and conventional banking, Čihák and Hesse (2008) conducted an empirical study about the financial stability in Islamic banks and conventional banks. They used cross-country data for 70 banks with 520 observations, of Islamic banks and conventional banks during the period 1993-2004 to capture the impact of bank size on the stability in Islamic banks and conventional banks. They used the z-score as a measure of stability and found that financially, small Islamic banks tend to be stronger than small conventional banks, large Islamic banks tend to be weaker than large conventional banks, and small Islamic banks tend to be stronger than large Islamic banks.

Furthermore, in their study Islam and Kozokov (2009) used secondary data from the period 2005-08 for 66 banks, and they used the z-score as a stability measure for both Islamic banks and conventional banks. They found that there was no significant difference in the stability of Islamic banks and conventional banks and that Islamic banks were not less risky than conventional banks even during the financial crises.

Research conducted by Hasan and Dridi (2010) in which their sample included about 120 banks, found that before the financial crisis, IBs were more profitable than the CBs, and that for the period 2008-09, the average profitability of IBs was similar to that of CBs. Moreover, large IBs performed better than smaller ones. Furthermore, during the crisis, the credit and asset growth of Islamic banks was at least twice high as that of CBs.

Beck, Demirgüç-Kunt and Merrouche (2010) describe the most common Islamic banking products, and they compared the business orientation, quality, cost-efficiency and stability of Islamic banks and conventional banks. They found that Islamic banks were more cost-effective in a large sample of countries, while conventional banks were more cost-effective than Islamic banks in countries where both types exist. They also found that Islamic banks had a higher capital–asset ratio. Moreover, the efficiency and stability for both types differ between countries;

thus, they concluded that Islamic banks are more stable but less cost-effective than conventional banks in countries where the market share of Islamic banks is higher.

In another study Beck, Demirgüç-Kunt and Merrouche (2013) compared the business model, efficiency, and asset quality of Islamic banks and conventional banks using a sample of 22 countries. Their study covered period during and after the last financial crisis. Their empirical study showed that there were few significant differences in the business model, and that Islamic banks were less efficient, but had higher intermediation ratios. Moreover, Islamic banks had higher asset quality were better capitalized. Furthermore, they found that asset quality and higher capitalization helped Islamic banks to perform better during the last financial crisis.

Kabir, Worthington and Gupta (2015) investigated credit risk in both Islamic banks and conventional banks. They used Merton's distance-to-default (DD) model. They found that in general, depending on the DD model, Islamic banks had a lower credit risk than their counterparts. Conversely, Islamic banks had a lower z-score and higher NPLs (Nonperforming loan/ assets) than conventional banks, suggesting that Islamic banks had a higher credit risk. They did not find any significant difference in credit risk during the financial crisis, however, which refutes the findings of previous studies that Islamic banks performed better during the crisis.

2.1- Islamic bank model

Islamic banks work under Islamic laws (Sharia), which forbid working with interest rate and loans trading (Čihák & Hesse, 2008; Ghassan, Fachin & Guendoz, 2012).

2.1.1: Overview of Islamic banks

Islamic banking is a system of banking which works according to Sharia which refers to Islamic laws which came from the Islamic religion. Under these laws, Islamic banks prohibit interest rates on deposits and collecting interest when offering loans; this process is called *Riba* in the Islam religion. Instead, Islamic banking uses other ways and contracts, such as: profit-and-loss sharing (PLS) arrangements, when the banks contribute a business by offering the capital and share the profit and loss in that business, and purchase and resale transactions (goods and

services), which are the main forms of Islamic banking contracts. In PLS, the rate of return is not known or fixed before embarking on the transaction. Moreover, Islamic banking prohibits trading in financial risk (which is seen as a form of gambling, which is forbidden) and in a business that involves alcohol, gambling activities, or non-Islamic media. Therefore, Islamic banks have to take some risk to make their profit compliant with Sharia and do not work with products that harm human beings (Čihák & Hesse, 2008; Ghassan, Fachin & Guendoz, 2013).

Customers of Islamic banks are not different from the conventional banks' customers, as they expect their money to be productive and safe when they deposit it in the bank. They want to invest their money in goods and activities that are allowed in Islamic laws and they want to be safe from financial crisis and fraudulent practices. Ethical values and moral integrity are very important in Islamic banking, as they are the key for the stability and efficiency of the banks and the financial system, and they attract investors, especially Muslim investors who are searching for investments that are compliant with Islamic laws. Islamic banks are not only for Muslim communities, but also for all communities, so they are additional choices available for customers. Additional choices can play an effective role in improving the quality of services and improving social welfare (Khan & Muljawan, 2003).

Stability, equitable distribution of wealth and income, economic growth, economic well-being with full employment, and the mobilization and of savings for economic development guarantee a (profit-sharing) return is to all parties involved (ed. Hassan, & Lewis, 2007). In addition, to the fact that Islamic banks offer a variety of religiously acceptable financial services to Muslim communities, like other aspects of Islamic society, Islamic banks try to achieve socio-economic development (Chapra, 1985). Consequently, Islamic banks have the same goals as conventional banks and additional goals, and they try to achieve those goals by following Islamic laws and applying Islamic finance tools.

2.2: Islamic banking contracts

Islamic banks have different forms of contracts, in particular Murabaha, Mudarabah, Musharakah, Ijara, Sukuk and Takaful.

2.2.1: Murabaha contract

Murabaha is a contract where the bank buys an asset or goods from a third party, and resells those purchases to a second party (could be individual or company) with an amount of profit agreed between the bank and the second party. The difference between this contract and conventional interest-based lending is that if the second party fails to make a deferred payment on time, the mark-up (the profit which was agreed on) will not increase from and the bank itself become the owner of the product which means it carries the associated risks. Example on *Murabaha* contract, when a person wants to buy a car which costs 10000$ so he goes to the bank and the bank buy the car and resell it to that person in installments and charge a flat fee (ed. Hassan, & Lewis, 2007; Khan & Bhatti, 2008).

2.2.2: Mudaraba contract (finance by way of trust)

This term refers to a form of partnership which one partner (rabb al-mal) brings the capital and the other party (mudarib) brings personal effort (skills) and manage the capital. The bank can provide the full capital or part of it. The investor bears the risk, so if the investment goes bankrupt the bank will lose the capital and the other party will lose the work and the effort. *Mudaraba* enter both sides of the balance sheet on the asset side, as project financings and on liability side as investment. Moreover, the mudarib (other party) has the option to buy the investment from the investor (the bank) (ed. Hassan, & Lewis, 2007).

2.2.3: Musharakah contract

It is a contract between the bank and the customer whereby the Islamic bank offer the capital to an enterprise, and the enterprise might be existing or new either on a permanent or temporary basis. If the contract is temporary, one partner promises to buy the equity from the other party gradually until the title of the equity is completed. While if the contract of *Musharakah* is permanent, the bank manages the enterprise and search for ways to develop the project's profit (El Tiby, 2011).

The possible risks for this contract is credit risk which the bank might loss their share in capital which invested in the project or credit risk related to the payment that the customers would pay to the bank. Operational risk rises up when there is insufficient management during the life of the project, and this risk usually happen as a result of the lack of experience or the bank is not

involved in managing the project or follow it is financial reports. To avoid this risk, the bank is required to follow the project and take the right decision at the right time (El Tiby, 2011).

2.2.4: Ijarah contract

Ijarah contract means hiring or leasing. It is an agreement between the Islamic bank and the customer, and by this agreement the bank lease an asset to the customer who has the right to benefit from the asset on an agreed rental over a period of time.

Possible risks for this contract is credit risk, when the customer (lessee) is unable to serve the lease rental when it is due. Market risk could be a possible risk if the customer defaults, in this case the bank might dispose of the asset at the market price, which might be lower than the agreed price. Operational risk happens when the customer (lessee) use the asset in activities that are not legal in Shariah principles, such as selling cigarettes or alcohol (El Tiby, 2011)

2.2.5: Sukuk (Islamic bonds)

Sukuk is a financial certificate, it is Islamic bonds as an alternative to conventional bonds. *Sukuk* according to the accounting and auditing organization for Islamic financial institutions (AAOIFI), is "an Islamic investment certificate which represents an undivided beneficial ownership of an underlying asset which grants investors a share of an asset along with the cash flows and risk commensurate with such ownership" (ed. Hassan, & Lewis, 2007). Table 1 describes the difference between Islamic *Sukuk* and conventional *bond*.

Table 1: Distinguish between Islamic Sukuk and conventional bond. Source: (Jamaldeen & Faleel, 2012).

