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Macroprudential Policy and Tools in a Dual Banking System: Insights from the Islamic Finance Literature

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Abstract

The current global financial meltdown has highlighted the need of promoting financial stability through better regulation of financial institutions. The contentious debate is strongly emphasizing in particular on macroprudential tools, their implementation, and effectiveness. This paper provides a critical review of theoretical and empirical research on Islamic finance literature that have investigated macroprudential policy and its impact. In particular, the theoretical and empirical literature on the impact of macroprudential policy to the financial stability and risk-taking of Islamic and conventional financial system. The paper has identified studies over a sixteen-year from 2000 to 2016 related to Islamic finance literature by utilize an analytical evaluative framework as its main investigative tool. The findings suggest that only limited empirical research and analytical tools were available on macroprudential policy framework in Islamic financial system due to the fact that Islamic financial system is still in infancy stage and far from being able to create analytical framework. The theoretical studies of macroprudential policy in Islamic finance points to mixed results, while empirical research of macroprudential policy are not conclusive.

Keywords: Islamic finance, macroprudential policy, financial stability
JEL Classification: G20, G21, G28

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Macroprudential Policy and Tools in a Dual Banking System: Insights from the Islamic Finance Literature

Muhamed Zulkhibri[1]

1. Introduction

From late 2008 onwards, the global financial crisis has raised attention to both policy makers and academicians on the importance of financial regulation and supervision. The regulators focus on promoting financial stability and mitigating financial imbalances that could lead to have severe macroeconomic consequences. One of the centre agenda to help predict and cope with financial imbalances is through designing macroprudential policy and regulation appropriately (Arnold, Borio, Ellis, & Moshirian, 2012) The Bank for International Settlements (BIS), the European Systemic Risk Board (in the EU), the Financial Stability Oversight Council (in the US), and others financial regulators at global level are strongly emphasize on designing the proper macroprudential policy (Baker & Widmaier, 2015).

Within the heated discussion of financial stability, Islamic financial system also received a great deal of attention that examined their stability. The proponents of Islamic finance believed that Islamic financial system is theoretically and empirically proven to be more resilience toward financial crisis rather than conventional counterpart (Čihák & Hesse, 2010). Nevertheless, this system is still not immune to the crises because of natural causes and the deviations from Shari'ah norms. As a matter of fact, the policy framework to address the stability of Islamic financial system is urgently needed (Aziz, 2008).

Research on macroprudential policy has gained momentum and popularity among policy makers and academia since the late 2008. The bulk of research in the forms of journal articles, conference papers, books, and reports has increased remarkably. However, research literature on

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macroprudential policy has mainly focuses on conventional banking and financial institutions. No attempt was done to explore macroprudential policy in both conventional and Islamic financial institutions. Given the fact that research on macroprudential has increased considerably, the objective of this research is to provide a critical review of the state of research on macroprudential and to investigate the gaps in the literature pertaining macroprudential policy in dual banking system so that to recommend directions for further research.

The paper evaluates a number of selected studies that have been conducted to research on macroprudential issues. In particular, the paper critically reviews the literature on macroprudential policy, financial stability, and risk-taking of the Islamic financial system vis-à-vis the conventional financial system. Hence, this study provides insights from the literature for the Islamic financial institutions requirements for a macroprudential policy to attain financial stability of the financial system.

This paper is organized as follows. Section 2 provides a review of literature pertaining to the history, definition, and the importance of macroprudential policy. Section 3 critically analyse the existing studies of both theoretical and empirical research on macroprudential policy from various aspects. Finally, Section 4 is the conclusion and recommendations for further research.

2. Macroprudential Policy: History, Definition, and Its Importance

Financial crises, throughout history, have resulting in the transformation of regulatory process. The well function of economy and financial system are characterized these transformations (Widmaier, Blyth, & Seabrooke, 2007). Nonetheless, the question of interconnectedness among financial institutions have neglected in account of such transformations (Bell, 2011). Likewise, financial regulation and supervision has largely ignored in their systemic and macroeconomic consequences (Blanchard, Ariccia, & Mauro, 2010). In the aftermath of global financial crisis in 2008, there has been renewed interest in understanding the linkages among financial institutions, macroeconomic activity, and financial stability. During this period, the term of macroprudential has received considerable attentions among policy makers and regulators.

Historically, macroprudential is not a new terminology in economic literature. The first attempt on macroprudential was made during the meeting of Cooke Committee[2], the forerunner of BIS (Baker, 2013a, 2013b; Blundell-wignall & Roulet, 2014). The concern was about to overcome the problems associated with a financial institution that could lead to severe systemic financial implications. In the midst of 1980s, BIS launched a report defined macroprudential policy as a set of policies to promote the soundness of overall financial system and payments mechanism (BIS, 1986). In the early 2000, (Crockett, 2000) has disaggregate the function between microprudential and macroprudential policies. While the former is focused on stand-alone financial institution, the latter dealing with financial system as a whole.

Nonetheless, the macroprudential ideas were far from being implemented by regulators and policy makers in the early 2000s. Little attention was given to implement regulatory ratios, such as, capital ratios or loan-to-value ratios, as cyclical policy tools (Blanchard, Ariccia, & Mauro, 2010). In fact, in 2003, Alan Greenspan[3] had dismissive the macroprudential advocates in maintaining the stability of financial system. As pointed by Borio[4], 'a decade ago, the term of macroprudential was rarely used, the policy makers and regulators have little interest to engage with this concept'. A number of macroprudential advocates following financial crisis of 2008 were actively promoted these ideas, *inter alia*, Borio, White, Persaud, Goodhart, and Haldane (Baker, 2013a). Increased evidence that strengthen macroprudential regulations amongst policy makers was surely reinforced by macroprudential advocates.

In the aftermath of financial crash in 2008, macroprudential became the centre policy agenda and driving the attention amongst regulators in both developed and developing countries. It is interesting to note that from the late 2008 onwards, macroprudential policies dominate in policy makings circles in a time span of little over six months (Baker, 2013a, 2013b). The development of macroprudential ideas was instantaneous and dramatic in short time span. In fact,

[2] In 1979, the Cooke Committee (the forerunner of BIS committee) used the word of 'macroprudential' to refer of how problems associated in particular institutions could led to have systemic impacts.
[3] In 2003, Alan Greenspan, the former Federal Reserve Chairman, had underestimate the macroprudential analysis and arguments in the meeting at the Kansas City Federal Reserve. He disbelieved with the dangers of the inflate financial boom. Many of other regulators had the same view with Greenspan in that meeting.
[4] In 2009, Claudio Borio, the Director of Research at Bank for International Settlements (BIS) delivered a speech of how macroprudential was moved from obscurity into centre policy agenda amongst regulators. In that, he said that, 'we are all macroprudentialist now'.

in this period, macroprudential became recognized as a political priority amongst political leaders of the G20 countries[5]. Likewise, this policy is also established in the work programmes of standard-setting bodies, i.e. BIS, IMF, and national central banks. In short, Table 1 below shows the brief history of macroprudential policies in a chronological order.

