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Islamic finance: instruments, risks and institutions

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Introduction

The recent global financial crises have adversely affected the financial world with the closure of more than 160 financial institutions. Consequently, the disparaging series of events (such as Global financial crisis 2007/2008 and European debt crisis 2009/2010) have raised serious concerns about current financial practices for policymakers and academicians and call for new reforms in the financial system or to find alternative medium of conducting financial affairs. In this regard, Islamic finance has emerged as an alternative robust system to provide financial intermediation services based on mutual risk-sharing without involvement in interest payment and toxic financial products. The global Islamic finance industry is increasing in an upward direction witnessed by its positive growth rate of 10% over the last 10 years around the globe, with total assets of USD 2.19 trillion as on 1H2018 (IFSB Report, 2019).

Being an emerging and quite hot topic in the field of banking and finance, this dissertation deals mainly the topics on Islamic finance and follow the structure of three essays for gaining insight to the different aspects of Islamic finance such as Islamic banking, Islamic insurance and Bond (sukuk), and a viable role this can play in financial development of an economy.

The first essay is related to the comparative analysis of risk management practices in Islamic and Conventional banking and also investigates the impact of the liquidity risk on bank stability. We first, investigate the relationship between liquidity and credit risk. Employing a simultaneous structural equation approach, on a comprehensive dataset of 52 IBs and CBs, from selected Organization of Islamic Cooperation Countries for the period of 2007-2015, a negative relationship is found between credit risk and liquidity risk. We then investigate the relationship between

liquidity risk and stability, finding a negative relationship just for the Islamic banks. We finally show that Islamic banks are better than conventional in managing risks. This essay is already published in *Research in International Buisness and Financa, Volume 48, pages 17-31*.

The second chapter follows a thorough bibliometric review of the literature on Takaful (Islamic Insurance). This paper has received the best paper award at *ADEIMF annual conference, September 13 14, 2019 Turin (Italy)*. Takaful represents a growing financial segment addressing the insurance needs of Islamic societies and economies. We provide a thorough analysis of existing contributions on Takaful, by adopting a meta-literature methodology that encompasses both a bibliometric (quantitative) and content (qualitative) analysis. By reviewing 65 articles, we aim to provide a rigorous background for the Islamic finance industry, its societies and economies, academic research and policymakers. We identify and review three leading research streams on Takaful: its overview, growth paths and models; governance mechanism; products/services and customer perception. Finally, We derive and summarize 16 leading future research questions based on meta-literature review.

The third and final essay is related to the role of trade and financial openness in financial development and the real economy through the channel of Islamic banks. This paper has also received the Best paper award at *4th IFBBE 2019: Building a Better World Through Inclusion, Sustainability and Ethics, 16-17 September Valencia, Spain*. In this paper, we analyze the impact of trade and financial openness on financial development in the Gulf Cooperation Council (GCC) region by using a comprehensive dataset of 44 Islamic and 48 conventional banks for the period of 2007-2015. We find that trade and financial openness have a positive impact on Islamic bank profitability but simultaneous openness to both trade and capital markets will reduce the profitability of Islamic banks. Moreover, We find that trade and financial openness increase the loan volume but reduce the stability of Islamic banks.

We also conducted a bibliometric review of literature on Sukuk(Islamic bonds) with my supervisor and other co-authors of a paper **(which is not the part of the thesis).** Sukuk (Islamic bonds) is one of those Islamic finance sectors that have experienced the fastest growth during the last decade. Using a quali-quantitative approach known as meta-literature review, the aim of this paper is to survey the Sukuk literature over the period 1950-2018. In total we review and analyze 80 papers

through bibliometric citation analysis (using HistCite and VOSviewer software) coupled with content analyses. We show the influential aspects of the literature, such as countries, institutions, journals, authors, articles and topics. We also present the co-authorship network and identify three research streams: (1) Sukuk overview and growth, (2) Sukuk and finance theories, (3) Sukuk and stock market behavior. Through the review and analysis of the published research on Sukuk, we finally provide 11 future research questions in order to extend the research on this topic.

Essay 1

Liquidity Risk, Credit Risk and Stability in Islamic and Conventional Banks

Liquidity Risk, Credit Risk and Stability in Islamic and Conventional Banks[1]

Abstract

The aim of this paper is to provide a thorough assessment of Islamic banks' (IBs) liquidity risk compared to conventional banks (CBs). We firstly investigate the relationship between liquidity and credit risk. Employing a simultaneous structural equation approach, on a comprehensive dataset of 52 IBs and CBs, from selected Organization of Islamic Cooperation Countries for the period of 2007-2015, we find that credit risk and liquidity risk have negative relationship. We then investigate the relationship between liquidity risk and stability, finding a negative relationship just for IBs. We finally show that Islamic banks are better than conventional in managing risks.

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1. Introduction

One of the crucial and central part of Islamic finance is its banking system i.e. Islamic banks (hereafter referred as IBs). Although Islamic banking initially started for Muslims in the Muslim populated territories, this concept of banking has widely spread around the world, especially after subprime financial crisis. The last couple of decades have observed the development of a number of IBs working in different parts of the world. The global Islamic banking industry is increasing in an upward direction witnessed by its positive growth of rate of 10% over the last 10 years across 14 jurisdictions, with a total asset of USD 1.493 trillion as on 1H2016 (IFSB Report, 2017).

IBs have the same functions of their conventional counterparts even if the nature and structure of their products are completely different. It is not allowed for IBs to be involved in transactions based on interest (*riba*), uncertainty (*gharar*) and speculations/gambling (*qimar*). The basic difference between Islamic and conventional banks is that the former is based on profit and loss sharing mode of financing, at least on the liability side of their balance sheet (Obaidullah, 2005).

Despite being *Sharia compliant* in their operations, IBs cannot be considered immune to all the risks faced by conventional banking system. Among all risks, liquidity and credit risks are the most important ones to deal with in the banking sector. Banks usually face credit risk on the asset side of their balance sheet, while liquidity risk arises from liability side. If the bank has financed too many distressed projects, it is harder for the bank to meet the depositors' demand. A default on loan by the borrower positively contributes to the liquidity risks. Additionally, the bank can face "bank run" on its deposits if the economic situation gets worsen, which will ultimately deteriorate the values of assets financed by the banks (Imbierowicz and Rauch, 2014). Therefore higher credit risk results in higher liquidity risks.

IBs, on the other hand, face liquidity risk in a different way compared to CBs. Firstly, IBs also receive deposits on which they have to pay profits. But, due to limited investment venues, IBs find it harder to pay the profits and that situation increases the liquidity risk. Secondly, IBs have a very limited money market, which makes it harder for IBs to raise funds during shortage of liquidity. Moreover, it is a regulatory condition for all banks to keep a statuary reserve in Central Bank, with an interest being paid on that amount, but since the interest is not allow under Islamic law, IBs do not receive any payment over their reserves. Thereby, IBs are recommended to keep more cash on hand to overcome their liquidity risk.

Financial institutions usually face credit risk on the asset side of their balance sheet so as IBs. Errico and Farahbaksh (1998) pointed out special risk attached to equity like assets including *Musharakah and Mudarabah* (Ashraf et al. 2016). As in these contracts, relationship of banks with their clients is purely based on partnership, thus Islamic bank principally cannot ask collateral to hedge this kind of credit risk. Therefore, due to the involvement of moral hazard, asymmetric information and having limited expertise in projects involving PLS based contacts, IBs are usually reluctant to invest in such projects. On the other hand, liabilities of IBs are also equity-like in nature which is mainly based on *Mudarabah* contract, thus losses would be shared among the bank and depositors and give an extra layer of protection to the IBs. Even if the current deposits are based on *Qard-al-Hassana* (deposits are considered as interest free loan and has to be pay back on demand) and *Wadi'ah* (IBs act as safe custodian of deposits), these features can exacerbate liquidity risk

There are a lot of studies explaining that IBs are more stable, especially during financial crises (Abedifar, et al., 2013;Beck, et al., 2013; Miah and Uddin, 2017), but the reality shows that some of them were closed due to liquidity shortage. For example, Ihlas Finans in Turkey started its operations in 1995 with the aim to facilitate small investors and savers to park their investments on interest free basis. With the asset side of its balance sheet mainly composed of illiquid assets, during the banking crisis in Turkey in 2000-2001, Ihlas Finans faced a bank run on its deposits resulting in its closure (Ali, 2007).

The aim of this paper is to offer a comprehensive assessment of liquidity risk in IBs compared to CBs. To do this, we firstly examine the relationship between liquidity risk and credit risk and, secondly, the impact of liquidity risk on bank stability. We analyze a sample of 26 IBs and 26 CBs for the period of 2007 to 2015 from selected Organization of Islamic Cooperation (OIC) countries. We calculate liquidity risk as the difference of all liabilities that can be withdrawn in a very short notice from all assets, which can be turned into cash quickly, at low cost, to cover expected and unexpected withdrawals. The credit risk is measured by dividing the difference of loan charge off and loan recoveries by last year allowance for non-performing loans.

We find that there is a negative relationship between liquidity and credit risk in IBs. Moreover, we find a positive relationship between liquidity risk and bank stability (measured by z-score and DD) for CBs and a negative relationship between liquidity risk and IBs' stability, during post

subprime financial crisis. During financial crisis, we observe negative relationship between liquidity risk and bank stability for both, using DD proxy of bank stability, but this relationship turns to insignificant for IBs when we add control variables. Lastly, we study the comparative performance of IBs and CBs in terms liquidity risk, credit risk and bank stability. We find that IBs outperform CBs in managing liquidity and credit risk, but we find some mixed results for stability of both banking systems.

Our study is a value addition to the existing literature on comparative performance of liquidity risk, credit risk and stability of Islamic and CBs. Moreover, from a risk management perspective, we use more realistic approach, developed by Imbierowicz and Rauch (2014), for calculating our main variables, especially for credit risk for which we also take into consideration the effect of loan charge offs and loan recoveries. To the best of our knowledge, our study is the first to thoroughly assessing the liquidity risk and its relationship with credit risk in IBs and also the first to investigate the impact of liquidity risk on bank stability taking into account both accounting and market base measure of bank stability.

The reminder of the paper is arranged in following chronological order. Section 2 explains the literature review and hypothesis development. Section 3 describes the data methodology and measurement of variables. Section 4 and 5 explain our main results and robustness checks respectively. Section 6 concludes the study.

2. Literature review, theoretical framework and hypothesis foundation

2.1 Literature review on liquidity risk, credit risk and stability in IBs

Over the last century, there has been a good number of studies in the literature taking into consideration the role of financial institution in an economy, more precisely banks (Tobin, 1963; Gurley and Shaw, 1960; Bryant, 1980; Diamond and Dybvig, 1983; Diamond, 1984, among all). In the quest of investigating the role of banks, Richard (2015) points out three different theories of banking. According to him, the first theory of banking considers banks as institutions that collect funds from savers and lend it to the investors. The second theory, which is the reserve theory of banking, takes each bank as financial intermediary having no power to create money rather it should be created by the collective banking system through 'multiple deposit expansion'. The third

theory of banking rejects the role of bank as financial intermediary and argues that each bank has the power to create credit and so new money while extending a new loan.

All these theories, especially the theory of financial intermediary, implicitly evince that there is some relationship between liquidity and credit risk. A growing body of literature, especially after subprime financial crisis, emphasizes the positive relationship between these two risks (Allen and Carletti, 2008; Cornetta et al., 2011; Gefang et al, 2011; Imbierowicz and Rauch, 2014). Imbierowicz and Rauch (2014) examine the relationship of liquidity and credit risk in US banks for the period of 1998-2010. They find a very weak and positive inter relationship of liquidity and credit risk using bank specific measures, but they show a very strong and positive relationship in terms of bank internal liquidity and bank-external credit risk. Cornetta et al. (2011) argue that financial crisis dwindled liquidity from the market. They divide banks into two categories: (1) banks, having deposits and equity capital finance as core source of funding, continue to lend more as compared to other banks and (2) banks, having more illiquid asset, reduce lending to increase their liquidity. Lastly, banks, in managing their liquidity risk, force them to reduce credit supply which results in decreasing the credit risk. This also shows co-positive movement of both risks.

All this literature is more relevant for the mainstream financial system. IBs, on the other hand, have very different structure of their operations but they are similar to CBs in their functions. Nevertheless, the concept of financial intermediaries has also a well-established record in Islamic economic system. Financiers (*Sarrafs*), execute many transactions in the same way of CBs but in an informal way. Udovitch (1981) defines it as 'Bankers without Banks'. They were involved not only in domestic operation but also cross border payment system. It is also evident that such financial intermediaries also succor each other to overcome liquidity shortage.

IBs are working parallel to CBs all around the globe with the same functions to meet the need of all its stakeholders but with different contractual structures (Hennie and Iqbal, 2008). Therefore, relying on the same literature of CBs, we assume that there is relationship between liquidity risk and credit risk in IBs.

Previous empirical literature on IBs mainly investigates their performance, efficiency, stability and risk management individually or in comparison to CBs (How et al., 2005; Olson and Zoubi, 2011; Abedifar et al., 2013; Beck et al., 2013; Alqahtani et al., 2016:2017; Bitar et al., 2017,).

All of the above literature mainly focuses on the relationship of liquidity or credit risk with efficiency and profitability of IBs, or deals only with comparative performance of both risks. The only study on this topic (Ghenimi , et al., 2017) analyzes the relationship between liquidity and credit risk and their impact on bank stability. They do not find any relationship between liquidity and credit risk but both risks individually and jointly effect bank stability. Our paper differs from them mainly in three ways. Firstly, we consider both Islamic and conventional banks. Secondly we use more comprehensive dataset and taking into account major OIC countries which are considered hub of Islamic finance (please see (E&Y, 2016)). Thirdly, we use not only accounting base measure of bank stability i.e. Z-score but also market base measure of bank stability i.e. Martin distance to default.

There is general consensus among the scholars that IBs usually have excessive liquidity due to inadequate investment opportunities (Basu et al., 2015; Al-abedallat, 2016). On the liability side of the balance sheet, IBs receive deposits based on profit & loss sharing (PLS) on which they have to pay profit. On the other hand, they invest those funds on the asset side. Due to limited investment opportunities, they have high liquid assets so liquidity risk is very low. Therefore, IBs expose themselves to credit risk by extending loans through *Murabaha and Ijarah* in order to generate more profits, but the overall default risk would still be in control. It is not necessary that a bank with low liquidity/credit risk controls both risk together as it reflects a very limited overall risk of instability (Imbierowicz and Rauch , 2014). Therefore, in both cases of high or low liquidity/credit risk in IBs, we expect a negative relationship between them.

There are several studies analyzing the impact of liquidity risk on bank stability (Wagner, 2007; Čihák and Hesse, 2010; Cornetta, et al., 2011; Beck, et al., 2013; Almarzoqi, et al., 2015). Wagner (2007) argues that liquidity risk has negative impact on bank stability. Higher liquid assets, initially, improve the stability of the bank and make crisis less costly. Consiquently, the bank starts taking risk to increase profitability, which offsets the initial positive impact and increase bank instability. Cornetta et al. (2011) find that banks, with high illiquid assets, increase their liquidity and decrease lending during financial crisis. Almarzoqi et al. (2015) report similar finding while Čihák and Hesse (2010) discover no relationship between liquidity risk and stability for larger IBs but significant negative relationship is oberseved for small IBs.

Sharia Supervisory Board (SSB) also plays a positive role in the performance of IBs. SSBs make sure all the products and contracts to be Sharia compliant and serve the real purpose of economic activity concept, thus, do not allow boards of directors and management to involve in aggressive poor quality of lending and excessive risk taking behavior. Under such multilayer governance structure, Islamic banks are forbidden to create credit against credit due to prohibition of interest under Sharia law and are also not allowed to deal in doubtful products such CDOs and CDS (Mollah and Zaman, 2015). Additionally, IBs do not create debt with direct lending but through the sale or lease of real assets and are better collateralized. These attributes of IBs suggest they have low credit risk while, having excess liquidity and low liquidity risk, they opt to increase their profitability through consumer lending and borrowing, thus, expect to have negative sign for both liquidity and credit risk as reported in table 2. A higher liquidity risk reduces the stability of banks especially during bank run. Therefore, based on the above literature and arguments, we propose the following hypothesis for our study:

Hypothesis 1: Liquidity risk and credit risk are interconnected in IBs.

Hypothesis 2: Liquidity risk is negatively related to credit risk in IBs.

Hypothesis 3: Liquidity risk and bank stability are interconnected in IBs.

Hypothesis 4: Liquidity risk is negatively related to bank stability in IBs.

2.2 Literature review on IBs' performance and risks

There are several empirical studies comparing the performance of IBs in terms of liquidity risk, credit risk and bank stability. Taking a deeper look into the literature, we divide the stream of literature into two categories considering the time factor i.e. financial crises.

Pre-financial crisis period includes studies of Samad (1999) and Al-Jarrah and Molyneux, (2007) who find IBs to be more efficient while El-Gamal and Inanoglu (2002) and Bader et al. (2008) show no major difference between IBs and CBs in terms of efficiency and productivity. Just a few studies show less efficiency for IBs (Abdul-Majid et al., 2010)

After subprime financial crisis, IBs got the attention of the academics and scholars to investigate performance, stability and risk management practices in order to check differences with conventional financial system (Čihák and Hesse, 2010; Hasan and Dridi, 2010; Abedifar et al., 2013; Beck et al., 2013; Baele et al., 2014; Kabir et al., 2015; Saeed and Izzeldin, 2016) and this

stream of literature found IBs to have lower credit risk, better asset quality and more stable as compare to CBs..

We identify another developing stream of literature which might possibly explain the better performance of IBs in terms of credit risk and liquidity risk based on the role of *Sharia Supervisory Board* (SSB). Mollah and Zaman (2015) show a positive relationship between SSB and performance of IBs and consider it as key feature of governance for IBs. SSB make sure that Islamic banking product does not involve any interest (*riba*), excessive risk/ speculation (*gharar*) and based on real economic activity to maintain social justice in the society (Beck et al., 2013). Choudhury and Hoque (2006) call SSB in IBs a "Supra Authority". That is why IBs have been never exposed to toxic or mortgage back securities. Collateralized debt obligations (CDOs) and credit derivative swap (CDS) are not allowed as they are forbidden by Islamic law (Ahmed, 2009).

A few studies also consider the role of customers' religious belief in better performance of IBs such as (Loo, 2010; Baele et al., 2014) and suggest that Islamic bank's customers are better in honoring their commitments and more loyal.

According to the above literature and reasoning, IBs have better quality of assets, are well-capitalized and have better governance structure. Therefore, we expect IBs to have better management of liquidity risk and credit risk than CBs, thus proposing the following hypothesis.

Hypothesis 5: IBs manage liquidity risk better than CBs.

Hypothesis 6: IBs manage credit risk better and are more stable than CBs.

3. Data and Methodology

3.1 Data Sample selection

We collect data from Bloomberg Professional Service and using individual financial statements publicly available at respective bank website for the period 2007-2015.

For the purpose of this study, we initially select 40 banks of each banking sector (i.e. Islamic and conventional banking) from selected OIC countries which are arguably considered the hub of Islamic finance. All these countries meet the basic condition, i.e. both types of banks coexist. Data for CBs are easily available either using Bloomberg database or publicly available financial statements. But, we reduce the dataset to 26 banks from each sector due to data unavailability from Islamic banking side. We select largest Islamic and CBs by total assets operating in those countries,

cross checked with "The Banker Special report" (November, 2015) and respective country Central Bank. We maintain the same number of banks for both banking sector in order to give the same playing field for the purpose of this study.

Table 1. Sample

Country Name	Initial Papulation			Sample Dataset		
	IBs	CBs	Total	IBs	CBs	Total
Bahrain	5	5	10	5	5	10
Bangladesh	4	4	8	0	0	0
Indonesia	3	3	6	1	1	2
Kuwait	4	4	8	3	3	6
Malaysia	4	4	8	4	4	8
Pakistan	4	4	8	2	2	4
Qatar	4	4	8	3	3	6
Saudi Arabia	5	5	10	3	3	6
Turkey	3	3	6	2	2	4
United Arab Emirates	4	4	8	3	3	6
Total	**40**	**40**	**80**	**26**	**26**	**52**

This table contains bank population and sample data set and classify country list and bank type. As observed from the table, initially there were total 80 banks which reduced to 52 due to unavailability of data especially for IBs not only at Bloomberg but also some banks do not have publically available archive of their financial statements.