	Islamic Sukuk	**Conventional bonds**
Asset ownership	Sukuk give the investor partial ownership in the asset on which the sukuk are based.	Bonds do not give the investor a share of ownership in the asset, project, business, or joint venture they support. They are a debt obligation from the issuer to the bond holder
Investment	The asset on which sukuk are based must be sharia-compliant.	Generally, bonds can be used to finance any asset, project, business, or joint venture that complies with local legislation

criteria		
Issue unit	Each sukuk represents a share of the underlying asset.	Each bond represents a share of debt.
Issue price	The face value of sukuk is based on the market value of the underlying asset.	The face value of a bond price is based on the issuer's credit worthiness (including its rating).
Investment rewards and risks	Sukuk holders receive a share of profits from the underlying asset (and accept a share of any loss incurred).	Bond holders receive regularly scheduled (and often fixed rate) interest payments for the life of the bond, and their principal is guaranteed to be returned at the bond's maturity date.
Effects of costs	Sukuk holders are affected by costs related to the underlying asset. Higher costs may translate to lower investor profits and vice versa.	Bond holders generally are not affected by costs related to the asset, project, business, or joint venture they support.

2.2.6: Takaful (Islamic insurance)

Taken literally, *Takaful* means "mutual or joint guarantee", and it is used to denote Islamic insurance. Typically, *Takaful* takes the form of *Mudarabah*, where two parties agree to share their losses by contributing periodic premiums in the form of investments (Greuning, & Iqbal, 2008). Islamic laws prohibit life insurance, as is offered by conventional banks, due to the uncertainty, doubt, probability and charging of interest involved. In comparison, Takaful is a free-interest contract (Khan & Coopers, 2008). Table 2 outlines the difference between Takaful insurance and conventional insurance.

Table 2: Difference between Islamic insurance and conventional insurance. Source: (Greuning & Iqbal, 2008).

	Takaful insurance	Conventional insurance
Benefits	Paid from the related participants' funds under mutual assistance.	Paid from the company reserves.

	The funds shall be invested in any interest-free Shari'a-approved assets and also meet any required national insurance regulations and laws.	The funds may be invested in any assets so long as they meet required national insurance regulations and laws.
Operations	Operational mechanisms shall be in line with the Shari'a rules.	Operational mechanisms shall be in line with the national insurance regulations and laws.
Profit	Underwriting profit is distributed to the policyholders. Shareholders' profit is generated from the return on the investments of the shareholder capital and expenses paid to the shareholders by the policyholders for (i) managing the company on behalf of the policyholders; and (ii) managing the policyholders' investment funds on behalf of the policyholders.	Policyholders do not get any share of the underwriting profit (except in mutual companies); shareholders' profit is generated from the company's underwriting profit plus any investment returns.
Company	Company is better known as an operator, which acts as a trustee, manager and also entrepreneur.	Relationship between the company and the policyholders is on one to one basis.
Policyholder Fund	The policyholder fund belongs to the policyholders on collective basis and is managed by the shareholders.	All (ie. both policyholder and shareholder) funds belong to the company, though separation of assets may be maintained between shareholders and policyholders for specific insurances (eg. with profits).
Regulations	The operational mechanisms and products must be Shari'a-compliant and be in accordance with required national laws and insurance regulations.	Operational mechanisms and products have to be in accordance with the required national laws and insurance regulations.

2.3: The difference between Islamic and Conventional banking

The Islamic banking system is based on the act of making profits under the Shariah principles of Islam. Conventional banks rely on man-made laws and focus on maximizing profits. The fundamental concept behind conventional banks' practices is to lend money and get it back later, charging high interest to generate profit (Sabir et al. 2014). Conventional banks receive interest on the loans they provide to investors; the banks do not take part in the investor's business. Whether a business makes a profit or a loss, the bank still receives interest according to the original agreement.

In comparison, in Islamic banking the bank is part of the business. It gets back only a share of the profit from the business to which the bank has provide funds. In the case of any loss occurring, the business party (that is, the investor) does not lose out in monetary terms, rather the business forgoes the reward for its activities during that period. Therefore, the depositors are seen as investors in the company, although they do not participate in risk management, with shareholders contributing to risk management. Conversely, in conventional banks the investors usually own the investment and contribute to risk management costs; unless the bank is a part of the business, in which case then both sides would contribute to risk management. (Sabir et al. 2014; Shaban et al. 2013; Arnu & Turner, 2003).

Greuning, and Iqbal (2008) mentioned that understanding the balance sheet of a financial institution is important approach and a good point to start to understand the risk management of the financial institution. Table (3,4) indicates the balance sheets of Islamic and conventional banking.

Table 3: balance sheet of CB, source: (Greuning, and Iqbal, 2008).

Assets	**Liabilities**
Loans and advances to customers	Customers' deposits
Cash and cash balances with other banks	Due to banks and other financial institutions
Investments in associates, subsidiaries and joint ventures	Other liabilities

Financial assets held for trading	Sundry creditors
Cash and cash balances with the central bank	Equity and reserves

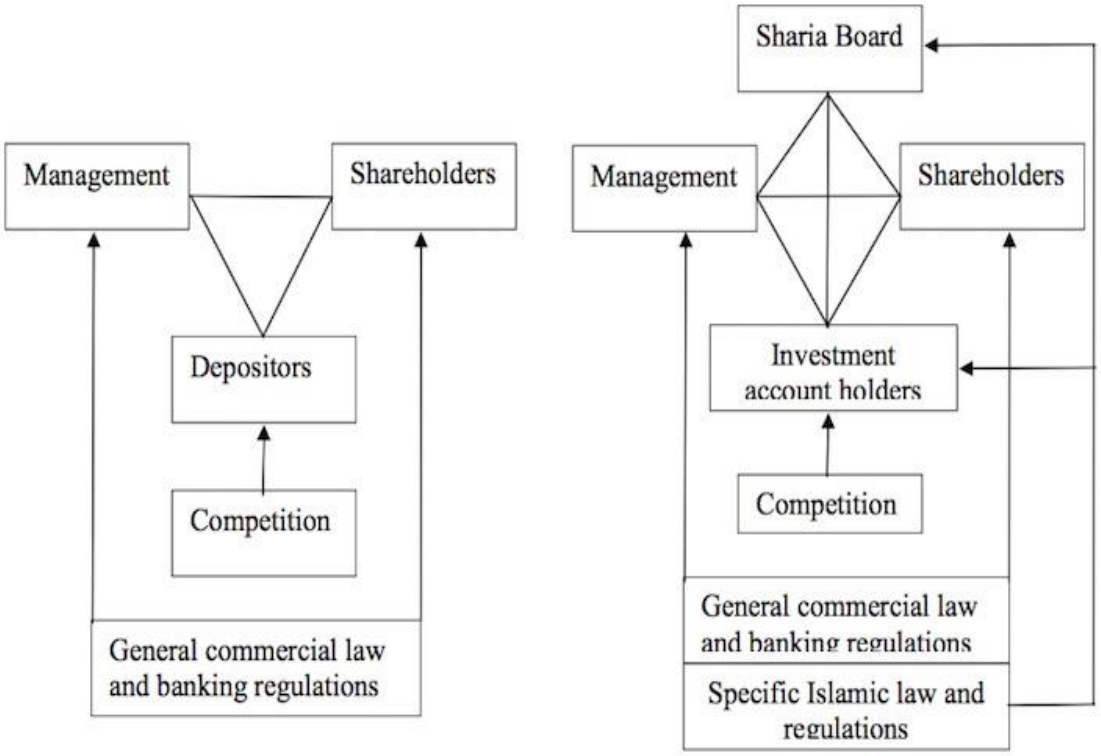
Table 4: balance sheet of IB, source: (Greuning, and Iqbal, 2008).

Application of funding	**Sources of funding**
Cash balances	Demand deposits (amanah)
Financing assets (murabaha, salam, ijara, istisna)	Investment accounts (mudarabah)
Investment assets (mudarabah, musharakah)	Special investment accounts (mudarabah, musharakah)
Fee-based services (ju'ala, kafala, and so forth)	Reserves
Non-banking assets (property)	Equity capital

From the tables above it is apparent that the risk profile of an Islamic bank's balance sheet is different to that of conventional banks. This is because the return on the depositors' investments when working with an Islamic bank is linked to the return on their assets. Moreover, the assets belonging to the two institutions are different; conventional banks tend to stay with fixed income, very low credit-risk debt securities, whereas an Islamic bank's assets are focused on asset-based investments. These have credit risk and are also backed by real assets; therefore, the lending capacity of Islamic banks depends upon the state of the real assets in the wider economy. In addition, the conventional banks' assets are financed by a loan from the bank to the customer; in Islamic banks, the asset and the financing are coupled together (Greuning, & Iqbal, 2008).

The governance of Islamic banks is different to that of conventional banks, not only as regards the status of the depositors, but in the presence and construction of the Shariah boards in Islamic banks. The Shariah board's priority is to ensure that all business activities conducted by the bank complies with Islamic law and principles. Figure (1) compares the typical governance structure of both conventional and Islamic banks.

