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Analyse the Effect of Islamic Derivatives during Financial Crises of 2008 Using Data Envelopment Analysis

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Abstract. There is a very broad debate recently on the competence of Islamic financial derivatives in banks as a risk management tool better than traditional financial derivatives in conventional banks. The economic crisis that occurred in 2008 was a real measure to prove or deny this claim. In terms of bank performance, this research empirically compares Islamic and traditional banks, to evaluate the feasibility and efficiency of Islamic and traditional banks. The Data Envelopment Analysis (DEA) as statistical approach used in this research. The Kuwaiti banks were selected as a case study for the period 2006-2011 because it cover the period before and after the financial crisis of 2008. The data obtained from the Scope website, the annual accounts from banks, the IMF database, PhD studies and other tools. The research showed that Kuwait's traditional banks were higher in efficiency and performance before the 2008 financial crisis, but the Islamic banks made a better performance afterwards. However, Islamic and traditional banks are subject to a comparable degree of risk, but different in nature; and the Islamic banks are less safe to financial shocks than conventional banks are. Since Islamic banks are unable to charge a fixed, standardized return and are unable to borrow from the financial market, Islamic banks may face more risk and unpredictable asset returns. The implication of these facts of the over-management modernisation of Islamic banks is important in order to reach a higher degree of efficiency. It will give Islamic banks an advantage over the traditional bank. For traditional banks, they need to invent specific strategies to reduce costs and retain their market position.

Keywords. Islamic banks, conventional banks, efficiency, performance- Data envelopment analysis

1. Introduction

Efficiency in Islamic and conventional banks occupies an important position effecting planning and development strategies across the world. At the beginning of the twenty-first century, conventional and Islamic banks underwent great development [1]. Relationships between Arab banks and international banks increased significantly, this led to improvements within the banking industry throughout the Arab world, such as a structural reform in the financial system, liberalization of the capital, and total market integration that became inevitable [2].

Risks and challenges for the Arab, Islamic and conventional banks have increased and have become in the face of fierce competition with foreign banks that has opened branches in Arab and Muslim countries [3]. Therefore, both types of Arabic banks must raise their efficiency to the level of professional foreign banks. Islamic and conventional, Arabic banks have to diversify their products in



direct and indirect investments and to work seriously to reduce costs to a minimum in term of input and output [4]. Therefore, it became a necessity for Arab banks to analyse the operational cost in terms of inputs and outputs, and to try to determine the optimal size of production and the optimum mix of products that can be accessed [5].

This research will attempt to measure the efficiency of Islamic and conventional Kuwaiti banks's activities from 2006 to 2010. This period covers the financial crises of 2008. The aim is to find out, which is more efficient in term of efficiency, Islamic or conventional banks, given the consequences of financial crises. The results of the empirical analysis in this research will confirm or reject the allegation that both type of banks in Kuwait have the same efficiency level in cost control.

Derivatives are financial agreements between companies that derive their value from other entities, such as properties, traded shares, indexes, interest rates, exchange rates, commodities, loans and equities, or other sources [6]. The derivative is a contract, which gives the parties a right to obtain or offer something now, but not an obligation, or in future, may be a stock of goods of a business, foreign exchange, wheat, oil, or an arrangement next week with their neighbour on two bags of sugar [7].

Contracts, for example, the dates, the mutual obligations of the party and the duration of the deal are stipulated. The most popular forms of derivatives in Arab countries are forward futures, conditional futures, options and swaps [8]. The main characteristic of derivatives is the generation of profit which reflects changes in the price of the underlying assets, and the derivative is a useful tool that allows investments to be made, even if weather data are based on rainfall or the sunny days number in a certain region "(International Journal of Innovative and Applied Finance 2013 p: 2).

In 2008, there were shocks and imbalances on world capital markets not seen ever since the Great Depression of 1929. The 2007 US mortgage crisis was the ignition that started the world financial crisis' eruption. Because of liquidity abundances in the US economy for the period 2001-2006, the real estate market has seen considerable growth since 2001 [9].

The growth of the mortgage market was a result of rising demand for immovable goods and subsequently a subsequent rise in real estate prices, with a fall of about 1% in 2003, which was the lowest since 1958 [10]. However, also the non-qualified, which not historically permitted, has been approved by the US Government and in compliance with the Fane Mae and Freddie Mac rules and procedures [11].

Since the financial crisis, profitability and Arab banking ability to cope with financial crises had shadowed capital markets and banks, the financial crises became a big concern for researchers (Mohamed Hafez, 2018). In the last two decades, the Arab banks have seen cultivating and widespread growth, both in Islamic and modern terms [12].