3.2 Selection of Variables

We select two main risk factors for this study i.e. liquidity risk and credit risk. There are many studies (Kim and Sohn, 2017; Saeed and Izzeldin, 2016; Imbierowicz and Rauch, 2014) which use liquidity and credit risk both jointly and individually with different objectives.

Following the literature on bank stability, we select two proxy variables for bank stability. First, we apply accounting based measure i.e. Z-score as proxy of bank stability in order to check the impact of liquidity risk on bank stability. Z-score is arguably a well-established measure of bank stability among scholars and practitioners (Čihák and Hesse, 2010: Beck et al., 2013). Despite of its popularity, Čihák and Hesse (2010) find a possible drawback espacially when its used to measure stability of IBs. Having the feature of *PLS* at least on the liability side, it may undervalue the stability of the bank.

To account for this issue, we apply a market based measure of bank stability. Market based measure is considered better in predicting a bank failure than the accounting one. Therefore, we also use *Merton's Distance to Default* (DD) as market based proxy of measuring bank stability (Kabir et al., 2015).

3.3 Measurement of Variables

3.3.1 Measurement of Liquidity Risk and Credit Risk

Following the study of Imbierowicz and Rauch (2014), the variable for liquidity risk is the difference of all liabilities which can be withdrawn on a very short notice from all assets, that can be turned into cash quickly at low cost to cover expected and unexpected withdrawals and standardized by total assets. A positive value shows that the bank does not have enough liquid assets to meet its short term liabilities. Therefore, a bank has to tap other sources in order to avoid classical bank run which can further increase the default risk of the bank. On the contrary, a negative value shows that the bank has more liquid assets compared to short-term liabilities so it can meet all its obligation.

The credit risk is measured by dividing the difference of loan charge off and loan recoveries by last year allowance for non-performing loans. This ratio explains the ability of the bank to manage its loans. If the ratio is more than 1, the bank has more loan losses and need to revise its credit risk policy. Table 2 and 3 explain the main variables and their expected signs.

3.3.2 Measurement of Z-score and Distance to Default

The Z-score is the sum of return on asset (ROA) and equity to asset ratio (EAR) divided by standard deviation of ROA. It is inversely related to bank insolvency: the higher/(lower) the value of z-score, the lower/(higher) is the probability that bank will go into insolvency.

DD is the difference of assets' market value of and default point, divided by the product of assets' market value and volatility of assets. We collect all the data of default probability (DP) from Bloomberg Professional Services. We, then, estimate DD by inverse comulative distribution function of default probability.

Let DD a standard normal variable, where $DD \sim N(0,1)$. The probability of default ($P_{default}$)

is $CDF(-DD)$:

$$P_{default} = CDF(-DD) = \phi(-DD) = 1 - \phi(DD)$$

$$\phi(DD) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{DOD} e^{-t^2/2} \ dt$$

In other words

$$\phi(DD) = \frac{1}{2}\left[1 + erf\left(\frac{DD}{\sqrt{2}}\right)\right] \qquad\qquad [1]$$

Equation 1 also works in reverse, if we have probability of default ($P_{default}$) by inverse of the cumulative distribution function we can define DD.

$$\phi^{-1}\left(P_{default}\right) = \sqrt{2} \ erf^{-1}\left(2P_{default} - 1\right), \ P_{default} \in (0,1) \qquad [2]$$

Table 2 Main variables and expected signs

Variable Name	Notation	Source	Expected Sign
Bank Risk Specific Variable			
Liquidity Risk	LR	Author's calculation using data from Bloomberg and individual bank financial statements	Negative
Credit Risk	CR	Author's calculation using data from Bloomberg and individual bank financial statements	Negative
Bank stability Variable			
Z-score	Z-score	Author's calculation using data from Bloomberg and individual bank financial statements	Negative
Distance to default	DD	Author's calculation using Bloomberg data.	Negative

This table explain the expected sign of the main variables. For bank risk variables, we expect to have negative sign for both liquidity and credit risk. For bank stability variables, we expect to have negative sign of liquidity risk with z-score and distance to default.

Table 3. Description of main variables

Variable Name	Estimation		interpretation
	CBs	IBs	
Liquidity Risk	{(Demand deposits +transection deposits +Brokered deposits + NOW accounts + Contingent liabilities within one year)-(Cash + currency & coins +trading assets + Fed fund purchased+ commercial paper+ Securities available for sale)) ± Net interbank lending position) ± Net derivatives position}/Total Assets	(Demand Deposit (Amanah)+ Investment Accounts (Mudarbah) +short-term Special Investment account (Mudarbah+Musharkah)+ Contingent liabilities within one year)-(Cash +currency & coins + trading assets+ reserve with central bank + Securities available for sale) ± Net interbank lending position ± Net derivative position)}/Total Assets	LR > 0 implies that the bank is not able to fulfill sudden cash withdrawal. Higher the value, higher is the liquidity risk.
Credit Risk	$$\frac{Loan\ change\ of f s_t - Loan\ Recoveries_t}{Loan\ Loss\ Allownce_{t-1}}$$		CR > 1 implies unexpected losses
Z-Score	$$ln(ROA+EAR)/SD(ROA)$$		Higher value implies that the bank is more stable.
Distance to Default	$$\frac{(Market\ value\ of\ assets - Default\ Point)}{(Market\ value\ of\ assets)(Volatility\ of\ assets)}$$		Higher value implies that

| | | the bank is more stable. |

This table explains the estimation of main variables and its interpretation.

3.3.3 Control Variables

Moreover, we also consider some control variables which possibly can influence the main variables of this study and also elucidate the general position of the bank. These include return on assets (ROA), efficiency ratio (ER), and asset growth (AG), loan growth (AG) as bank-specific variables, and GDP as macroeconomic variable as well recognized by the literature (see Abedifar, et al., 2013, Imbierowicz and Rauch, 2014). Table 4 explains all the control variables used for this study and their estimation.

Table 4 Description of control variables

Control Variables	Unit	Estimation Method
Return on Asset (ROA)	%	(Net Income /Total Assets)*100
Efficiency Ratio (ER)	%	(Operating Expenses/Total Revenue)*100
Loan Growth (LG)	%	$\left\{\dfrac{Loan_t - Loan_{t-1}}{Loan_{t-1}}\right\}*100$
Asset Growth (AG)	%	$\left\{\dfrac{Total\ Assets_t - Total\ Assets_{t-1}}{Total\ Assets_{t-1}}\right\}*100$
GDP	%	Growth rate of Gross domestic product (downloaded from WDI Website) of the countries selected for this study

This Table explains all the control variable used for this study and their estimation.

3.4 Methodology

This study follows the three-stage process. Firstly, we divide the data into two categories, i.e. subprime financial crisis and post financial crisis period. For the former, we use the time period from 2007 to 2008 while post financial crisis covers 2009-2015 period. Furthermore, we first run

the analysis for all banks merging both Islamic and CBs to check pattern of relationship between LR and CR. We then separately run the analysis for both banking system which is one of the main objective of this study.

At first, the direction of relationship between LR and CR is not pronounced at the beginning. To account for this problem, we used structural equation approach through 3 stage least squares method as used by (Imbierowicz and Rauch, 2014) and (Mollah and Zaman, 2015).

$$CR_{i,t} = LR_{i,t} + ROA_{i,t} + ER_{i,t} + LG_{i,t} + AG_{i,t} + GDP_{i,t} \qquad [3]$$

$$LR_{i,t} = CR_{i,t} + ROA_{i,t} + ER_{i,t} + LG_{i,t} + AG_{i,t} + GDP_{i,t} \qquad [4]$$

These equations are run simultaneously controlling the problem of endogeneity of the respective independent variable and to check the contemporaneous effect and influence of independent variable on dependent variable. We apply the unit root Dicky fuller GLS test on the relevant dependent variables which was rejected. As mentioned earlier, we additionally include return on asset (ROA), efficiency ratio (ER), asset growth (AG), loan growth (LG) and gross domestic product growth (GDP) as control variables.

Secondly, we run the simultaneous equations using again 3 stage least square method, following the same pattern as in the previous section, taking into account financial crisis factor and bank type to test the relationship of liquidity risk with bank stability, using following equations:

$$Z - Score_{i,t} = LR_{i,t} + ROA_{i,t} + ER_{i,t} + LG_{i,t} + AG_{i,t} + \varepsilon_{i.t} \qquad [5]$$

$$LR_{i,t} = Z - Score_{i,t} + ROA_{i,t} + ER_{i,t} + LG_{i,t} + AG_{i,t} + \varepsilon_{i.t} \qquad [6]$$

$$DD_{i,t} = LR_{i,t} + ROA_{i,t} + ER_{i,t} + LG_{i,t} + AG_{i,t} + \varepsilon_{i.t} \qquad [7]$$

$$LR_{i,t} = DD_{i,t} + ROA_{i,t} + ER_{i,t} + LG_{i,t} + AG_{i,t} + \varepsilon_{i.t} \qquad [8]$$

Lastly, we use Mann-Whitney U test along with mean value from descriptive statistic as followed by (Hassan et al., 2009) in order to compare the performance of IBs with respect to its counterpart in terms of LR, CR and bank stability.

4. Results

4.1 Descriptive statistics

Table 5 explains the descriptive results of all banks. We include the dataset of 52 banks (with the exception of DD analysis where we use 30 banks due to unavailability of data) subdivided simultaneously based on two factors, i.e. categories of banks and incorporating the financial crisis period. Our main objective of this study is to investigate the relationship between liquidity risk and credit risk in IBs in comparison to conventional ones and how LR influences bank stability, but to see the direction of relationship, we also run analysis for all banks.

Table 5 Descriptive statistics

Categories of Banks	Des. Statistics	Financial crisis period				Post financial crisis period			
		LR	CR	Z-score	DD	LR	CR	Z-Score	DD
All Banks	No. of observation	104	104	100	60	364	364	362	210
	Minimum	-0.9205	-6.379	0.5679	2.037	-0.498	-11.39	-0.0919	1.93
	Maximum	1.54	1.974	8.485	3.68	1.87	5.09	6.045	3.84
	Mean	0.17349	-0.0927	3.865	3.08	0.221	0.1773	3.777	3.204
	S.D	0.359	1.061	1.366	0.283	0.311	1.098	1.096	0.295
CBs	No. of observation	52	52	51	30	182	182	181	105
	Minimum	-0.26	-2.08	0.567	2.55	-0.35	-2	2.459	2.394
	Maximum	1.54	1.45	8.485	3.44	1.87	5.09	5.566	3.77
	Mean	0.2716	0.0597	3.914	3.035	0.2874	0.273	4.152	3.216
	S.D	0.344	0.639	1.4246	0.232	0.355	0.828	0.8358	0.238
IBs	No. of observation	52	52	49	30	182	182	181	105
	Minimum	-0.92	-6.38	1.92	2.037	-0.49	-11.4	-0.0919	1.93
	Maximum	0.87	1.97	6.839	3.68	1.04	4.17	6.045	3.844

Mean	0.0756	-0.2451	3.815	3.141	0.155	0.0815	3.4	3.191
S.D	0.351	1.348	1.316	0.3228	0.245	1.31	1.195	0.344

This table explains the descriptive statistics of main variables for all categories of banks and subdivided period of financial crisis and post financial crisis.

For all banks, the mean value of LR is 0.1734 and CR is -0.0927 during financial crisis period which implies high liquidity risk and low credit risk while the z-score is 3.865 and DD is 3.08. But the intensity of both risk increases to 0.221 and 0.1773 for LR and CR respectively during the post financial crisis with the decrease in z-score also to 3.777 but DD value increases. The LR and CR is 0.2716 and 0.0597 respectively for CBs with z-score 3.914 and DD 3.035 during financial crisis period. LR slightly increases but CR intensively increases to 0.273 during post financial crisis, with z-score at 4.152 and DD value 3.216. This implies that the impact of LR is greater, in terms of profitability, than CR, resulting in more stability for CBs. The results of IBs are more pronounced. IBs have the value of LR 0.0756 and CR -0.2451 during financial crisis, which is better compared to CBs. But, CBs are slightly more stable compared to IBs. We find the same pattern of increase for IBs during post financial crisis period. The contrasting results of z-score and DD suggest the careful selection of methodology for assessing the stability of the banks.

It could be due to aftershocks of financial crisis, but it has not as much material impact on Middle East economies as on Western economies. Plausible major reason of this increase in LR and CR would be due to real estate crisis in Middle East countries especially in UAE started late 2008 and early 2009.

4.2 The relationship between liquidity risk and credit risk in terms of bank type.

The structure of the products used by IBs is different compared to CBs, so it is likely that LR and CR have different patterns of relationship in terms of bank type. During the financial crisis period, we do not find any statistically significant relationship between LR and CR neither as LR (dependent variable) and CR (independent variable) nor in vice versa case for CBs, but we find negative relationship between LR and CR after adding control variables for IBs. Our results are partially supported by the findings of (Imbierowicz and Rauch, 2014) as they also don't provide evidence of any relationship between LR (dependent variable) and CR (independent variable).

However, we find statistically significant negative reciprocal relationship between CR and LR for both CBs and IBs in post financial crisis period. The results are reported in table 6 and 7.

The main sources of funding for banks are the deposits that they receive on the liability side of their balance sheet. They channelize and park all the deposits using available sources on the asset side of the balance sheet. LR together with CR results in default risk or bankruptcy of the bank. The risk manager sets the tolerable level of default risk. If the credit risk is already high, the bank will reduce liquidity risk by investing in low yield highly marketable securities in order to keep tolerable level of default risk. But, if the credit risk is low, the bank has a cushion and can increase liquidity risk by investing in less liquid relatively high yield securities at same level of tolerable default risk. Moreover, this negative relationship in IBs could also be due to extra Sharia monitoring on the part of Sharia Supervisory Board (SSB) which reduces credit risk (Mollah and Zaman, 2015) and attitude of Islamic banking customers who timely honor their commitments (Baele et al., 2014). Our results are consistent with the findings of Ghenimi , et al., (2017). These results support our hypothesis 1 and 2.

Table 6 Liquidity and credit risk relationship: simultaneous equation

Credit risk and liquidity risk relationship				
Regression Analysis- Simultaneous Equation				
		Financial Crisis period		Post Financial Crisis period
LR-All Banks				
	CR	.01557	.0035586	-.0004391	-.0182085
	ROA		-.0259351		.0031126
	ER		.0000202		.0004388
	LG		-.0001733		-.0013168
	AG		-.0009531		-.0020132
	GDP		-.0098552		-.0027282
LR-CBs				
	CR	-.08474	-.0943867	-.12004***	-.10351***
	ROA		-.0393465		-.0382778
	ER		-.0000896		.004608**
	LG		-.0058036		.00707**
	AG		.0048486		.0002108
	GDP		.0013975		.0085246
LR-IBs				
	CR	-.04951	-.0554278*	-.03405*	-.040985**
	ROA		-.048632*		.000242
	ER		-.002057		-.00064
	LG		.000085		-.00094
	AG		-.000168		.00115
	GDP		.001208		-.0020

The table show the result of regression analysis by simultaneous equation through 3-stage least square for the period of 2007 to 2015 which is further divided into financial crisis period(2007-2008) and post financial crisis period (2009-2015).Moreover, ROA, efficiency ratio(ER), loan growth (LG), asset growth (AG) and GDP are the control variables.

*** indicates the statistical significance at 1%.

** indicates the statistical significance at 5%.

* indicates the statistical significance at 10%

Table 7 Liquidity and credit risk relationship: simultaneous equation

Credit risk and liquidity risk relationship				
Regression Analysis- Simultaneous Equation				
		Financial Crisis period		Post Financial Crisis period
CR-All Banks				
	LR	.114252	.0274149	-.0038922	-.064291
	ROA		-.019583		.0356124
	ER		-.0000867		-.0011355
	LG		-.0009117		-.004015
	AG		.0012247		-.0114775 **
	GDP		-.0305276		-.008821
CR-CBs				
	LR	-.29155	-.3196586	-.6535512***	-.6229174***
	ROA		-.034689		.0076098
	ER		-.0001741		-.0014498
	LG		-.0079205		.0082339
	AG		.0039991		-.0146671
	GDP		-.0320682		-.0085305
CR-IBs				
	LR	-.72972	-.85456*	-.97140*	-1.1120**
	ROA		-.05952		.0202
	ER		-.01088		-.0014
	LG		-.00252		-.0064
	AG		.00761		-.0084
	GDP		-.042908		-.0082

The table show the result of regression analysis by simultaneous equation through 3-stage least square for the period of 2007 to 2015 which is further divided into financial crisis period(2007-2008) and post financial crisis period (2009-2015). Moreover, ROA, efficiency ratio(ER), loan growth (LG), asset growth (AG) and GDP are the control variables.

*** indicates the statistical significance at 1%.

** indicates the statistical significance at 5%.

* indicates the statistical significance at 10%

4.3 The relationship between liquidity risk and bank stability

Following the same pattern as in the previous section, we run the simultaneous equations using 3 stage least square method for the period of 2007 to 2015, subdivided into financial crisis from 2007 to 2008 and post financial crisis period from 2009 to 2015, taking into account the bank type. We report all the results in tables 8, 9, 10 and 11.

It is very important for IBs to ensure its stability as they are exposed to different risks as compare to CBs. In addition to normal business risks, IBs also face commercial/withdrawal and reputational risks. IBs maintain profit equalization reserves (IFSB-1, 2005) to mitigate withdrawal risk. They are more prudent to maintain its stability as they are exposed to reputational risk which can deteriorate the trust of investors, depositors and eventually can lead to bank run and insolvency. Therefore, we may observe different results for IBs as compare to CBs

During the financial crisis period, we find statistically significant positive relationship between liquidity risk and bank stability for CBs, using z-score, while we observe negative relations when DD is used as proxy of bank stability. On the other hand, post financial crisis period shows a statistically significant positive relationship of LR and bank stability. This could be due to the fact that CBs have more market share in countries under investigation resulting in higher profitability which is one of the main determinants of bank stability (see E&Y, 2016; Beck, et al., 2013; Čihák and Hesse, 2010).

For IBs, we find statistically significant negative relationship between LR and bank stability, using z-score, both in financial and post financial crisis periods, implying that higher liquidity risk reduces the bank stability. We find similar results for LR and bank stability during the post financial crisis period, using the proxy variable DD. There are possibly two reasons. First of all, IBs generally hold higher liquidity (lower liquidity risk), that improves the stability of the bank. To enjoy more profitability, IBs are mainly dependent on investment in illiquid assets which increase the liquidity risk and decrease the stability of banks especially during crisis, as happened in failure case of Ihlas Finans (Ali, 2007). It is not necessary that ROA always positively contributes to bank stability as observed during financial crisis, using Z-score, for IBs. If profitability is the major concern of the managers, it would induce managers to take more risk

which results in higher volatility of ROA, thereby, leading to decrease in bank stability (Ibrahim and Rizvi, 2017).

Table 8 Z-score and liquidity risk relationship: simultaneous equation

Z-Score and Liquidity risk Relationship				
Regression Analysis-Simultaneous Equation				
	Financial crisis period		Post financial crisis period	
Z-Score-All Banks				
LR	-0.5601	-0.9426**	0.6417***	0.4748***
ROA		-0.1982**		0.4062***
ER		-0.0127***		-0.0046***
LG		-0.0024		-0.0074**
AG		0.0142**		0.0011
GDP		0.0344		-0.0006
Z-Score-CBs				
LR	1.2228***	1.4887***	0.6853***	1.2105***
ROA		0.2231		0.4854***
ER		-0.0056		-0.0167***
LG		0.0340**		-0.0168***
AG		-0.0003		0.0034
GDP		-0.0148		-0.0029
Z-Score-IBs				
LR	-2.4309***	-2.9643***	-1.0431***	-1.3955***
ROA		-0.4602***		0.3206***
ER		-0.0092		-0.0053***
LG		-0.0008		-0.0067
AG		0.0095		0.0059
GDP		0.1057***		-0.0064

This table show the relationship of liquidity risk with stability of the bank, using Z-score as bank stability for the period of 2007-2015 subdivided into financial crisis period (2007-2008) and post financial crisis period (2009-2015), using the 3stage least square simultaneous equations. Moreover, return on asset (ROA), efficiency ratio(ER), loan growth (LG) and asset growth (AG) are the control variables.