Figure 1: Stylized governance structures of conventional and Islamic bank. Source: (ed. Hassan, & Lewis,2007).



The Accounting and Auditing Organization for Islamic Financial institutions (AAOIFI) issued the governance standards of Shariah board, on the 'Shariah supervisory board: appointments, composition and report' and explained Shariah board as:

a- Is an independent body of specialized jurisits in fiqh almua'malat (Islamic commercial jurisprudence).

b- Is entrusted with the duty of directing, reviewing and supervising the activities of the Islamic financial institutions in order to ensure that they are in compliance with Islamic Sharia rules and principles.

c- Can issue fatwas and rulings which shall be binding on the Islamic financial institution.

d- d- Shall consist of at least three members' who are appointed by the shareholders upon the recommendation of the board of directors.

e- Shall prepare a report on the compliance of all contracts, transactions and dealings with the Shariah rules and principles (ed. Hassan, & Lewis, 2007).

Chapter 3: Risks in Islamic and conventional banks

"Risk can be defined as an unplanned event with financial consequences resulting in loss or reduced earnings" (Vasavada et al. 2005). "Risk also refer to uncertainties resulting in adverse outcome, adverse in relation to planned objective" (Kumar et al. 2005).

Risk can be classified into two types: systematic risk and unsystematic risk. Systematic risk usually refers to the market and the economy; this risk can not be diversified. Unsystematic risk usually relates to specific companies; this risk can be diversified (Allen & Santomero, 1998). Figure (2) shows the different categories of banking risk.

Figure 2: Categories of Banking Risks 1, source: (Vyas & Singh, 2010).

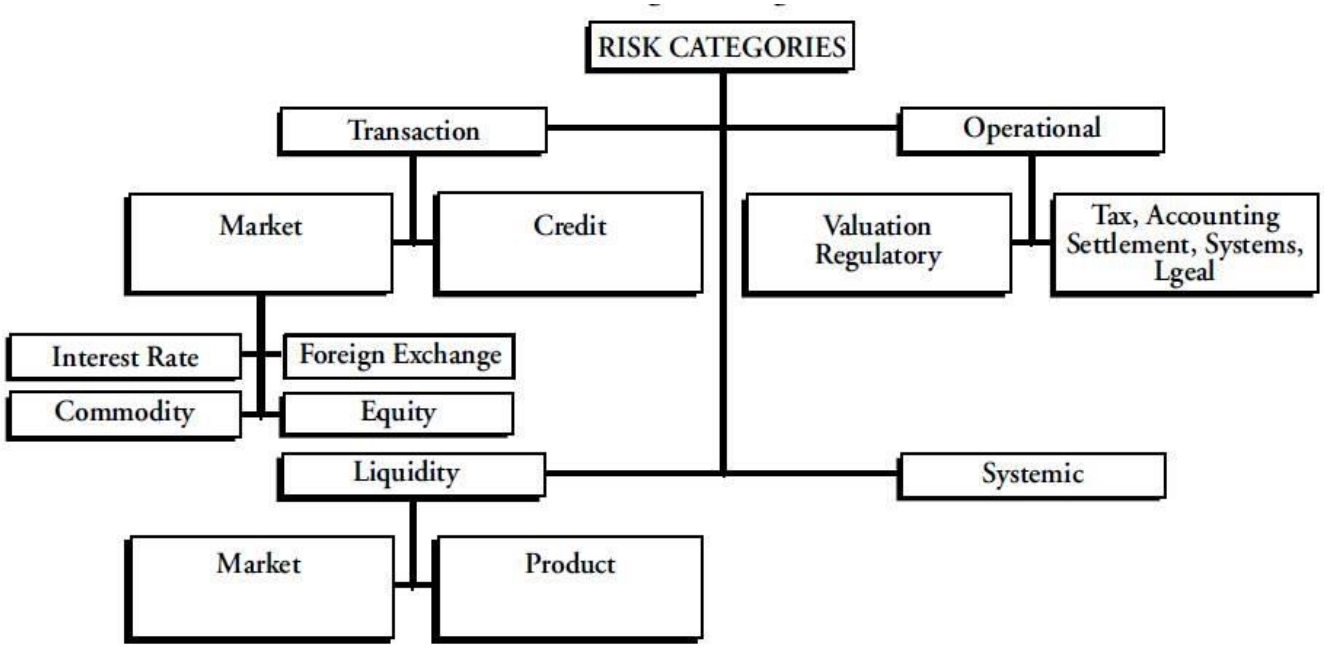


Table 5: Major risks faced by IB. Source: (Rosly & Zaini, 2008).

Product based on	**Major risks**	**Risk classification**
Murabahah	Credit risk	Unsystematic
Musharakah	Market and agency risk	Systematic
Mudarabah	Market and agency risk	Systematic
Ijarah thumma al-bay'	Credit risk	Unsystematic
Ijara wa iktina	Operational and payment risk	Unsystematic
Salam	Delivery risk	Systematic
Istisna'	Delivery risk	Systematic
Bay'al-enah	Credit risk	Unsystematic
Tawarruq	Credit risk	Unsystematic
Commodity murabahah	Credit risk	Unsystematic

We can see from the table 5 above that *Murabaha* in Islamic banks faces credit risk. This happens when the bank delivers the asset to the other party but does not receive payments from the other party (that is, the investor) on time. In *Salam* contracts the investor can benefit from the fact that the bank will not charge them for any delayed payments; therefore, the bank could face this kind of delivery risk. However, in some cases the bank uses collateral as a security with which to reduce credit risk. In the table below we can see the level of the risk for each contract that might be held by Islamic banks.

Table 6: Risks in different of financing. Source: (ed. Hassan, & Lewis, 2007).

	Credit risk	**Market risk**	**Liquidity risk**	**Operational risk**
Murabaha	2.47 (17)	2.75 (12)	2.62 (16)	2.8 (15)
Mudarabah	3.38 (13)	3.56 (9)	2.57 (14)	2.92 (13)
Musharakah	3.71 (14)	3.67 (9)	3.0 (13)	3.08 (12)
Ijarah	2.64 (14)	3.17 (6)	3.1 (10)	2.9 (10)
Istisna	3.13 (8)	2.75 (4)	3.0 (6)	3.29 (7)
Salam	3.2 (5)	3.25 (4)	3.2 (5)	3.25 (4)

The number of respondents are indicated in the parentheses

The table 6 above shows some important risks in Islamic banks. We can see here that credit risk is considered to be lowest in *Murabaha* (2.47) contracts, with the highest risk experience by *Musharakah* (3.71). *Ijarah* (2.64) has the second-lowest credit risk, while *Istisna* (3.13) and *Salam* (3.2) are riskier than all the other contracts except *Musharakah* in terms of credit risk.

It appears that contracts involving profit and loss sharing experience higher credit risk. This is for two main reasons. Firstly, because sometimes the other party does not pay its obligations to the bank. Secondly, it can occur when the bank acts as a financier of the project but does not contribute to its management and thereby is not involved in managing credit risk. In *Ijarah* and *Murabaha* contracts, the other party gives the bank a relatively certain income and the ownership of the least asset remains with the bank. *Salam* and *Istisna* are riskier than *Murabaha* contracts because the value of the product (and hence the return) at the end of the contract is uncertain.

This may be the case for many reasons, such as a natural disaster (commodities feature in *Salam* contracts) and production failures (applicable to *Istisna* contracts).

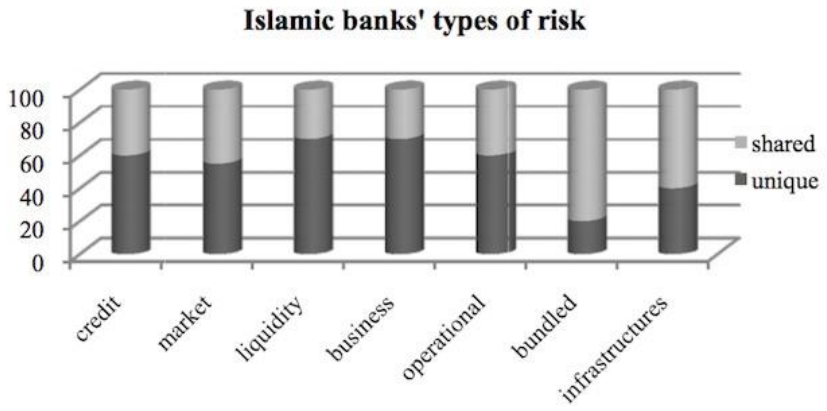
Murabaha (2.75) and *Istisna* (2.75) appear to be the lowest in terms of market risk; conversely, this risk is high for the profit-sharing contracts (*Musharakah* (3.67) and *Mudarabah* (3.56)). This shows that contracts that are related to equity, assets and commodity are higher risk than other contracts, such as *Murabaha*.

