

## TESTING THE PROCYCLICALITY OF ISLAMIC AND CONVENTIONAL BANKS IN INDONESIA\*

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### ABSTRACT

*Procyclicality of banking system is believed to be one of important sources of financial system systemic instability need to be addressed in macroprudential policy. This study aims to test procyclicality of Islamic and conventional banks in Indonesia using several quantitative methods as an early study in developing Islamic macroprudential policy.*

*The main results show that, using Ordinary Least Square (OLS), Error Correction Model (ECM) and Autoregressive Distributed Lag (ARDL), Islamic real financing growth will increase more than the increase of conventional real loan growth when real GDP growth increases, suggesting that Islamic bank is more procyclical than conventional bank. Further results show that procyclicality of Islamic bank does not create credit bubbles, so that it can be categorized as good procyclicality, which can be beneficial to long-term economic growth. Meanwhile, procyclicality of conventional Bank does create bubbles, so that it can be categorized as bad procyclicality, which amplifies the amplitude of business cycle, creates bubbles, builds up systemic risk and causes financial instability. Therefore, since Islamic bank has inherent stability and has closer link to the real sector, measures for Islamic macroprudential should be less than those for conventional macroprudential.*

**Keywords:** Procyclicality, Islamic Macroprudential Policy, Islamic Bank, Dual Financial System.

**JEL Classification:** E59, E69, G29

## 1. INTRODUCTION

### 1.1 Background

Since the collapse of the Bretton Woods Agreement (BWA) in August 1971, the gold standard system collapsed and a modern financial system started to form, which is characterized by volatility, exchange rate fluctuations and decline, excessive credit expansion, asset price bubbles, financial fragility, imbalances, and ultimately repeated financial crisis, such as the banking crisis in the UK (1973-1974), a deep recession in the industrial countries (1978-1980), the debt crisis in developing countries (1980-1982), the savings and loan crisis in Latin America (1980), the collapse of the capital market in the USA and the UK (1987), the collapse of a low-quality debt securities (1989), the financial crisis in

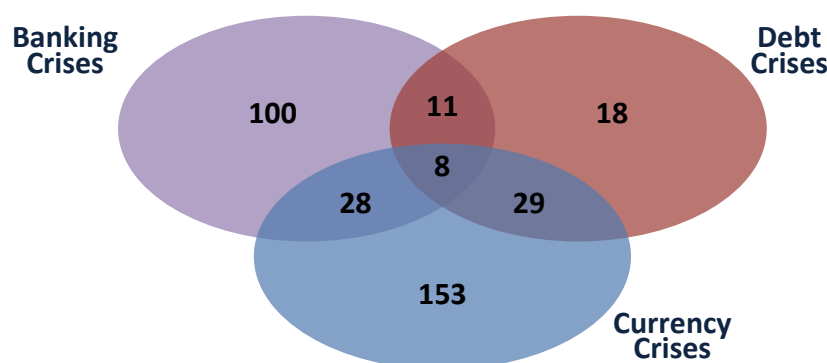
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Mexico (1994), the financial crises in Asian countries, Russia, Brazil and Argentina (1997-1999), as well as the global financial crisis (2007-2008) which has not been recovered until now and has spread to European countries such as Greece, Ireland, Portugal, Italy, Spain, Cyprus, Slovenia, Slovakia, Finland and Belgium.

After the collapse of BWA in 1971, financial crises have resurfaced more frequently and spread wider all over the world. The probability of systemic crises appears to have been rising (Bordo et al. 2001). There is no single country that could escaped from financial crisis, even for some countries that have generally followed some sound fiscal and monetary policies (Chapra 2008). Moreover, financial crises have evolved and happened not because of cyclical or managerial failures, but because of structural failures/fundamental deficiencies in various countries under very different regulatory systems as well as at different stages of economic development (Lietaer et al. 2009). Since the collapse of the BWA, Laeven and Valencia (2012) recorded that there have been 431 episodes of financial crises, including 147 banking crises, 218 currency crises, and 66 foreign debt crises, including 68 twin-crisis and 8 triplet-crisis (see Fig. 1).



Source: Laeven and Valencia (2008), with correction.

**Fig. 1** Financial Crises post Bretton Woods

Banking crisis was recorded as the second most frequent financial crisis and it was the prime cause of recent global financial crisis. The procyclicality of banking system, which refers to the interactions between the banking system and the real economy which are mutually reinforcing and tend to amplify the amplitude of the business cycle, has been known as one of important sources of systemic instability in the financial system.

Meanwhile, Islamic bank is a different kind of bank compared to conventional bank, which provides various Islamic financial services in accordance to Islamic teachings, especially it should be free from ribā (usury or interest), free from maysir (game of chance or speculation) and free from gharar (excessive uncertainty).