Table 1. Chronological development of macroprudential policy and regulation

Year	Main event
1979	The meeting of Cooke Committee, the forerunner of BIS, firstly introduced the terminology of macroprudential
1986	BIS launched a report on macroprudential. They define macroprudential as a set of policies to ensure the soundness of financial system and payment mechanisms
2000	BIS delineates the features between macroprudential and microprudential policy
2003	Little attention has been given on the use macroprudential in the meeting of Federal Reserve at Kansas City, USA.
2008-onwards	The collapse of Lehman Brothers following with global financial crisis. The idea of macroprudential suddenly became renowned among policy makers in short period of time

Source: authors' compilation using various sources.

Albeit used in economic policy making, following the global financial crisis of 2008, macroprudential policy has proven as a difficult term to understand and even more harder to measure it (Baker, 2013b, Blundell-wignall & Roulet, 2014, Claessens, 2015). Given the complexities of financial system and probability of financial crisis is unknowable, macroprudential policy has been associated with different economic circumstances to address the objectives of preserving financial stability. There is no commonly shared definition of macroprudential policy. Many scholars agree that macroprudential policy is seen as aiming at aiming financial stability by adopting policy measures toward risk affecting the financial system as a whole (Agénor & da Silva, 2012; Baker, 2013; Cerutti, Claessens, & Laeven, 2015; Engel, 2016; Galati & Moessner, 2013).

BIS (2010) defines macroprudential as regulatory policies that have an objective to ensure the stability of financial system and reduce the potential of systemic risks against domestic and external shocks, and assert their effectiveness and continuous function. In more specific,

[5] The member of G20 countries consist of finance ministers and central bank governors of 19 countries: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, South Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, United Kingdom, and United States – together with European Union (EU).

macroprudential policy has two dimension: time dimension and cross-sectional dimension (Borio, 2010). The time dimension covers procyclicality of financial system, that is, the tendency for financial variables to fluctuate during the up phase of economic cycle. While cross-section dimension associated with the systemic risk as a result of interconnectedness of financial institutions and market that can jeopardize financial system as a whole.

The main macroprudential concept is the collective systemic outcomes that matter instead of individual action (Baker, 2013b). From macroprudential point of view, to make individual institution safe does not necessarily make the whole financial system safe. As a consequence, macroprudential views that regulators should implement top-down approach to ensure the stability of entire system. The main advantage of having macroprudential policy is to improving the financial stability in the economy (Ghosh, 2016; Zdzienicka, Chen, Diaz Kalan, Laseen, & Svirydzenka, 2015). To date, there is a bulk of literature on the impact of macroprudential policies in addressing the soundness and stability of financial system. Changes in macroprudential policies have been typically found improves the stability of financial system (Bruno & Shin, 2014; Claessens, Ghosh, & Mihet, 2013; Cornford, 2015; Rubio & Carrasco-Gallego, 2014).

As noted earlier, macroprudential measures to limit the risks and cost of systemic crises by addressing the interconnectedness among financial institutions and procyclicality of financial system (Claessens et al., 2013; Ghosh, 2016). In other words, a major role of such policies is to ensure the soundness and stability of financial system. To have a better understanding in the concept of macroprudential, one needs to understand the features of macroprudential in comparison with microprudential policies. A comparison of these two is shown in Table 2.

Table 2. Comparison between macroprudential and microprudential policies

Details	Macroprudential	Microprudential
Short-term objective	Impeding financial distress to expand	To avoid a default of one financial institution
Long-term objective	To prevent the costs of systemic crises in the economy	To protect investors and depositors
Risk nature	Focus on collective behaviour of financial institutions	Focus on behaviour of one financial institution

Correlation among financial institutions	Important	Not considered
Direction of prudential controls	Top-down: in dealing with systemic risk	Bottom-up: in dealing with risks of one financial institution

Source: arranged by the author using Borio (2003)

Following the recent financial crisis of 2008, there has been considerable instrument of macroprudential policies worldwide. Among other things, such as a maximum loan-to-value (LTV) ratio which have been adopted in several countries, i.e. New Zealand, Canada. Other type of this instrument includes a ceiling on the debt-to-income (DTI) ratio for home mortgage that has been implemented in United Kingdom. In most cases, the present macroprudential instruments are used together (Claessens, 2015).

3. Insights from Macroprudential Literature

The selected sample of the literature on macroprudential policy has been categorized into theoretical and empirical research from various sources mainly within the major publishers in economics and finance subjects. The number of articles with specific discussion on macroprudential from these publications are 774. Turning to the distribution of studies by category, Figure 1 exhibits the distribution of the sample of the studies according to category. Notice that most of studies on macroprudential policy is dominated by theoretical investigations. This category constitutes roughly about sixty per cent out of total number of reviewed literature. This trend indicates that both financial systems (conventional and Islamic financial system) are vulnerable to systemic risks. Therefore, research in macroprudential policy related issues are required to provide better understanding in preserving the stability of these systems.

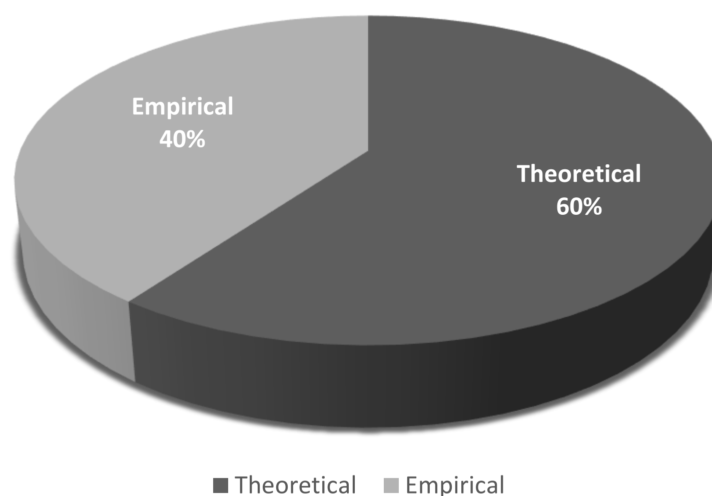
3.1 Macroprudential Policy: Theoretical Perspectives

3.1.1 Macroprudential policy: conventional perspectives

In the first category of research, the literature concerning around the underlying theoretical of macroprudential policy. Debate is still continual among academics, practitioners, and policy

makers on the theoretical nature and performance of the policy. The formulation of macroprudential policy comes in ensuring the soundness and safety of the financial system (Claessens, 2015; Mishkin, 2009; Tomuleasa, 2015). Prior to the crisis, both academia and regulators had focuses on the stability of individual financial institutions, and not the overall financial system. In other words, before the crisis, the greater attention has been paid to microprudential policies to preserve financial stability.