*** indicates the statistical significance at 1%.

** indicates the statistical significance at 5%.

 * indicates the statistical significance at 10%

Table 9 Z-score and liquidity risk relationship: simultaneous equation

Z-Score and Liquidity risk Relationship

Regression Analysis- Simultaneous Equations

		Financial crisis period		Post financial crisis period	
LR-All Banks					
	Z-Score	-0.0372	-0.0568**	0.0518***	0.0565***
	ROA		-0.092***		-0.0242
	ER		-0.004***		-0.0003
	LG		0.0001		0.0004
	AG		0.0001		0.0009
	GDP		0.0098		0.0040
LR-CBs					
	Z-Score	0.0725***	0.1123***	0.1239***	0.3067***
	ROA		-0.0925**		-0.1748***
	ER		-0.0015		0.0083***
	LG		-0.0065*		0.0092***
	AG		0.0025		0.0003
	GDP		0.0091		0.0072
LR-IBs					
	Z-Score	-0.163***	-0.183***	-0.0435***	-0.0734***
	ROA		-0.119***		0.0230
	ER		-0.0044**		-0.0009**
	LG		-0.0002		-0.0011
	AG		0.0020		0.0018
	GDP		0.0175*		-0.0021

This table show the impact of liquidity risk on the stability of the bank, using Z-score as bank stability,

for the period of 2007-2015 subdivided into financial crisis period (2007-2008) and post financial crisis

period (2009-2015), using 3stage least square simultaneous equations. Moreover, return on asset (ROA), efficiency ratio(ER), loan growth (LG) and asset growth (AG) are the control variables.

*** indicates the statistical significance at 1%.

** indicates the statistical significance at 5%.

* indicates the statistical significance at 10%

Table 10 Distant to Default (DD) and liquidity risk relationship: simultaneous equation

DOD and Liquidity risk Relationship

Regression Analysis- Simultaneous Equation

		Financial crisis period		Post financial crisis period	
DD-All Banks					
	LR	-0.276***	-0.1926*	0.0312	-0.0630
	ROA		-0.0006		0.040***
	ER		0.0001		-0.0019***
	LG		-0.0005		0.0007
	AG		0.0021		0.0040**
	GDP		0.0145**		0.0092**
DD-CBs					
	LR	-0.1061	-0.3010*	0.3365***	0.2165***
	ROA		-0.0553		-0.0764***
	ER		-0.0001		-0.0087***
	LG		-0.0044		0.0001
	AG		0.0079**		0.0030
	GDP		0.0108		0.0060
DD-IBs					
	LR	-0.2849**	-0.0441	-0.4014***	-0.3871***
	ROA		0.0440		0.1112***
	ER		-0.0005		-0.0012**
	LG		-0.0013		0.0011
	AG		-0.0008		0.0028
	GDP		0.0119		0.0042

This table show the impact of liquidity risk on the stability of the bank, using Distance to default as bank stability, for the period of 2007-2015 subdivided into financial crisis period (2007-2008) and post financial crisis period (2009-2015), using 3stage least square simultaneous equations. Moreover, return on asset (ROA), efficiency ratio(ER), loan growth (LG) and asset growth (AG) are the control variables.

*** indicates the statistical significance at 1%.

** indicates the statistical significance at 5%.

* indicates the statistical significance at 10%

Table 11 Distant to Default (DD) and liquidity risk relationship: simultaneous equation

DD and Liquidity risk Relationship

Regression Analysis- Simultaneous Equations

		Financial crisis period		Post financial crisis period	
LR-All Banks					
	DD	-0.3972***	-0.2582*	0.0213	-0.0540
	ROA		-0.089***		-0.0158
	ER		-0.0003		-0.0007
	LG		0.0001		-0.0002
	AG		-0.0002		0.0029
	GDP		0.0155*		0.0043
LR-CBs					
	DD	-0.1403	-0.3621*	0.3856***	0.3575***
	ROA		-0.093***		-0.0095
	ER		-0.0003		0.0055**
	LG		-0.0024		0.0023
	AG		-0.0016		0.0004
	GDP		0.0280***		0.0078
LR-IBs					
	DD	-0.4273**	-0.0552	-0.1743***	-0.3075***
	ROA		-0.1165**		0.0192
	ER		-0.0070**		-0.0009**
	LG		0.0021		-0.0004

AG	0.0047	0.0044**
GDP	-0.0102	-0.0016

This table show the impact of liquidity risk on the stability of the bank, using Distance to Default as bank stability, for the period of 2007-2015 subdivided into financial crisis period (2007-2008) and post financial crisis period (2009-2015), using 3stage least square simultaneous equations. Moreover, return on asset (ROA), efficiency ratio(ER), loan growth (LG) and asset growth (AG) are the control variables.

*** indicates the statistical significance at 1%.

** indicates the statistical significance at 5%.

 * indicates the statistical significance at 10%

4.4 Comparison of liquidity risk management

In this section, we check the performance of both banking system in order to verify which is better in managing their liquidity. We could do it only by mean comparison but it does not satisfy our purpose of testing the hypothesis. To account for this problem, we employ the Mann-Whitney U test which is a relevant test for such kind of data of two independent samples having same distribution. We report the results in Table 12.

We provide evidence that IBs perform significantly better as compared to its counterpart during both phases of sample period. Table 12 shows that the mean and mean rank value of LR for IBs is 0.0756 and 43.26 which is pretty much lower than the CBs. These results are statistically significant at p-value of 5% during financial crisis period and 1% during the period of post financial crisis and support our hypothesis 3 which says that IBs are better in managing their liquidity risk. Practitioners and academic scholars unanimously agree on the point that IBs have relatively less investment opportunities in order to maintain extra checks for the safe parking of their deposits. Thus, IBs normally have excess liquidity in terms of cash holdings, which can lead to commercial risk due to the difference of return rate between IBs and CBs. In CBs, the rate of return is ex ante and fixed whereas, the rate of return in IBs is based on PLS (profit & loss sharing) and ex post. To maintain competitive rate of return, they use the smoothing income approach as required by IFSB (IFSB-1, 2005). The commonly used methods of smoothing income are profit equalization reserves (PER) and the investment risk reserves (IRR), which allow IBs to stabilize and make their rate of return as competitive as in conventional banking to mitigate the commercial risk/withdrawal risk.

4.5 Comparison of credit risk management and bank stability

In order to check the performance of credit risk management and bank stability between both banking systems, we follow the same pattern and methodology as applied in previous section for liquidity risk management. We do not find any statistical significance pattern between CBs and IBs in terms of credit risk management during both, financial crisis and post financial crisis period but it does not mean that our results have no economic meaning. Results are reported in table 12.

Comparing the mean values, we find better credit risk management in IBs having the value of CR -0.2451 and 0.0783 in financial crisis and post financial crisis period respectively which is better as compared to CBs. The lower value of CR implies lower loan losses and vice versa. There could be several reasons of this better performance but three of them are worth mentioning here. Firstly, IBs do not deal only in documents but also in goods and use money as a tool of exchange rather dealing in money which is common in CBs (Ayub, 2009). IBs strictly make sure the underlying asset that makes the transaction related to the real economic activity. Secondly, the structure of the products is entirely different in IBs compared to their counterparts. IBs do not generally extend loan in the form of hard cash to their customers. Lastly, all financial institutions dealing in loans charge penalty in case of late payment, and in similar way IBs act. But, there is fundamental difference between such penalties. In Islamic finance, the impact of this charge is positive for society. Instead of making it part of their profit, as in CBs, IBs create charity account and spend that charity for the welfare of society, keeping it separate from their CSR (corporate social responsibility) activities.

Regarding bank stability, as reported in table 12, we do not find any statistical significant difference during financial crisis but the higher mean value of z-score 3.914 implies that CBs are more stable. Additionally, we find CBs to be more stable at statistically significant p-value of 1% during post financial crisis with higher z-score of 4.152.

Using market based measure DD, we find IBs to be more stable during financial crisis at p-value 5%, while we do not find any statistical difference between both banking systems during post financial crisis. But higher DD mean value of 3.216 suggests that CBs are more stable. There might be several reasons, but some points are worth mentioning here. Firstly, IBs have very limited market share in all countries selected for this study, with the exception of Saudi Arabia having

market share of 51.2% (see E&Y report, 2016). Secondly, IBs, with limited investment opportunities, have generally excess liquidity which ultimately reduces their profitabality, thus negatively affecting their stability. Our contrasting results of banks' stability, using accounting and market based measures, are partially in line with the findings of Kabir et al. (2015) and suggest to emphasize more on the idenification of specific methodology in assessing banks' stability.

Table 12 Performance Comparison of Liquidity risk, credit risk and bank stability

Bank Type		Financial crisis	Post financial crisis		
LR-IBs	Observation	52	182		
	Mean	0.0756**	0.157***		
	Mean Rank	43.26**	160.32***		
	Sum of Ranks	2250	29179.5		
LR-CBs	No. of Observation	52	182		
	Mean	0.2716	0.2874		
	Mean Rank	61.73	204.67		
	Sum of Ranks	3210	37250.5		
CR-IBs	Observation	52	182		
	Mean	-0.2451	0.0783		
	Mean Rank	49.08	174.13		
	Sum of Ranks	2552	31691		
CR-CBs	Observation	52	182		
	Mean	0.0597	0.273		
	Mean Rank	55.92	190.87		
	Sum of Ranks	2908	34739		
Stability-IBs		Financial Crises		Post Financial Crisis	
		Z-score	DD	Z-score	DD
	Observation	50	30	182	105
	Mean	3.815	3.141**	3.4	3.191

	Mean Rank	48.82	34.9**	146.97	104.48
	Sum of Ranks	2441	1047	26749	10970
Stability-CBs	Observation	51	30	182	105
	Mean	3.914	3.035	4.152***	3.216
	Mean Rank	53.14	26.1	218.03***	106.52
	Sum of Ranks	2710	783	39681	11185

This table explain the performance of both CBs and IBs in terms of liquidity risk, credit risk and bank stability. Again we subdivided the time period into financial crisis period from2007 to 2008 and post financial crisis period from 2009 to 2015. We applied Mann-Whitney U test in order to check the performance and test the relevant hypothesis.

*** indicates the statistical significance at 1%.

 ** indicates the statistical significance at 5%.

  * indicates the statistical significance at 10%

5. Robustness checks.

We follow two stage robustness checks. Firstly, we eliminate the GDP from our control variables in order to check the relationship between bank specific variables. Secondly, we apply random effect GLS approach (Mollah and Zaman, 2015) to further check the validity of our results. This method is used if the differences across different variables have influence on the dependent variable. Furthermore, we also perform same task using the robust standard error (Beck et al, 2013) for which the tables are not reported due to brevity of space. As expected, the results of these robustness tests further validate our main findings that there is negative relationship between liquidity risk and credit risk.

Table 13 GLS Random effect

Liquidity risk and credit risk relationship				
Regression Analysis- GLS				
		Financial crisis period		Post financial crisis period
LR-All Banks				
	CR	0.01557	0.00840	-0.00044	-0.00736
	ROA		-0.03617		0.001232
	ER		-7.12E-06		0.000473
	LG		-5.2E-05		-0.00135
	AG		-0.0011		-0.00213
LR-CBs				
	CR	-0.0654	-0.07145	-0.1116 ***	-0.106 ***
	ROA		-0.02136		-0.0341
	ER		1.54E-05		.00416**
	LG		-0.00524		.00782***
	AG		0.004913		0.00020
LR-IBs				
	CR	-0.0495	-.055880*	-.03405*	-.04087**
	ROA		-.047266*		-0.00144
	ER		-0.00211		-0.00062
	LG		0.000073		-0.0009
	AG		-0.00015		0.00105

The table show the result of regression analysis using GLS for the period of 2007 to 2015 which is further divided into financial crisis period (2007-2008) and post financial crisis period (2009-2015).Moreover, ROA, efficiency ratio(ER), loan growth (LG) and asset growth (AG) are the control variables.

*** indicates the statistical significance at 1%.

** indicates the statistical significance at 5%.

* indicates the statistical significance at 10%

Table 14 GLS Random effect

Credit risk and liquidity risk relationship

Regression Analysis- GLS

		Financial crisis period		Post financial crisis period	
CR-All Banks					
	LR	.098970	.0711016	.00911	-.03334
	ROA		-.0438436		.0440
	ER		-.0002103		-.0016
	LG		.00021		-.0031
	AG		-.0017318		-.0080
CR-CBs					
	LR	-.25896	-.2963255	-.5823***	-.6306***
	ROA		-.0112075		-.6306
	ER		-.0000602		-.0008
	LG		-.0043653		.0075
	AG		-.0032616		-.0144
CR-IBs					
	LR	-.4231	-.5326	-.6029*	-.7713**
	ROA		-.1011		.0188
	ER		-.0008		-.0009
	LG		.0008		-.0053
	AG		-.0017		-.0084

The table show the result of regression analysis using GLS for the period of 2007 to 2015 which is further divided into financial crisis period (2007-2008) and post financial crisis period (2009-2015).Moreover, ROA, efficiency ratio(ER), loan growth (LG), asset growth (AG) and GDP are the control variables.

*** indicates the statistical significance at 1%.

 ** indicates the statistical significance at 5%.

  * indicates the statistical significance at 10%

6. Conclusions and policy implications

Liquidity and credit risks are the most important types of banking risks. We investigate the relationship between liquidity risk and credit risk in IBs. Moreover, we examine the impact of liquidity risk on bank stability and also compare the performance of IBs and CBs with respect to liquidity, credit risk and bank stability. We find a negative relationship of liquidity and credit risk during financial crisis period for IBs but find negative relationship between liquidity and credit risk during post financial crisis not only in IBs but also in CBs. This relationship could be due to high or low credit/liquidity risk in banks.

On the other hand, the negative relationship of these risks in IBs could also be due to governance mechanism and Islamic banking customer's behavior. IBs have multi-layer governance structure including Sharia Supervisory Board that makes sure all the activities to be compliant with Sharia.

Moreover, we find a positive relationship between liquidity risk and bank stability for CBs during post financial crisis period, while IBs have negative relationship between liquidity risk and stability both during financial crisis and post financial crisis periods using z-score. But, after employing the DOD variable as a measure of bank stability, we find this negative relationship only in post financial crisis period. IBs generally have lower liquidity risk resulting in higher stability of the IBs. Lower liquidity risk might initially improves the stability, but the bank management will start taking risk, to increase profitability, which offsets the initial positive impact and increases bank instability. Additionally, we also find that IBs performance are better compared to CBs in terms of both, credit and liquidity risk while CBs are found to be more stable. We perform some robustness tests using different method which further supported our results.

Our results have several implications. There is great amount of theoretical and empirical literature dealing with the theoretical and practical aspects of IBs but very limited studies focus on risk management structure in IBs. To the best our knowledge, our study is the first to investigate

and study such relationship in IBs, so this study has value additive contribution to very limited existing literature in this field.

In addition, study also has some recommendation for risk managers in banks and regulators. The risk management unit of the bank should jointly work not only to minimize the default risk but also enhance the overall performance of the bank. Additionally, Islamic financial institution should also launch Research & development programs (R&Ds) to develop Islamic financial markets to park excess liquidity. On the other hand, regulators should carefully consider our findings in the formation of liquidity and credit risk management policy for IBs as they are exposed to such risks from different channels as compared to conventional banking system.

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Essay 2:

A Bibliometric Review of Takaful Literature

A Bibliometric Review of Takaful Literature[2]

Abstract

Takaful represents a growing financial segment addressing the insurance needs of Islamic societies and economies. Nonetheless, only recently the related literature achieved a significant number of contributions. Therefore, it has not been yet explored how research streams are evolving, where gaps in academic knowledge are, as well as which papers, authors and journals are more influential in this field.

We provide a thorough analysis of existing contributions on *Takaful*, by adopting a meta-literature methodology that encompasses both a bibliometric (quantitative) and content (qualitative) analysis. By reviewing 65 articles, we aim at providing a rigorous background for the Islamic finance industry, its societies and economies, academic research and policymakers.

We identify and review three leading research streams on *Takaful*: its overview, growth paths and models; governance mechanism; products/services and customer perception. We also identify the leading academic institutions, countries, journals, in this literature, as well as authors, their co-authorship networks and their role in these streams. Finally, we derive and summarize 16 leading future research questions based on meta-literature review.

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[2] *Received the best paper award at ADEIMF annual conference, September 13 14, 2019 Turin (Italy).*

1.Introduction

Over the last three decades, Islamic finance has grown exponentially, reaching total assets of $2.05 trillion in 2017 and becoming one of the financial industry mainstreams. *Takaful* (Islamic insurance) is an important yet under-investigated segment of Islamic finance, despite its total contribution of USD 26.1 billion in 2016 (IFSB, 2018). A recent survey (Pew Research, 2017) shows that Muslims are 24% of the world population, or as high as over 1.8billion. With a significant projected population growth and recent regulatory and public awareness reforms, *Takaful* operators have the potential to become major players in the global insurance industry. Right now, they are expected to reach total assets of $40 billion with a compound average growth rate (CAGR) of 13% by 2023 (IFSB, 2018; IMARC, 2018)

The concept of insurance is well-rooted in the Islamic economic system with the aim of promoting welfare and solidarity among all segments of society, through shared responsibility and mutual cooperation. *Takaful* is an alternative way of providing insurance services, compliant to *Shariah* principles, implying the absence of uncertainty, gambling and interest charge.

In this regard, the role of corporate governance is among the most relevant issues in *Takaful*, due to the presence of multi-layer systems. Nevertheless, the relationship between policyholders and *Takaful* operators potentially increase agency issues, due to significant information asymmetries. Among other frequently described challenges there are also its peculiar solvency position, the lack of an effective dedicated reinsurance market, the call for specific expertise and skills from its human resources, as well as its different approach to investments and the role played by *sukuk* markets.

Academic research on *Takaful* is limited, relatively recent but quickly growing (Figure 1).

Figure 1. Number of publications and total global citations on Takaful.
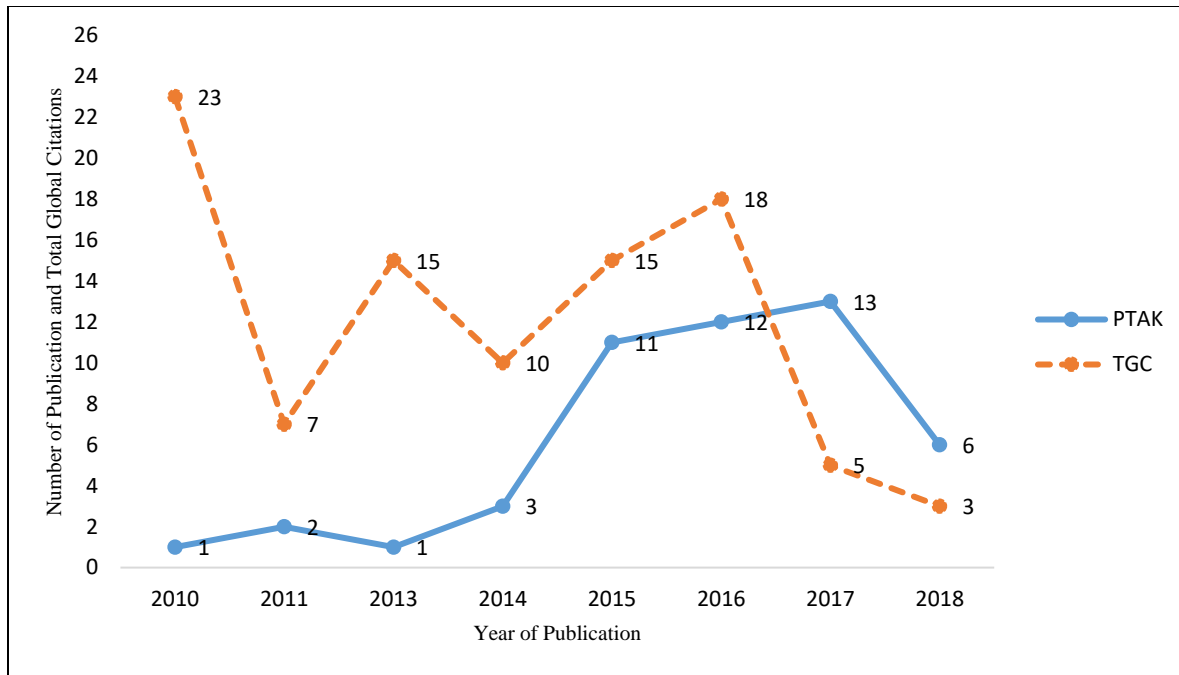
Note: this figure presents the summary of our sample of *Takaful* papers across time, in terms of both the total number of published articles (PTAK) and the total global number of citations (TGC).