Conceptually, Islamic bank doing ‘true’ Islamic finance would not be susceptible to man-made financial crisis, which occurs due to the transgressions of Allah’s laws in financial dealings, especially in the abandonment of the main pillars of Islamic finance, namely prohibition of ribā (usury or interest), prohibition of maysir (game of chance or speculation) and prohibition of gharar (excessive uncertainty), in their many forms, as well as due to misbehaviors of economic actors, poor governance and unsustainable fiscal system (Ascarya 2013b). Meanwhile, natural financial crisis occurs due to natural phenomena, such as drought, natural disaster, natural business cycle, etc.

In the contemporary world of dual financial/banking system, ‘true’ Islamic finance/banking could not yet be fully applied and Islamic financial institutions, including Islamic bank, could

not yet operate fully in accordance to Islamic teachings. For example, main pillars of ideal Islamic finance/banking are still lacking in the real world application.

**Table 1** Some Essential Pillars in Islamic Economic System

PILLAR	ISLAMIC IDEAL	ISLAMIC CONTEMPORARY
Mode of Transaction	Main: PLS; and Trade (No <i>Riba</i> , <i>Gharar</i> and <i>Maysir</i> )	Main: Trade; and PLS (No <i>Riba</i> , <i>Gharar</i> and <i>Maysir</i> )
Money System	Full Bodied (or backed-up) Money	Fiat Money
Banking System	100% Reserve Banking	Fractional Reserve Banking
Zakat System	Obligatory Zakat (Tax on iddle asset); Redistribution	Voluntary Zakat; No redistribution

Consequently, Islamic finance/banking is still creating financial bubble through multiplier and leveraging of fractional reserve banking system. Islamic finance/banking is still susceptible to liquidity risks, since it is still dealing with mismatches, including maturity and nominal mismatches.

Nevertheless, empirical studies show that, although Islamic finance/banking is still far from the ideal, Islamic finance/banking is more resilience to financial instability/crisis than conventional finance/banking. For the case of Indonesia with dual financial system, Ascarya (2009) and Ascarya (2013a) show that Islamic finance which is based on profit-and-loss sharing (PLS) is more resilience to financial instability/crisis than conventional finance which is based on interest rate.

In a country adopting dual banking system, where conventional bank co-exists with Islamic bank, the procyclicality of both banking systems should be fully understood by the regulators, since they could be two different things, which need different treatments.

## 1.2 Objectives

As an early study in developing macroprudential policy under dual financial system in Indonesia, this study aims to test the procyclicality of Islamic bank financing and conventional bank credit, to provide better understanding and input to design proper macroprudential policy and/or instruments under dual financial system in Indonesia.

## 1.3 Methodology

This study applies several quantitative methods, including Ordinary Least Square (OLS), Error Correction Model (ECM) and Autoregressive Distributed Lag (ARDL) to test procyclicality of Islamic and conventional banks in Indonesia, so that the robustness of the results could be improved.

# 2. LITERATURE REVIEW

## 2.1 Overview of Procyclicality

Many scholars believe that procyclicality is an inherent feature of contemporary financial sector of an economy, which potentially affecting financial stability. Landau (2009) defined procyclicality as the tendency of financial variables to fluctuate around a trend during the economic cycle, so that the increase of procyclicality simply means fluctuations with broader amplitude. Similar to Landau, Abdellah (2009) defined procyclicality as the interactions between the financial system and the real economy which are mutually reinforcing, where these interactions tend to amplify the amplitude of the business cycle. However, Landau

(2009) asserted that such a simple description seldom fits the behavior of financial systems in real life, which characterizes by features of complex system. Usually, following a shock, the path of asset prices and evolution of financial aggregates will display various and highly irregular forms of volatility, with possible non linearities and discontinuities (liquidity freezes is one a good example).

Furthermore, the procyclicality can also be defined as a mechanism that encompasses the interactions of at least three reinforcing cycles that move in tandem. They are the business cycle, the financial cycle and the cycle of risk-taking behavior represented by fluctuation in asset price or the asset price cycle. The three cycles are self-reinforcing (Abdellah 2009). As also stated by Nijathaworn (2009), procyclicality is not just the result of interactions between business cycle and financial cycle, but it is also affected by risk-taking cycle, which is a characteristic marked by over-optimism during economic boom and over-pessimism in times of economic bust cycle.

**Table 2** Interaction between Business Cycle, Risk Behavior, and Financial Cycle

Phase	Business Cycle	Risk-Taking Cycle	Financial Cycle
Expansion Phase	<ul style="list-style-type: none"> <li>• Macroeconomic Stability</li> <li>• Increased economic growth</li> </ul>	<ul style="list-style-type: none"> <li>• Confidence and optimism up</li> <li>• Risk-taking up</li> <li>• Credit Demand up</li> </ul>	<ul style="list-style-type: none"> <li>• Risk value down, interests rate spread down</li> <li>• Asset prices up, pushing up collateral value</li> <li>• Leverage up</li> <li>• Foreign capital inflows up</li> <li>• Credit extension up</li> </ul>
Contraction Phase	<ul style="list-style-type: none"> <li>• Lifted macro volatility</li> <li>• Decreased economic activity</li> </ul>	<ul style="list-style-type: none"> <li>• Market confidence down</li> <li>• Risk Averse</li> <li>• Credit demand down</li> </ul>	<ul style="list-style-type: none"> <li>• Banks do deleveraging</li> <li>• Loan loss provision up</li> <li>• Interest rate spread up</li> <li>• Credit extension down</li> <li>• Capital inflows down</li> </ul>