Figure 1. Distribution of selected studies on macroprudential



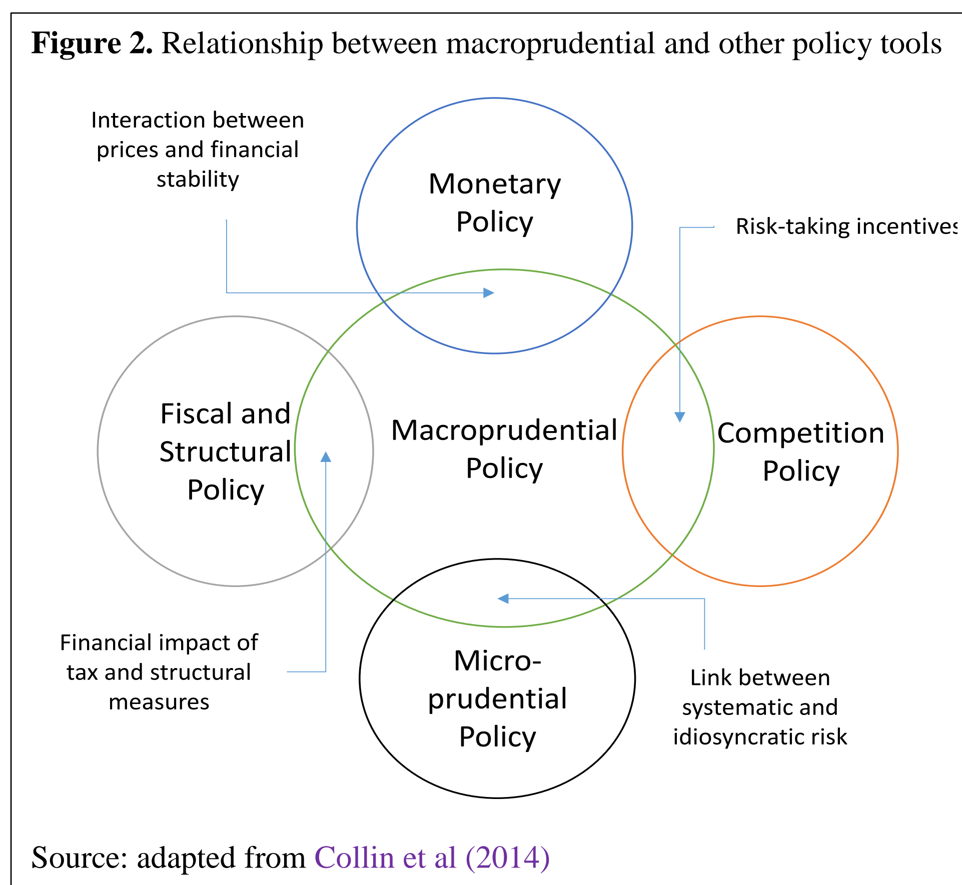
Source: authors' own compilation

The discussion also touched on the linkages between monetary and macroprudential policy, especially in the aftermath of recent financial crisis (Andriushin & Kuznetsova, 2013; Blanchard, Ariccia, & Mauro, 2010; Buiter, 2014; Cagliarini, 2016; Claessens, 2015; Mishkin, 2009). According to Blanchard, Ariccia, & Mauro (2010), it seems better combining monetary and macroprudential policy. The former policy deals with aggregate activity and inflation, while the latter policy to deal with excess leverage, excess risk-taking, and deviation of asset prices from fundamentals. Similarly, Andriushin & Kuznetsova (2013) also explain that macroprudential tools do not so much replace monetary policy but supplement it. According to them, its important for regulators to determine their orientation whether to achieve monetary stability or macro-financial

stability. Buiter (2014) added that it is necessary to coordinate the use of monetary and macroprudential instrument to mitigate the procyclical consequences.

The similar line of research from Mishkin (2009) makes noteworthy contributions to understand macroprudential and monetary policies. The dichotomy between monetary and macroprudential policy is a false thought, since these two policies are interlinked to each other. For example, if interest rates are kept low to stimulate the economy, there is a greater chance that a credit bubble might prevail. Accordingly, this may need macroprudential policy to ascertain that credit bubble does not develop. In Malaysia, Aziz (2008) asserted that the combination between macroprudential and other tools, including monetary, microprudential, and fiscal policy tools have demonstrated to improve the stability in financial system[6]. Figure 2 illustrates the linkage between macroprudential and other policy tools.

Figure 2. Relationship between macroprudential and other policy tools



Source: adapted from Collin et al (2014)

[6] On December 2012, the former Governor of Bank Negara Malaysia (BNM), Zeti Akhtar Aziz, had delivered a speech at Islamic Development Bank (IDB) inaugural lecture on Islamic economics, finance, and banking in Jakarta, Indonesia.

Another important issue to be noted here is the lack of analytic frameworks on macroprudential instruments (Andriushin & Kuznetsova, 2013; Arnold, Borio, Ellis, & Moshirian, 2012; Cagliarini, 2016; Castelnuovo, Lim, & Robinson, 2016). Unlike monetary policy that has a common framework over last two decades, research on macroprudential policy is still in infancy stage and far from being able to provide a common analytical framework. To date, there are fragmentary approaches suggested by macroprudential experts to mitigate systemic risks (Andriushin & Kuznetsova, 2013). The reason for this is due to considerable differentiation in the forms of financial institutions and innovation in the financial products across the markets.

Other research argues that lack of theoretical work could leads macroprudential policy seems problematic (Arnold, Borio, Ellis, & Moshirian, 2012). Policymakers often rely on the experience of other countries to guide them on good practice of macroprudential policy. Particularly, there is no 'one size fits all', and that different approaches might be effective depending on the country specifics[7]. A more recent study also reveals that lack of analytical framework about the efficacy of macroprudential policy could weaken in the use of this policy (Cagliarini, 2016). In particular, most of macroeconomist have merely considers the dynamic stochastic general equilibrium (DSGE)[8] model to think about macroprudential policies. Notice that this model is complex and perplexing to understand the mechanisms by which macroprudential policy work.

The debate continues to evolve on the effectiveness of macroprudential policy (Andriushin & Kuznetsova, 2013; Ascarya et al 2016; Galati & Moessner, 2013). Ascarya, Rahmawati, & Karim (2016) believe that the effectiveness of macroprudential policy depends on the adequate of data, rigorous information, and extensive research. In similar vein, Andriushin & Kuznetsova (2013) argue that the effectiveness of macroprudential policy depends on (i) the precision of their coordination, (ii) the country specific characteristics, and (iii) the vulnerability of systemic risks factors. The effectiveness of this policy is characterized by the decreasing correlation between lending growth and dynamics of gross domestic product (GDP). Recently, Galati & Moessner

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[7] See for example the discussion of the regulatory harmonization in Humphery-Jenner (2012), Weatherhill (2012), and Lajis et al. (2016).

[8] Dynamic stochastic general equilibrium (DSGE) model is a branch of applied general equilibrium theory that give influence in contemporary macroeconomics, including macroprudential theory.