The aim of this paper is to carry out a thorough bibliometric review, discussing the main aspects of *Takaful* literature and providing directions for future theoretical and empirical research. We adopt a bibliometric meta-analysis, with data visualization techniques coupled with content analysis (Alon et al., 2018).

So far, only one study specifically analyses existing literature on Islamic insurance (Sadeghi, 2010) through a traditional review, focusing on the evolution and growth of the *Takaful* market, the nature of *Takaful* and the comparison of *Takaful* with conventional insurance.

Our meta-literature review is different in the following ways. Firstly, we analyze 65 articles up to 2019, through a novel quali-quantitative approach (bibliometric citation analysis and content analysis). Secondly, we apply citation, co-citation, co-authorship and cartography analysis through HistCite and VOSviewer software. Thirdly, we examine two extensive datasets: 49 articles from ISI Web of Knowledge (ISI WOK) published over the period 1950-2018 for bibliometric analysis

and additional 16 influential articles and working papers published in 2019 to present outside this reference source for content analysis.

This study has multiple findings. Firstly, we present the influential aspects of *Takaful* literature in terms of countries, institutions, authors, top journals and articles/topics. Secondly, we identify the most relevant research streams: (1) *Takaful* overview, growth and models; (2) governance mechanism of *Takaful* market; (3) *Takaful* products/services and customer perception. Then, we discuss each stream after representing it through a cartographic analysis, encompassing co-authorship networks. Finally, the meta-literature review allows us to identify suggestions for future research on this topic.
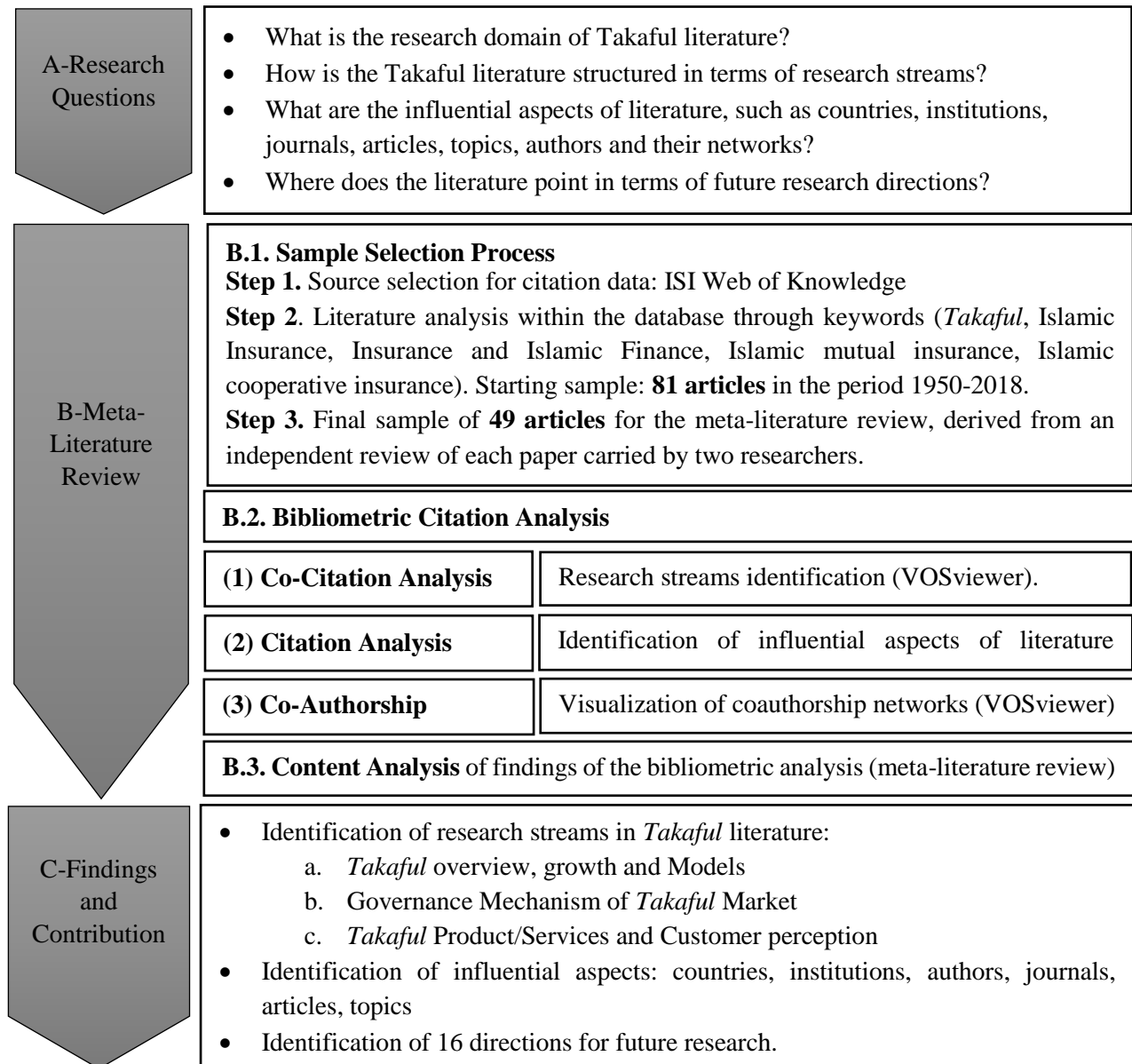
The remainder of this paper is structured as follows. Section 2 reviews our methodological approach. Section 3 presents the main results of the co-citation and content analysis, especially discussed thoroughly the leading research streams in *Takaful*. Section 4 presents our findings on future research streams and, finally, Section 5 concludes our paper.

2. Methods

In social sciences, methodologies such as the bibliometric analysis (quantitative) and the content analysis (qualitative) are becoming increasingly used by scholars (Zamore, Djan, Alon, and Hobdari, 2018). By contrast, they are still in their infancy in finance (see, for example, Zamore et al., 2018; Helbing, 2018).

In this study, we perform a meta-literature review that consists of both a bibliometric analysis and content analysis of 65 articles up to 2019 on *Takaful*. The structure of our methodological process is summarized in Figure 2 and illustrated in the following paragraphs.

Figure 2. Methodology

A-Research Questions	• What is the research domain of Takaful literature? • How is the Takaful literature structured in terms of research streams? • What are the influential aspects of literature, such as countries, institutions, journals, articles, topics, authors and their networks? • Where does the literature point in terms of future research directions?
B-Meta-Literature Review	**B.1. Sample Selection Process** **Step 1.** Source selection for citation data: ISI Web of Knowledge **Step 2**. Literature analysis within the database through keywords (*Takaful*, Islamic Insurance, Insurance and Islamic Finance, Islamic mutual insurance, Islamic cooperative insurance). Starting sample: **81 articles** in the period 1950-2018. **Step 3.** Final sample of **49 articles** for the meta-literature review, derived from an independent review of each paper carried by two researchers.

B-Meta-Literature Review	**B.2. Bibliometric Citation Analysis**	
	(1) Co-Citation Analysis	Research streams identification (VOSviewer).
	(2) Citation Analysis	Identification of influential aspects of literature
	(3) Co-Authorship	Visualization of coauthorship networks (VOSviewer)
	B.3. Content Analysis of findings of the bibliometric analysis (meta-literature review)	

C-Findings and Contribution	• Identification of research streams in *Takaful* literature:
	    a. *Takaful* overview, growth and Models
	    b. Governance Mechanism of *Takaful* Market
	    c. *Takaful* Product/Services and Customer perception
	• Identification of influential aspects: countries, institutions, authors, journals, articles, topics
	• Identification of 16 directions for future research.

2.1 Sample selection process

We adopt the research protocol in meta-literature analysis proposed by Apriliyanti and Alon (2017) by following three steps in the selection of investigated research papers.

Firstly, we collect papers and citation data from the ISI – Web of Knowledge database, representing a significant source of high-quality research with citation data dating back to 1950. We limit our selection to year-end 2018.

Then, we select the keywords able to analyze and discriminate papers within our sample. The most effective terms (i.e.: including most papers in the selection process), with decreasing ability in identifying papers potentially material for our sample, are: "Takaful", "Islamic insurance", "Insurance and Islamic finance", "Islamic mutual insurance", "Islamic cooperative insurance". This search yields 81 articles, with the first paper being published in 2010.

The final step is represented by a cursory examination of each paper, conducted independently by two researchers, to confirm or reject its relevance within the field of *Takaful* research. Inclusion or exclusion is contingent on an explicit address of the topic within the contribution (Zott et al., 2011). Altogether, the final sample built through these steps consists of 49 articles, published from 2010 to 2018.

2.2 Meta-literature review

The meta-literature review consists both on a bibliometric (quantitative) and content (qualitative) analysis. Price (1965) introduces the bibliometric analysis to identify relationships between articles based on citations (Kim and McMillan, 2008). In Downe-Wamboldt (2017, p. 314) one can find the definition of the content analysis: "a research method that provides a systematic and objective means to make valid inferences from verbal, visual, or written data in order to describe and quantify specific phenomena".

Within this methodological framework, we apply the following four analyses attributable to the meta-literature analysis on *Takaful*: (1) a bibliometric co-citation analysis; (2) a bibliometric citation analysis, (3) a bibliometric co-authorship analysis, and (4) a content analysis.

Consistently with Van Eck and Waltman (2014), we use HistCite and VOSviewer software to perform the bibliometric analysis.

The prominent variables in the bibliometric analysis follow the HistCite - Glossary (2018): (1) Total number of publications on Takaful in the literature (P_{TAK}); (2) Total global citations (TGC), representing the number of citations received by each article within ISI – Web of Knowledge; (3)

Total local citations (TLC), representing the number of citations received by each article by other contributions in our sample; (4) Average global citations per year (TGC/t);

(5) Average local citations per year (TLC/t).

As a first step, the bibliometric co-citation analysis is carried through VOSviewer and allows us to identify three leading research streams, as in Alon et al., 2018. Figure 3 illustrates this result, as well as connections across contributions. The concept of co-citation refers to the frequency with which two articles are cited together and, therefore, implies a strong connection between them (Small, 1973; Zupic and Čater, 2015).

In the second stage, we identify influential aspects of the literature in terms of bibliometric citation through HistCite. We classify contributions in terms of institutions (Table 2), countries (Table 3), journals (Table 4), authors (Table 5 and Figure 4), and articles (Table 6). This process is conducted consistently with Øyna and Alon (2018) and Iddy and Alon (2019).

In the third stage, we present the authorship network in the literature on *Takaful* through a bibliometric co-authorship citation analysis (see Table 4 and Figure 4) by using VOSviewer software (Piette and Ross, 1992).

Finally, we coupled bibliometric analysis with content analysis, following a more traditional approach of articles review (Bahoo et al., 2018; Gaur and Kumar, 2018). We content analyzed 65 articles, including 49 articles from ISI WOK up to 2018, plus 16 influential articles and working papers published in 2019 to draw our conclusions and suggestions for future research on *Takaful*.

3. Results of co-citation analysis: identification and review of Takaful research streams

We identify citation mapping by using VOSviewer software by following Iddy and Alon (2019). VOSviewer provides a visual representation of networks of articles that is based on co-citations, and clusters them into leading research streams identified by different colors.

Our results reveal that the *Takaful* literature is mainly organized in three clusters (Figure 3). To label these streams, we content analyze each paper. The resulting identification leads to the following denomination: (1) Takaful overview, growth and Models; (2) Governance Mechanism of Takaful Market; (3) Takaful Product/Services and Customer perception.

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Figure 3. Research streams on *Takaful* identified through the co-citation analysis.
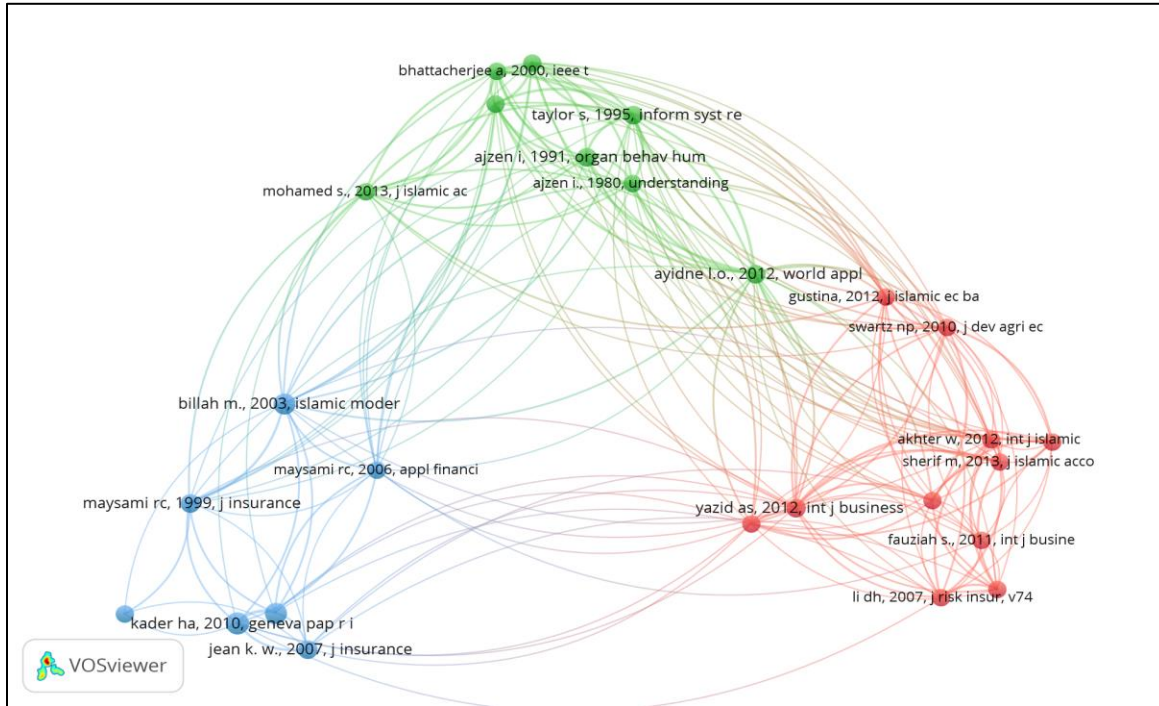
Note: this figure presents the result of the research streams identification process, labeled through the content analysis. Each point represents one contribution (author, year and journal) and links represent citation patterns. The three main streams are *Takaful* overview, growth and models (in Blue), Governance mechanism of *Takaful* (in Red), *Takaful* Products/Services and Customer perception (in Green).

In the following paragraphs we review the main contents of *Takaful* literature as emerging from these three research streams. Table 1 presents the list of main papers discussed in these streams.

Table 1. Key papers and databases.

Author/s Name	Year	Name Article	Name of Journal	Database	Nature of Paper
Abdul Kader et al	2010	The Cost Efficiency of Takaful Insurance Companies	The Geneva Papers on Risk and Insurance - Issues and Practice	World Islamic Insurance Directory	Empirical
Siala	2013	Religious influences on consumers' high-involvement purchasing decisions	Journal of Services Marketing	Questioner Based Data	Empirical
Md Husin et al	2016c	The roles of mass media, word of mouth and subjective norm in family takaful purchase intention	Journal of Islamic Marketing	Questioner Based Data	Empirical

Author/s Name	Year	Name Article	Name of Journal	Database	Nature of Paper
Md Husin and Ab Rahman	2016a	Do Muslims intend to participate in Islamic insurance?: Analysis from theory of planned behavior	Journal of Islamic Accounting and Business Research	Questioner Based Data	Empirical
Naifar	2014	Credit Default Sharing Instead of Credit Default Swaps: Toward a More Sustainable Financial System	Journal of Economic Issues		Theoretical
Masud	2011	Takaful: An innovative approach to insurance and Islamic Finance	University of Pennsylvania Journal of International Law		Theoretical
Abdul Kader et al	2014	Cost efficiency and board composition under different takaful insurance business models	International Review of Financial Analysis	World Islamic Insurance Directory	Empirical
Md Husin and Ab Rahman	2016b	Predicting intention to participate in family takaful scheme using decomposed theory of planned behaviour	International Journal of Social Economics	Questioner Based Data	Empirical
Sherif and Hussnain	2017	Family Takaful in developing countries: the case of Middle East and North Africa (MENA)	International Journal of Islamic and Middle Eastern Finance and Management	Annual reports of Takaful	Empirical
Boulanouar and Alqahtani	2016	IPO underpricing in the insurance industry and the effect of Sharia compliance: Evidence from Saudi Arabian market	International Journal of Islamic and Middle Eastern Finance and Management	DataStream, Thomson Banker and the Saudi Stock Exchange	Empirical
Noor and Abd Rahman	2016	Cooperative Takaful for Non-Banking Financial Institutions: Islamization of SOCSO in the case of Malaysia	Intellectual Discourse		Theoretical
Ustaoglu	2015	Public Awareness, Understanding and Attitudes towards Interest-free Insurance (Takaful) Services Evaluation by Education Level: Survey Based on Empirical Analysis for Turkey	Journal of Asian and African Studies	Questioner Based Data	Empirical
Karbhari et al	2018	Governance mechanisms and efficiency: Evidence from an alternative insurance (Takaful) market	Journal of International Financial Markets, Institutions and Money	World Islamic Insurance Directories	
Akhter et al	2017	A comparison of Islamic and conventional insurance demand: Worldwide evidence during the Global Financial Crisis	Research in International Business and Finance	Swiss Re Sigma Reports, World Takaful Conference and Ernst & Young Takaful Reports and WDI.	Empirical
Mokhtar et al	2017	Corporate demand for general takāful in Malaysia	ISRA International Journal of Islamic Finance	Questioner Based Data	Empirical
Al-Amri	2015	Takaful insurance efficiency in the GCC countries	Humanomics	World Islamic Insurance Directory	Empirical
Khan	2015	Optimal incentives for takaful (Islamic insurance) operators	Journal of Economic Behavior & Organization		Theoretical
Abdul Wahab et al	2007	Islamic Takaful: Business Models, Shariah Concerns, and Proposed Solutions	Thunderbird International Business Review		Theoretical
Abu Kasim	2012	Disclosure of Shariah compliance by Malaysian takaful companies	Journal of Islamic Accounting and Business Research		Theoretical

Author/s Name	Year	Name Article	Name of Journal	Database	Nature of Paper
Akther and Hussain	2012	Takaful standards and customer perceptions affecting takaful practices in Pakistan: a survey	International Journal of Islamic and Middle Eastern Finance and Management	Questioner Based Data	Empirical
Alshammari et al	2019	The impact of competition on cost efficiency of insurance and takaful sectors: Evidence from GCC markets based on the Stochastic Frontier Analysis	Research in International Business and Finance	DataStream and annual reports	Empirical
Asafa and Smith	2019	Consumer Protection in Takaful, Kuala Lumpur, Malaysia	Islamic Financial Services Board		Theoretical
Ayub	2007	Takaful: An Alternative to Conventional Insurance. In: Understanding Islamic Finance	Book chapter from the book Understanding Islamic Finance John Wiley and Sons Ltd		Theoretical
Baharin and Isa	2013	The Efficiency of Life Insurance and Family Takaful in Malaysia: Relative Efficiency Using the Stochastic Cost Frontier Analysis	AIP Conference Proceedings	Annual Reports	Empirical
Billah	1998	Islamic Insurance: Its Origins and Development	Arab Law Quarterly		Theoretical
Coolen-Maturi	2013	Islamic insurance (takaful): demand and supply in the UK	International Journal of Islamic and Middle Eastern Finance and Management		Theoretical
Gustina and Abdullah	2012	Analysis of Demand for Family Takaful and Life Insurance: A Comparative Study in Malaysia	Journal of Islamic Economics, Banking and Finance	Annual Reports	Empirical
Kamil and Nor	2014	Factors influencing the choice of Takaful over conventional insurance: the case of Malaysia	Journal of Islamic Finance	Interviews of takaful operators	Theoretical
Kwon	2007	Islamic Principle and Takaful Insurance: Re-evaluation	Journal of Insurance Regulation		Theoretical
Matsawali	2012	A Study on Takaful and Conventional Insurance Preferences: The Case of Brunei	International Journal of Business and Social Science	Questioner Based Data	Empirical
Maysami and Kwon	1999	An analysis of Islamic Takaful insurance; A cooperative insurance mechanism.	Journal of Insurance Regulation		Theoretical
Maysamia and Williams	2006	Evidence on the relationship between Takaful insurance and fundamental perception of Islamic principles	Applied Financial Economics Letters		Theoretical
Redzuan et al	2009	Economic Determinants of Family Takaful Consumption: Evidence From Malaysia	International Review of Business Research Papers	Central Bank of Malaysia	Empirical
Sherif and Shaairi	2013	Determinants of demand on family Takaful in Malaysia	Journal of Islamic Accounting and Business Research	Central Bank of Malaysia, International Financial Statistics (IFS)	Empirical
Yazid et al	2012	Determinants of Family Takaful (Islamic Life Insurance) Demand: A Conceptual Framework for a Malaysian Study	International Journal of Business and Management		Theoretical

3.1 Review of research streams: Takaful overview, growth and models

The leading research stream in terms of numerosity within our literature sample is represented by the description of *Takaful*, the analysis of its business models and its growth.