The most significant factor is the opening of the Arab economies to the global economy, structural reforms within the Arab financial system, capital liberalisation and the advent of semi-integration between the Arab markets. This triggered a strong rise in the banks 'and financial institutions' deposits and assets ratio.

2. Research questions

The Traditional banks actually rely on the mobilisation price of economic resources, which in the Islamic perspective is usury, so how can Islamic banks compete with classical banks with financial resources attraction? If this incentive does not make Islamic banks priorities, then what is the most important factor in attracting money into the deposit? The comparison of efficiency and performance between Islamic and conventional banks in Kuwait explains whether similar responses occur or differ. The study will attempt to measure the extent of which the Kuwait Stock Exchange affected by the 2008 financial crisis. I will conduct an empirical analysis to find out any symptoms of differences and similarity of banking efficiency and performance in Kuwaiti banks. Therefore, the major questions of this research are as follows

- 1- Can the Islamic banks in Kuwait have a greater ability to control costs and balance income and expense than the traditional banking?

2- Do the traditional and Islamic banks in Kuwait have sufficiently large economies of scale to expand their activities?

3. Objective of the Study

Security markets play an essential role in providing the necessary liquidity to achieve economic development, which is highly vulnerable to economic and political events [13]. It endures the most of the successive crises in the global economy and all the subsequent social problems. The expansion volume of activity in the financial markets and the diversity of varied financial products traded coincide with the increase in financial risks [14].

Among the most important of these risks is the changing interest rate, exchange rate fluctuations, unstable prices of raw materials and financial assets [15]. There was an essential requirement for protection and coverage against financial risks that led to the emergence of all types of financial derivatives. Financial derivatives emerged at the beginning to manage interest-rate risk and exchange rate risk [16].

Forward contracts traded in unregulated markets; then future contracts emerged; that traded in organized markets. Derivatives expanded to include, financial assets, raw materials, bonds, indices, shares, and swap, which used to cover the risk of default payment, which later known as Credit Default Swap (CDS). Excessive use of financial instruments by banks and financial institutions led to the occurrence of untoward results and made derivatives one of the most important reasons that led to the financial crisis in 2008 [15].

The financial crisis has urged the world to re-think of these financial instruments and to be aware of how to deal with it [10]. In February 2003, Warren Buffett - One of the world's richest and most successful investors and businessmen – gave his annual address to the General Assembly, Buffett described financial derivatives as "time bombs for clients and for the economic system [6]." He added, "It's like hell: easy access to it and almost impossible to get out." In addition, he said, "We believe that the derivatives, financial weapons of mass destruction" [17]. In this context, the research will apply the data envelope analysis DEA method on the data of conventional and Islamic banks for the period 2006-2010, and estimate the level of efficiency of Kuwaiti banks.

This research aims to explore the effect of financial derivatives on the banks of Kuwait as a case study; due to banks in Kuwait is an ideal example of an Arab banking system [18]. Many international economic institutions reiterates that Kuwaiti banks able to be a model for the Islamic financial centre in the region and the whole world, and that the Kuwaiti Commercial laws are a model for the application of Islamic economics [19].

4. Literature review

In 2008, Kuwait witnessed a significant growth in nominal GDP, it stood at 41.5% to reach 158.02 billion US dollars, compared to \$ 111.8 billion in 2007 [13]. This increase is supported by strong oil price and the volume of oil export, combined with increased foreign investment in the country until late 2008 [7]. In 2009 the nominal GDP fell by a large margin amounted to - 29.6% or 111.3 billion US dollars, due to the financial crisis and the decline in the oil market price [3] .

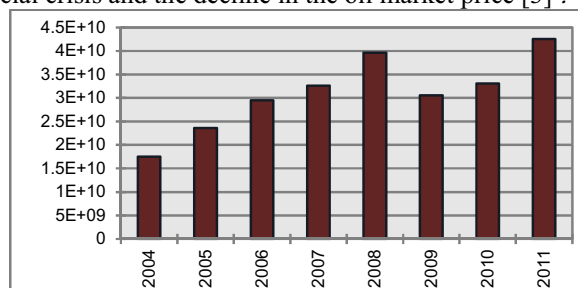


Figure 1. Kuwait GDP growth between 2004 and 2011 in \$us billions.