Source: Nijathaworn (2009), Edited.<sup>2</sup>

According to Athanasoglou and Daniilidis (2011), the causes of procyclicality can be attributed to market imperfections and deviations from the efficient market hypothesis, while other factors -including Basel II and accounting standards- may have exacerbated it. Moreover, Geršl and Jakubik (2009/2010) stated that procyclicality is caused by a whole range of interconnected factors (or natural sources), such as information asymmetry, fluctuations in balance-sheet quality, over-optimistic (or over-pessimistic) expectations, herd behavior by market participants and financial innovation. In addition, financial regulation and the accounting rules for revaluation of financial assets in financial institutions' balance sheets can also play an important role.

Not all procyclicality is bad (Landau 2009). He stated that it all depends on the causal link: is the financial system the origin or the amplifier of destabilizing dynamics? Or does it simply react to cyclical evolutions in the real economy? Landau (2009) suggested that we should only be concerned by "intrinsic procyclicality", which is created inside and by the financial system. He explained further that real and significant damages occur if and when financial imbalances are allowed to build for a long time with two consequences: *first*, asset prices significantly deviate from their fundamental trend, which creates distortions in the allocation of resources; and *second*, those imbalances unwind suddenly and abruptly, triggering major disruptions in growth and the economic cycle, which is closely resembles the definition of a

<sup>2</sup> See Rethinking Procyclicality What Is It Now and What can be Done, Nijathaworn (2009)

bubble. Landau explained further that cyclical fluctuations cannot develop into a bubble unless some amplification mechanisms are allowed to work fully in an overall permissive financial environment. Therefore, the procyclicality of banking system which causes financial bubble is bad, but, the procyclicality of banking system which does not cause financial bubble is good and it can be beneficial to long term growth.

## 2.2 Previous Studies

In most countries, financial systems are pro-cyclical. It is due to the loan growth to the non-financial sector private sector as output is expanding and contracting during the recessions by banking system, either Islamic or conventional. There are a number of empirical studies of the procyclicality nature of banks' behavior. The wide empirical evidences have shown that lending rapidly increases during economic upturns, suggesting credit cycle would tend to amplify cycles. Some of the study investigated the Pro-cyclicality behavior due to bank lending growth such as, Kupiec et al. (2013), Ghosh (2013), Utari et al. (2011), Bebczuk et al. (2011), Geršl and Jakubik (2009/2010), Jeong (2009), Hyung (2009), Akinboade and Makina (2009), and Foos et al. (2007).

Kupiec et al. (2013) found that a bank's own loan portfolio performance was an important determinant of its subsequent loan growth. When a bank's troubled loans increase, on average, the bank would reduce its lending growth in the subsequent quarter. Also, consistent with the literature, he found evidence that a bank's overall profitability was an important determinant of its subsequent loan growth. Their estimates suggested that a bank's capital and liquidity ratios were positively related to its subsequent loan growth. The data clearly show that when banks suffered losses, it affected their lending behavior. Faced with losses, banks appeared to curtail lending growth because their loans or other investments were performing poorly.

Ghosh (2013) examined whether banks' funding structure amplified procyclicality. Using disaggregated data on GCC banks for 1996-2009, the study employed panel data techniques to explore the lending behavior of GCC banks that incorporated the period of the recent economic crisis. More specifically, the study suggested that banks with greater dependence on wholesale funds appeared to have cut back lending by a significant amount. The procyclicality of the financial system and the crisis exacerbated the effect, although the impact was a bit moderate for Islamic banks. The procyclicality exacerbated the conventional banks since in terms of real loan growth, commercial banks expanded their loan book at a much faster rate as compared to Islamic banks .

Utari et al. (2011) investigated the banking procyclicality and assessment on risk taking channel in Indonesia. Linear regression and panel data were employed by using monthly time series data ranging from 2000 to 2012. The findings suggested that 1) by using correlation and panel data approaches, supply of bank loan, either aggregate or disaggregate showed a procyclicality. In aggregate, the loan growth tended to increase during the expansion (boom) period, and slowed-down during contraction (burst) period. The procyclicality effect was empirically stronger during expansion period rather than contraction period; 2) The GDP growth did not significantly lead to consumption credit growth due to the absence of collateral assets which was influenced by economic cycle; 3) Procyclicality behavior in banking were caused by economic growth, collateral assessment in credit evaluation, banking risk, capital, size of bank, and bank ownership (foreign or domestic); 4) the risk perception rose in banking sector played an important role on monetary policy transmission mechanism through credit channel.

Bebczuk et al. (2011) provided up-to-date worldwide evidence on whether changes in credit precede (and eventually cause) changes in economic activity in the short-run. They found that according to the evidence produced, credit procyclicality, in the sense that the simple correlation coefficient was positive and significant at 10% or less, prevailed in just 45% of the countries when annual data were used, and 23% with quarterly data.