Mudarabah (2.57) appears to experience the least liquidity risk, with *Murabaha* (2.62) coming straight after. These are usually used for short-term finance. The other instruments are considered to have a higher liquidity risk: *Musharakah* (3.0), *Ijarah* (3.1), *Salam* (3.2) and *Istisna* (3.0). It appears that liquidity risk is lower in short-term financing contracts and higher in long-term contracts.

. *Murabaha* (2.8), *Mudarabah* (2.92), and *Ijarah* (2.9) are considered to experience lower levels of operational risk, while product-deferred instruments such as *Salam* (3.25) and *Istisna* (3.29) are considered to have higher operational risks. Profit-sharing contracts such as *Musharakah* (3.08) also have fairly high operational risk (ed. Hassan, & Lewis, 2007).

The risks faced by Islamic banks are complex and difficult to mitigate compared to those faced by conventional banks. The significant market and credit risks inherent in Islamic banking exist due to its regulation by *Shariah* laws (Khan & Ahmed, 2001). However, Arrifin, Archer and Karim (2009) argue that Islamic and conventional banks face the same types of risks, but that it is the level of risk that differs between Islamic and conventional banks. In addition, risk measurement techniques for Islamic banks are not advanced as those employed by conventional banks. The figure below shows the shared and unique risks in conventional and Islamic banking.

Figure 3: shared and unique risks in CB & IB. Source: (Kozarevic, Nuhanovic &Nurikic, 2013).



Credit risk in conventional banks relates to the banks' lending activities In the case of Islamic banks, the lending process is replaced with investment and partnership contracts, therefore, credit risk management becomes more important.

Credit risk occurs in Islamic banking when the counterparty fails to meets its obligations according to the agreed terms. Each type of contract held by Islamic banks (*Musharakah*, *Mudarabah* and *Ijarah*) as well as the working capital financing transactions (such as *Salam*, *Istisna* and *Mudarabah*) poses a different credit risk to the bank's profits (Misman, & Bhatti, 2010).

3.1.1: Credit risks

Credit risks are higher in *Murabaha* contracts due to its necessary compliance with Shariah laws. Additionally, the nature of the contract has an impact on credit risk in *Murabaha* contracts, because the buyer has the right to refuse the product purchased by the bank. Moreover, the bank will expose both market and price risks as a result of the credit risk faced (Abdul Rehman, 2016). Banks also face credit risk in *Mudarabah* contracts because the bank acts as a financier of the business and does not contribute to the management of the project.

3.1.2: Market risk

Market risks occur when unfavorable movements happen to the market prices. Interest rate risks, foreign exchange risks, equity risks and commodity risks are all examples of market risk.

3.1.3: Liquidity risk

Liquidity risks arise when the banks are unable to pay their liabilities due to a mismatch between the maturity of the assets and the liabilities. This risk is considered to be the main one to which banks are exposed. Liquidity risks include funding risks, time risks and call risks.

3.1.4: Operational risks

Operational risks occur as a result of a failure in the system. Technology, inadequate procedures and the weak internal processes of Islamic banks are all susceptible. Legal, fiduciary and reputational risks are included under the term operational risk. Rate-of-return risk arises because of uncertainty regarding return on investment (ROI) in Islamic banking.

3.1: Risks specific to Islamic banking

There are some risks that exist only in Islamic banking, because of its nature and the laws it follows.

3.1.1: Displaced commercial risk

According to (AAOIFI) and Abdul Rehman (2016) displaced commercial risk arises when Islamic banks face problems to pay its investors and depositors a higher rate of return than that which should be paid under the real contract. This risk happens when a bank has underperformed for a period and remains unable to generate enough profits for its account holders and investors.

3.1.2: Governance risk

This risk occurs as a result of a failure to govern the institution. Negligence in terms of the administration of contracts, an inability to meet its obligations and a weak internal and external environment can all play a part. Governance risk includes legal risks, which is the term for when

banks are unable to fulfil their contracts (Greuning, & Iqbal, 2008).

3.1.3: Withdrawal risk

This risk arises from the competitive pressures faced by the Islamic banks both from other Islamic banks and conventional banks. The bank faces this risk when the investors withdraw their funds when they earn lower rate of return than would be get from another banks (Khan & Ahmed, 2001).

3.1.4: Fiduciary risk

This risk arises when banks are not able to perform according to both the explicit and implicit standards regulating their fiduciary responsibilities. This risk includes that of legal action, if the bank were to violate its fiduciary responsibilities to depositors and shareholders. From a fiduciary agent's view, Islamic banks are expected to achieve their best for depositors and shareholders. If the objectives of depositors and shareholders do not match with the banks' and differ from the bank's actions, the bank is exposed to fiduciary risk (Greuning, & Iqbal, 2008).

3.1.5: Transparency risk

It is defined as "the public disclosure of reliable and timely information that enables users of that information to make an accurate assessment of a bank's financial condition and performance, business activities, risk profile, and risk management practices" and it happens due to bad decisions because of incomplete information. Islamic bank contracts reported from nonstandard conventions and this could be one source of lack of transparency. Moreover, Islamic bank's financial instruments needs and require different conventions of reporting to reflect the true financial picture of the bank (Greuning, & Iqbal, 2008; Abdul Rehman, 2016).

3.2- Main differences in Islamic and conventional banks

Table 7: Differences between Islamic & Conventional banks. Source: (Zaharuddin Hj Abd Rahman, 2007).

Conventional banking	Islamic banking

1. The functions and operating modes of conventional banks are based on man-made principles.	1. The functions and operating modes of Islamic banks are based on the principles of Islamic Shariah.
2. The investor is assured of a predeter- mined rate of interest.	2. In contrast, it promotes risk sharing between provider of capital (investor) and the user of funds (entrepreneur).
3. It aims to maximize profit without any restriction.	3. It also aims to maximize profit, but subject to Shariah restrictions.
4. It does not deal with zakah.	4. In the modern Islamic banking sys- tem, it has become one of the ser- vice-oriented functions of the Islamic banks to collect and dis- tribute *zakah.*
5. Lending money and getting it back with interest is the fundamental function of the conventional banks.	5. Participation in partnership business is the fundamental function of the Islamic banks.
6. Its scope of activities is narrower when compared with an Islamic bank.	6. Its scope of activities is wider when compared with a conventional bank. It is, in effect, a multipur- pose institution.
7. It can charge additional money (compound rate of interest) in case of defaulters.	7. The Islamic banks have no provision to charge any extra money from the defaulters.
8. In it, the bank's own interest very often becomes prominent. It makes no effort to ensure growth with equity.	8. It gives due importance to the public interest. Its ultimate aim is to ensure growth with equity.
9. For interest-based commercial banks, borrowing from the money market is relatively easier.	9. For Islamic banks, it is comparatively difficult to borrow money from the money market.

11. Conventional banks place greater emphasis on creditworthiness of the clients.	11. Islamic banks, on the other hand, place greater emphasis on the via- bility of the projects.
12. The status of a conventional bank in relation to its clients is that of creditor and debtors.	12. The status of the Islamic bank in relation to its clients is that of part- ners, investors, and traders.

Chapter 4: Methodology and Data

In order to get a clear picture of Islamic banks compared to conventional banks, both qualitative and quantitative techniques used. Former parts discussed theoretically the difference between both types (IB & CB) and the latter part will discuss empirically the difference between the two distinct banking system by using the data for both types to calculate z-score, ROA, leverage, and analyze the regression. Both methodology combination makes it easer and more clear to observe which type is more stable or riskier.

4.1: Data collection

This study relies on data that has been collected from the banks' balance sheets, which can be found on each bank's website. This data has been used to calculate the return on assets (ROA), leverage and z-score for each bank, covering 10 years between 2006 and 2015. Country-level data such as GDP growth and the inflation rate has collected from websites belonging to organizations such as Federal Reserve Economic Data by the Federal Reserve Bank (FRED), Trading Economics and The World Bank.

4.2: The sample and selection criteria

The selection of Islamic banks in this study primarily comes from countries in the Gulf region. The sample does not cover the full range of Islamic and conventional banks worldwide; rather, it covers four countries. It is hoped that a comparison of specific banks will give a more in-depth understanding as to what affects the stability of each type of bank, in that it will allow us to find the elements or variables that add quality or improve stability.

It is worth noting that country-level data varies between countries, which might affect the results. For example, one entry such as liquidity or assets might have a different impact on a bank's stability in different countries.

Ten years' worth of data from five Islamic banks has been collected, of which four are located in the United Arab Emirates (UAE) and one in Jordan. Their annual reports confirm that they are properly Islamic banks. In additional, ten years' worth of data has been collected from seven conventional banks from the United States, as well as from two Swedish banks.