Frequently, papers discuss the role of insurance within Islamic finance, since it does not comply with Islamic principles, in spite of not being entirely excluded that actions taken in order to reduce losses are legitimate (Maysami and Kwon, 1999; Maysamia and Williams, 2006), as a form of mutual aid. However, it requires fully-shared responsibility across participants and discourage wealth maximization (Masud, 2011).

The vast majority of the literature recalls that, for this reason, conventional insurance violates the principles of *gharar* (uncertainty is managed asymmetrically), *maisir/qimar* (gambling and speculation when gains of one party are contingent on losses of the other), *riba* (interest-bearing exposures) (Alshammari, et al., 2019; Akhter, et al., 2017; Coolen-Maturi, 2013; Abdul Wahab , et al., 2007; Ayub, 2007).

Defining *Takaful* is frequently discussed by the literature (Ayub, 2007; Billah, 1998). Its etymology is linked to the Arabic word *"kafl",* meaning guaranteeing, securing and taking care of one's need. While the simplest form of *Takaful* is very close to mutuality across participants to a risk-pooling mechanism, the first juridical definition is found in the Malaysian Takaful Act (1984): *"A scheme based on brotherhood, solidarity and mutual assistance which provides for mutual financial aid and assistance to the participants in case of need whereby the participants mutually agree to contribute for that purpose".*

More recently, AAOIFI (2015) defines it as: *"A process of agreement among a group of persons to handle the injuries resulting from specific risks to which all of them are vulnerable. A process, thus initiated, involves payment of contributions as donations, and leads to the establishment of an insurance fund that enjoys the status of a legal entity and has independent financial liability".*

The contractual nature of *Takaful* involves two Islamic concepts: *tabarru*, that means voluntary donation or contribution (Abdul Wahab , et al., 2007) and *waqf,* which refers to endowment and retention of property/wealth for a specific purpose (Ayub, 2007). Contracts are also typically separated between family (life) and general (property/casualty or non-life) *Takaful* (Ayub, 2007).

The definition also includes discussion of business models that provide *Takaful* products and services. The risk-pooling process is managed by a *Takaful* Operator (TO), entitled to charge fees

or commissions for its services. Despite several variations across countries, most references point towards the *mudarabah* and the *wakalah* models (Abdul Kader, et al., 2014; Masud, 2011; Abdul Wahab , et al., 2007).

Mudarabah is a partnership-based contract where one party provides capital and the second participates with skills, at a pre-determined sharing ratio (f.i. 60-40% or 50-50%) (Ibrahim and Ali, 2015; Ayub, 2007; Abdul Wahab , et al., 2007))). Figure 4 presents this mechanism.

Figure 4: Mudharabah model adapted from Abdul Wahab et al., 2007.
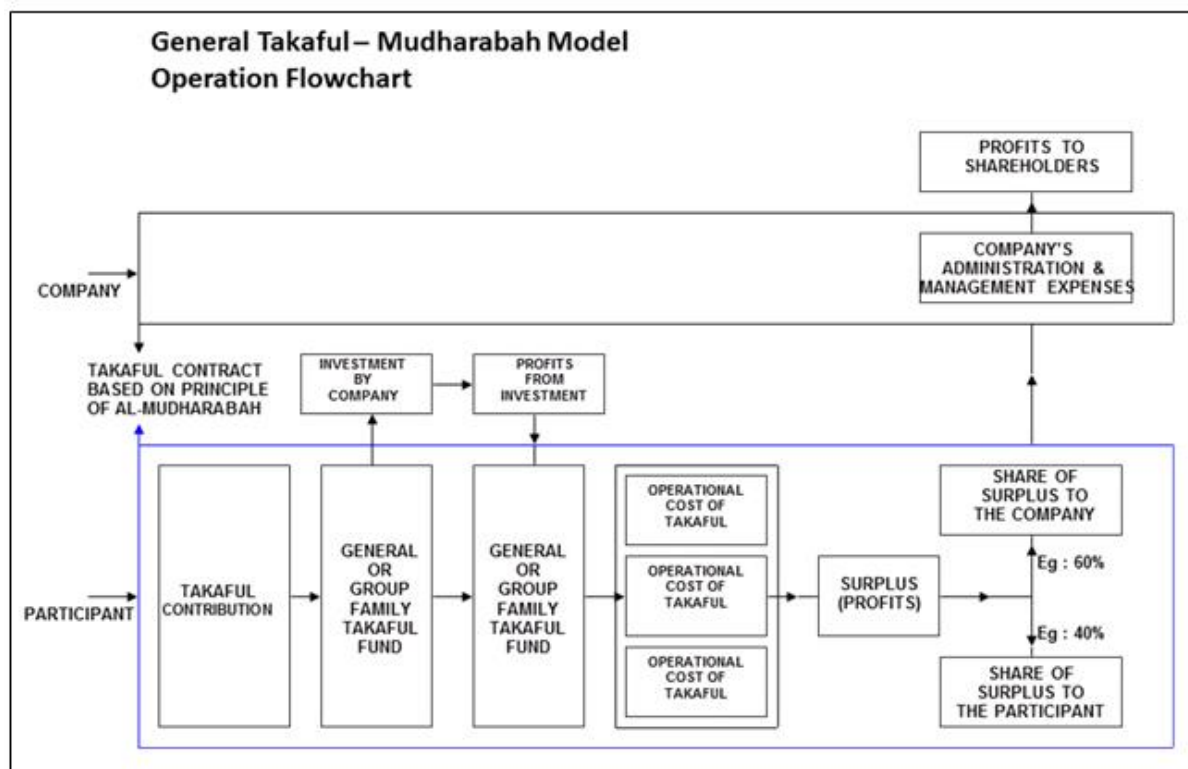
Wakalah resembles a conventional principal-agent contract, where the TO acts as agent on behalf of policyholders, receiving a pre-defined fee/commission for the managing effort (Swartz and Coetzer, 2010; Abdul Wahab et al., 2007). Figure 5 illustrates this model.

Figure 5: Wakalah model adapted from Abdul Wahab et al., 2007
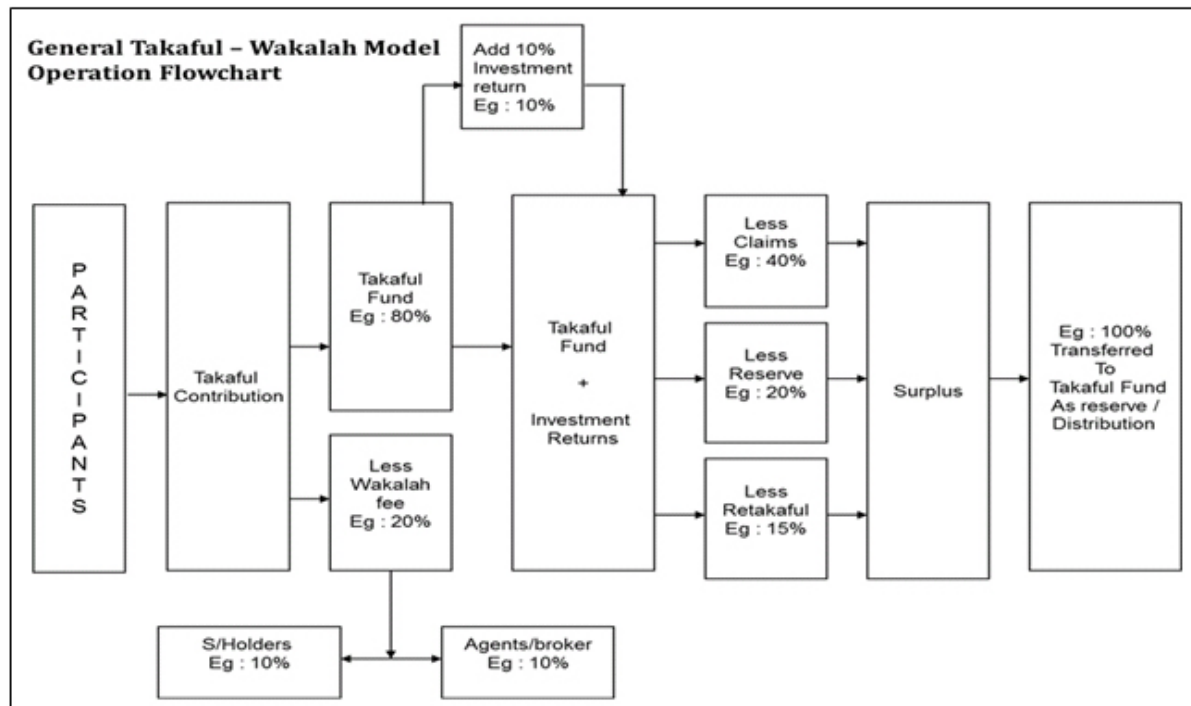
The growth and performance of the Takaful industry are also frequently discussed within this stream, as the first examples date back only to 1979, in Sudan and Saudi Arabia (Alshammari, et al., 2018; Lewis, 2015). The most recent cross-country data (IFSB, 2018) shows an increasing pace of growth (12.5% globally, or around 26 billion USD, in 2016, with Takaful operators growing from 100-150 to 330 in just a decade). However, it is highly concentrated: Saudi Arabia (38%), Iran (34%), Malaysia (7%) and UAE (6%) represent 86% of the global market. Compared to the usual growth pattern shown by conventional insurance, that sees non-life (marine) risks covered first and life insurance later, general *Takaful* dominates in GCC (93%) and MENA (non-GCC, 86%), while family *Takaful* leads in South East Asia-Pacific (74%) and South Asia (58%).

Finally, a growing number of theoretical and especially empirical papers deals with the comparison between *Takaful* and conventional insurance (Masud, 2011; Sadeghi, 2010; Kwon, 2007). Masud (2011) identifies five specific fundamentals of *Takaful*: (1) mutuality and risk-sharing (Kwon, 2007; Maysamia and Williams, 2006; Billah, 1998); (2) ownership of funds remains with the participant; (3) the elimination of uncertainty (*gharar*); (4) the role of *mudharabah* profit sharing or *wakalah* fees in defining profitability; (5) limitations to eligible investments.

3.2 Review of research streams: Governance mechanism of Takaful market

The role of corporate governance (CG) appears crucial in *Takaful*, as documented by our second research stream.

Within the context of business models, the relationship between policyholders and *Takaful* operators make the agency issue more complex, since the former do not have any direct or indirect role in designing contracts. In the same direction, Asafa and Smith (2019) identify the issues and challenges faced by policyholders with reference to asymmetric information and in assessing price and quality of products. Furthermore, they suggest that part of current practices may diverge from the required structure of Islamic insurance and, through maximization of own benefits, they may convey reputational damage to the *Takaful* market.

Takaful operators have multi-layers governance structure. In addition to the traditional Board of Directors (BODs), the *Shariah* Supervisory Board (SSB), along with a *Shariah* Auditing Committee, monitor and approve operations assuring compliance to Islamic principles. This role involves also guidance to management on governance, product design and enforcement of contracts: in case of violation, the whole transaction is turned to charity and kept separated from other activities.

CG in *Takaful* is the focus of few studies. Karbhari et al. (2018) study the impact of CG on efficiency in *Takaful* for 21 countries, finding several managerial and operational inefficiencies. More specifically, they report that CEO/chair duality significantly improves both technical and scale efficiencies, while SSB has a positive impact only on scale efficiency. Surprisingly, the impact of audit committees remains insignificant across all efficiency level. Abdul Kader et al. (2014:2010) report similar findings but with no impact of SSB on efficiency.

Alshammari et al. (2019) test the quiet life hypothesis, while studying the impact of competition on the comparative cost efficiency of conventional insurance and *Takaful* in GCC countries. The quiet life hypothesis suggests that managers in a less competitive market may not use their full efforts to maximize the profitability of the firm and enjoy a "quiet life". Authors posit that competition has a positive relationship with cost efficiency in the GCC insurance market, including *Takaful*. However, the results vary across business models, with a negative relationship of the competition-efficiency nexus for conventional insurance and positive for *Takaful*.

Transparency in financial disclosures also plays a vital role in stengthening CG, since it reduces information asymmetry among stakeholders (Armstrong, et al., 2016) and increases their confidence towards firms' operations. In a similar context, Akther and Hussain (2012) identify the lack of transparency in reporting standards and internal control for *Takaful* in Pakistan. They argue that *Takaful* is following the same reporting standards as conventional insurance. Similarly, Abu Kasim (2012) finds the SSB disclosure to be fully in conformity with supervisor's guidelines; however, it seems that instead of following the essence of disclosure practices, it is driven by a simple compliance to rules. Moreover, the role of SSB is also constrained in Malaysian *Takaful*: being hired part-time, they do not participate to every stage of product development. This is also further evidenced by Boulanouar and Alqahtani (2016), who do not find any effect of *Shariah* compliance on the underpricing of *Takaful*, which is probably due to underwriters not considering the Shariah status of *Takaful* firms.

Albeit *Takaful* and conventional insurance share some features, the former is more prone to agency problems due to a more complex product design and contractual relationship. Khan (2015) proposes a modified agency theory in the context of *Takaful*, arguing that if incentives should include surplus-sharing, this might not be optimal for *mudarabah* models. Furthermore, a *wakalah* hybrid model is suggested, since it encourages the *Takaful* operator to increase the pool of funds and reduces the risk for the policyholder. Moreover, Kallamu and Saat (2015) empirically support the agency theory by finding that an independent auditing committee enhances the profitability of *Takaful* firms, while the dual role of directors in auditing and nomination committees reduce it. They also argue that an independent director efficiently monitors management and restricts a potential opportunistic behavior.

3.3 Review of research streams: Takaful Product/Services and Customer perception

This stream of literature studies products and services offered by *Takaful*, focusing on customers' perceptions (Akther and Hussain, 2012; Swartz and Coetzer, 2010), corporate demand (Gustina and Abdullah, 2012; Coolen-Maturi, 2013; Mokhtar et al., 2017; Akhter et al., 2017), customer preferences among Takaful and conventional insurance (Matsawali et al., 2012; Kamil and Nor, 2014), economic determinant (Redzuan et al., 2009; Sherif and Shaairi, 2013; Yazid et al., 2012).

Notwithstanding its growth, *Takaful* still shows very low penetration levels if compared to the insurance industry, also when focusing on several Muslim countries only. It seems that a leading role is played by a lack of customers awareness. Maysami and Williams (2006) argue that a large segment of the Muslim population surprisingly ignores *Takaful*, requiring significant investments in awareness campaigns. Furthermore, Muslims with more conservative beliefs are reluctant towards *Takaful*, not being entirely assured about its compliance with *Shariah* requirements. Akther and Hussain (2012) conduct a survey on customers' loyalty and perception in Pakistan, concluding that 91% of respondents do not know *Takaful*. Swartz and Coetzer (2010), with similar findings, also emphasize on launching awareness programs for both customers but also for agents and similar market players.

Gustina and Abdullah (2012) analyze the determinants for the demand of family *Takaful* and life insurance in the Malaysian market for the period of 1990-2009, finding that religion, education, savings and GDP per capita are the main drivers. They argue that a higher acceptance rate of family *Takaful* over life insurance is associated to the religious and cultural background of the overall insurance market and channeling of pooled funds towards ethical and socially responsible directions.

The demand for corporate *Takaful* is relatively low in Malaysia: despite a fundamental awareness, the value proposition and a better product offer and efficiency of services outperform *Shariah* compliance (Mokhtar, et al., 2017). A positive association between knowledge of *Takaful* and adoption in Malaysia from both agents and customers is found by Kamil and Nor (2014). However, Matsawali et al. (2012) report that people in Brunei, despite their lack of *Takaful* knowledge, still prefer it. With the same motive, Coolen-Maturi (2013) suggests to offer *Takaful* through the banking channel in the UK market, arguing that people are willing to buy provided that they offer better or similar benefits with competitive prices.

We identify another stream of literature on the acceptance and adoption of *Takaful* from the perspective of the Theory of Planned Behavior (TPB). Extending the theory of reasoned actions, it predicts the intention of behavioral engagement towards a specific action at a specific time and place (Ajzen, 1991). The preliminary studies of Md Husin and Ab Rahman (2016a; 2016b; 2016c) find variations in the individual intention to participate in family *Takaful*. Individual intentions can

be explained by awareness, knowledge, perceived behavioral control, attitude and exposure towards *Takaful* practices (Ustaoglu, 2014; Siala, 2013).

Akhter et al. (2017) identify two main drivers of *Takaful* demand: the economic and demographic dynamics of a country. Economics factors include inflation, GDP, savings rate, inflation and income, while demographic variables encompass education quality (including religion), health and urbanization. Authors empirically document that GDP per capita is negatively associated with both *Takaful* and conventional insurance, although the former showed more resilience during the recent financial crises. Moreover, the level of education has a significantly positive impact on *Takaful* only. Redzuan et al. (2009) show similar findings, in particular a negative impact of long term interest rates and composite stock indexes.

Similarly, Sherif and Shaairi (2013:2017) demonstrate that higher income, Islamic banking development, dependency ratios and education increase the demand for *Takaful*. An increase in income renders *Takaful* more accessible; however, it might be indifferent if wealth allows to absorb risks within individual financial portfolios. These findings are consistent with those of Yazid et al. (2012).

3.4 Citation analysis: influential aspects of the Takaful literature

After identifying and discussing the leading research streams, we employ a bibliometric methodology to assess the features of the most influential literature. By using HistCite, we focus on the following variables: countries, institutions, authors, journals, articles and co-authorship networks.

We identify the most influential countries and institutions based on the number of published papers (P_{TAK}), accordingly to Kim and McMillan (2008). Tables 2 and 3 show that research on *Takaful* is not limited to Muslim countries and includes the USA, Australia, and the UK. Nonetheless, the top three institutions are the International Islamic University Malaysia, the University of Malaya, and the International Shariah Research Academy for Islamic Finance, respectively.

Table 2. Ranking of influential institutions and citation metrics on *Takaful*

	Institute	P_{TAK}	% P_{TAK} of total	TLC	TGC
1	International Islamic University Malaysia	12	24.5	1	5
2	University of Malaya	9	18.4	3	14
3	International Shariah Research Academy for Islamic Finance	3	6.1	0	0
4	Universiti Putra Malaysia	3	6.1	0	1
5	Bournemouth University	2	4.1	8	25
6	COMSATS Inst Information Technology	2	4.1	0	0
7	La Trobe University	2	4.1	0	0
8	University of Bath	2	4.1	1	3
9	Universiti Brunei Darussalam	2	4.1	0	0
10	University of Technology Malaysia	2	4.1	3	11

Note: this table presents the breakdown of the leading contributions in our sample of *Takaful* papers by the reference institution, as well as their bibliographic metrics: the number of publications (PTAK) and its relative weight (%PTAK of total), total local citations (TLC) and total global citations (TGC).

Table 3. Ranking of influential countries and citation metrics on *Takaful*

	Country	P_{TAK}	% P_{TAK} of total	TLC	TGC
1	Malaysia	31	63.3	4	20
2	UK	6	12.2	8	39
3	Nigeria	4	8.2	0	1
4	Pakistan	4	8.2	0	0
5	Saudi Arabia	4	8.2	0	5
6	Turkey	3	6.1	1	1
7	Australia	2	4.1	0	0
8	Brunei	2	4.1	0	0
9	USA	2	4.1	1	7

Note: this table presents the breakdown of the leading contributions in our sample of *Takaful* papers by the reference country, as well as their bibliographic metrics: the number of publications (PTAK) and its relative weight (%PTAK of total), total local citations (TLC) and total global citations (TGC).