Geršl and Jakubik (2009/2010) study found that under certain assumptions the feedback effect on the real economy could be 1–2 percentage points of year-on-year GDP growth over a period of at least one year. Procyclicality of the financial system should thus be taken into account in economic and macro-prudential policy-making.

Jeong (2009) empirically studied the bank's loan supply over the business cycle from 1993:1 to 2008:3. The findings suggested that, 1) after the 1997-1998 financial crises, the level of sensitivity of real corporate lending to the real GDP growth rate was greater than one, meaning that the banking industry might amplify swings in the real economy; 2) the positive and significant interaction between the real GDP growth rate and the wholesale funding indicated that when banks depended more on wholesale funding, lending tended to be more sensitive to the business cycle and responsible for the substantial increase in procyclicality; 3) local bank was less procyclical rather than nationwide bank; 4) The household loan has been generally changing much less than the real estate cycle since LTV regulation. It implied that LTV regulation might have made banks less sensitive to the real estate cycle.

Akinboade and Makina (2009) studied empirical analysis on the linkage between the behavior of bank lending and business cycles in South Africa. Overall evidence suggesting pro-cyclicality of bank lending was uncovered both at macro and micro levels. At macro level, bank lending and lending rates have moved in tandem with business cycles. At micro level, bank lending to households and firms was generally pro-cyclical.

Foos et al. (2007) investigated if and how past loan growth affects the riskiness of banks from 14 major western countries under “regular conditions. This study shows that: (i) past loan growth has a positive and highly significant influence on subsequent loan losses with a maximum in the third year, (ii) loan growth also leads to a decline in the relative interest income of banks. This finding holds for most countries and supports the view that new loans which add to the existing credit portfolio tend to be underpriced (relative to their default risks), and (iii) loan growth is significantly negatively related to bank solvency. Although intertemporal two-way linkages are found between loan growth and loan losses, the aforementioned positive relation between past loan growth and contemporaneous loan losses remains robust and turns out to be economically more important than the inverse relation. In another robustness test, we consider abnormal loan growth instead of raw loan growth and obtain highly similar results.

### 3. METHODOLOGY

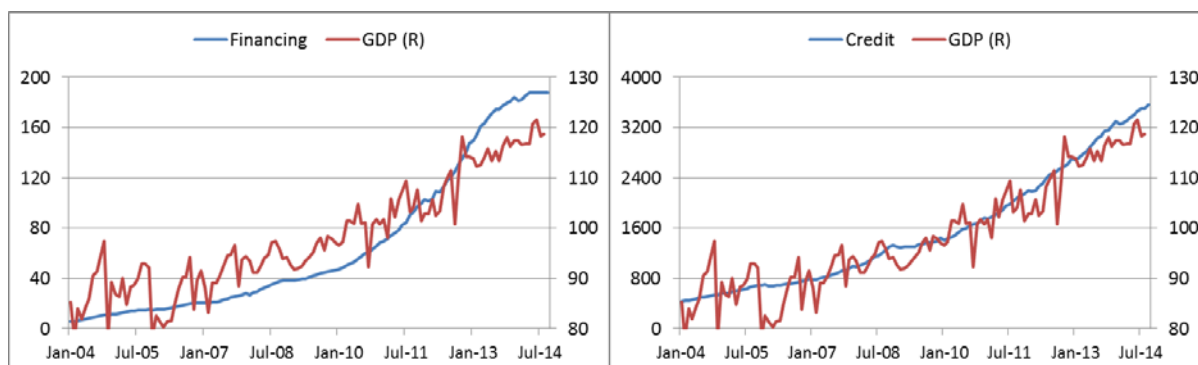
#### 3.1 Data

Data used in these empirical studies are three sets of monthly time series data. The first set of data is used for testing procyclicality of Islamic and conventional banking, started from January 2004 to August 2014, including:

- Islamic model: Islamic real financing (RFN), gross domestic product which is proxied by industrial production index (GDP), non-performing financing ratio (NPF), Islamic

overnight Interbank Money Market margin (IMM) and Islamic capital to asset ratio (ICTA).

- Conventional model: conventional real credit (RCR), gross domestic product which is proxied by industrial production index (GDP), non-performing loan ratio (NPL), conventional overnight Interbank Money Market margin (MM) and conventional capital to asset ratio (CCTA).