The UAE is the heart of the economy in the Gulf region. It is an open market that attracts investors from all over the world. The first Islamic banks were founded in Dubai, thus, it is reasonable to include Islamic banks from this country. One Jordanian Islamic bank has been included, because although there are additional Islamic banks in the UAE these are smaller, with limited data. Jordan is a neighbor of the UAE and the size of the Jordanian bank is comparable to that of the four from the UAE.

The United States (US) is the heart of the world's economy. The biggest conventional banks are located there and the financial crises started in the US. Therefore, US conventional banks are sensible to use when constructing an empirical analysis to compare conventional with Islamic banking. Two Swedish banks were added in order to distinguish the Islamic dummy in the regression analysis.

This study contains 96 observations: 40 observations concerning Islamic banks and 56 concerning conventional banks. There are some outliers that were excluded because they are far away from the mean (Čihák & Hesse, 2008); the sample is more balanced without outliers.

4.3: Specifying bank stability

Unlike previous research, this essay compares the stability of five Islamic banks and seven conventional banks. In order to measure bank stability, the banks' z-score, leverage and ROA have been used to construct an empirical comparison. The aim is to find which elements add strength to each bank's z-score.

4.3.1: Z-score

The z-score is one of the most important measures of a bank's stability. This measure is directly related to the probability of the bank's insolvency, which occurs when the value of the bank's

debt becomes higher than the value of its assets. The z-score can be calculated using equation (1) (Čihák & Hesse, 2008).

$$Z = \frac{k + \mu}{\sigma} \quad (1)$$

Where k is the equity capital as percent of assets, μ is the return as a percentage of the assets and σ is the standard deviation of ROA. Therefore, the z-score connects the bank's capital with its ROA and its risks (volatility of returns). The z-score also indicates the standard deviation of how far the bank's asset returns have to fall before the bank becomes insolvent. Thus, the z-score is the bank's distance from insolvency; a higher z-score implies that the bank is more stable and therefore has a lower probability of insolvency risk.

The z-score can be applied to both Islamic banks and conventional banks, because it is a fairly objective measure of safety across different financial groups. Furthermore, the z-score is not affected by the bank's activities nor its insolvency, whereas other measures might signal a liquidity problem. (Ghassan, Fachin & Guendoz, 2013; Li, Tripe & Malone, 2017).

The z-score method has a possible failing; namely, that it displays the book value of the capital and reserves and so could therefore underestimate the financial strength of the Islamic banks. Financial liabilities in Islamic banks consist of investment accounts that can be seen as a form of equity (in general, this is based on the *Mudaraba* principle). A possible counterargument against this criticism is that the conventional banks can pass on risks to their customers through their ability to adjust (and delay adjustments in) loan rates and deposits (Čihák & Hesse, 2010).

4.3.2: Leverage:

The leverage ratio or debt/equity ratio is used to measure the bank's financial leverage. It indicates how much debt a bank is using to finance its assets and can be calculated using equation (2).

$$\text{Leverage} = \frac{\text{Total liabilities}}{Total\ equity} \quad (2)$$

This ratio measures the bank's overall leverage; it is the best-known measure of capital adequacy. The higher the leverage, the greater the risk being accepted by creditors; a lower leverage indicates greater long-term financial safety. In general, creditors prefer a low leverage ratio because it provides protection for the bank (Arunachalam, 2006).

4.3.3: Return on assets (ROA)

This is a profitability ratio widely used by financial institutions. It measures the efficiency of the company when generating profits. This ratio displays the ability of the bank to utilize its assets (Hossan & Habib, 2010).

$$\text{ROA} = \frac{\text{Net income}}{Total\ assets} \qquad (3)$$

This ratio is used for both kind of banks (conventional and Islamic) and it is based on the net income that a bank makes from its total assets. ROA indicates how much income the financial institution generates from it is assets; the higher the ROA, the better it is, because that means that the bank can generate more profit from its assets. ROA is also a good tool for investors, as it allows them to have an idea as to what extent the company it effectively converting their money into net income (Heikal, Khaddafi & Ummah, 2014).

In addition to the measures above, outliers are calculated by estimating the first quartile, third quartile and calculate the outlier by using the equations:

Lower bound = first quartile – 1.5 * IQR; Upper bound = third quartile + 1.5* IQR, where IQR is interquartile ranges. Therefore, the outliers are the values outside the range of (lower bound – upper bound) for the z-scores. The values of the upper and lower bounds available in the table 9 below which are based on the tables (11,14) in Appendix.

4.4- Control Variables

A number of control variables which cover the bank and country level, are used for analysis. The control variables are based on my calculation, z-score are calculated as equation (1), leverage is calculated as equation (2), ROA is calculated as equation (3) and this is due to the lack of data

especially for Islamic banks. In the analysis, I included ROA (profitability), leverage (solvency ratio), assets (bank size) as bank level control variables. While I included GDP growth and inflation rate as country level control which are collected from Federal Reserve bank economic data (FRED), trading economics and world bank.

In order to recognize the impact of bank type on the z-score, I included a dummy variable that takes a value of 1 if the bank is Islamic bank, and 0 if commercial bank (Čihák & Hesse, 2008).

4.5: Regression Analysis

Regression is a statistical technique used in finance to determine how strong is the relation between one variable (dependent variable) and a series of other variables (independent variables). Regression helps economists to explore how strong the dependent variable is affected by each independent variable. Since, my data is both cross-sectional (12 banks) and time-series (2006-15). I used Panel data analysis, which is consistent with many scholars (Čihák & Hesse, 2008; Kabir, Worthington & Gupta, 2015; Beck, Demirgüç-Kunt & Merrouche, 2013).

The panel data is more accurate and contains more sample variability than cross-sectional data. Also, the panel can control heterogeneity and can measure effects that can not be measured in cross-section or time-analysis (Hsiao, 2003; Baltagi, 2013).

4.5.1- Regression model

The output of the regression is tested in statistical package EViews. The z-score is taken as dependent variable, with three bank level vector variables and two country level variables. It is measured as in the following equation:

$$\mathbf{Z_{i,j,t} = \alpha + \beta 1(Bank\ level\ control)_{I,j,t} + \beta 2\ (Country\ level\ control)_{j,t} + \beta 3\ (Islamic\ dummy)_{I} + \varepsilon_{I,j,t}} \quad (4)$$

Where $Z_{i,j,t}$ is the risk measure (Z-score) for bank I, in country j, at time t. β1(Bank level control) is a vector of bank level control variables (assets, leverage, ROA). β2(country level control) is a vector of country variables (GDP growth, inflation rate). β3(Islamic dummy) is included to distinguish between Islamic and conventional banks and it takes the value of 1 for Islamic banks and 0 for conventional banks. $\varepsilon_{I,j,t}$ is a residual.

Chapter 5: Empirical Analysis and results

By looking at the results of the z-scores for the Islamic banks, it can be seen that there is high variability across the sample. Z-score values vary between 5.8 to 312.41, which reflects that there are outliers in the z-scores. Without outliers, the variability is between 5.8 to 41.15. Therefore, in the table 8 below we can see z-scores with and without outliers for both types of banks (i.e. Islamic and conventional). In conventional banks, there is no significant volatility in the z-score value; this is because large banks usually do not have outliers. The results of the table (8) and Figures (4, 6, 7) are the average results of the tables (11, 12, 13, 14, 15, 16) in Appendix below. The tables in Appendix are calculated from equation (1) for the z-score, (2) for leverage and (3) for ROA.

Table 8: Summary statistics. Source: author's calculations based on balance sheets data

	Mean		Std. Dev		Min		Max		Observation	
Measures	IB	CB	IB	CB	IB	CB	IB	CB	IB	CB
Z-score	72.15	23.03	102.17	12.03	5.27	10.05	312.89	48.33	40	56
Z-score*	22.95	23.03	10.77	12.03	5.27	10.05	41.15	48.33	32	56
ROA	0.012	0.01	0.0007	0.0012	-0.01	-0.006	0.025	0.053	40	56
Leverage	6.41	12.67	2.78	4.86	2.73	7.27	14.98	28.98	40	56

*Excluding Outliers **Islamic banks ***Conventional banks

Table 9: Upper and lower bound of the z-score. Source: author's calculation

	Islamic bank	Conventional banks	Observation
Upper bound	61.76	76.35	40
Lower bound	1.90	4.58	40

Table 8 above shows that on average, Islamic banks and conventional banks are quite similar to each other in terms of of their z-scores (stability) when outliers are excluded. The empirical results would be significantly different if outliers were included because some Islamic banks have very high z-scores; therefore, it is important to account for outliers to get suitable and realistic results. Moreover, the variability in the z-score in the case of Islamic banks (41.15-5.27) is less than that of conventional banks (48.33-10.05), resulting in an overall z-score volatility of 10.77% for Islamic banks and 12.03% for conventional banks. This is because Islamic banks prohibit working and investing in highly-leveraged or speculative businesses and operations which are not based on tangible assets. These results are consistent with the findings of Islam & Kozokov (2009).