As for the population and labour force, the total population of Kuwait has risen by 8.6% during 2007 compared to 4.6% in 2006, due to the increase of non-Kuwaiti population at a rate of 6.8%. While the Kuwaiti population growth rate held steady at 1.3%. The number of non-Kuwaiti labour forces grew by 9%, and the amount of the Kuwaiti labour force increased by 6.6% (Kuwait - Economic Insight. 2011).

Kuwait's economy has a low rate of inflation before the 2008 crisis. The economy has been maintained an inflation rate range between 0.8% in 2000 to 1.6% in 2004 but rose thereafter dramatically [20]. The consumer price index recorded the highest rate by reaching 10.5% in 2008 compared to 5.5% in 2007. This increase was mainly due to the increase in liquidity in the economy, currency fluctuations and rising domestic demand for housing and food sectors [21]. Inflation of CPI rate has reached 4.7% in 2009, due to the Kuwait authority end the pegged Dinar to US Dollar (Kuwait - Economic Insight. 2011).

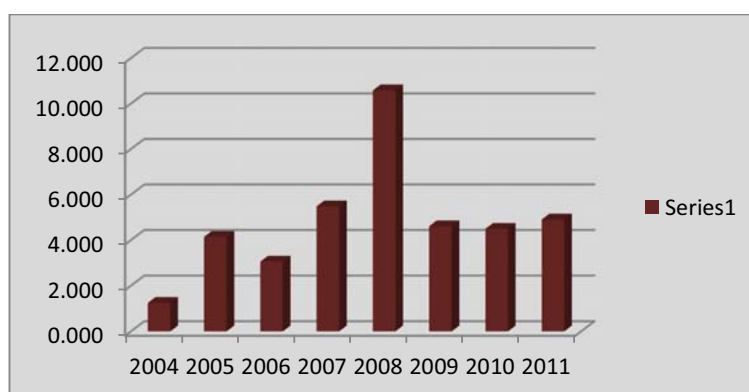


Figure 2. Development of consumer price index percentages in Kuwait 2004-2011.

The exchange rate of the Kuwaiti dinar to US dollar stood at around \$ 3.448 in 2006. The fluctuations of the US dollar against other major currencies, especially the Euro, Japanese yen, and the British pound had a negative impact on the purchasing power of the Kuwaiti dinar [22]. Dollar fluctuations in the global market hit the inflation rate in Kuwait through changes in import prices. Kuwait followed a special exchange rate policy by linking the Kuwaiti dinar to a basket of weighted currencies, during the period from March 18th, 1975, until December 31th, 2002 [23].

The Kuwaiti dinar remained pegged to the US dollar during the period from January 5th, 2003, until May 19th, 2007, at a rate of 3.4626 US dollar exchange rate. On May 20th, 2007, the Kuwaiti dinar was to break ties with US dollars and other currencies [24]. The assets and foreign reserves of the country were perfectly adequate to protect the currency [10]. The total foreign reserves minus gold reserve was \$ 16.5 billion by the end of 2008 compared to 16.7\$ billion at the end of 2007. The foreign reserve fell slightly to \$ 16 billion in 2009 [6].

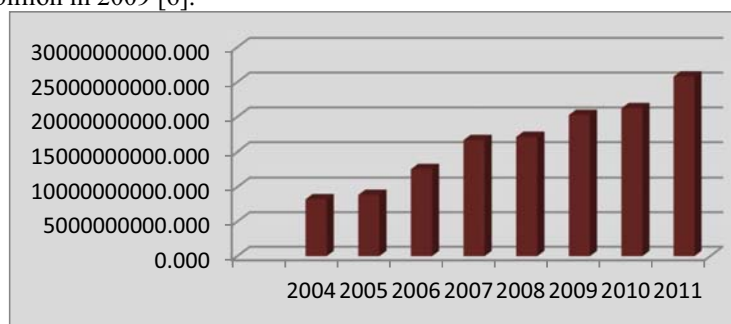


Figure 3. Kuwait total reserve, excluding gold 2004-2011 in \$US millions.

Large oil prices during the period 2004-2008 have led to a huge surplus in the budget. The percentage reached 30.3% of GDP in 2008 compared to 26.6% in 2007 on the back of the global oil boom. This surplus has declined to 10.9% of GDP in 2009 due to the financial crisis [22].