**Fig. 2** Islamic Financing (Left) and Conventional Credit (Right) in Rp(Trillion)

### 3.2 Model to Test the Pro-cyclicality of Bank Financing/Lending Growth

The term procyclicality is referred to describe the mutually reinforcing mechanism through which the financial system can amplify business cycle fluctuations and possibly cause or exacerbate financial stability (BIS 2008). Meanwhile, Geršl and Jakubik (2009/2010) defines procyclicality as the magnification of swings in the economic cycle by financial sector activities most notably bank lending. Since Keynes' (1936) seminal work, researcher have grappled with the question as to whether banks change their lending standards systematically over the business cycle, and that if they do whether there is a discernible and economically important effect on aggregate fluctuations. Some of empirical researches suggest that one major contributor to the boom and bust nature of the business cycle is the way that banks alter their lending standards over economic peaks and troughs (Farmer 1985; Gorton and Kahn 1993; Greenwald and Stiglitz 1993; Smith 1995; Zarnowitz 1985). Asea and Blomberg (1997,1998) further report systematic patterns in lending standards, with banks tightening credit in recessions and easing it during expansions, arguing that lending cycles exacerbate business cycle. In any case bank lending in general tends to be pro-cyclical, that is, it contracts during an economic slowdown and rises during an expansion (Akinboade and Makina 2009; Craig et al. 2006).

In general, economic literature considers the banking system as inherently procyclical (Geršl and Jakubik 2009/2010; Craig et al. 2006). Jeong (2009) argues that the financial accelerator, over-optimism, reduced supervisory toughness, capital requirements, deterioration in the quality of screening technology, are as the sources of procyclicality. In addition, Craig et al. (2006) enumerates that the sources of pro-cyclicality in the banking system originating in the structure of financial systems, namely excessive reliance on collateral to mitigate credit risk, delayed recognition of, and provision on, NPLs and regulatory forbearance, underpricing of credit risk so that lending margins that are too narrow to cover the risk, deterioration in the quality of credit assessment during cyclical upswings, directed lending by state-owned bank and connected lending, bank reliance on volatile foreign sources of funding, financial liberalization.

To estimate procyclicality, the paper sets up model specification by following fixed-effect model, based on Berger and Udell (2004), Jimenez and Saurina (2005), as follows:

$$cloang_{i,t} = \beta_0 + \gamma_i + \beta_1 GDPg_t + \beta_2 conc_{t-1} + \sum_{i=3}^n \beta_i control_{i,t-1} + \epsilon_{i,t} \quad (1)$$

Where  $cloang_{i,t}$  denotes the real growth rate of corporate loans of bank  $i$  in period  $t$ ;  $GDPg$  is the real GDP growth rate;  $conc$  is the 4-firm market concentration ratio;  $\gamma$  represents an individual fixed effects;  $control$  denotes control variables that prior studies have found to affect loan growth.

In this study, we modify the above employed variables by using the Industrial Production Index (IPI) as a proxy for GDP. The IPI is used in the equation to proxy the business cycle. If banks behave procyclicality, loan growth (demand side) is procyclical due to positive sign on GDP growth (supply side) (Craig et al. 2006). This model 1 is applicable for analyzing either the procyclicality in Islamic or conventional bank.

$$dLRCR_t = \alpha_1 + \alpha_2 dGDP_t + \alpha_3 dNPL_t + \alpha_4 dCMM_t + \alpha_5 dCCTA_t + \epsilon_t \quad (2)$$

$dLRCR_t$  = first difference of  $\ln [(CR_t/CPI_t)]$  “monthly amount of real credit”, where  $\ln$  denotes the natural logarithm,  $CR$  is aggregate credit,  $CPI$  is the consumer price index, and  $t$  denotes time of monthly period;

$dGDP_t$  = first difference of Industrial Production Index;

$dNPL_t$  = first difference of Non-Performing Loan;

$dCMM_t$  = first difference of Conventional Interbank Money Market;

$dCCTA_t$  = first difference of Conventional Capital to Asset;

$\epsilon_t$  = error term.

$$dLRFN_t = \alpha_1 + \alpha_2 dGDP_t + \alpha_3 dNPF_t + \alpha_4 dIMM_t + \alpha_5 dICTA_t + \epsilon_t \quad (3)$$

$dLRFN_t$  = first difference of  $\ln [(FN_t/CPI_t)]$  “monthly amount of real financing”, where  $\ln$  denotes the natural logarithm,  $FN$  is aggregate financing,  $CPI$  is the consumer price index, and  $t$  denotes time of monthly period;

$dGDP_t$  = first difference of Industrial Production Index;

$dNPF_t$  = first difference of Non-Performing Financing;

$dIMM_t$  = first difference of Islamic Interbank Money Market;

$dICTA_t$  = first difference of Islamic Capital to Asset; and

$\epsilon_t$  = error term.

Empirically, the procyclicality between GDP growth and real credit growth exists by looking at their positive correlation, and vice versa (Craig et al. 2006). Once the coefficient on GDP growth is close to 1 (one), suggesting that the pattern of credit is in line with the cycle on average rather than having a much greater amplitude. For example, during an economic expansion, the opposite occurs, as more businesses become eligible for loans under the banks' terms and condition of lending. As Bernanke and Gertler (1989) and Berger and Udell



(1992) argue, this scenario suggests not only that bank lending is procyclical, but also that the availability of bank loans to fund the economic activities of businesses may exacerbate the magnitude of business cycles. The positive sign on interbank money market rate (MM) suggests that the authorities increase interest rates as credit growth accelerates, which suggest monetary policy is not adding to pro-cyclicality. The estimated coefficient of NPL is expected to be positive as this weakens banks, which then can exacerbate pro-cyclicality by leading them to cut lending further (Craig et al. 2006). The capital to asset ratio (CTA) is expected to positively promote pro-cyclicality, suggesting stronger banks increase lending more rapidly (Craig et al. 2006).