(2013) gave comprehensive review on macroprudential. They argue that its complicated to assess the effectiveness of macroprudential policy, as these measures are combined with other policies. The challenge remains due to the scarcity of data to conduct empirical research in the field. Moreover, they believe that its too early to assess the effectiveness of the tools that were launched only few years ago.

3.1.2 Macroprudential Policy: Islamic Perspectives

In Islamic economics and finance, macroprudential policy and regulation are relatively a new concept. Albeit there are some microprudential studies in Islamic banks (Errico & Farahbaksh, 1998; Chapra & Khan, 2000; Hawary, Grais, & Iqbal, 2004; Sundararajan & Errico, 2002), however, it is hardly any research on macroprudential. Several studies are named in literature that address the theoretical concept of macroprudential from Islamic point of view (Arvai, Prasad, & Katayama, 2014; Ascarya, Rahmawati, & Karim 2016; Chowdhury & Islam, 2011; Hadian, 2016; Lajis, Bacha, & Mirakhor, 2016; Yoshida, 2016; Zulkhibri & Naiya, 2016).

Many scholars believe that Islamic financial system is relatively stable because of some intrinsic elements and moral values enshrined in the Shari'ah principles (Buiter, 2014; Galati & Moessner, 2013; Hadian, 2016; Nachane & Islam, 2012; Yoshida, 2016). These elements such as the prohibition of interest in deposit-lending activities, the condemnation of leverage, and excessive speculation that trigger financial shocks in conventional peers (Buiter, 2014). Moreover, Islamic finance encourages profit-loss sharing (PLS) instruments that have a crucial impact to the stability of Islamic financial system. In this sense, Chapra (2007) argues that PLS contract will ensure the greater discipline by making Islamic bank more vigilant in lending activities, at the same time, the depositors more cautious with the health of Islamic banks. Ultimately, such discipline carries the greater stability and even greater efficiency in Islamic financial system.

It has been acknowledged that Islamic finance could be the solution to mitigate financial instability problems. Buiter (2014) encourages all stakeholders in financial sector should adopt Islamic finance. The excessive debt in the public sector, banking sector, and households sector should be either write down or converted into equity. The study encourages households sector to

convert excessive mortgage into Islamic-style mortgage. While for banking sector, it suggests to convert excessive leverage into Islamic equity. Given the facts about the salient features of Islamic financial system, one may conclude that Islamic financial system has intrinsic stability rather than conventional-based system.

The question arises whether the design of macroprudential framework should be taken in place to maintain the stability of Islamic financial system. Until recently, there is a debate among Islamic economists in the use of macroprudential policy. One group of scholars believes that Islamic finance still needs for macroprudential policy although they have a greater stability. In this regard, Ascarya, Rahmawati, & Karim (2016) believe that macroprudential policy should be conducted in Islamic financial system, since this system is operated under a dual financial system with conventional peers. Therefore, Islamic financial system is not immune to financial shocks because of several deficiencies occurred, for instance, natural causes and deviations from Islamic moral norms.

In practice, Islamic banks are diverge from its profit-loss sharing principle and still largely based on mark-up or profit margin instruments (Chong & Liu, 2009). Consequently, macroprudential policy is required to enhance resilience and stability of Islamic financial system. This is supported by Hadian (2016) suggests that Islamic finance subjected to macroprudential regulations similar with conventional counterparts. The study argues that Islamic banks, to some extent are exposed to externalities that create systemic risks and financial imbalances. In similar vein, Oseni (2015) also advocate the use of macroprudential policy in Islamic finance. The reason for this is to prevent systemic risks associated in the Islamic financial system.

Other group of scholars, however, cast a doubt in the use of macroprudential policy in Islamic financial system (Zaman, 2013; Yoshida, 2016). The lecture delivered by Zaman (2013),[9] pointed that morality and social norms are the key principles to the Islamic approach in regulating financial markets. He implicitly feels sceptical in the use of macroprudential policy in Islamic financial system as this system has different structure and moral norms. Philosophically,

[9] In 2013, Asad Zaman delivered a speech at the Bank of Indonesia International Seminar of Islamic Finance in Bali, Indonesia.

macroprudential regulation in conventional system allows greed and profit seeking without any regards to others. This practice should be regulated to ensure the stability of this system. Concurrently, regulators in conventional system should be just, ethical, and ensuring the traders do not make any harms to society. The current structure most likely will fail because profit-seeking norms eventually corrupt the regulators. These regulation problems may not be arise in Islamic financial system because this system has different type of institutional structure and moral values enshrined in Shari'ah.

Along the same line of research, it is argued that the potential mismatch most likely will occurred between macroprudential regulation and Islamic finance (Yoshida, 2016). The study argues that macroprudential policy heads for the opposite direction that Islamic finance aiming at. In this regard, macroprudential policy aiming to maintain stability in the financial system by the way of segregating banking operations of deposits and lending activities from equity investment[10]. Meanwhile, Islamic finance is more likely to encourage equity-based instruments in accordance with Islamic principles. In summary, this policy challenges the philosophy of profit-loss sharing (PLS) enshrined in Shari'ah principles.

3.2 Macroprudential Policy: Empirical Analysis

3.2.1 Financial stability and systemic risks

Having discussed the theoretical works of macroprudential policy, we review empirical studies whose examine the linkages between macroprudential policy and stability in Islamic financial system. The importance to preserve financial stability and to mitigate systemic risks is what macroprudential policy aiming at. With particular reference to Islamic banks, a number of empirical studies have examined the relationship among macroprudential approach, financial stability, and systemic risks (Ali, 2016; Al-khouri & Arouria, 2015; Blundell-wignall & Roulet, 2014; Louati & Boujelbene, 2015).

[10] The Dodd-Frank Act in the US does not allow for deposit-taking banks from principal investment (equity investment) to eliminate business and market risk.

Similar with conventional-based system, the literature in Islamic finance has also highlighted the importance distinction between tools that address time series dimension of financial stability, i.e. procyclicality in financial system (Ascarya, Rahmawati, & Karim, 2016), and cross-section dimension, i.e. how risk is distributed within financial system (Alamad, 2016; Aysan, Disli, & Ozturk, 2016; Ghosh, 2014, 2016; Zhang & Zoli, 2016). Ascarya, Rahmawati, & Karim (2016) examine procyclicality of Islamic and conventional banks in Indonesia by using a set of econometric techniques. It shows that the Islamic bank is more procyclical rather than conventional peers. Nonetheless, this procyclicality of Islamic bank can be regarded as good procyclicality since it does not create credit bubbles, so that it can bring benefits for economic growth in the long-run period. Concerning with this, the literature has highlighted several instruments to address procyclicality, for example loan-loss provisions (Galati & Moessner, 2013; Laeven, 2013; Nachane & Islam, 2012). A loan-loss provision[11] is an important instrument through which the mis-assessment of risk can strengthen financial cycle (Galati & Moessner, 2013).