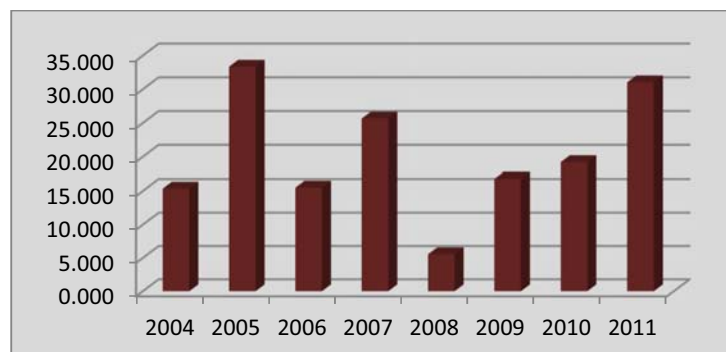


Figure 4. Budget surplus /deficit as a percentage of GDP in \$US millions.

4.1. Islamic derivatives

In Islamic financial point of view, all financial instruments should meet specific criteria to be legitimate in Sharia law, such as the underlying asset must exist in physical form and the seller should have the legal ownership of the asset at the time of transaction [25]. However, there are five items should be avoided in any Islamic transaction: usury (riba), uncertainty (gharar), gambling, (maysir), corruption (rishwa), ignorance (jahl). In recent years, there has been some tolerance of these conditions in a method called Islamisation of conventional derivatives [26]. In general, Islamic derivatives that used by Islamic banking can be as follows:

- 1- **Mudarabah:** it is a form of business contract or an agreement between two parties, in which one gives the money and the other gives his best activity in trade and work with this money. They split the benefit between them according to stipulated conditions whether a half or a third or a quarter (Abozaid, 2014). Etc. However, if the company lost, the loss will be to the owner of the money alone, it does not incur the second party against the loss of his best and his work. Therefore, it is not fair that wasted effort and work, and calls for the participation of the owner of money in the loss, as long as it was not in default or neglect [25].
- 2- **Istisna'a:** it is a contract between a buyer and a manufacturer of a needed product to his specifications. This type of derivative occupied an important role in Islamic banking and investments that have funded residential buildings [27]. It's characterized by fixed price predetermined for the product, and the two parties have the right to cancel the agreement before the production begins, but both parties cannot cancel it once the manufacturer begins production [28].
- 3- **Salam Contract:** it is an agreement between two parties to carry out a purchase or sale of an underlying asset at a predetermined maturity date, but the money paid in full at present [29]. The first party offers to sell a specific commodity or manufactured material in lower prices for a second party, which entitled to sell it to the third party at a higher price, but it should be on the same maturity date. It stands at the opposite nature of futures when the exercise price higher than the spot price. This contract behaves like a forward contract. The only difference is that the buyer pays the entire money in the present [30].
- 4- **Ijara:** it is a transaction as the same design as an installment leasing agreement, where the bank purchase a fixed asset as requested by the specific tenant, then the bank finance the purchase and possession the fixed asset, then with a long-term contract, handed over to the tenant to benefit from it [31]. The Tenant shall pay for the rent according to the contract, to cover the value of the fixed asset. At the end of the period, the lessee acquires the assets after payment of the rest of the value of fixed asset. This contract has the exact same features of a modern interest-based finance lease [32].
- 5- **Musharakah:** it is a contract between two parties to start a business with share profit and loss. It is a structure of financial partnership based on profit and loss sharing, which considered the heart of Islamic finance because it's based on sharing risk and profit instead of interest-bearing

loans [33]. Musharakah contract achieves many strategies in the Islamic operating financial system. It accomplishes multiple benefits for both the banks and the community and achieves economic development [34].

- 6- **The Bai'bil-wafa & Bai 'bil Istighlal:** Bai'bil-wafa is a contract between two parties, one sells an asset to another party, who pledges to sell back the asset on a predetermined future date at the same price, with a condition of not sell the assets to the third party [35]. This contract is similar to Repo except the price when exercise the contract should be as the same as the initial price [36]. The buyer has the right to utilize the property. Bai 'bil Istighlal is the same as Bai'bil-wafa but the buyer leases the asset to the seller to the maturity of the contract [37].
- 7- **Bai-Istijrar:** it is a contract between two parties where a buyer purchases an asset under a single agreement in different instruments, with no bargaining required for each item purchased [25]. The deal will be exercised at maturity date with the current price. It can be between a company and a bank for raw material or commodity, the bank purchase the commodity at the current price and resell it to the company on the agreement of different price to be paid in the future [33].
- 8- **Sukuk:** it is a new financial formula motivated by the jurisprudence of Islamic law in financial transactions. Sukuk is a funding mechanism moving toward what has been missed in Islamic banking of true partnership between the factors of production in the speculative funding formula participation and transformation of Murabaha financing which was adopted by most of the Islamic banks [35].