### 3.3 Methods

Three quantitative methods will be applied simultaneously in this study, namely, Ordinary Least Square (OLS), Error Correction Model (ECM) and Autoregressive Distributed Lag (ARDL) to obtain more robust results.

An error correction model (ECM) is a time-series econometric dynamic system with the characteristics that the deviation or error of the level state from its long-run relationship will be fed into its short-run dynamics. ECM requires that the underlying variables are stationer at first difference or I(1) but there exists cointegration(s) between/among variables. The general equation of ECM can be illustrated as follows in equation (4):

$$\Delta y_t = \alpha_0 + \sum_{i=1}^p \alpha_i \Delta x_{it} + \gamma(y_{t-1} - \beta_0 - \sum_{i=1}^p \beta_i x_{it-1}) + \varepsilon_t \quad (4)$$

where,  $y$  is dependent variable, which is either economic growth or inflation;  $x_p$  is  $p$  selected independent variables, specific for each model; and  $\varepsilon_t$  is disturbance or error term with zero means and constant variance-covariance. Moreover,  $\alpha_i$  are short-run coefficients,  $\beta_i$  are long-run coefficients and  $\gamma$  is a speed of adjustment coefficient, known as *error correction term* (ECT), where  $-1 < \gamma < 0$ .

An autoregressive distributed lag (ARDL) is a time-series econometric model for the analysis of long-run relations when the underlying variables are stationary at first difference or I (1) but there exists cointegration(s) between/among variables. Based on Engle-Granger (1987), a linear combination of two or more variables may be stationary I (0), even though the variables are individually not stationary I (1). If the linear combination is stationary, the linear relationship can be referred to as cointegration and if it is in the form of equation, then this is the cointegration equation and its parameters are cointegration parameters which reflect the long-term relationship.

After optimum different number of lag(s) of each variable is added to the equation, the general equation of ARDL can be illustrated as follows in equation (5):

$$y_t = c_0 + \sum_{i=1}^p \delta_i y_{t-i} + \sum_{j=0}^q \delta_j x_{1t-j} + \sum_{k=0}^r \delta_k x_{2t-k} + \dots + \sum_{l=0}^z \delta_z x_{nt-l} + \varepsilon_t \quad (5)$$

## 4. RESULTS AND ANALYSIS

Several data testing should be followed as a standard procedure using ECM and ARDL methods. Tests for ECM include unit root test, cointegration test (Engle-Granger), error correction term (ECT) check, and diagnostic test (if OLS is used), before estimating the ECM model. Tests for ARDL include cointegration test (Bound Test) and model selection with appropriate tests, before estimating the ARDL model. In addition, Granger causality is

conducted to determine causal relationships between variables. The complete results of all ECM and ARDL procedures can be obtained from the authors.

#### 4.1 ECM Tests

##### a. Unit Root Test

Unit root tests of all variables in Islamic model can be seen in Table 3. The results show that results show that most Islamic variables are not stationary in level, but all Islamic variables are stationary in first difference.

**Table 3** Unit Root Test of Islamic Variables

Variable	Augmented Dickey-Fuller Value		Phillips-Perron Value	
	Level	1 <sup>st</sup> Difference	Level	1 <sup>st</sup> Difference
LRFN	-3.155141	-7.780960*	-3.037496	-8.648505*
LGDP	-6.703127*	-4.387177*	-7.025073*	-27.22720*
ICTA	-2.980469	-13.25947*	-3.062872	-13.12512*
IMM	-3.874877*	-16.38328*	-5.761143*	-25.29517*
NPF	-2.247861	-14.52164*	-2.543680	-15.17053*

Note: \*indicates that the data is stationary at 5% McKinnon critical value

Meanwhile, unit root tests of all variables in conventional model can be seen in Table 4. The results show that results show that not all conventional variables are stationary in level, but all conventional variables are stationary in first difference.

**Table 4** Unit Root Test of Conventional Variables

Variable	Augmented Dickey-Fuller Value		Phillips-Perron Value	
	Level	1 <sup>st</sup> Difference	Level	1 <sup>st</sup> Difference
LRCR	-3.804909*	-10.62743*	-2.151449	-10.64863*
LGDP	-6.703127*	-4.387177*	-7.025073*	-27.22720*
CCTA	-3.043484	-12.33544*	-2.822423	-12.33544*
CMM	-9.166797*	-15.24231*	-9.371282*	-55.58519*
NPL	-4.085413*	-6.370945*	-3.134822	-11.59630*

Note: \*indicates that the data is stationary at 5% McKinnon critical value

##### b. Cointegration Test

Tests of cointegration (Engle-Granger) are applied to residuals of the long-term estimates of Islamic and conventional models. After the residuals are obtained, the next step is to test the stationarity of the residuals. If the residual data is stationary, it can be concluded that there is cointegration, so that the model can be estimated using ECM. Table 5 shows the results of stationarity tests of the long-term estimation residuals. The results show that both residuals are stationary, since the ADF probability values are less than the five percent significance level.