We also present the list of leading journals, both in terms of number of published papers (P_{TAK}) and their influence, measured by the yearly number of global citations (TGC/t), as in Fetscherin and Heinrich (2015). Results are provided in Table 4. Our results show that leading finance and economics journals are not yet attentive on this particular field.

Table 4. Ranking of productive and influential journals

	Sorted by number of articles published				
	Journal	P_{TAK}	% P_{TAK} of total	TLC/t	TGC/t
1	ISRA-IJIF	4	8.2	0	0
2	JIABR	4	8.2	0.33	1.67
3	IJIMEFM	3	6.1	0	0.83
4	HU	2	4.1	0	0
5	ID	2	4.1	0.33	0.33
6	IJEAS	2	4.1	0	0
7	JIM	2	4.1	0.67	2
8	MEJM	2	4.1	0	0
9	AJBM	1	2	0	0
10	AS	1	2	0	0

	Sorted by global citations per year				
	Journal	P_{TAK}	% P_{TAK} of total	TLC/t	TGC/t
1	GPRIP	1	2	0.78	2.44
2	JSM	1	2	0	2.17
3	JIM	2	4.1	0.67	2
4	JIABR	4	8.2	0.33	1.67
5	IJIMEFM	3	6.1	0	0.83
6	JOE	1	2	0	0.8
7	QRIFM	1	2	0	0.75
8	IJSE	1	2	0	0.67
9	IRFA	1	2	0.2	0.6
10	IJEMA	1	2	0	0.5

Note: the table represents the top 10 journals based on number of articles published (PTAK) and average number of global or local citations per year (TGC/t and TLC/t, respectively). Full details on individual journals are provided in Appendix A1.

Moreover, we identify influential authors, co-authorship networks. Again, we base our ranking on the number of global citations (TGC), as in Kim and McMillan (2008). Leading authors published 39% of the papers in our sample, as shown in Table 5. Further, co-authorship networks (Liu et al., 2005; Piette and Ross, 1992) are graphically presented in Figure 6. The identification of the top influential authors and the network among them is essential for the growth of the field, as a reference for policymakers, regulators, supervisors and prospective researchers.

**Table 5. Ranking of influential authors and co-authorship network**

Ranking of Top Authors	Name of Author	Institution	% P_{TAK} of total	P_{CIB}	TLC	TGC
1	Mike Adams	University of Swansea, UK	2	4.1	8	25
2	Philip Hardwick	University of Bournemouth, UK	2	4.1	8	25
3	Hale Abdul Kader	University of Nottingham, UK	2	4.1	8	25
4	Asmak Ab. Rahman	University of Malaya	4	8.2	3	13
5	Maizaitulaidawati Md Husin	University of Technology Malaysia	4	8.2	3	13
6	Haytham Siala	Roehampton University, London, UK	1	2	0	13
7	Noriszura Ismail	The National University of Malaysia	2	4.1	2	7
8	Hania Masud	University of Pennsylvania, Philadelphia, United States	1	2	0	4
9	Nader Naifar	Al-Imam Muhammad Ibn Saud Islamic University	1	2	0	4

Co-Authorship Network		
Co-Authorship Network in Streams: A=Red, B=Green, C=Blue	Author	Institution
A	Zulkornain Yusop	Universiti Putra Malaysia
A	Alias Radam	Universiti Putra Malaysia
A	Rubayah Yakob	The National University of Malaysia
A	Noriszura Ismail	The National University of Malaysia
B	Ahmad Hidayat Buang	University of Malaya
B	Wan Marhaini Wan Ahmad	University of Malaya
B	Asmak Ab. Rahman	University of Malaya
C	Aziz, Shahab	Universiti Teknologi Malaysia
C	Hussin, Nazimah	Universiti Teknologi Malaysia
C	Maizaitulaidawati Md Husin	University of Technology Malaysia

Note: The table shows the list of the 9 most influential authors publishing on *Takaful* based on total global citations (TGC) and co-authorship networks. Metrics include the relative weight of the number of publications (PTAK), total local (TLC) and global citations (TGC). These top 9 authors published 39% of articles in our sample. The details of authors who formulate a network in figure 6 are presented through the notation "A, B, C", were A refers to *Takaful* overview, growth and models (Blue, above), B to Governance mechanism of *Takaful* (Red, above), C to *Takaful* Products/Services and Customer perception (Green, above).

Figure 6. Co-authorship Network on *Takaful* and research streams
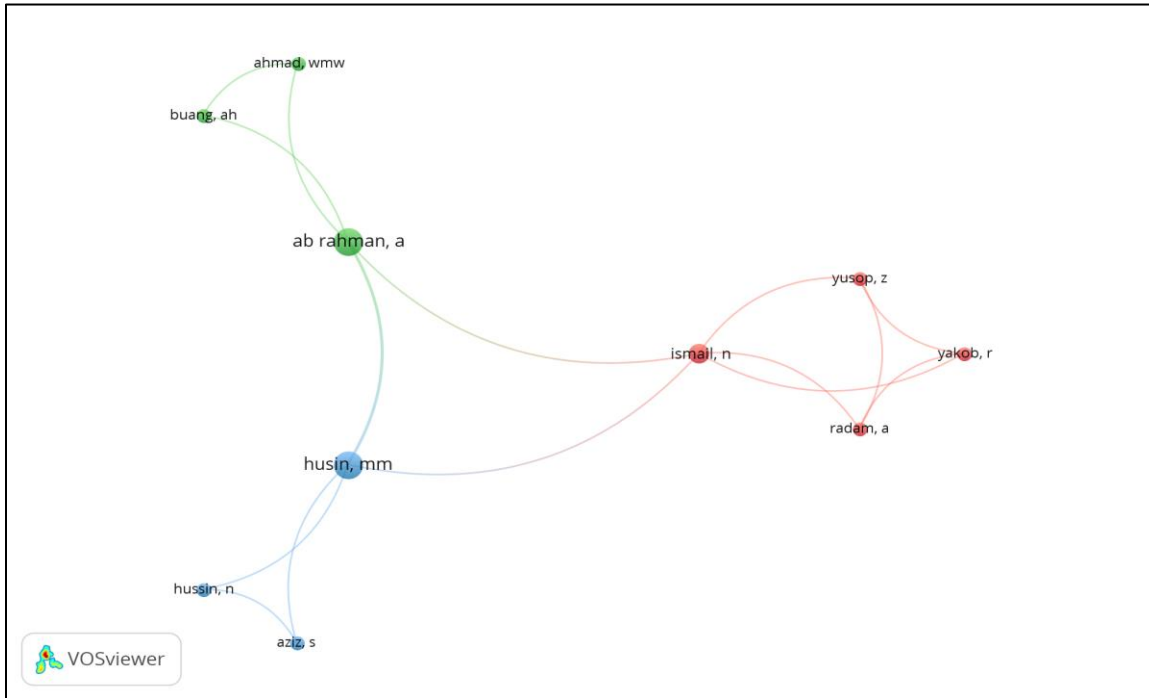
Note: this figure presents the result of the co-authorship identification process, distinguished by research stream. Each point represents one author and links represent co-authorships. The three main streams are *Takaful* overview, growth and models (in Blue), Governance mechanism of *Takaful* (in Red), *Takaful* Products/Services and Customer perception (in Green).

Finally, we present in Table 6 the most influential articles, ranked by the number of their local and global citations (TLC/t and TGC/t), consistently with Apriliyanti and Alon (2017). The main focus of these studies is to investigate the efficiency of *Takaful* firms (Abdul Kader, et al., 2010), the determinants of customer intentions towards purchasing *Takaful* (Md Husin and Ab Rahman, 2016a; Md Husin, et al., 2016c; Ustaoglu, 2014) and *Takaful* for non-banking financial institutions (Noor and Abd Rahman, 2016).

Table 6. List of influential articles

Sorted by TLC/t				
Author(s) and Year	Journal	TLC	TLC/t	TGC
1 Kader, Adams, and Hardwick (2010)	GPRIP	7	0.78	22
2 Husin , Ismail, and Rahman, (2016)	JSM	2	0.67	6
3 Noor and Ab Rahman (2016)	ID	1	0.33	1
4 Husin and Rahman (2016)	JIAB	1	0.33	5
5 Ustaoglu M (2015)	JAFS	1	0.25	3

Sorted by TGC/t				
Author(s) and Year	Journal	TGC	TGC/t	TLC
1 Kader, Adams, and Hardwick (2010)	GPRIP	22	2.44	7
2 Siala (2013)	JSM	13	2.17	0
3 Husin, Ismail, and Rahman (2016)	JSM	6	2.0	2
4 Husin and Rahma (2016)	JIAB	5	1.67	1
5 Naifar (2014)	JEI	4	0.8	0

Note: This table represents the 5 most influential and trending articles/topics based on total yearly local (TLC/t) and global citations (TGC/t). The full details of journals are given in Appendix A.

4. Future Research Directions

The bibliometric review of the literature, complemented by content analysis, allows us to identify several suggestions for future research (Table 7) and to discuss their width and breadth.

Table 7. Future research questions

Research Stream		Future Research Questions	References
Takaful overview, growth and Models	1	What are the similarities/differences in the interpretation of Shariah laws with respect to different school of thoughts and jurisdictions?	Abdul Wahab et al., 2007; Ayub, 2007
	2	What are the steps required to have standardized Shariah supervision and regulatory framework for takaful industry?	Authors' review
	3	Development of financial products for the takaful market.	Authors' review
	4	How do takaful firms invest their financial resources?	
	5	Do takaful activities spur economic growth?	Authors' review
	6	Does institutional environment matter in shaping the beneficial mechanism of risk sharing in the takaful industry and its impact on economic growth?	(Lee & Chang, 2016).

Governance Mechanism of Takaful Market	7	Does SSB improve the efficiency of Takaful firms as compared to conventional insurance?	Karbhari et al., 2018
	8	What is the impact of SSB and CG on the profitability of takaful?	Authors' review
	9	There are plenty of studies investigating the impact of SSB on performance and risk-taking behavior of Islamic banking, but further detailed studies are required to study the impact of CG/SSB on risk-taking behavior of takaful industry.	Authors' review
	10	What is the impact of national culture on the stability and risk-taking behavior of takaful firms?	Gaganis et al., 2019
	11	Does CG/SSB mediate the impact of national culture on the stability and risk-taking behavior of takaful firms?	Authors' review
	12	Khan (2015) proposed a modified version of agency theory with respect to the contractual nature of takaful products but no study has been conducted to test this theory.	Khan, 2015
Takaful Product/Services and Customer perception	13	Most studies on demand for takaful products and its determinants are restricted to a country or a city in a specific country. Future studies are required with larger samples investigating cross-country variations in demand for takaful products and services.	Sherif and Hussnain, 2017; Md Husin and Ab Rahman, 2016a
	14	What are the implications of different marketing and behavioral theories for the takaful industry?	Authors' review
	15	Are takaful customers really faith driven?	Authors' review
	16	What is the role of financial and religious literacy on the preference of Takaful over conventional insurance?	(Lin et al., 2017)

Note: This table presents the main directions for future research as explicitly suggested by reviewed papers and identified through content analysis, or as derived from reviewing the relevant literature on the specific research stream by our meta-literature review (identified as "authors' review").

Above all, we identify a frequent call towards the role of SSB in promoting the development of Islamic finance. The utmost challenge in this direction is represented by potential discrepancies in the interpretation of Islamic principles across jurisdictions and its effects on *Takaful* (f.i. on the distribution of the surplus sharing). Future studies may encompass the design of a coherent and standardized supervisory and regulatory framework.

Another important issue is represented by the presence of underdeveloped capital and money markets and, in particular, limitations on investments within *sukuk* that, despite tremendous growth, are potentially seen as limiting the needs of *Takaful*. Future research may explore further the nature of *Sukuk* within *Takaful*, as well as the availability of other sources of admissible investments for takaful firms.

The current literature on corporate governance in *Takaful* is mostly theoretical, with empirical studies showing inconclusive results (Karbhari et al., 2018; Abdul Kader et al., 2014). These studies mostly ignore the role of SSB in comparing it with conventional insurance. Therefore, it is not clear whether the additional layer of CG has any impact on *Takaful*, especially in terms of efficiency and profitability.

The role of SSB is also crucial in determining the risk-taking behavior of Islamic financial institutions (IFIs). Several studies investigate the impact of SSB on performance and risk-taking behavior of Islamic banking (Safiullah and Shamsuddin, 2018; Mollah and Zaman, 2015), but further studies are required for *Takaful*.

Gaganis et al. (2019) argue that insurance is a culture-specific product, that should be evaluated and designed on the basis of cultural norms and patterns. This matters for *Takaful* as well, beyond religion itself and extending to country-specific cultural norms. Future research might consider focusing on the impact of national culture on the stability and performance of *Takaful* and could also help in designing the favourable conditions for its effectiveness and further growth.

Recently, Khan (2015) proposes a modified version of agency theory for *Takaful* but no study has been conducted to test it. With the main argument involving a required surplus sharing to incentivizing *Takaful* operators, it might not be optimal for *mudarabah* models if compared to *wakalah* hybrid modes. Empirical research is then called within this stream.

A significant body of research reports the association between insurance, economic growth and stability. *Takaful* is expected to produce similar results, but empirically assessing the role played in achieving stable economic growth is also an interesting research field.

Similarly, the institutional environment (f.i. political, legal and economic environment) mediate the role financial development on economic growth (Lee & Chang, 2016). Moreover, although the nature of takaful and insurance is different but takful is governed within the same regulatory framework as of insurance industry in most of the countries. Thus, the role of the institutional environment in shaping the beneficial mechanism of risk sharing in the takaful industry and its impact on economic growth is still a puzzle and call for new studies.

Most of the current literature on the determinants for the *Takaful* demand is limited to one country or even specific cities. Therefore, larger samples are needed to test cross-country variations, for the benefit of the industry, its reference economies, and regulators. On top of this,

the effectiveness and design of customer awareness programs are still open to an empirical assessment.

Financial literacy plays a crucial role in the decision-making process of purchasing a financial product(Lin, et al., 2017). This is more evident in the case of Takaful products which are driven by religious laws. Thus, future studies are required considering the impact of financial and religious literacy on the demand for takaful products.

5. Conclusions and limitations

This paper presents all major aspects of the *Takaful* literature through a meta-literature review. Under this approach, we incorporate two datasets for the period 1950-2018: 49 articles from ISI WOK for our bibliometric analysis and 65 articles for the content analysis. We apply the following techniques to assess the Islamic insurance literature: a bibliometric citation and co-citation analysis, a co-authorship analysis, a cartographic analysis, and content analysis.

Our results reveal the influential aspects of *Takaful* literature such as countries, authors, institutions, and articles. Furthermore, we identify three main research streams: (1) *Takaful* overview, growth, and models, (2) governance mechanism of *Takaful*, (3) *Takaful* products and services and customer perception.

Lastly, this study presents the future research agenda for Takaful. The common ground that seems to link all proposals for forthcoming research can be summarized as follows, with relevant policy implications. The role played by insurance in fostering economic growth is well known and it is reasonable to expect a similar effect for Takaful. However, there are currently limitations to its development that need investigation. Firstly, the interpretation of Shariah principles and cultural differences produce diversity in governance, products and regulation versus a generalized call for greater standardization. Secondly, the Shariah board may play a role in terms of performance, efficiency and risk-taking that has not been scrutinized in depth yet for Takaful. Thirdly, growth is affected by the lack of consumers' awareness, whereas marketing and behavioral implications have not been analyzed in order to produce strong evidence of best practices. Finally, some results in the literature are extremely limited in geographical scope and need to be tested empirically for robustness over larger samples.

This study is also subject to some limitations. Firstly, our methodology may miss high-quality papers that currently received no citations (Apriliyanti and Alon, 2017). Secondly, we also may have missed papers that are not listed in our main literature source (ISI WOK), despite we reduced this limitation by extending our initial sample towards unlisted or working papers, to the best of our knowledge. However, we did not incorporate additional sources, such as Google Scholar, due to the different implied data quality.

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Appendix-A

Table A1. Information on journals included in our sample of *Takaful* literature

Name of journals	Code	Name of journals	Code
Geneva papers on risk and insurance-issues and practice	GPRIP	Journal of economic issues	JEI
Journal of Islamic marketing	JIM	Isra international journal of Islamic finance	ISRA-IJIF
Intellectual discourse	ID	Journal of Islamic accounting and business research	JIABR
Journal of Islamic accounting and business research	JIAB	International journal of Islamic and middle	IJIMEFM

		eastern finance and management	
Journal of Asian and African studies	JAFS	Humanomics	HU
International review of financial analysis	IRFA	Intellectual discourse	ID
University of Pennsylvania journal of international law	UPJIL	Journal of services marketing	JSM
Journal of services marketing	JSM	Journal of Islamic accounting and business research	JIABR
International journal of ethics and systems	IJEAS	International review of financial analysis	IRFA
Journal of Islamic marketing	JIM	International journal of economics management and accounting	IJEMA
Middle east journal of management	MEJM	International journal of social economics	IJSE
African journal of business management	AJBM	Qualitative research in financial markets	QRIFM
Al-Shajarah	AS	Journal of economic issues	JOE

Essay 3:

Trade, financial openness and Islamic banks: Evidence from GCC Region

Trade, financial openness and Islamic banks: Evidence from GCC Region[3]

Abstract

The recent wave of liberalization in GCC countries has opened up a debate on the role of Islamic finance in the financial development of an economy. By using a comprehensive dataset of 44 Islamic and 48 conventional banks for the period 2007-2015, in this paper we investigate the impact of trade and financial openness on financial development in the GCC region. We find that trade and financial openness have a positive impact on Islamic bank profitability but simultaneous openness to both trade and capital markets reduces the profitability of Islamic banks. Moreover, the trade and financial openness affect Islamic banks in a different way compared to conventional banks. Particularly, we unveil that trade and financial openness increase the loan volume, but reduce (increase) the stability of Islamic banks (conventional banks).

Keywords: Trade openness, Financial openness, Islamic banks, Z-score, Distance-to-Default.

Jel Classification: F63, G21

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[3] Received the Best paper award at 4th IFBBE 2019: Building a Better World Through Inclusion, Sustainability and Ethics, 16-17 September Valencia, Spain.

1. Introduction

The recent wave of liberalization in GCC countries has opened up a debate on the role of Islamic finance in the financial development of an economy. Preliminary literature provides enough evidence that financial development positively contributes to the economic growth of a country. Rajan & Zingales (2003) proposed openness theory of financial development, suggesting that the level of financial development depends on the country's overall participation in global goods and financial markets. According to this theory, existing industrial and financial groups are usually against the financial development, arguing that financial openness will make easier for the new entrants to start a business, which will further reduce the monopoly of the existing groups.

Trade and financial openness are interconnected. Trade openness increases the competition by bringing more foreign companies, putting pressure on domestic firms to invest more in their overall infrastructure. Therefore, regulatory authorities are encouraged to bring reform in the financial sector to have an easy access to loans. Those financial reforms make the banking sector more competitive, decreasing the cost of a loan for firms and increasing the volume of credit in the economy. On the other hand, higher financial openness will open external sources of funding from international money and capital markets for domestic firms, accelerating the competition in the credit market. In order to be competitive, the bank will likely reduce the cost of the loan for firms (Ashraf, 2018).

Trade and financial openness might also affect the stability of a bank. Higher trade openness gives a bank an advantage to improve its borrower's selection, which should reduce the bank risk. On the other hand, trade and financial openness foster the competition, which can reduce the cost of credit. Thus, banks might relax their credit standards and increase financing on the asset side of their balance in order to compensate for the lower cost of loans, hence, increasing overall bank risk and reducing the bank stability.

Since the structure of Islamic banks is different, we might observe different pattern for them, comparing to conventional, at least for two reasons. Firstly, Islamic banks do not deal only in documents but also in goods, making real economic transactions and promoting the real economy, ultimately improving both the financial sector and the overall economy.

Secondly, the basic essence of Islamic banks is to promote the culture of risk sharing (i.e. profit & loss sharing, P&LS), being not involved in transactions based on interest, uncertainty, and speculation. Therefore, in an ideal situation of P&LS mode of financing, trade and financial openness should positively affect Islamic banks' cost and volume of financing, unlike conventional banks. Moreover, the clients on both sides of the Islamic bank balance sheet can enjoy maximum profit and, even in the case of a recesion, the losses would be shared. This process would not put the overall economy on stake as happened during recent subprime financial crises.