Zhang & Zoli (2016) investigate similar issues on the use of macroprudential policy in reducing procyclicality in Asian financial markets, including Muslim dominated countries such as Malaysia and Indonesia[12]. In particular, macroprudential instruments have been widely used in Asian compared to other regions, especially for housing related measurements. By using panel regressions, the results show macroprudential instruments have several times used as counter-cyclical tools to dampen financial instability. In addition, housing related instruments, including LTV and DTI ratios, can reduce credit growth and housing price inflation in Asia. In short, macroprudential instruments can mitigate systemic risks in Asian region and therefore can be beneficial tools for policy makers in the expansion stage of financial cycle.

The importance of early warning indicators have been studied in Islamic finance literature (Mohamed, 2016). Early warning indicators most likely will send the warning signals before the vulnerabilities spread too large in financial system. Several Muslim countries, such as Qatar,

[11] Banks have considerable policy of their loan-loss provisioning for bad loans. When comes to mounting losses, banks will hold back on the provisioning for bad debt to preserve their capital.
[12] In this study, Zhang & Zoli (2016) categorize the sample into (1) Asian advanced economies, i.e. Hong Kong, Taiwan, Singapore, and Korea, (2) Asian Emerging Economies, i.e Malaysia, Indonesia, Thailand, Philippines, Thailand, Vietnam, India, and China.

United Arab Emirates (UAE), Oman, Indonesia, and Malaysia, have developed early warning indicators instruments for macroeconomic surveillance. In particular, CAMEL[13] specific variables is a good early warning indicator of systemic banking problems in the Gulf Cooperation Council (GCC) countries (Maghyereh & Awartani, 2014).

Another line of research on financial stability examines the systemic risk problems of individual Islamic financial institution or Islamic financial system as a whole (Blundell-wignall & Roulet, 2014; Cerutti, Claessens, & Laeven, 2015; Cevik & Teksoz, 2013; Ghosh, 2014). This research highlights interconnectedness among financial institutions and the availability substitutes. Systemic risks remain need to be addressed by regulators as this leads to financial crisis and worse economic outcomes.

Blundell-wignall & Roulet (2014) argue systemic risks arise because financial institutions are actively engaged with three main activities: (1) credit intermediation, (2) maturity transformation, and (3) leverage. The study examines the impact of macroprudential policy on bank systemic risk in developed and emerging countries, including some Muslim nations such as Malaysia, Indonesia, Turkey, Egypt, Kazakhstan, Pakistan, Morocco, and Tunisia[14]. The measureres of bank riskiness is distance-to-default (DTD)[15], while taking into account systemic importance, leverage, and business model aspects in banking sector. The findings suggest that there is high complexity and interdepence in the financial system. The calibraton of macroprudential policy seems relatively difficult than counter-cyclical rules. Much consideration should be taken in adopting macroprudential policy in the face of bank systemic risk.

The identification and measurement of systemic risks due to contagion effect in interbank and financial markets (Claessens, 2015). Interlinkages and systemic importance may be existed among non-banking institutions, such as money market, hedge fund, or shadow banking. This spillovers issue is also relevant in Islamic finance due to coopeartion between regulators across

[13] CAMEL variables consist of capital, asset quality, management quality, earnings, and liquidity
[14] In total, there 29 countries are included in the final sample; Argentina, Brazil, Bulgaria, Chile, China, Czech Republic, Egypt, Hungary, Iceland, India, Indonesia, Israel, Kazakhstan, Korea, Latvia, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, Romania, Russia, South Africa, Sri Lanka, Thailand, Tunisia, Turkey, and Venezuela
[15] Distance-to-default is derived from Black-Scholes options pricing model (BSOPM)

jurisdictions, and differences in treatment between Islamic and conventional finance (Hasan & Dridi, 2011; Kammer, Norat, Piñón, Prasad, & Towe, 2015). Hence, this require coordinated action in Islamic finanical system worldwide to detect potential sources of systemic risks. In micro-level,

3.2.2 Risk-taking activities

The second group of empirical literature focuses on the linkages between macroprudential policy and risk-taking activities in financial system. This includes the role of macroprudential policy in influencing risk-taking of Islamic banks. To the extent that how much credit, capital, and liquidity affect bank risk-taking are also taking place (Alamad, 2016; Aysan, Disli, & Ozturk, 2016; Ghosh, 2016).

Ghosh (2016) investigates the extent to which macroprudential policy give influences on bank risk-taking across Islamic and conventional banks in GCC countries. To answer the research questions, the study used the generalized method of moments (GMM) technique. The study points three important results: (1) Not all of macroprudential instruments are effective in dampening impact on bank risk-taking, (2) The impact of macroprudential policy on bank risk-taking between Islamic and conventional banks are not identical, (3) In particular, capital-related measures (i.e. dynamic provisioning) is the most effective tool in mitigating excessive risk-taking compared to credit- (i.e. DTI ratio) and liquidity-related measures (i.e. reserve requirements). Taking these concerns together, the proper calibration of macroprudential policy can effectively curb systemic risks, concurrently, can ease the burden of monetary policy. In similar vein, Aysan, Disli, & Ozturk (2016) indicate that macroprudential policy may reduce bank incentives to risk-taking in Turkish banks including participation banks[16]. Bank risk-taking in Turkey has increased remarkably particularly in the aftermath of financial crisis. Therefore, macroprudential policy is not completely effective in curbing bank related concerns.

The link between bank risk-taking and financial stability has been studied in Islamic finance literature (Al-khouri & Arouria, 2015). The paper examines the relationship between credit growth and stability of GCC banks. By using GMM technique, excessive level of risk-taking leads

[16] In Turkey, Islamic banks are called as participation banks. This name is essentially recalls equity based financing through which customers participate in risk-return sharing.

to a decrease in bank stability. A high level of bank risk-taking is likely to have moral hazard problems and exacerbate fragility in banking institution. In particular, during financial crisis, credit growth has positive impact in influencing banks stability in GCC countries. In comparison, Islamic banks have a low level of credit risk and relatively more stable rather than conventional counterparts. The finding is contradict with the study by Ashraful, Chowdhury, & Haque (2016) which indicated that Islamic banks usually have a high level of credit risks due to their nature of trade-based investment. Cerutti, Claessens, & Laeven (2015) investigate the linkages between macroprudential policies and developments in credit and housing markets in developed and emerging countries covering some selected Muslim countries such as Bangladesh, Indonesia, Kazakhstan, Morocco, Pakistan, Tajikistan, Tunisia, and Turkey. By using a GMM estimation technique, macroprudential policies are frequently used in emerging economies. These policies are effective in reducing the growth rate in credit and in dampening the financial cycles.