**Table 5** Engle-Granger Cointegration Test

MODEL	Engle-Granger		Probability	Description
	ADF t-stat	Critical Value		
LRFN	-7.877317	-3.445590	0.0000	Cointegrated
LRCR	-5.859209	-1.943364	0.0000	Cointegrated

##### c. Error Correction Term

Error correction term (ECT) of Islamic model is -0.0221 with probability of 0.1358, so that even though the negative sign is correct, it is not significant (see column 7 on Table 8). Therefore, the results of Islamic ECM model are not valid, and the first difference OLS (ordinary least square) Islamic model could be used as alternative results.

Meanwhile, ECT of conventional model is -0.0292 with probability of 0.0272, so that the negative sign is correct and it is significant (see column 3 on Table 8). Therefore, the results of conventional ECM model are valid.

#### d. Diagnostic Test

When ECM model is estimated using OLS, diagnostic testing of residuals should be done. Islamic model result of Breusch-Godfrey Serial Correlation test shows that the probability value (0.0000) is less than five percent significance level, so that there is a problem of autocorrelation in the Islamic ECM model (see column 7 on Table 8). This problem could be corrected using Heteroscedasticity Consistent Coefficient Covariance method, namely Newey-West method. The results of White Heteroscedasticity test shows that the probability value of Obs\*R-squared (0.0853) is more than five percent significance level, so that there is no heteroscedasticity problem in Islamic ECM model (see column 7 on Table 8).

Furthermore, in the conventional model, the Breusch-Godfrey Serial Correlation test indicates that the probability value (0.9287) is more than five percent significance level, so that there is no problem of autocorrelation in the conventional ECM model (see column 3 on Table 8). The results of White Heteroscedasticity test indicates that the probability value Obs\*R-squared (0.8167) is also more than five percent significance level, so that there is no heteroscedasticity problem in conventional ECM model (see column 3 on Table 8).

## 4.2 ARDL Tests

### a. Cointegration Test (Bound Test)

Cointegration test using Bound Test (Pesaran and Shin 1997), is done by adding long-term variables in the model, and then perform a joint test to determine whether the addition of long-term variables is significant. If the value of the F-statistic is greater than the upper value in the Pesaran's table, it means that the addition of the long-term variables is significant and that there is cointegration.

**Table 6** Cointegration Test

MODEL		Bound Test (ARDL)		Probability	Description
		F Test	Pesaran		
Islamic	LRFN(-1)	2.8642	3.805	0.018	No Cointegration
	LRFN(-2)	1.4194	3.805	0.223	No Cointegration
	LRFN(-3)	2.0181	3.805	0.082	No Cointegration
Conventional	LRCR(-1)	2.2960	3.805	0.050	No Cointegration
	LRCR(-2)	1.7595	3.805	0.127	No Cointegration
	LRCR(-3)	1.0011	3.805	0.421	No Cointegration

The results of cointegration tests in Table 6 show that, up to lag three, there is no cointegration in Islamic and conventional models.

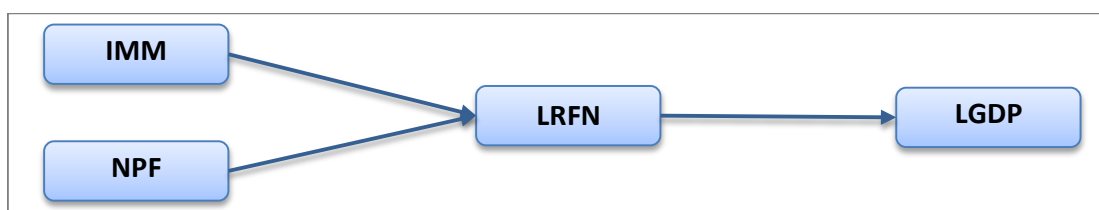
#### b. Model Selection and Tests

For Islamic model, the results of first difference ARDL in lag-1 and lag-2 still have autocorrelation problems, indicated by the probability values of serial correlation (0.002 in lag-1 and 0.027 in lag-2) are less than five percent significance level. The results of first difference ARDL in lag-3 indicate that this model has been free from the problem of autocorrelation (with serial correlation probability value of 0.075, which is more than five percent significance level) and heteroscedasticity (with heteroscedasticity probability of 0.519, which is more than five percent significance level). However, the highest Schwarz Bayesian Criterion (SBC) is at Lag-2 (309.7375).

Moreover, for conventional model, the results of first difference ARDL in lag-1 show that this model has been freed from the problem of autocorrelation, where the probability value of serial correlation (0.145) is more than five percent significance level. Moreover, this model has also been freed from the problem of heteroscedasticity, where the probability value of heteroscedasticity (0.582) is more than five percent significance level.