The previous research on Islamic banks mainly focused on profitability (Azad et al. 2019; Yanikkaya et al., 2018), efficiency (Safiullah & Shamsuddin, 2019; Beck et al. 2013), stability (Albaity et al., 2019; Čihák & Hesse, 2010) and risk management (Hassan et al., 2019; Ibrahim & Rizvi, 2018; Abedifar et al. 2013). There are very few papers assessing the impact of Islamic banks on financial development and, eventually, on economic growth (Grassa & Gazdar, 2014; Hassan et al., 2013; Imam & Kpodar, 2016; Kassim, 2016). In general, the authors find Islamic banks to positively contribute to the economic growth of the country, but without taking into account the impact of trade and financial openness on financial development.

The main purpose of this paper is to investigate the impact of trade and financial openness on the development of the banking sector in GCC countries over the period of 2007-2015. The GCC is the ideal region to investigate this topic, for mainly two reasons. First, GCC countries share similar economic policies, including free trade and capital movements with high-level of trade openness, that varies from 60.86% in Saudi Arabia to 205% in UAE (WDI, 2016). The GCC countries have also taken many initiatives to increase the role of the private sector (e.g. Saudi Arabia is planning to expand privatization in 16 sectors and also the sale of ARAMCO). Second, GCC countries are arguably considered to be the hub of Islamic finance with total assets of USD 927.1 billion, including Islamic banking assets of USD 704.8 billion (IFSB, 2019).

To briefly preview our results, we find that trade and financial openness have a positive and significant impact on the cost of Islamic bank credit, while the simultaneous impact of trade and financial openness is negative. This last result implies that a country, with high level of both trade and financial openness, experiences a reduction of Islamic banks' profitability. This study also reveals that trade and financial openness have a positive impact on the volume of Islamic bank

loans, suggesting that Islamic banks can reap the benefit of trade and financial openness as compared to conventional banks. Lastly, we use both accounting based measure (i.e. Z-score) and market based measure (i.e. Merton distance to default, DD) to test the impact of openness variables on the stability of banks. The results provide evidence that trade and financial openness reduce the stability of Islamic banks, while increasing the stability of conventional banks.

This study contributes to the existing literature at least in two ways. First, we extend the literature studying the role of Islamic banks, at the macro level, on financial development and economic growth (Grassa & Gazdar, 2014; Hassan et al., 2013; Imam & Kpodar, 2016; Kassim, 2016). More specifically, we test the openness theory proposed by Rajan & Zingales (2003) on Islamic banks' profitability and stability at the micro level. Second, this study adds to the very thin but expanding strand of the literature examining the determinants of Islamic banks' stability in comparison to conventional banks (Čihák & Hesse, 2010; Beck, et al., 2013; Kabir, et al., 2015; Albaity et al., 2019; Hassan, et al., 2019). In this regard, we unveil that a country which is simultaneously open to trade and capital accounts might observe the decrease in the stability of Islamic banks.

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature, providing also a theoretical framework. Section 3 describes our dataset, variables and econometric strategy. Section 4 discusses our findings and, finally, section 5 concludes this study.

2. Theoretical framework and literature review

A vast amount of literature assessing the financial development and economic growth nexus, mainly finds that financial development positively favors economic growth (Levine, 1997; Rajan & Zingales, 1998; Demetriades & Andrianova, 2004; Jedidia et al., 2014). If financial development is so important for economic growth, there are authors wondering why so many countries have underdeveloped financial systems (Rajan & Zingales, 2003). To answer this question, they propose an interest-group theory of financial development, alternatively known as openness theory. In this theory, Rajan and Zingales (2003) argue that both industrial and financial incumbent groups, cross-border trades and capital flows are the main factors to influence the financial sector development. A developed financial sector creates opportunities for new firms to establish and grow, ultimately boosting the competition and corroding the rent of incumbent groups. Therefore, these groups

might discourage and oppose the financial sector development. The authors also suggest that the impact of the aforementioned group will be weaker if the economy is simultaneously open to trade and capital flows. In other words, trade openness without financial openness might result in financial repression and loan subsidies, with the consequence to provide cheap financing to industrial incumbents. Instead, financial openness without trade openness is more likely to give access to industrial incumbents to raise funding from external sources, probably deteriorating the profits of domestic financial institutions.

Previous literatures mainly focused on the impact of trade and financial openness on economic growth at macro level (Law, 2008;2009; Baltagi et al., 2009; Kim et al., 2010; Herwartz & Walle, 2014; Menyah et al., 2014; Muhammad et al., 2016;) and micro level, using bank-level data (Bonaccorsi di Patti & Hardy, 2005; Denizer et al., 2007; Hermes & Nhung, 2010; Zhang et al., 2015; Luo et al., 2016; Bremusa & Buch, 2017; Ashraf, 2018; Aluko & Ajayi, 2018).

Law (2008) investigates the impact of trade and financial openness on financial development in Malaysia, using the bound testing approach. He finds that both trade and financial openness positively spur the financial development but no evidence is provided for the simultaneous effect of trade and financial openness on financial development. In another study, this simultaneous effect is a positive significant determinant of financial development for developing countries (Law, 2009).

Baltagi et al. (2009) assess the role of trade and financial openness on financial development in industrialized and developing countries, finding that both variables have a significant impact on financial development. Furthermore, they also provide evidence that the marginal effect of trade openness is negatively related to financial openness and vice versa. Kim et al. (2010) find that financial development and trade openness are complements in the long run and substitutes in the short run.

Herwartz & Walle (2014) argue that the impact of financial development on economic growth depends on the level of openness of a country in terms of trade and capital accounts. By using a comprehensive dataset of 78 countries for 1981-2006, they find an inverse impact of financial openness on finance-growth nexus and positive for the trade openness. More specifically, a higher level of financial openness reduces the impact of financial development on economic growth,

while trade openness enhances this relationship. In a similar vein, Menyah et al. (2014) reject finance-led growth and trade-led growth hypothesis for 21 African countries. Their empirical findings suggest very limited support to the aforementioned hypothesis, which implies that trade and financial liberalization have no impact on economic growth. In contrast, Muhammad et al. (2016) find a positive relationship of financial development with economic growth in GCC countries but they do not consider the openness hypothesis proposed by Rajan and Zingales (2003).

Considering the role of trade and financial openness at a micro level, Zhang et al. (2015) investigate the impact of trade and financial openness on financial development with three different indicators to differentiate the size, efficiency, and competition within the dimensions of financial development. They find that openness has a positive impact on financial efficiency and competition, but it's negatively related to the size of financial development.

Bonaccorsi di Patti & Hardy (2005) find profit efficiency to be increased for Pakistani banks immediately after financial liberalization but reduced in the following years. Denizer et al. (2007) also report the similar findings that banking efficiency for Turkish banks was reduced after financial liberalization due to serious macroeconomic instability in the Turkish economy. On the other hand, Hermes & Nhung (2010) show a positive impact of financial liberalization on banking efficiency in Latin America and Asian banks during the period of 1991-2000.

Bourgain et al. (2012) argue that financial openness is indispensable and induces banks to be financially more transparent, keeping under control the risk management. Nonetheless, it increases the competition for financial institutions, potentially reducing the profitability. In this regard, Luo et al. (2016), using a comprehensive dataset of 2007 commercial banks for the period 1999- 2011, document the relationship between financial openness, bank risk and profit efficiency in 140 countries. They find that financial openness reduces the efficiency of bank profitability without any change in bank risk level, while it has an indirect positive effect on bank risk level through the channel of reduced bank profit efficiency.

Bremusa & Buch (2017) investigate the impact of financial openness and large bank on economic growth using a panel dataset of 79 countries for the period of 1996 to 2009. They find that bank-level shock significantly influences the economic growth, while financial openness has

a negative impact on GDP growth. Moreover, granular effects are stronger when the economies are financially closed and concentrated.

Ashraf (2018) tests the openness theory on emerging economies taking into account bank-level data of 287 banks for the period 2000-2012. He finds that trade openness stimulates bank development through increasing loan volume and lowering the cost and risk of the bank credit. Financial openness, instead, has a negative impact on the cost and the loan volume of the bank, being also positively associated with bank risk-taking. In fact, higher financial openness brings more competition to the economy, forcing banks to reduce the cost of credit; but for higher profitability, banks expose themselves to risk by extending higher loan credit. Surprisingly, the author shows that higher financial openness reduces the volume of bank credit.

3. Data and Methodology

3.1 Data

For the collection of data, we rely on four databases. We collect financial statement data using Bankscope and Bloomberg databases for the period 2007-2015 for the banks working in the GCC countries (i.e. Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates). For the data of trade openness and macroeconomic variables, we use the WDI World Bank database and financial openness data, collected from Chinn & Ito (2006).

As we are specifically interested in the impact of trade and financial openness on cost, volume, and stability of banks, we incorporate only banks with traditional banking model of lending/borrowing (for instance, we exclude all banks having investment and corporate financial services orientation), using consolidated data where possible and individual data for the remaining banks. We eventually have a sample of 92 banks, comprised of 44 Islamic banks and 48 conventional banks. Table 1 presents a detailed summary of the data for this study

Table 1 Sample description

Country Name	Initial Population			Sample Dataset		
	Islamic Banks	Conventional Banks	Total	Islamic Banks	Conventional Banks	Total
Bahrain	15	20	35	18	9	27
Oman	2	10	12	0	6	6
Kuwait	7	20	27	6	5	11
Qatar	6	11	17	6	6	12
Saudi Arabia	8	10	18	4	8	12
United Arab Emirates	12	32	44	10	14	24
Total	50	103	153	44	48	92

This table contains bank population and sample data set, divided by bank type and country list. As observed from the table, initially there were total 153 banks which reduced to 92 banks, with 44 Islamic and 48 conventional banks.

3.2 Measurement of Variables

3.2.1 Dependent variables

Keeping in mind the objective of the study, we incorporate the Net Interest Margin (NIM) as a proxy variable to assess the cost of banks, which is computed as the difference of interest income and interest expense divided by total interest-bearing assets. This variable measures total interest income received from the borrower and interest expense paid to depositors (Demirgüç-Kunt et al., 2004; Claessens et al., 2018).

Since interest is prohibited under *Shariah* Law, interest income and interest expense should be considered as financing income (profit for Islamic banks from PLS, *Musharaka* and *Mudarabah*), cost-plus profit (*Murabaha*), lease based (*Ijarah*) mode of financing and financing expense (profit for the depositors mainly through *Mudarabah*) divided by profit-generating assets for Islamic banks.

For the volume of bank credit, we use a proxy variable of annual gross loans to total assets. This variable captures the bank lending behavior, i.e. how much funds bank allocate for loans out

of its total assets (Cole & Turk-Ariss, 2013; Ashraf, 2018). Table 2 presents the description of all the variables used in this study.

Table 2 Main variable description

Type	Variable	Estimation
Dependent variables	Net Interest Margin (NIM)	(Net Interest Income /Total Average Earning Assets)
	Gross Loans to total assets (GLTA)	(Total Gross Loans /Total Assets)
	Z-Score	(ROA + Equity/TA) / σROA
	Distance to Default (DOD)	$\dfrac{(Market\ value\ of\ assets\ -\ Default\ Point)}{(Market\ value\ of\ assets)(Volatility\ of\ assets)}$
Independent variables	Trade Openness (TO)	(Import +export)/GDP
	Financial Openness (FO)	Kaopen index which measures the level of capital account openness in a country.
	Size(Log_TA)	Natural Logarithm of total assets
	Equity Ratio(ETA)	Equity/Total Assets
	Deposits to Total Assets (Deposits_TA)	Total Deposits/Total Assets
	Cost to Income Ratio (CIR)	(Operating Expenses/Total Revenue)
	Non-interest income to total revenue (NONIITR)	Non-Interest Income/Total Revenue
	ROAA	Return on Average Asset
	Non-Performing Loans to Gross Loans(NPLGL)	(Non-performing loan/Gross Loans)
Macroeconomic Variables	GDP	GDP Growth
	Inflation (Inf)	Inflation (Consumer price index)
	Bank Concentration (bank_con)	Assets of three largest bank/Total Commercial Bank Assets in a country

This table describes the main variables and their estimation

For bank stability, we use Z-Score, which is widely used in the literature as accounting measure of bank stability (Ashraf, 2018; Beck et al., 2013; Čihák & Hesse, 2010). This variable is measured as the sum of return on assets (ROA) and equity to asset ratio (ETA) divided by the standard deviation of ROA. A higher value of this variable indicates the higher level of stability for a bank.

The Z-score is calculated as the sum of the ROAA and the equity-to-asset ratio, divided by the standard deviation of the ROAA. Higher values of Z-score signal higher resilience and, therefore, more stability.

Islamic banks, by their nature, have a large amount of investment account holder (IAH), with similar features of equity capital, but these IAH are not fully reflected in this traditional measure (Čihák & Hesse, 2010). Therefore, such an accounting base variable can lead Islamic banks to be professed as less stable.

To account for this issue, we also apply a market-based measure of stability, i.e. Merton's Distance to Default (DD), which is considered the best measure in assessing bank stability (Kabir, et al., 2015). The DD is traditionally measured as the difference between the market value of assets and a default point, defined as the sum of short-term and half of long-term liabilities, divided by the product of the market value of assets and their volatility. A higher value of this variable implies that the bank is more stable.

For this study, we collect default probabilities from Bloomberg Professional Services and measure the DD by the inverse cumulative distribution function as follows.

Let be a standard normal variable, where, the probability of default is defined as:

$$P_{default} = CDF(-DD) = \phi(-DD) = 1 - \phi(DD)$$

$$\phi(DD) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{DD} e^{-t^2/2} \ dt$$

or, equivalently:

$$\phi(DD) = \frac{1}{2}\left[1 + erf\left(\frac{DD}{\sqrt{2}}\right)\right] \qquad [1]$$

Equation 1 allows us to define DD from the probability of default, as follows:

$$\phi^{-1}\left(P_{default}\right) = \sqrt{2} \ erf^{-1}\left(2P_{default} - 1\right), \ P_{default} \in (0,1) \qquad [2]$$

Due to data unavailability on this variable, we are forced to reduce the sample of this particular analysis to 21 Islamic and 35 conventional banks.

3.2.2 Measurement of Independent Variables

To assess trade openness (TO), we use trade to GDP ratio which is measured as the sum of total import and export divided GDP. This variable is widely used in the literature of economic growth and financial development (for example Ashraf, 2018; Zhang, et al., 2015 among others).

For financial openness (FO), we employ the dejure Chinn-Ito index (which is known as KAOPAN index). This index is constructed based on the information available in the IMF annual report on exchange arrangement and exchange restriction (AREAER). More specifically, it takes into account a binary dummy variable, which codifies the restriction on a cross-border financial transaction. A high number indicates a lower level of restriction (Chinn & Ito, 2006).

3.2.3 Control Variables

Following the literature on bank cost, volume and stability (Ashraf, 2018; Claessens, et al., 2018; Beck, et al., 2013; Čihák & Hesse, 2010), we also incorporate some bank-specific variables. We include the natural log of total assets (log_TA), the equity to total assets (ETA), the deposits to total assets (Deposits_TA), the cost to income ratio (CIR) and the non-interest income to total revenue (NONIITR). To capture the effect of the global financial crisis, we introduce a dummy variable crisis, which takes the value 1 if the year is 2008 and 2009 and zeroes otherwise.

To control country-specific factors, we use gross domestic product growth (GDP) and inflation level (inf) in a country. Moreover, we include bank concentration proxy variable (bank_con) which is the share of three largest bank assets over total commercial bank assets in a country, to account for the possible effect of the banking industry on individual bank performance in terms of cost, volume and stability level (Ashraf, 2018; Zhang, et al., 2015).

3.3 Econometric model

We run a series of multivariate regressions to investigate the impact of trade and financial openness on cost, volume and stability of banks with the following static panel model;

$$Y_{i,j,t} = \alpha_0 + \beta_1 TO_{j,t} + \beta_2 FO_{j,t} + \beta_3 (TO\_FO)_{j,t} + \beta_4 bank\_con_{j,t} + \gamma CV_{i,j,t} + \delta M_{j,t} + \varepsilon_{i,,j,t} \qquad [3]$$

The $Y_{i,j,t}$ will take the alternative dependent variables, which are NIM, GLTA, Z-score and DD while (TO), (FO) and their interaction term TO_FO are the three main explanatory variables. CV and M are the vectors for the bank and macroeconomic country-specific control variables respectively. All the bank-specific variables are winsorized at 1% at each tail to mitigate the possible effect of an outlier. We include interacted year countries dummy in all regression models.

In order to choose between fixed and random effect model, we apply Hausman tests. which suggests the use of a fixed-effect model.

4. Main Results and Discussion

4.1 Descriptive statistics

Table 3, 4 and 5 present the descriptive statistics of all variables subdivided by Islamic and conventional banks. For Islamic banks, the average value of NIM is 3.021, which is slightly lower than conventional banks, implying that Islamic banks are less profitable. This could be due to the fact that Islamic banks have to be more prudent in order to be *Shariah* compliant and bear extra monitoring and controlling cost. The mean value of GLTA indicates that conventional banks have a higher share of client base with a higher amount of loans in their balance sheet.

Considering the bank stability measure, we find Islamic banks to be more stable compared to conventional, implying that Islamic banks have better quality assets and are more resilient in the event of distress. The mean value of Z-score, which is an accounting based measure, is 7.518 for Islamic while the same variable has the mean value of 4.013 for conventional banks. On the other hand, the mean value of DD is 3.279 and 3.277 for Islamic and conventional banks respectively.

Trade and financial openness are the country-level variables which are the same for both Islamic and conventional banks. The mean value of TO is 131.68, while FO has the mean value of 2.01.

Considering the bank-specific variables, the mean value of ROAA, log_TA, and deposits_TA confirms our earlier finding that Islamic banks are less profitable and smaller in size compared to conventional banks. However, Islamic banks have higher dependency on non-interest income activities with the mean value of NIIGR 44.714. The non-performing loans are also higher in Islamic banks compared to conventional banks with the mean value of 8.44. Furthermore, Islamic banks, on average, have an equity asset ratio of 29.891 which is higher as compared to convention banks with an average equity ratio of 14.936. While the cost to income ratio is higher for Islamic banks, which could be due to unexploited scale of economies and higher monitoring cost. Our results are quite in line with the previous literature such as Abuzayed et al. (2018) and Albaity et al. (2019).

Table 3 Descriptive statistics: All banks

Variable	Obs	Mean	Std.Dev.	Min	Max
NIM	739	3.102	3.143	-4.48	62.22
GLTA	712	58.86	18.772	1.619	102.247
Z_score	739	5.507	5.601	-2.843	46.188
DD	505	3.272	0.511	1.649	5.306
ROAA	739	1.766	3.609	-31.15	31.95
ETA	739	21.31	20.093	0.77	99.78
Deposits_ta	663	62.454	18.489	0.139	84.583
log_ta	739	22.59	1.702	16.309	25.72
NIIGR	739	37.137	27.794	-63.35	362.28
NPLGL	637	5.786	9.246	0	100
CIR	739	48.374	38.211	9.09	393.99
TO	739	131.941	40.039	72.353	196.429
FO	739	2.021	0.562	1.082	2.374
GDP	739	4.509	4.2	-7.076	19.592
INF	739	3.444	3.376	-4.863	15.05
Bank_concentration	739	70.238	11.342	49.485	89.313

This table presents the descriptive statistics of all banks. Net Interest Margin (NIM), Gross loans to Total assets (GLTA), Zscore (Z-score) and Merton distance to default (DD) are dependent variables. Trade openness (TO) and Financial Openness (FO) are the main explanatory variables while bank-specific variables include return on assets (ROA),Equity to total assets (ETA), deposit to total assets (Deposits_TA), log of total assets (log_TA), Non-interest income to gross revenue (NIIGR), Non-performance loans to gross loans, cost to income ratio (CIR), and growth of gross domestic product (GDP), inflation (Inf) and bank concentration (Bank_concentration) are the macroeconomic variables

Table 4 Descriptive statistics: Islamic banks

Variable	Obs	Mean	Std.Dev.	Min	Max
NIM	315	3.021	4.506	-4.48	62.22
GLTA	294	53.744	23.926	1.619	99.316
Z_score	315	7.518	7.513	0.752	46.188
DD	181	3.265	0.563	1.737	5.306
ROAA	315	1.586	5.129	-31.15	31.95
ETA	315	29.891	27.076	6.34	99.78
Deposits_ta	251	58.697	23.745	0.139	84.583
log_ta	315	21.84	1.785	16.309	25.156
NIIGR	315	44.714	38.153	-63.35	362.28
NPLGL	223	8.441	14.04	0	100
CIR	315	62.532	50.186	10.09	393.99

This table presents the descriptive statistics of all banks. Net Interest Margin (NIM), Gross loans to Total assets (GLTA), Zscore (Z-score) and Merton distance to default (DD) are dependent variables. Trade openness (TO) and Financial Openness (FO) are the main explanatory variables while bank-specific variables include return on assets (ROA), Equity to total assets (ETA), deposit to total assets (Deposits_TA), log of total assets (log_TA), Non-interest income to gross revenue (NIIGR), Non-performance loans to gross loans, cost to income ratio (CIR). Country specific variables are the same as in Table 3.