Notably, the issue of banking system stress test is an interesting topic to be addressed, including in Islamic banks (Ali, 2016; Elsiefy, 2012). In particular, empirical research in bank stress testing can shape recent progress in the area of risk management framework. Islamic banks have unique risks for instance Shari'ah risk, fiduciary risk, and displaced commercial risk. Nonetheless, to the extent both Islamic and conventional banks use stress-testing design, which are not very much different. As a matter of facts, regulators in Muslim countries encourage Islamic banks to develop specific scenarios in part of stress testing approach.

4. Conclusion

This paper reviews and assesses selected literature on macroprudential policy within the context of Islamic banking and finance. The selected samples of the literature are categorized into theoretical and empirical research. To date, only limited empirical research and analytical tools are available for macroprudential policy framework in Islamic financial system. In contrast with conventional literature, research on macroprudential policy in Islamic financial system is still in infancy stage and far from being able to create analytical framework. Nonetheless, macroprudential policy has gained attention among regulators and academicians in the field of Islamic economics and finance particularly in the aftermath of financial crisis.

The theoretical works of macroprudential policy in Islamic finance points to mixed results. Debate is still continued among Islamic economists on the nature of the policy from Islamic point of view. Some research supports the need for macroprudential policy framework for Islamic financial institutions; others question whether this policy is applicable with Islamic moral values. In addition, the empirical investigations on macroprudential has been categorize into two main issues: (i) financial stability and systemic risk, and (ii) risk-taking behaviour. On the issues of financial stability, the literature provides support to the use of macroprudential policy in preserving financial stability and mitigating systemic risks in Islamic financial system. Finally, for risk-taking behaviour, the calibration of macroprudential instruments is frequently effective in curbing Islamic bank risk-taking.

As for methodology, the models used in empirical research of macroprudential policy are not conclusive in one direction. Several econometric techniques are utilized for investigating macroprudential policy, *inter alia*, ordinary least square (OLS), vector auto-regression (VAR), autoregressive distributed lag (ARDL), general autoregressive conditional heteroscedasticity (GARCH), and generalized method of moments (GMM) estimation (Ascarya, Rahmawati, & Karim 2016; Blundell-wignall & Roulet, 2014; Cerutti, Claessens, & Laeven, 2015; Ghosh, 2014, 2016). Therefore, for policy makers, the literature suggests that there is a need to provide macroprudential measures that comply with Shari'ah principles in order to maintain financial stability and mitigate systemic risks for Islamic financial industry.

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Appendix 1. Summary of conceptual literature on macroprudential policy with dual banking system

No	Author	Nature of Research	Objectives	Methodology	Findings
1	Arvai, Prasad & Katayama (2014)	Conceptual	to discuss the importance of macroprudential policy in the GCC countries taking into account particular characteristics of GCC economies	Descriptive	Macroprudential policy is an essentially important policy tool in the GCC countries that have been used over many years, but they have implemented without a formal adequate framework & structural reforms. These are required to ensure coordination among regulators and to ensure financial stability. Among of the toolkits including early-warning system (EWS) & macro stress testing to monitor systemic risks.
2	Asad Zaman (2013)	Conceptual	to discuss an Islamic approach to regulation of financial markets	Descriptive	Macroprudential regulation in conventional system allows greed and profit seeking without any regards to others. This practice should be regulated to ensure the stability of this system. Meanwhile, morality and social norms are the key principles to the Islamic approach in regulating financial markets
2	Ascarya, Karim, Rahmawati, Muqorrobin & Wiranatakusuma (2016)	Conceptual	to investigate risks exposed in Indonesian Islamic banks and to examine of how macroprudential policy be implemented in dual banking system	Descriptive	Shari'ah non-compliance risks are among the peculiarity of unique risks in Islamic banks. In the long-run, some calibration are required to implement macroprudential policy in dual banking system (1) instruments which affecting financial sector, (2) instruments which affecting real sector, (3) instruments which include conventional & Islamic macroprudential

3	Aysan, Dolgun & Turhan (2013)	Conceptual	to critically analyze performance, governance structure, and deregulation of participation banks in Turkey	Descriptive	Turkish participation banks are more countercyclical and liquidity buffers. In that, to reduce the financial imbalances of participation banks, the microprudential approach of Islamic finance needs to be coupled by the macroprudential framework
4	Buiter (2014)	Conceptual	To critically examines the role of central banks in the mitigating financial instability	Descriptive	Among of the solutions in mitigating financial instability problems are: (1) introduce Islamic finance for all. Too much debt in the public, private, and household sector should be either write down or converted into equity. For household, the debt problem may be converted into an Islamic style-mortgage. For banks, excessive leverage can be converted into equity. For public debt, equitize public debt outstanding by using a range of useful risk-sharing instruments. (2) The need for macroprudential instruments to mitigate procyclical consequences, particularly macroprudential countercyclical instruments (capital requirements, LTV ratios, DTI ratios). At the same time, it would be need to coordinate monetary and macroprudential instruments
5	Cagliarini (2016)	Conceptual	To discuss macroeconomic consequences of macroprudential policies	Descriptive	Many macroprudential instruments do not target the underlying causes of financial instability problems. Among the weaknesses of macroprudential policy is the lack of analytical framework about the effects (and side effects) of this policy. The current model, such as DSGE (Dynamic stochastic general equilibrium) models, are not a good tool because of their complexity and lack of adequacy to study macroprudential policy

6	Castelnuovo, Lim & Robinson (2016)	Conceptual	To analyze macroeconomic consequences of macroprudential policies	Descriptive	Macroprudential is at the main agenda of policy discussions in the following years. Some theoretical and practical issues about macroprudential: (1) The clear objective(s) of these policies, is it to reduce systemic risk and/or dampen economic cycles? (2) The need to review basic economic principles governing policy intervention; i.e. market failures & externality, (3) Which agency should be responsible for macroprudential? (4) Are we over-reacting towards global financial crisis?
7	Chowdhury & Islam (2011)	Conceptual	to shed some light on the role of macroeconomic policy-mix, including macroprudential policy, in achieving the Millenium Development Goals (MDG)	Descriptive	Macroeconomic policy-mix in developing countries is in part to receive support from international financial institutions. However, in most cases, they have failed to generate growth and reduce the poverty. Moreover, macroprudential is designed to response and preventing global financial crisis.
8	Claessens (2015)	Conceptual	to reviews existing research on macroprudential policies, covering its tools, usade, and lessons form experiences	Descriptive	The literature on macroprudential, in many ways, has not started from externalities and market imperfections that may lead to excessive procyclicality and build-up systemic risks. Identifying the source of externalities can help in determining the best corresponding of specific macroprudential policies. Overall, the most usage of macroprudential instruments can be named as follows (1) LTV, (2) DTI, (3) Credit growth, (4) Foreign currency, (5) Reserve requirements, (6) Dynamic provisioning