It is a version of typical legitimate transactions of Leasing, Salm, Istisna'a, speculation and other professions such as the development of the financing requirements to be an alternative to bonds that deals in interest banking [27]. Once the instruments have emerged and spread, become so famous and contemporary tool accepted by Muslims and non-Muslims even spread all over the world. In addition, there are an Islamic derivatives not widely used in financial institutions such as Arbun, wa'd and jialah [34].

4.2. Risk of Islamic Derivatives

Finance in the Islamic banks built on the application of the provisions of Islamic Sharia in all banking and investment transactions. This is by applying the concept of financial intermediation, based on participation in the profit and loss [38]. The purpose is to attract deposits, invest money, make a profit and provide banking services. The provision of funding for investors creates ways of financing and banking services [39].

Therefore, Islamic banks have distinguished itself from traditional banks by achieving legitimate controls in financial transactions, which contributed to a growth of money. This function may increase the rate of development faster than the traditional banking system [40]. Islamic banks are exposed to many risks, like conventional banks and most important of these risks:

- 1- **Credit risk:** it is the risk may result from the possibility of failure to meet financial obligations for both parties. These risks are larger in cases of speculation (Mudarabah) and participate (Musharakah), due to mismatch information [41]. It is called (risk of loss of capital), and usually happens when both parties not taken to comply with the requirements of Islamic contracts.
- 2- **Market risk:** Market risk arises from fluctuations in stock prices and currency exchange rate, and the inability of banks to attract customers. There are risks associated with the nature of the market, which determines the profit and loss [42]. It is considered a source of risk to the Islamic derivatives market. The Bank may face risk in the case of profit distribution, which based on profit-sharing agreements when it comes to maturity date distribution [36]. In addition, the market risk arises when the bank's assets are not sufficient for the distribution of these profits. Islamic banks expose themselves to a significant risk, and may lose its reputation and clients if not avoid these risks [29]. The market risk could cause by equity price fall, which arises from the decrease in fair value of shares, due to changes in stock indexes; Thus, exposing the investment portfolio to the risk of losing valuable market value [41].

- 3- **Liquidity risk:** it is the lack of adequate liquidity in the operational requirements of the Islamic Bank, or inability to fulfil the Bank's obligations. This kind of risk more influential in Islamic banks than conventional banks, because of Islamic banks cannot borrow with interest from other banks to cover its needs of liquidity [42]. In addition, Islamic banks cannot sell debt to other banks only in its nominal value; however, most of the deposits in Islamic banks are in current accounts [32].
- 4- **Operational risks:** it is the risks arising from human errors, professional, and technical faults, whether intended or unintended, this risk is higher in Islamic banks because of complications in the Islamic law [26].

4.3. Risk of Conventional Derivatives

Derivatives risks are mainly related to unexpected fluctuations in the prices of derivative contracts due to the unpredictability of financial asset prices. Derivative's risks that may result from a lack of liquidity, which in turn results in a deterioration of asset prices, and become impossible to conduct hedging contract against the decline in the asset price in the future (Khan, 2017).

In addition, there is settlement risk, probably contracted assets up to a minimum on the settlement day, which could see sharp fluctuations that affect the value of assets [30]. Consequently, continuing decline in price leads to a sharp price volatility in these securities. The risks that might face a certain financial market could contaminate other financial markets [38]. The risks of conventional banks that deal with traditional derivatives can be as follows:

- 1- **Market risk:** market risks arise from the volatility of prices of financial engineering tools in the financial market. Since these instruments are sensitive largely to the market conditions, thus, any small change in the value of implicit existing assets of contracting could lead to a substantial change in the value of the financial engineering tool [40]. The market risk is one of the most important types of risk that dealers in financial engineering tools must monitor and measure, despite the fact that an accurate measurement of this type of risk is difficult and complex, especially with those sensitive tools to price volatility [31].
- 2- **Operational risks:** it's the risk that associated with the economic losses incurred by the financial entity because of regulatory weaknesses in management and operation of derivative contracts within the enterprise itself [34]. It is also true in the absence of coordination between those responsible for dealing in derivatives markets with those responsible for the registration and proof of financial books in the facility [27]. Operational risk can increased with the complexity of financial engineering tools and makes it difficult to avoid large losses because of mismanagement [35].
- 3- **Settlement risk:** it is the risk of implementation of agreed transactions because of only a few of financial transactions settled in real- time or on the same day of implementation [39]. As the settlement period may extend a few days, and this leads to one of the parties may expose to lose, due to the possibility of price change quickly during that period [33].
- 4- **Legal risks:** this risk arises from changes in the legal environment as well as the ambiguity of some of the legal aspects of derivatives contracts, which lead to a difficulty of enforcing contracts [25]. Legal risks could be due to the lack of precise documentation, lack of powers to authorize, lack of clarity, and the difficulty of judicial execution in the event of problems [37]. Legal risk could be emerging from non-performance of contract, due to non-possession of the validity of some traders to enter contractual deals, and so there will be no legal obligation to the other party, and then not being able to judicial execution in hardship and bankruptcy.
- 5- **Credit risks:** also called the risk of failure to meet financial obligations. It is when parties of the contract fail to fulfill their obligations in a financial derivative contract [43]. Dealers can lose very large sums of money when the counterparts fail to meet their obligations. Financial managers become more interested in the kind of risk associated with the tools of financial engineering [44]. Especially the ones that deal with the parallel market, as there is no clearinghouses and initial margins, in particular, contracting. The credit risk was the main reason