The figures (4, 6, 7) below explain how the z-score, leverage and ROA performed during 2006-15 for Islamic banks and conventional banks.

Figure 4: Average z-score for IB & CB. Source: author's calculations.

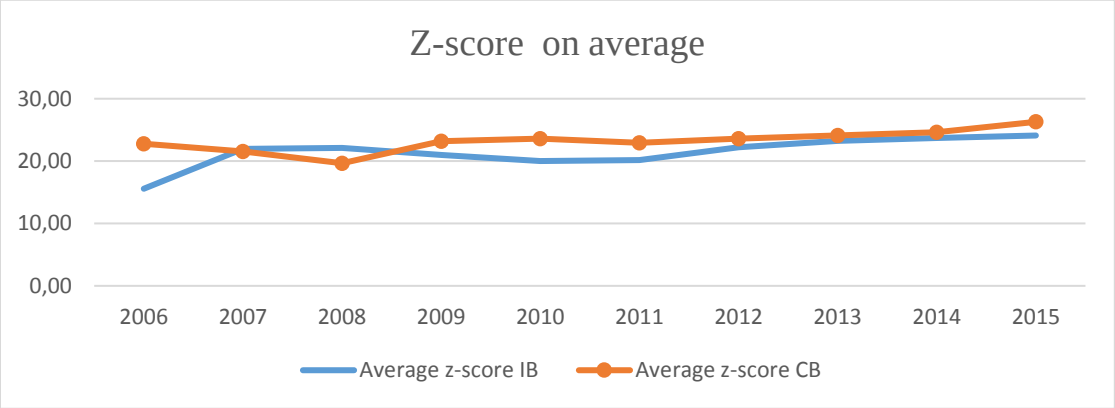


Figure 5: Banks' average z-score for UAE & US. Source: FRED

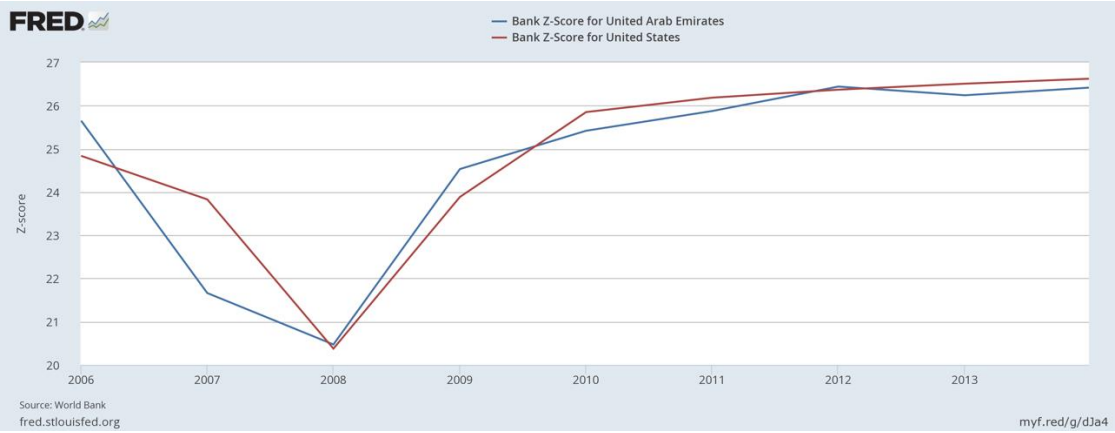


Figure 4 shows that IB had a lower average z-score than CB except in 2008-09. In 2008, z-score of CB decreased by around 10% compared to an 0% decrease in IB. This is because IB were not directly affected by the last financial crisis 2008-09, since IB adheres to Islamic laws which depend on profit-loss sharing and investment in real goods and services. This suggests, and figure 6 confirms, that the ROA for IB is higher than the ROA for CB in 2008-09. Moreover, IB forbids selling assets that are not owned. These factors affect the quality of the assets in IB though quality of the ROA and the z-score (i.e. the stability). Moreover, we can observe from figure 7 that IB has lower leverage than CB, due to the restriction placed by Islamic laws on the sale of debt and CBs using more debt to finance their assets.

Figure 4 also shows that the z-score for CB after the crisis time, which increased by 18%, was higher than the z-score of IB, which decreased by 5.28%. This is because the return on assets for CB increased by 51% compared to 2008. For IB, the ROA decreased by 0.68%. The downward trend in the z-score for IB after the crisis came about because IBs are strongly related to the real economy, and property markets declined in many countries where IBs are strongly represented. In addition, UAE is one of the biggest oil-and gas-producing countries (Vcantugakkas, 2017). After the crisis and the subsequent recession, oil prices fell from 94.1$ for a barrel in 2008 to 60.86$ for a barrel in 2009, and between 2008-10 the oil price declined by 21% (See Figure 10). Therefore, IBs were not directly affected by the last financial crisis. These results are consistent with Gallali & Chakroun (2015). Figure 5, indicates that on average the z-score for UAE banks (IB & CB) are between 20-27 which are consistent with the results of this study sample, and we can observe that the banks' z-score for UAE are below the z-score for US banks except the

period 2008-09 where the last financial crisis happened.

Figure 6: Average ROA. Source: author's calculations.

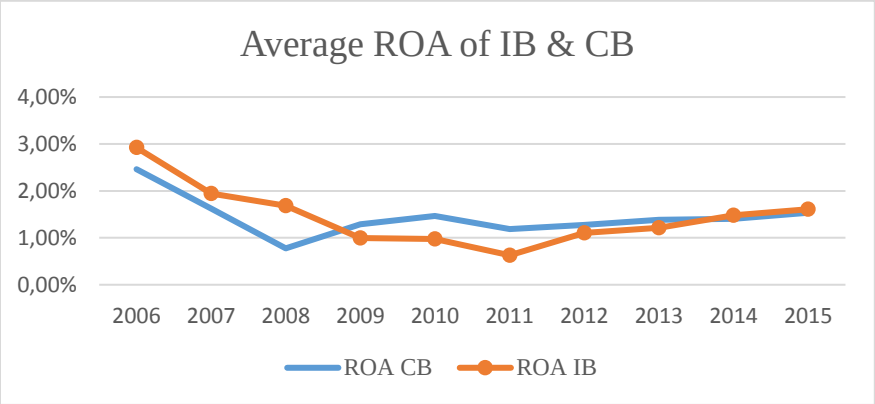


Figure 7: Average leverage for IB & CB. Source: author's calculations.