9	Mauro, Caristi, Couderc et al (2013)	Conceptual	to examine the development & prospects for Islamic fiannce with a special reference on Europe. It comprises of risks associated, corporate governance, stability and policy conducted in both conventional and Islamic finance	Descriptive	In the wake of global financial meltdown, there is a debate whether Islamic finance can play a role in the stabilization of global financial system. In the EU, Islamic finance is still in infant stage. The conduct of macroprudential policy should be compatible and carefully evaluated with Islamic law. Consequently, one needs to develop for a Shari'ah-compliant macroprudential policy
10	Galati (2013)	Conceptual	to identify the usage of macroprudential tools, their implementation, effectiveness, and their impact on macroeconomic outcomes	Descriptive	Macroprudential is aimed to prevent systemic financial distress and also tailored to achieve financial stability
11	Hadian (2016)	Conceptual	to discuss the applicability of macroprudential instruments in Islamic economic system	Descriptive	Macroprudential policies are still debatable issue and suffer from a lack of thorough definition and mandate. These policies do not address the main causes of systemic risk and externalities in conventional system. Moreover, regulators in Islamic financial system should encourage financial intermediaries to realize a genuine Islamic finance by providing the required infrastructures. In the short-run, it is indispensable to consider macroprudential instruments which are compatible with Shari'ah principles.
12	Ishak (2013)	Conceptual	to discuss the applicability of macroprudential instruments in both	Descriptive	Islamic and conventional finance operate in similar environment. Both system are exposed to the high risk appetite from investors, excessive credit growth, and

			Islamic and conventional financial system		excessive exposure to real estate. Hence, macroprudential policy is required in a dual financial system
13	Krammer, Norat, Pinon et al (2015)	Conceptual	to discuss the specificities of islamic finance, covering regulation, policies, and its instruments	Descriptive	Macroprudential policies will play an important role in preventing the systemic risks in Islamic financial system. The interconnectedness among Islamic financial sectors and higher concentration of assets in cyclically sensitive sector, such as real estate and construction may amplify the potential for procyclical of risks. Moreover, most macroprudential instruments seem applicable to Islamic banks, such as countercyclical capital buffer, leverage ratio, dynamic provisioning, and sectoral risk weights. However, Islamic finance presents some peculiarity challenges for the implementation of macroprudential policies, i.e. different practices of Shari'ah-compliance, supervisory, & regulatory across jurisdictions. Hence, it is required to consider the unique characteristics of Islamic finance for the application of macroprudential policy.
14	Kardar (2011)	Conceptual	to discuss the evolving role of macroprudential policy and its implications in financial sector surveillance, special reference to Pakistan	Descriptive	Macroprudential policies are influenced by analytical, institutional, and political factors that require to be addressed through effective coordination & communication among stakeholders. In addition, It is required to review the inherent strengths of Islamic economic system and how it can contribute to preserve financial stability.

15	Lajis, Bacha, & Mirakhor (2016)	Conceptual	to examine the efficacy of Malaysian regulatory framework of for Islamic banks, in preserving financial stability and supporting real economy	Descriptive	The current regulatory framework unintentionally misaligns incentives and discourages Islamic banks to embrace risk-sharing principles for their financial instruments. Specifically, 67% of misaligned incentives pertain to prudential regulations, i.e. statutory reserve requirement (SRR), liquidity framework; others have negative effect against risk sharing. Hence, it is required for re-configuration of regulatory framework to better promotion of risk sharing.
16	Hazik (2016)	Conceptual	to discuss the need to have timely early warning indicators for macroprudential policies	Descriptive	Macroprudential policies are part of the policy implementation in emerging & developed markets, including in Islamic finance. The benefits of these tools are that they can reduce procyclicality and systemic risks. However, it is required to have some institutional reforms and early warning indicators to address the cyclical behavior in Islamic financial system
17	Nachane & Islam (2012)	Conceptual	to discuss the impact of regulations (monetary, fiscal, & macroprudential) in recent global crisis, special reference to South Asia	Descriptive	The various macroprudential measures (LTV, DTI, provisioning requirement) have salutary effect in mitigating severe consequences of the crisis in South Asia region: India, Pakistan, Bangladesh
18	Oseni (2015)	Conceptual	to examine the challenges of dispute management in Islamic financial services through *maqasid* Shari'ahh framework	Descriptive	It is needed to consider macroprudential policy reforms that based on *maqasid* Shari'ahh spirit to cater for systemic risks associated with the nature of Islamic finance

19	Tomuleasa (2013)	Conceptual	to address the issue of macroprudential policy with regard to its objectives, instruments, and the challenges	Descriptive	Due to high sensitivity prevailed in international financial markets, so macroprudential policy is required to support investor protection, mitigating systemic risks, and preserving financial stability.
20	Yoshida (2016)	Conceptual	to address the applicability of macroprudential instruments in Islamic financial system	Descriptive	The potential mismatch most likely will occurred between macroprudential regulation and Islamic finance. Macroprudential policy heads for the opposite direction that Islamic finance aiming at. In this regard, macroprudential policy aiming to maintain stability by the way of segregating banking operations of deposits and lending activities from equity investment. Meanwhile, Islamic finance is more likely to encourage equity-based instruments in accordance with Islamic principles
21	Zulkhibri & Naiya (2016)	Conceptual	to synthesize the literature on macroprudential policy in dual banking system, where both conventional and Islamic banks operate side-by-side	Descriptive	There is no 'one size fits all', different macroprudential models may be effective depending on country specific characteristics. Moreover, there is no differentiation between conventional and Islamic banks have been practiced by regulators with dual banking system. In fact, Islamic banks is still predominantly based on mark-up or profit margin instead off equity-based instruments

Appendix 2. Summary of empirical literature on macroprudential policy with dual banking system

No	Author	Nature of Research	Type of Research	Objectives	Methodology	Findings
1	Lee, Asuncion & Kim (2016)	Empirical	Effectiveness of macroprudential	to analyze how effectively macroprudential policies control credit growth, leverage growth, & housing price appreciation in selected developing Asian countries	Qual VAR Model	In developing Asia, macroprudential policies can promote financial stability. The three types of macroprudential policies - credit related, liquidity related, & capital related - are proved effectively for different types of macroeconomic risks. For example, in South Korea, credit tightening, i.e. loan-to-value & debt-to-income ratios had instantaneous effect in dampening rising in house price. Similarly, the authorities in Singapore had successfully dampening house price inflation by capping the loan-to-value ratio. However, in Indonesia, liquidity-tightening measures, i.e. reserve requirements, min holding period for short-term government debt had significant effect on credit expansion & leverage growth
2	Blundell-Wignall & Roulet (2014)	Empirical	Macroprudential, credit risk & risk-taking	to explores the issue of macroprudential with regard to the determinants of bank systemic risk, and the effectiveness of capital control	Panel Data Analysis	(1) Tier 1 capital ratio has negative relationship with the housing price cycle, which is appropriate for macroprudential policy in this sector (2) Capital control is not an appropriate macroprudential tool for emerging market economies (EMEs). From the analysis, capital controls lead to negative outcome of GDP growth.