for a financial failure of many banks and financial institutions [45]. This type of risk is more common in non-regulated markets. It can cope with credit risk for those derivatives through the credit rating of counterparts and a commitment to certain ceilings for these risks [46].

- 6- **Liquidity risks:** it is a risk of lack liquidity and the inability to pay off obligations in the derivatives markets, which making difficult to trade. Despite the characteristic of high liquidity by those tools, however, there remains a problem of non-possibility of monetization of some types of contracts. Liquidity risk could be due to multiple factors relate to the nature of contracts, or due to market supply and demand conditions [32]. Liquidity risk leads to losses of contracting parties that want to liquidate their positions quickly [44].

There are other types of risk, though less comprehensive such as pricing risks or risks that found in certain types of derivatives [26]. In addition, the risk of rate of change of value of financial instrument does not equate with the rate of change in the financial asset. These risks increase when the protection is out of a different type in the financial derivative instrument or trading market for the asset that protected (Khan, 2017).

5. Data Envelopment Analysis

Data Envelopment Analysis (DEA) appeared as a quantitative method of operations research tools for measuring productive efficiency through an optimal combination of inputs and outputs of a group of institutions that have similar objectives and activities [47]. It was first employed by the doctoral student (Edwardo Rhodes) in the nineteen –fifties. The student was working on an educational program to measure the efficiency of various minority students in American schools [1].

The student; with the help of Professor Cooper, applied the style of linear programming to the data and developed a mathematical model to determine the weights of the inputs and outputs of each school separately [48]. Then they applied a comparison between the results for optimality of students. This technique depends on the (Pareto optimization), which states that any business enterprise will be incompetent if there are other institutions which are able to generate the same amount of output at less input and without an increase in any other supplier [49]. This method does not assume a random error and explain the deviation from the optimum limit as inefficient.

The DEA introduces the concept of efficiency as an assessment of similar institutions, for example, it can be used to estimate the production efficiency of a group of financial institutions, by driving efficiency through the number of institutions that together make up the frontier curve of performance (performance frontier) which encapsulates all observations [50]. The institutions that the efficiency points located on the border of the curve (the frontier) will be efficient in the distribution of input and output process [51].

Financial institutions that are not listed in the border curve are considered inefficient. To clarify the concept (DEA), suppose we have five business institutions (A, B, C, D, and E) with one input and which produce one output. Depending on the concept of (DEA), each enterprise's efficiency measured by comparison to the other institutions in the group. The figure below shows that the institutions (A, B, C, and E) are efficient institutions due to being located on the border curve of performance. Enterprise (D) located below the efficiency curve, is non-efficient because it used a larger amount of input to produce the same amount of production compared to other institutions [52].

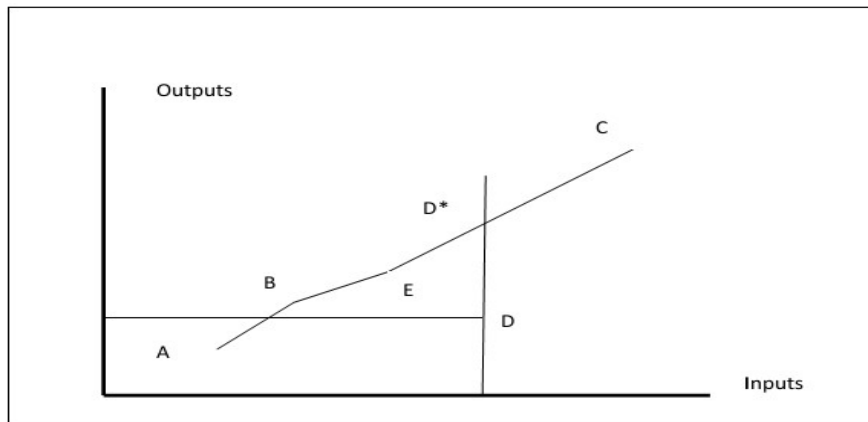


Figure 5. The DEA for a group of institutions.