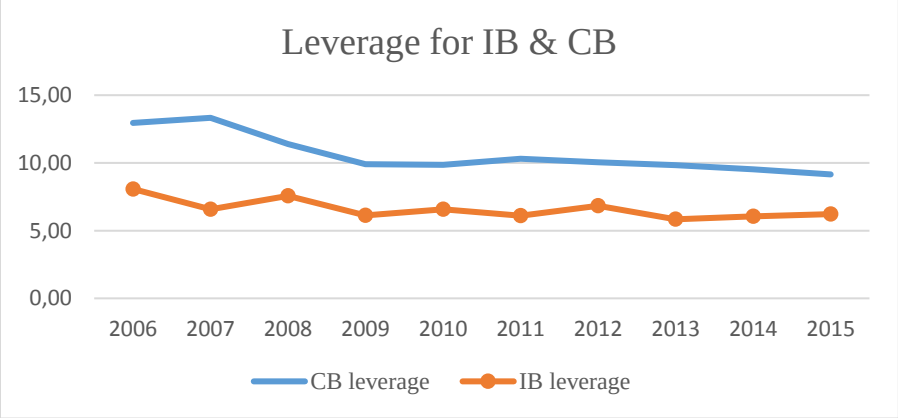


Figure 8: GDP growth of USA and UAE. Source: Tradingeconomics

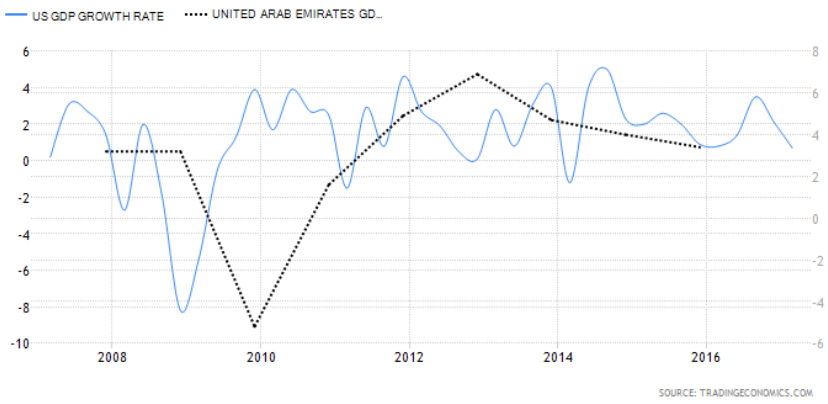


Figure 9: Inflation rates of USA and UAE. Source: Tradingeconomics

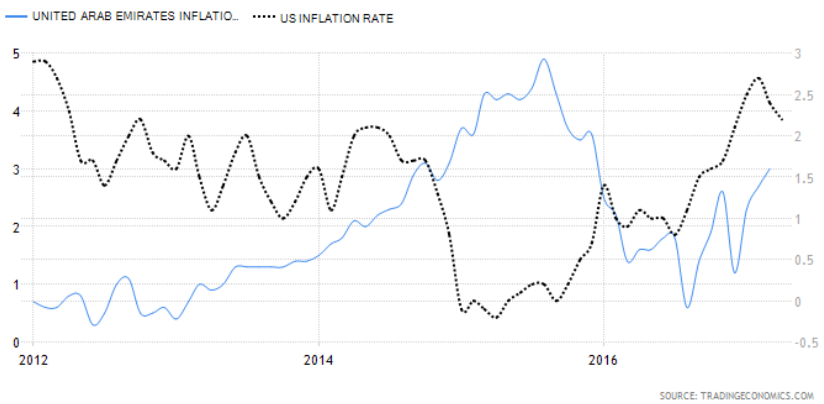
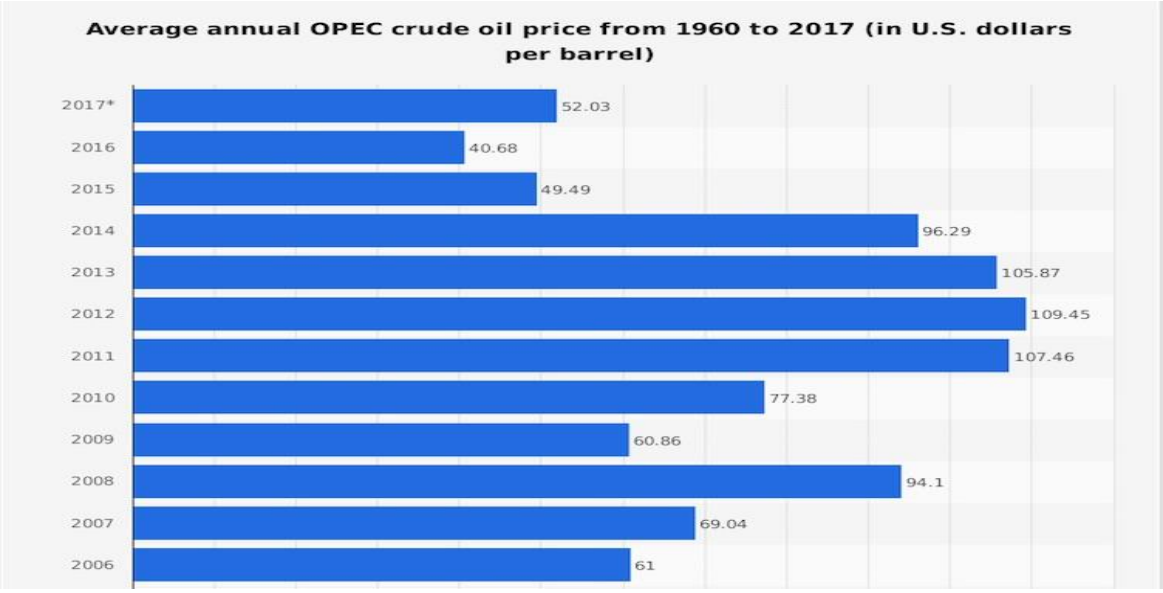


Figure 10: Average annual crude oil price. Source: Statista



5.1- Regression results and discussion

Table 10: Regression results: Panel ordinary least squares, 2008-15. Source: EViews calcualtions.

	Normal	Excluding leverage
Dep. Variable	Z-score	Z-score
Islamic Dummy	20.07 (0.23)	54.30 (0.00)***
Assets	-2.30 (0.008)***	-1.6 (0.06)*
ROA	24.53 (0.96)	461.33 (0.48)

Leverage	-6.27 (0.00)***	
GDP growth	-1.83 (0.45)	-0.39 (0.87)
Inflation	0.40 (0.86)	-0.19 (0.93)
Constant	110.74 (0.00)***	24.65 (0.04)**
R^2	0.25	0.13
Adjusted R^2	0.20	0.08
F (P value)	5.2 (0.00)	2.81 (0.02)
Observations	96	96

P values in parentheses. *significant at 10%; **significant at 5%; ***significant at 1%

In the panel data above we have two model, one model includes the leverage and the other model does not include the leverage. When I made the regression first time, the leverage was not included and in order to increase the value of R squared and have more control variable, I included the leverage since it was available, and this is the reason why I have two models

From the panel above, it can be observed that in these models (normal and excluding leverage) a negative relationship exists between assets (i.e. bank size) and the z-score; as the size of the banks becomes larger, their stability tends to decrease when using the z-score as a measure. Results show a significant relation at 1% when including the leverage and 10% when excluding the leverage, as a decrease in assets of 1 unit will decrease the z-score by 2.30 and 1.6 respectively. This indicates that when banks get larger they face more risk management challenges. This finding is consistent with Islam & Kozokov (2009), but diverges with the findings of Čihák & Hesse (2008). One possible reason could be the small sample size in the present study.

Risk management challenges arise because Islamic banks use conventional risk management techniques and tools to face and reduce risks, but risk management tools in conventional banks are related to the interest rate, and this tools become complex for Islamic banks when they apply those tools because of the Shariah laws that IBs follow and variety of contracts they use. Moreover, specifying the right and new products that Islamic banks can work with or invest in become an important issue because of the time that could be spend, effort and cost and those may be consider as risk management challenges faced by Islamic banks.

Table 10 presents that in each model at least one beta coefficient is significant. R-squared has a value between 13% and 25% reflecting that the sample explain a small portion of the z-score (the stability). Čihák and Hesse (2008) also found a low R-squared ranging between 15% and 22% with different specifications.

From the panel regression, it can be observed that the Islamic dummy being positive implies that IB are less risky than CB, since there is a positive relationship and a higher z-score implies less risk. Moreover, when leverage is excluded, the Islamic dummy becomes significant. This is because the leverage has stronger predictive power on the z-score. This means that banking stability as measured by the z-score is driven more by leverage than the banks being either IB or CB.

In the table 10, we have a panel regression, and this implies that in each model at least one beta coefficient is significant. R squared suggest that in the normal model which include the outliers or all different banks' size has 25% and only 13% when excluding the leverage. Čihák and Hesse (2008) also had a low R-squared ranging between 15% and 22% with different specification.

In the panel regression, we can observe that when Islamic dummy is positive implies that IB are less risky than CB, because there is positive relation and the higher the z-score imply less risky. Moreover, when we exclude the leverage, the Islamic dummy turns significant and this is because the leverage has stronger predictive power on the z-score. Which means that the banking stability-as measured by the z-score is driven more by the leverage rather than the fact whether the banks are of the IB or CB. In addition, in figure 7, we can see that the leverage for IB in the sample is lower than CB leverage, suggesting that IB is more efficient and less risky than CB in this sample. This results are consistent with Čihák and Hesse (2008) who found that large IB has lower z-score (less stable) than large CB, while small IB has higher z-score (more stable) than large and small CB.

From the panel regression, it can also be observed that a negative relationship exists between leverage and z-score which is significant at 1%, suggesting a strong effect of the leverage on the bank's stability regardless of whether it is IB or CB. This in turn suggests that a bank that finances its equity with debt faces more risks.

In table 10, we can observe the positive relation between the ROA and the stability (z-score) but

it is not significant, suggesting the positive relation between the profit and the stability.

In terms of the macroeconomic variables, it can be observed that there are no significant effects on the z-score (stability) in this sample, but that there is a negative relationship between the GDP growth and the z-score, a possible explanation is that an increase in the economic activities in the country may increase the banks size and this would have negative impact on the stability. Moreover, there is no significant relationship between the inflation rate and the z-score. These results are consistent with Čihák and Hesse (2008), who found that macroeconomic variables are not significantly related to the z-score (the stability).

Chapter 6: Conclusion and proposal for further research

The objective of the present study was to empirically examine the financial stability of Islamic banks and conventional banks during and after the last financial crisis (2006-2015). By using z-score as a measure of stability, it was determined that overall, Islamic banks tends to be less stable than conventional banks, and that this was due to regulatory and management challenges in IBs. Interestingly, Islamic banks performed better than conventional banks during the crisis, suggesting that Islamic laws helped Islamic banks to stand against the crisis. However, Islamic banks were affected in the next stages of the crisis due to strong relationship between Islamic banks and the real economy, suggesting that there is management challenges faced Islamic banks after the last financial crisis.