3	Aysan, Disli & Ozturk (2016)	Empirical	Macroprudential & financial stability	to examine the effectiveness of macroprudential policies in the Turkish banking sector toward depositor discipline	Panel Data Analysis	After the adoption of macroprudential measures in Turkish banking sector, the depositor responses for poor bank performance get stronger, particularly in the aftermath of the 2008 crisis. In short, macroprudential measures have a positive effect on financial stability after the 2008 crisis. Moreover, depositor discipline varies across bank types. While the state-owned banks appear to have similar disciple with private bank counter banks, Islamic banks have more loose discipline.
4	Alamad (2016)	Empirical	Macroprudential, credit risk & risk-taking	to identify different types of risks that facing by Islamic banks in their liquidity modelling, to develop risk management framworks special reference in UK Islamic banks.	Qualitative: Case Study	Identifying and managing risks is crucial for the survival of Islamic banking systems. Moreover, five-step risk management framework: (1) identify and asses any potential risks, (2) establish the risk controls, (3) ensure formal risk reporting process, (4) Communicate this process to all staff, (5) Regularly assess the risk controls through stress testing & audit, will provide Islamic banks with a shield that prevents a potential failure that could result from any identified risks
5	Ali & Ariffin (2016)	Empirical	Macroprudential & financial stability	to examine the effect of global financial crisis on the soundness of banks in Pakistan with the application of macroprudential stress test, particularly CLSA stress test	CLSA-stress test	Global financial crisis has adverse effect on bank stability during crisis period (2007-2009) relative to post-crisis period (2009-2012). In more specific, under CLSA criteria's, Emirates Global Islamic banks, Dawood Islamic banks, IDBP, and Zarai Bank found under stress during the crisis. This is mainly due to the absence of early warning system in those banks.

6	Al-Khouri & Arouria (2016)	Empirical	Macroprudential & financial stability	to examine the relationship between bank stability, performance & credit growth for 59 GCC banks, including islamic banks	two-stage generalized method of moments (2-stage GMM)	Credit growth does not affect the bank stability in GCC banks. But, at a high level of credit growth, banks become less stable. Larger banks are likely to provide more credit and more profitable, but they are less stable than small peers. During financial crisis, credit growth has negative effect on profitability, while still having positive effect on stability. In comparison, credit growth has more negative effect on the profitability of Islamic banks rather than conventional ones.
7	Ascarya, Rahmawati & Karim (2016)	Empirical	Macroprudential & financial stability	to test procyclicality of Islamic and conventional banks in Indonesia in attempt for developing Islamic macroprudential policy	Ordinary Least Square (OLS), Error correction model (ECM), Autoregressive distributed lag (ARDL)	As GDP growth increases, the Islamic financing growth will increase more than conventional loan growth. It is suggesting that Islamic banks are more procyclical than conventional ones. Moreover, unlike conventional banks that create credit bubbles, the procyclicality in Islamic banks do not credit bubbles. Therefore, it can regard as a good procyclicality that can bring benefits to long-term economic growth.
8	Elsiefy (2012)	Empirical	Macroprudential, credit risk & risk-taking	to examine the resilience of both conventional and Islamic banks in Qatar	Stress test	Credit risks remain to represent as a major source of vulnerabilities for both Islamic and conventional banks. Moreover, Islamic banks are more exposed to credit risks than conventional ones. The impact of credit quality is more severe in Islamic banks than conventional banks. After the crisis, Islamic banks are more exposed to high credit risk compared to before the crisis.
9	Gosh (2016)	Empirical	Macroprudential, credit risk & risk-taking	to investigate the role of macroprudential instruments in influencing credit risk-taking in GCC banking sector	Generalized method of moments (GMM)	Not all of macroprudential instruments are exert similar impact. It appears that capital adequacy ratios and reserve requirements are effective in reducing the potential of systemic risks. Moreover, Islamic banks have lower credit growth & higher leverage than

						conventional ones. After the imposition of macroprudential policy, there is a difference in bank risk-taking for Islamic than conventional banks.
10	Husman (2015)	Empirical	Macroprudential & financial stability	to compare the stability of Islamic and conventional banks by investigating the sensitivity to the business cycle fluctuations, special case in Indonesia	Generalized method of moments (GMM)	Islamic banks are more stable than conventional ones. In applying macroprudential policy, the regulators should observe Islamic banks as cautiously as their conventional peers. Particularly, CAR as the buffer component in z-score should be regulated in similar ways for both Islamic and conventional banks
11	Zakaria (2015)	Empirical	Macroprudential, credit risk & risk-taking	to evaluate the systemic risks of the Moroccan banking sector	Conditional VaR, VECH model, BEKK model, CCC-GARCH, and DCC-GARCH	The distress on the level of banking system is almost perfect dependence. The contagion dimension of systemic risk in the Moroccan bank is procyclical. In addition, the two banks: ATW & BMCE contribute massively to the formation of contagion risk. From this point of view, it is important for regulators to consider macroprudential measures to prevent a systemic risk
12	Zhang & Zoli (2016)	Empirical	Macroprudential & financial stability	to evaluate the effectiveness of macroprudential tools in Asia and other regions	Event study, Panel data	Asian economies appear to have a greater use of macroprudential measures, particularly housing-related measured compared to other regions. In addition, housing-related measures such as loan-to-value ratio and housing tax measures have been effectively curbing the housing price growth, credit growth, and bank leverage in Asia.
13	Maghyereh & Awartani (2014)	Empirical	Macroprudential, credit risk & risk-taking	to investigate the probability of bank distress in GCC banking system	Early warning system, Hazard model	The institutional development index, banks-specific characteristics, CAMEL variables, systemic shocks, and macroeconomic environment are the leading variables to identify the probability of bank distress

14	Louati & Boujelbene (2015)	Empirical	Macroprudential, credit risk & risk-taking	to investigate the relationship between banking competition and financial stability of Islamic and conventional banks in MENA and ASEAN regions	Stochastic frontier approach	The increased competition in Islamic banks can promote the overall banking stability. Even though the competitiveness is high, Islamic banks are more risk-averse in their risk-taking behavior. This assessment is important particularly for macroprudential surveillance.
15	Malini & Hendri (2016)	Empirical	Macroprudential & financial stability	to measure the response of Shari'ah stock index toward macroprudential and monetary policy in Indonesia	Event study, bootstrap automatic variance ratio	Nearly 76% of Shari'ah stock prices had been reacted within 1-minute toward 36 macroprudential and monetary policies from Bank Indonesia. In addition, out of 2738 trading days, only 31 trading days were significant and associated with macroprudential and monetary policy. Most of investors need more time to absorb and adjust the application of macroprudential and monetary policy.
16	Ismal & Hidayat	Empirical	Macroprudential & financial stability	to find an ideal RR-FDR formula for Islamic banks in Indonesia	Simulation	It appears that Islamic banks in Indonesia do not have enough liquidity reserve to mitigate short- and long-term liquidity mismatch leading to liquidity pressure. It is recommended to have FDR with the range between 77% - 109% and RR of 5%.