The most important characteristic of the (DEA) method is the possibility of determining the ideal input and output levels so that we can find the efficiency level of any financial institution [53]. We can drop the institution data on the efficient frontier curve and then determine the level of efficiency by controlling the amount and size of the input and output of the institution [54].

5.1. Methodology and analysis

Data collected for nine Kuwaiti banks, from the bank scope website's annual reports, IMF database and other sources. It includes four Islamic banks and five traditional banks, which are the main banks in Kuwait. Cross-sectional data for each bank used in the analysis to determine those banks operating in Kuwait as benchmarks for their peer banks in the region.

The data covered Kuwaiti bank activity between 2006 and 2010. There were small banks that were not included due to it not having an observable effect on the banking system in Kuwait. There will be two types of tests; first, I will use the (DEA) programming to test bank efficiency, to see the effect of the interaction between the size of the bank and total equity on the output elements of the Kuwait banks.

The following table describes the result from DEA analysis of the technical efficiency of Islamic banks in Kuwait for the period 2006- 2010. Here is the result of constant return to scale measurements, which describe the development of efficiency of Islamic Kuwaiti Banks.

Table 1. Technical efficiency in (CRS) percentage of Islamic banks from 2006 to 2010.

Bank name	2006	2007	2008	2009	2010
Ahli united bank (KME)	0.893	0.961	1	1	1
Kuwait Finance House	0.855	1	0.849	0.825	0.793
Boubyan Bank	0.379	0.462	0.819	1	0.909
Kuwait International Bank - KIB	0.890	0.912	0.996	0.978	0.931

In 2006, none of the Islamic banks were efficient, the closest bank to full efficiency was Ahli united bank (KME) and the rest of the banks did not use their resources efficiently. However, 2007 was a great year for three Islamic banks; the KFH got full marks for efficiency, followed by Ahli united bank, then KIB. The Boubyan Bank improved but did not efficiently use its resources. In 2008, there was a change for the better for some banks such as Ahli united bank, Boubyan Bank, and the KIB bank, but KFH's efficiency fell. 2009 and 2010 were years of decline in efficiency for KFH, Boubyan and KIB bank. Only Ahli united bank (KME) kept its level of efficiency during the period of study. The table below contains the percentage of efficiency with a variable return to scale.

Table 2. technical efficiency in (VRS) of Islamic banks from 2006 to 2010.

Variable return to scale	2006	2007	2008	2009	2010
--------------------------	------	------	------	------	------

Ahli united bank (KME)	0.912	0.971	1	1	1
Kuwait Finance House	1	1	1	1	1
Boubyan Bank	1	0.552	0.916	1	0.926
Kuwait International Bank - KIB	1	0.945	1	1	0.955

The results of table No (5.2) are very optimistic, due to most of the banks gaining full efficiency in their operations. The KFH bank was the best at using its resources. The weakest bank was the Boubyan Bank in 2007 but then improved in 2009 and achieved a moderate level in 2010.

In general, the Kuwait banks' efficiency increased in the first decade of the twenty-first century; our findings are consistent with a study of (Alsarhan, 2009) as it found that bank efficiency levels were constantly improving in the Gulf Cooperation Council during the period post-2000, because of banking reforms and economic openness. Also consistent with the study (AlKhathlan & Abdul-Malik, 2010), which attributes the evolution of bank efficiency to improve financial management of the banks and the increasing control and supervision by the Kuwaiti Monetary Agency.

In the table below, we see the efficiency of five conventional banks. It is obvious that the age of the bank and the size factor has a strong effect on the efficiency due to most of the conventional banks in Kuwait being established more than 40 years ago. Conventional banks operated very well during 2006; all the banks got a full mark one efficiency. Again, in 2007, the conventional banks did very well, except Burgan Bank which declined to 0.954.

In 2008, both Burgan Bank and the Commercial Bank of Kuwait declined in small ratio, but the rest of the banks continued with their amazing efficiency level. In 2009, Gulf Bank of Kuwait declined to 0.987 but still operated at a good level compared with Burgan Bank, which declined more than its level of efficiency of 2008. In 2010, the National Bank of Kuwait continued to achieve full efficiency with Al Ahli Bank of Kuwait, but the other banks declined.