Panel regression suggested that Islamic banks were not significantly more stable than conventional banks when leverage was included, suggesting that the leverage has strong predictive power for the z-score. The regression indicates that banking stability–as measured by the z-score–is driven more by the leverage regardless of whether the bank type is Islamic or conventional. Additionally, the leverage of Islamic banks was smaller than the leverage of conventional banks, implying greater long-term financial safety for Islamic banks in this sample.

Banks level variables, suggested that for the banks to perform better during and after crisis, the banks can invest in real assets, depend on other resource than debt to reduce the leverage affect. It might be less profitable, but it will be more stable for any further crisis. Therefore, those variables (real assets and leverage) add the quality to the stability when using the z-score as a measure because they are significantly related to the stability.

There is still a wide scope for further research. In particular, the sample could be extended to include more countries and banks. More data may help in arriving at a better understanding of the strong relationship between leverage and the bank stability presented in this paper, for different sizes of banks as well as non-fully-fledged Islamic banks.

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Appendix

Table 11: annual average z-score of IBs. Source: Authors calculation

	Dubai	Emirate	Abu dahbi	Sharjah	jordan
	z-score	z-score	z-score	z-score	z-score
2006	21.81	9.33			
2007	21.11	6.85			37.97
2008	16.43	5.81	25.15	312.42	41.15
2009	16.34	8.78	22.37	312.89	36.37
2010	16.28	6.54	24.09	305.85	33.17
2011	16.75	6.46	25.97	290.14	31.47
2012	17.68	5.28	31.94	284.44	34.05
2013	21.54	7.99	27.95	246.19	35.52
2014	22.37	9.40	27.38	210.88	35.72
2015	24.01	7.15	28.52	189.07	36.74

Table 12: annual average leverage of IBs. Source: Authors calculation

	leverage Dubai	leverage Emirate		leverage Abu Dahbi		leverage Sharjah		leverage jordan
2006	6.30	9.84						
2007	6.91	11.72				3.89		3.73
2008	8.53	14.77		8.09		2.74		3.72
2009	8.39	7.80		7.97		2.75		3.76
2010	7.56	10.19		8.28		2.83		4.03
2011	7.90	7.67		7.67		3.02		4.19
2012	8.03	13.21		5.80		3.12		4.00
2013	5.93	8.57		6.89		3.79		3.99
2014	6.00	8.53		7.18		4.67		3.92
2015	5.58	9.44		6.85		5.35		3.89

Table 13: annual average ROA of IBs. Source: Authors calculation

	Dubai	Emirate	Abu DAHBI	Sharjah	Jordan
	ROA	ROA	ROA	ROA	ROA
2006	0.024	0.034			
2007	0.030	0.014			0.014
2008	0.018	0.015	0.017	0.015	0.019
2009	0.014	0.005	0.001	0.016	0.013
2010	0.006	0.002	0.014	0.016	0.011
2011	0.012	-0.020	0.016	0.014	0.010
2012	0.012	0.002	0.014	0.015	0.012
2013	0.015	0.004	0.014	0.014	0.014
2014	0.023	0.008	0.016	0.014	0.013
2015	0.026	0.012	0.016	0.014	0.013

Table 14: annual average z-score of CBs. Source: Authors calculation

	Bank of America	JPMC	PNC	Goldman sachs	BNY mellon	SEB	Swedbank
	z-score	z-score	z-score	z-score	z-score	z-score	z-score
2006	22.18	39.93	23.51	11.52	16.75		
2007	20.31	36.76	21.01	10.42	19.26		
2008	21.37	32.86	16.16	12.87	15.03	18.59	12.27
2009	22.94	36.12	23.17	17.94	15.77	21.62	10.05
2010	21.41	37.86	24.52	16.81	17.43	24.09	14.24
2011	23.34	37.04	26.59	14.12	13.63	25.35	13.79
2012	23.41	39.58	26.24	15.39	13.39	24.47	13.71
2013	24.92	39.30	26.95	16.25	13.10	27.34	15.20
2014	25.32	40.83	26.06	18.02	12.93	26.31	14.36
2015	27.23	47.93	25.00	18.39	12.92	28.75	14.53

Table 15: annual average leverage of CBs. Surce: Authors calculation

	Bank of Amer	JPMC	PNC	Goldman sach	BNY mellon	SEB	Swedbank
	leverage	leverage	leverage	leverage	leverage	leverage	leverage
2006	11.24	11.67	9.44	23.42	9.03		
2007	11.72	12.68	9.35	26.16	6.72		
2008	10.27	13.03	11.45	13.74	8.46	28.99	19.95
2009	9.61	12.29	8.29	12.01	7.32	22.16	18.95
2010	9.92	12.02	8.05	11.78	7.48	20.90	16.00
2011	9.25	12.34	7.28	13.12	9.54	20.64	17.37
2012	9.33	11.56	7.31	12.40	9.63	21.40	16.90
2013	9.03	11.44	7.27	11.62	9.77	19.23	15.60
2014	8.64	11.10	7.49	10.34	10.01	20.46	17.07
2015	8.37	9.50	7.80	9.93	10.16	17.85	16.42

Table 16: annual average ROA of CBs. Source: Authors calculation

	Bank of Amer	JPMC	PNC	Goldman sach	BNY mellon	SEB	Swedbank
	ROA	ROA	ROA	ROA	ROA	ROA	ROA
2006	0.014	0.011	0.025	0.045	0.028		
2007	0.009	0.010	0.011	0.041	0.010		
2008	0.002	0.003	0.003	0.025	0.006	0.004	0.006
2009	0.003	0.006	0.009	0.053	-0.006	0.001	-0.006
2010	-0.001	0.008	0.013	0.043	0.010	0.003	0.004
2011	0.001	0.008	0.011	0.031	0.008	0.005	0.007
2012	0.002	0.009	0.010	0.036	0.007	0.005	0.005
2013	0.005	0.007	0.013	0.038	0.006	0.006	0.007
2014	0.002	0.008	0.012	0.040	0.007	0.007	0.008
2015	0.007	0.010	0.012	0.039	0.008	0.006	0.007

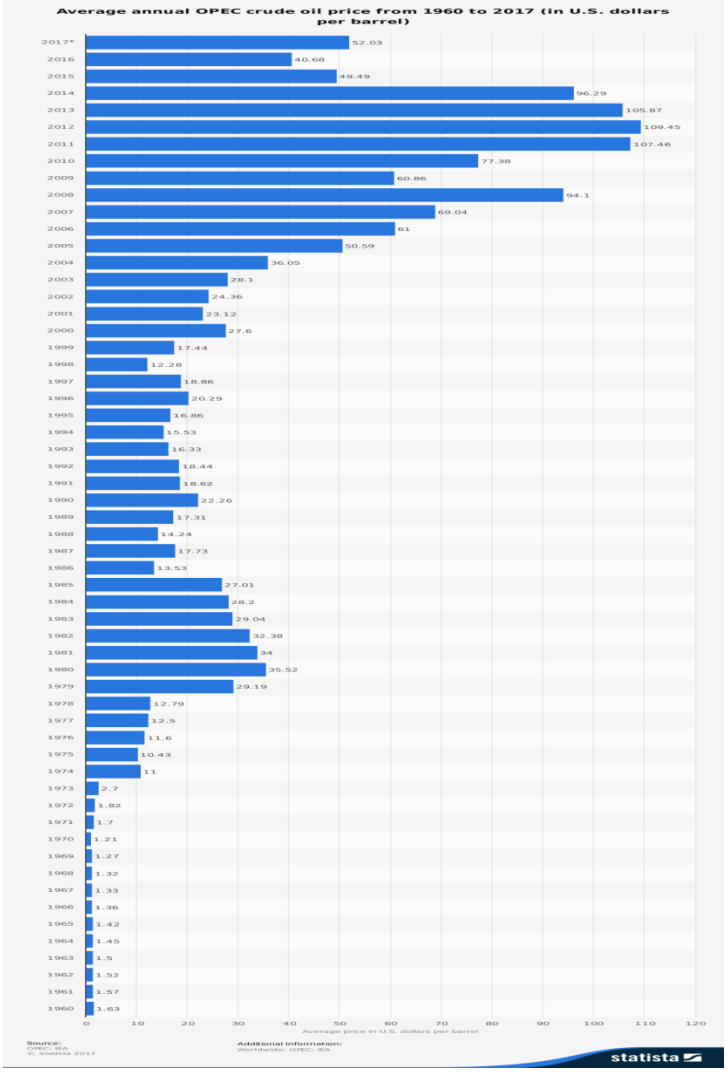

Figure 11: Average annual OPEC crude oil from 1960 to 2017. Source: Statista