Table 5 Descriptive statistics: Conventional banks

Variable	Obs	Mean	Std.Dev.	Min	Max
NIM	424	3.162	1.47	-3.45	10.33
GLTA	418	62.459	12.931	14.604	102.247
Z_score	424	4.013	2.755	-2.843	26.926
DD	324	3.276	0.481	1.649	5.177
ROAA	424	1.899	1.778	-16.16	18.04
ETA	424	14.936	8.038	0.77	99.78
Deposits_ta	412	64.742	13.919	0.436	82.585
log_ta	424	23.147	1.4	17.284	25.72
NIIGR	424	31.508	13.88	-44.65	158.33
NPLGL	414	4.356	4.453	0.05	30.33
CIR	424	37.855	20.434	9.09	333.33

This table presents the descriptive statistics of all banks. Net Interest Margin (NIM), Gross loans to Total assets (GLTA), Zscore (Z-score) and Merton distance to default (DD) are dependent variables. Trade openness (TO) and Financial Openness (FO) are the main explanatory variables while bank-specific variables include return on assets (ROA), Equity to total assets (ETA), deposit to total assets (Deposits_TA), log of total assets (log_TA), Non-interest income to gross revenue (NIIGR), Non-performance loans to gross loans, cost to income ratio (CIR). Country specific variables are the same as in Table 3.

4.2 Openness and cost of bank credit

Table 6 presents the results of the impact of trade and financial openness on bank credit. For conventional banks, we find both trade and financial openness having a positive and significant effect on the cost of bank credit, while we observe only trade openness to have a positive and significant impact on Islamic banks. On the other hand, the interaction term of financial and trade openness (TO_FO) has a negative impact on the cost of Islamic bank credit. The result of interaction term suggests that marginal positive effect of both openness variable is negative, which implies that the more positive coefficient of FO is, the more negative effect we have of TO on NIM of the bank; on the other side, the more positive coefficient of TO is, the more negative effect we have on NIM of Islamic banks.

There might be several reasons for this negative relationship, but above all, Islamic banks are smaller in size, have lower client base both on the assets and liability side of the balance sheet as observed in section 4.1 (Beck, et al., 2013; Čihák & Hesse, 2010). The basic essence of Islamic banks is to promote the culture of risk sharing through the profit & loss relationship but they are reluctant to participate in profit and loss sharing mode of financing due to moral hazard and asymmetric information issues.

Table 6 Openness and cost of bank

VARIABLES	NIM		
	All Banks	Islamic Banks	Conventional Banks
TO	0.07**	0.14**	0.03**
	(0.026)	(0.055)	(0.016)
FO	0.35	1.75	2.09**
	(2.395)	(6.515)	(0.909)
TO_FO	-0.03**	-0.06**	-0.01
	(0.012)	(0.023)	(0.007)
Deposits_ta	0.05**	0.05*	0.01**
	(0.021)	(0.026)	(0.005)
NPLGL	0.05	0.08**	0.00
	(0.036)	(0.035)	(0.011)
ETA	0.07**	0.06*	0.06***
	(0.031)	(0.035)	(0.014)
NIIGR	-0.04*	-0.05**	-0.02***
	(0.020)	(0.022)	(0.005)
log_ta	0.80	2.69	-0.23
	(0.960)	(1.756)	(0.182)
GTA	0.01**	0.01**	0.00
	(0.004)	(0.004)	(0.002)
CIR	-0.02	-0.01	-0.02***
	(0.013)	(0.012)	(0.004)
GDP	0.04**	0.14***	0.01
	(0.020)	(0.049)	(0.005)
Inf	-0.01	-0.01	-0.02**
	(0.022)	(0.075)	(0.007)
Bank-concentration	-0.01	-0.02	0.00
	(0.015)	(0.060)	(0.009)
Constant	-19.07	-65.14	3.29
	(21.271)	(40.744)	(5.161)
Observations	610	207	403
Number of indexnumber	82	34	48
Adjusted R-squared	0.41	0.57	0.49

This table presents the effects of trade and financial openness on net interest margin of banks using fixed-effect model. Net interest margin (NIM) is the dependent variable while trade openness (TO) Financial openness (FO) and their joint effect (TO_FO) are the main explanatory variables. Banks specific variables are deposit to total assets (Deposits_TA), Non-Performing loans to gross loans (NPLGL), Equity to total assets (ETA), Non-interest

income to gross revenue (NIIGR), log of total assets (log_TA), growth of total assets (GTA) and cost to income ratio (CIR) while bank concentration (Bank_concentration), growth of gross domestic product (GDP) and inflation (inf) are the country-specific variables.
Robust standard errors in parentheses.
Significance codes: *** indicate statistical significance at 1%, ** at 5% and * at 10%, respectively

4.3 Openness and volume of Bank Loans

This section presents the result of the relationship between trade and financial openness on the volume of bank loans. For conventional banks, we find a statistically significant negative impact of FO on the volume of loans, which suggests that banks, operating in financially liberalized countries, will have lower volume of the issued loan. Naturally, any entry of a new bank in a country will increase the competition and impact business activities of its competitor. Results are reported in table 7.

For Islamic banks, the individual effect TO on the volume of loans is statistically significant and negative. But, the interaction of TO and FO has a statistically significant positive impact on the volume of loans. This interaction results suggest that the financial openness will have a positive impact on loan volume of banks at a given level of trade openness and vice versa. This could be true for Islamic banks since the history of Islamic banks is not very old, still in its evolutionary phase, and can more reap the benefit of trade and financial openness as compared to conventional banks.

Table 7 Openness and Volume of bank loans

VARIABLES	GLTA		
	All banks	Islamic Banks	Conventional Banks
TO	-0.34***	-0.46**	-0.19
	(0.112)	(0.218)	(0.122)
FO	-24.25**	-27.13	-24.72*
	(11.668)	(20.155)	(13.061)
TO_FO	0.13**	0.20**	0.05
	(0.051)	(0.096)	(0.055)
Deposits_ta	0.14**	0.08	0.13*
	(0.054)	(0.064)	(0.074)
NPLGL	-0.24**	-0.34***	-0.01
	(0.090)	(0.077)	(0.154)
ETA	-0.50**	-0.82***	0.27
	(0.240)	(0.200)	(0.191)
NIIGR	-0.08**	-0.11**	-0.13**
	(0.034)	(0.046)	(0.050)
Log_ta	-7.05**	-10.54***	-2.85

	(2.837)	(3.561)	(2.508)
GTA	-0.04**	-0.05**	-0.01
	(0.017)	(0.021)	(0.019)
CIR	0.00	0.00	-0.07
	(0.024)	(0.028)	(0.071)
GDP	-0.16*	-0.11	-0.25***
	(0.084)	(0.172)	(0.068)
Inf	0.02	-0.23	0.15
	(0.121)	(0.330)	(0.129)
Bank-concentration	0.13	0.41	0.07
	(0.128)	(0.269)	(0.163)
Constant	271.54***	342.22***	174.84**
	(73.199)	(100.954)	(66.055)
Observations	610	207	403
Number of indexnumber	82	34	48
Adjusted R-squared	0.30	0.45	0.26

This table presents the effects of trade and financial openness on loan behavior of banks using fixed-effect model. Gross loan to total asset (GLTA) is the dependent variable while trade openness (TO) Financial openness (FO) and their joint effect (TO_FO) are the main explanatory variables. Banks specific variables are deposit to total assets (Deposits_TA), Non-Performing loans to gross loans (NPLGL), Equity to total assets (ETA), Non-interest income to gross revenue (NIIGR), log of total assets (log_TA), growth of total assets (GTA) and cost to income ratio (CIR) while bank concentration (Bank_concentration), growth of gross domestic product (GDP) and inflation (inf) are the country-specific variables.
Robust standard errors in parentheses.
Significance codes: *** indicate statistical significance at 1%, ** at 5% and * at 10%, respectively

4.4 Openness and Bank Stability

In this section, we examine the impact of openness on the level of bank stability. Considering both variables of bank stability measures, Z-score and Merton's DD, we find some contrasting results for both the banking business models. Table 8 presents the results of openness and bank stability.

For Islamic banks, FO has a statistically significant negative impact on bank stability when we employ Z-score as the dependent variable, while we observe no effect of interaction-term. We observe a similar pattern for conventional banks. However, the results of market-based measure of stability, i.e. Merton distance to default (DD), suggests some difference in terms of effect of trade and financial openness on Islamic and conventional banks. We find the positive impact of trade openness on stability of Islamic banks, while the interaction term TO_FO has a negative impact on stability of Islamic banks. When the trade and financial openness are high and

profitability is the major objective of a bank manager, it might motivate the managers to take more risk by extending more loans, which will result in higher volatility of ROA, thereby, decreasing the stability of banks.

On the other hand, the individual impact of TO and FO is negative for conventional banks while interaction term TO_FO exhibits a positive relationship. Conventional banks are large in size with a higher client base, as confirmed from the results of descriptive statistics, therefore, they are in better position to reap the benefits if a country is simultaneously open to both trade and financial openness.

This contrasting result of z-score and DD is due to the difference in methodological approaches to estimate these variables. Therefore, one must give emphasis on the selection of variables while assessing bank stability (Kabir et al., 2015; Abuzayed et al.2018)).

Table 8 Openness and Bank stability

VARIABLES	Z_score			DD		
	All banks	Islamic Banks	Conventional Banks	All banks	Islamic Banks	Conventional Banks
TO	-0.02	0.00	0.00	0.00	0.03**	-0.02**
	(0.027)	(0.061)	(0.021)	(0.009)	(0.012)	(0.009)
FO	-9.43**	-11.87*	-1.31	-1.35*	0.25	-3.06***
	(4.013)	(6.006)	(3.044)	(0.702)	(0.999)	(1.045)
TO_FO	0.02	0.02	-0.00	-0.00	-0.01**	0.01**
	(0.013)	(0.026)	(0.010)	(0.004)	(0.005)	(0.004)
ROAA	0.28***	0.25***	0.28***	-0.00	-0.01	0.05
	(0.066)	(0.076)	(0.081)	(0.016)	(0.018)	(0.044)
ETA	0.21***	0.22***	0.25***	0.03***	0.03***	0.01
	(0.023)	(0.033)	(0.031)	(0.008)	(0.007)	(0.011)
NIIGR	-0.00	-0.00	0.02*	-0.00	-0.00	-0.00
	(0.005)	(0.006)	(0.011)	(0.001)	(0.001)	(0.004)
log_ta	0.30	0.56	0.95	0.23*	0.27*	0.13
	(0.459)	(0.887)	(0.639)	(0.133)	(0.153)	(0.192)
GTA	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.003)	(0.005)	(0.002)	(0.001)	(0.002)	(0.001)
CIR	-0.01**	-0.01*	0.00	-0.00**	-0.00***	-0.00
	(0.006)	(0.007)	(0.004)	(0.001)	(0.001)	(0.003)
GDP	-0.01	-0.01	-0.01	-0.01	-0.00	-0.01
	(0.013)	(0.031)	(0.010)	(0.005)	(0.010)	(0.005)
Inf	-0.01	-0.03	0.02	0.02**	0.02	0.01
	(0.023)	(0.071)	(0.019)	(0.007)	(0.012)	(0.009)
Bank-concentration	-0.04*	-0.07	0.02	-0.01*	-0.00	-0.02*
	(0.025)	(0.086)	(0.018)	(0.007)	(0.013)	(0.008)
Constant	13.52	12.58	-21.88	1.23	-4.10	7.55
	(13.499)	(23.461)	(18.576)	(3.702)	(4.681)	(4.973)

Observations	715	301	414	492	175	317
Number of indexnumber	92	43	49	60	23	37
Adjusted R-squared	0.73	0.74	0.86	0.48	0.54	0.47

This table presents the effects of trade and financial openness on stability of banks using fixed-effect model. Z-score (Zscore) and Merton distance to default (DD) are the dependent variables while trade openness (TO) Financial openness (FO) and their joint effect (TO_FO) are the main explanatory variables. Banks specific variables are return on average assets (ROAA), Equity to total assets (ETA), Non-interest income to gross revenue (NIIGR), Log of total assets (log_TA), growth of total assets (GTA) and Cost to income ratio (CIR) while bank concentration (Bank_concentration), Growth of gross domestic product (GDP) and inflation (inf) are the country-specific variables.

Robust standard errors in parentheses.

Significance codes: *** indicate statistical significance at 1%, ** at 5% and * at 10%, respectively

4.5 Robustness checks

We applied two different robustness checks. First, due to higher monetary and controlling checks, Islamic banks usually face higher costs to execute their operations. Therefore, it is interesting to investigate if trade and financial openness have a similar impact on cost, loan behaviour and stability of banks. In this regard, we split our sample of Islamic banks with cost to income (CIR) above the median value. Our results (reported in table 9) remain consistent with the main findings, with some insignificant variables, but the coefficient signs remain the same.

Table 9 Openness impact on Banks with cost-income ratio above the median value

VARIABLES	NIM	GLTA	Z_score	DD
TO	0.08	-1.23	-0.07	0.03**
	(0.064)	(0.959)	(0.115)	(0.011)
FO	6.29***	-13.20	-26.32	1.08
	(2.062)	(43.021)	(15.593)	(1.247)
TO_FO	-0.03	0.49	0.05	-0.01
	(0.027)	(0.392)	(0.053)	(0.005)
Deposits_ta	0.03***	0.13		
	(0.008)	(0.112)		
NPLGL	-0.02***	-0.15***		
	(0.006)	(0.048)		
ROAA			0.26***	0.07***
			(0.087)	(0.021)
ETA	0.02*	-0.75**	0.21***	0.03***
	(0.009)	(0.274)	(0.042)	(0.004)
NIIGR	-0.02***	-0.12**	-0.01	-0.00
	(0.003)	(0.044)	(0.011)	(0.001)
log_ta	-0.12	2.95	-0.00	0.20
	(0.338)	(4.880)	(1.291)	(0.155)

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GTA	-0.00*	-0.01	-0.01	-0.00
	(0.001)	(0.022)	(0.009)	(0.001)
GDP	0.07**	-0.14	0.07	0.03
	(0.029)	(0.443)	(0.104)	(0.023)
Inf	-0.09***	0.10	-0.39**	0.01
	(0.026)	(1.035)	(0.181)	(0.047)
Bank-concentration	-0.00	1.69*	0.06	-0.01
	(0.061)	(0.982)	(0.279)	(0.024)
Constant	-8.69	-38.93	44.36	-4.28
	(10.994)	(180.317)	(27.930)	(4.018)
Observations	90	90	148	76
Number of indexnumber	25	25	34	16
Adjusted R-squared	0.71	0.58	0.74	0.71

This table presents the effects of trade and financial openness on cost, loan behavior and stability of banks using fixed effect model. Net interest margin (NIM), Gross loan to total asset, Z-score (Zscore) and Merton distance to default (DD) are the dependent variables while trade openness (TO) Financial openness (FO) and their joint effect (TO_FO) are the main explanatory variables. Banks specific variables are deposit to total assets (Deposits_TA), Non-performing loans to gross loans, Return on average assets (ROAA), Equity to total assets (ETA), Non interest income to gross revenue (NIIGR),log of total assets (log_TA) and Growth of total assets while bank concentration (Bank-concentration), growth of gross domestic product (GDP) and inflation (inf) are the country-specific variables.

Robust standard errors in parentheses.

   Significance codes: *** indicate statistical significance at 1%, ** at 5% and * at 10%, respectively

Second, we might have endogeneity issues in the data. For example, banks with higher capital ratios might attract deposit at a lower cost and lend it at a higher rate, affecting bank net interest margin. This is more crucial for Islamic banks since they have higher capital ratios. Therefore, we split the data of Islamic banks with capital ratios above the median value. Our results remain the same with respect to earlier findings, especially in case of NIM, as reported in table 10

Table 10 Openness impact on Banks with capital ratio above the median value

VARIABLES	NIM	GLTA	Z_score	DD
To	0.39*	0.32	0.46	0.03
	(0.209)	(1.763)	(0.409)	(0.019)
FO	17.51	34.54	8.17	-1.15
	(28.672)	(143.148)	(25.567)	(1.387)
TO_FO	-0.16*	-0.15	-0.16	-0.01
	(0.085)	(0.722)	(0.164)	(0.008)
Deposits_ta	0.01	0.56*		
	(0.021)	(0.280)		
ROAA			0.31***	-0.01
			(0.076)	(0.022)
NPLGL	0.08***	-0.26**		
	(0.026)	(0.097)		

NIIGR	-0.08***	0.11	-0.00	-0.01**
	(0.015)	(0.073)	(0.015)	(0.003)
log_ta	4.55**	6.25	-3.77*	-0.50*
	(1.864)	(8.632)	(1.909)	(0.281)
GTA	0.01	-0.05	-0.01	0.00
	(0.005)	(0.047)	(0.011)	(0.001)
CIR	0.03		-0.00	-0.00
	(0.020)		(0.009)	(0.002)
GDP	0.17**	1.04**	0.13	-0.03
	(0.074)	(0.438)	(0.077)	(0.017)
Inf	-0.14	0.84	0.01	0.04**
	(0.176)	(0.763)	(0.131)	(0.014)
Bank-concentration	0.13	-0.15	-0.19	-0.02
	(0.118)	(0.957)	(0.139)	(0.021)
Constant	-141.30	-196.29	71.30	17.28**
	(103.057)	(507.420)	(97.672)	(8.162)
Observations	67	67	147	101
Number of indexnumber	20	20	31	19
Adjusted R-squared	0.81	0.45	0.71	0.49

This table presents the effects of trade and financial openness on cost, loan behavior and stability of banks using fixed effect model. Net interest margin (NIM), Gross loan to total asset, Z-score (Zscore) and Merton distance to default (DD) are the dependent variables while trade openness (TO) Financial openness (FO) and their joint effect (TO_FO) are the main explanatory variables. Banks specific variables are deposit to total assets (Deposits_TA), Non-performing loans to gross loans, Return on average assets (ROAA), Non interest income to gross revenue (NIIGR),log of total assets (log_TA), Growth of total assets and cost to income ratio (CIR) while bank concentration (Bank-concentration), growth of gross domestic product (GDP) and inflation (inf) are the country-specific variables.

Robust standard errors in parentheses.

Significance codes: *** indicate statistical significance at 1%, ** at 5% and * at 10%, respectively

5. Conclusion

Over the last two decades, Islamic finance has rapidly increased and has its strong and significant presence not only in GCC countries but also around the globe including non-Muslim countries. This phenomenon called for the evaluation of this sector and its impact on overall financial development and the real economy. The main objective of this paper is to evaluate the role of trade and financial openness on financial development by using micro-level data of both Islamic and conventional banks for the period of 2007-2015.

Our analysis shows that the simultaneous openness of GCC countries to trade and capital accounts reduces the profitability of Islamic banks. This is arguably true since Islamic banks are very reluctant to participate in profit and loss sharing mode of financing due to the high presence

of asymmetric information and moral hazards in such contracts. Moreover, we find that trade and financial openness increase the volume of loans but reduce the stability of Islamic banks.

This study has several implications. It extends the ongoing debate on the role of trade and financial openness in financial development and contributes to the growing literature dealing with the impact of Islamic banks on economic growth. Additionally, the results of this study call for reforms in the Islamic finance industry. More specifically, the negative impact of trade and financial openness on the profitability of Islamic banks is against Islamic finance theories and practices. If Islamic banks have the equity participation mode of financing also on their asset side of the balance sheet, it will not only increase the overall profitability but will also increase resilience capability of Islamic banks to absorb losses during bad times which will protect the economy from the recession at the country level. Therefore, these results are of interest to regulators, policymakers and particularly for Islamic banks to adopt and bring innovative partnership-based products in their overall portfolio.

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