This is a positive indication that banks when expanding their operations, increasing the number of branches, and providing new banking services will affect their efficiency. In other words, the relatively small banks such as Burgan Bank are less efficient due to their decline in banking activity.

Table 3. technical efficiency (VRS) of conventional banks from 2006 to 2010.

Banks name	2006	2007	2008	2009	2010
National bank of Kuwait	1	1	1	1	1
Gulf bank of Kuwait	1	1	1	0.987	0.997
Commercial Bank of Kuwait	1	1	0.928	1	0.986
Al Ahli Bank of Kuwait	1	1	1	1	1
Burgan Bank	1	0.954	0.845	0.804	0.651

In the constant return to scale approach, the result is different from the variable return to scale. In the table below the result of DEA of constant, return to scale of conventional bank in Kuwait.

Table 4. technical efficiency (CRS) of conventional banks from 2006 to 2010.

Bank's name	2006	2007	2008	2009	2010
National bank of Kuwait	1	0.846	0.891	0.917	0.941
Gulf bank of Kuwait	1	1	1	0.985	0.987
Commercial Bank of Kuwait	1	1	0.926	0.96	0.957

Al Ahli Bank of Kuwait	0.936	0.989	1	0.973	0.994
Burgan Bank	0.867	0.907	0.819	0.793	0.648

Most of the conventional banks lost their full efficiency after 2007, which refer to the disturbances in the inputs and outputs during the financial crises. In 2009 and 2010, all banks declined in their efficiency, especially Burgan Bank, which declined severely. The comparison between Islamic and conventional banks in Kuwait shows that there are varieties of patterns that banks follow in different levels of efficiency. We can see from the figure below that before 2008 the conventional banks had superiority in efficiency over Islamic banks, but in 2008 and after, the Islamic banks started to take the initiative and became better operators in banking.

Table 5. The comparison of average technical efficiency of conventional and Islamic banks from 2006 to 2010.

	2006	2007	2008	2009	2010
Islamic banks	0.978	0.867	0.979	1	0.97025
Conventional banks	1	0.9908	0.9546	0.9582	0.9268

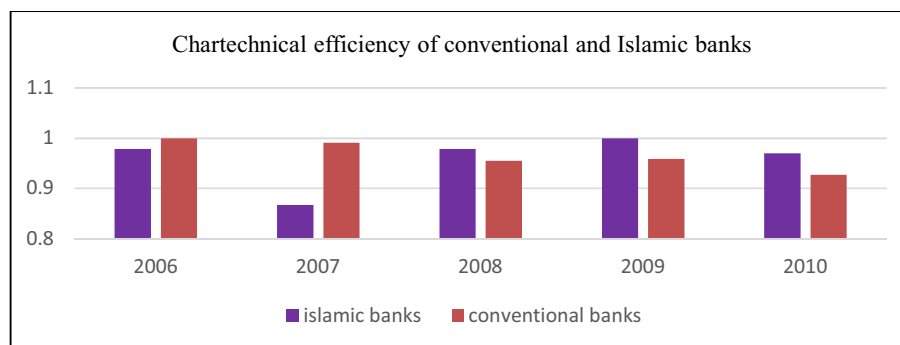


Figure 5. The comparison of average of technical efficiency of conventional and Islamic banks from 2006 to 2010.

The change in efficiency during the financial crises may due to the powerful tools of risk-sharing principle that attracts depositors and shareholders to supply the Islamic bank with enormous liquidity, which helped to stabilize the operating banking system in Islamic banks, which in turn improved the efficiency of Islamic banks.

6. Conclusion

The Data Envelopment analysis is a non-parametric mathematical style, which depends on the methods of linear programming, and provides useful information on the performance of financial institutions. Through the result, we conclude that Islamic and conventional banks characterized by a good level of efficiency either in constant return to scale or variable return to scale.

The comparison of banks' efficiency between Islamic and conventional in Kuwait shows that the conventional banks have superiority in efficiency over Islamic banks before the financial crises, but in 2008 and after, the Islamic banking started to take the initiative and become better operators, which lifted the level of efficiency.

The change in efficiency during the financial crisis may be due to the powerful risk-sharing principle that attracts depositors and shareholders to supply the Islamic Bank with enormous liquidity. This situation helped to stabilise the operating banking system in Islamic banks, which, in turn, improved the efficiency of Islamic banks or at least helped to maintain a lower level of efficiency decline.

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