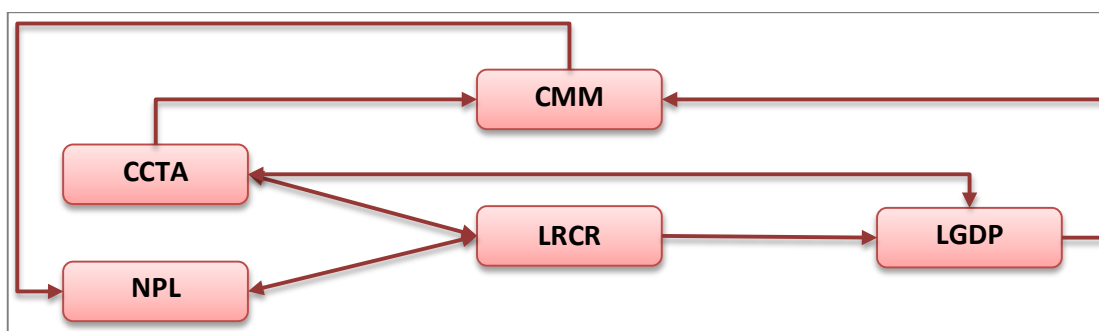
### 4.3 Results of Granger Causality

Granger causality of Islamic model shows one way causality, that IMM (Islamic money market) and NPF (non-performing financing) cause LRFN (Islamic real financing), while LRFN causes LGDP (output).



**Fig. 3** Granger causality of Islamic Model

Meanwhile, conventional model shows more complex loop of causality. CCTA (conventional capital to asset ratio) and NPL (non-performing loan) cause LRCR (conventional real credit), while LRCR causes CCTA and NPL. CCTA also causes LGDP, and vice versa, and then CCTA causes CMM (conventional money market rate). Moreover, LGDP causes CMM, and then CMM causes NPL. In addition, CMM does not cause LRCR.



**Fig. 4** Granger causality of Conventional Model

### 4.4 Results of Procyclicality

Table 7 and Table 8 present the results of Islamic and conventional models, which mainly is intended to see the impact of real GDP growth  $D(LGDP)$  to real Islamic financing growth

D(LRFN) as well as to real conventional loan growth D(LRCR), to see the procyclicality of Islamic financing and conventional credit.

**Table 7** Long Term ECM Results of Islamic (LRFN) and Conventional (LRCR) Models

Variable	Conventional		Variable	Islamic	
	Koefisien	Probability		Koefisien	Probability
LGDP	2.083**	0.000	LGDP	6.477**	0.000
CCTA	0.053**	0.000	ICTA	0.028	0.291
CMM	0.005	0.167	IMM	0.054**	0.001
NPL	-0.085**	0.000	NPF	-0.024	0.384
R <sup>2</sup>	0.9261		R <sup>2</sup>	0.8828	
Adjusted R <sup>2</sup>	0.9237		Adjusted R <sup>2</sup>	0.8789	
* Significant at the 0.05 level; ** Significant at the 0.01 level					

Table 7 shows the side results that Islamic real financing (LRFN) will increase three times the increase of conventional real loan (LRCR) when real GDP (LGDP) increases. LRFN will also increase when Islamic interbank money market margin (IMM) increases. Moreover, LRCR will also increase when capital to asset ratio (CCTA) increases, and it will decrease when non-performing loan (NPL) increases.

**Table 8** Short Term Results of Islamic (D(LRFN)) and Conventional (D(LRCR)) Models

Variable	Conventional			Variable	Islamic		
	OLS	ECM	ARDL		OLS	ECM	ARDL
D(LRCR)(-1)				D(LRFN)(-1)			0.3081**
D(LRCR)(-2)				D(LRFN)(-2)			0.2540**
D(LGDP)	0.0751*	0.1074**	0.0823**	D(LGDP)	0.1612**	0.2337**	0.1050**
D(CCTA)	-0.0174**	-0.0163**	-0.0163**	D(ICTA)	-0.0072	-0.0073	-0.0071*
D(CMM)	-0.0005	-0.0004	0.0005	D(IMM)	0.0021	0.0026	0.0019
D(CMM)(-1)			0.0013**	D(IMM)(-1)			
D(NPL)	-0.0072*	-0.0076*	-0.0086**	D(NPF)	-0.0052	-0.0057	-0.0043
D(NPL)(-1)			0.0073*	D(NPF)(-1)			0.0075*
ECT	-	-0.0292*	-	ECT	-	-0.0221	-
R <sup>2</sup>	0.2303	0.2608	0.3120	R <sup>2</sup>	0.1442	0.1886	0.3976
Adjusted R <sup>2</sup>	0.2050	0.2303	-	Adjusted R <sup>2</sup>	0.1162	0.1551	-
Prob. Serial Corr. Test		0.9287	0.1450	Prob. Serial Corr. Test		0.0000	0.0740
Prob. Hetero Test		0.8167	0.5820	Prob. Hetero Test		0.0853	0.5190
Autocorrelation in Islamic ECM is treated using Newey-West option							
* Significant at the 0.05 level; ** Significant at the 0.01 level							

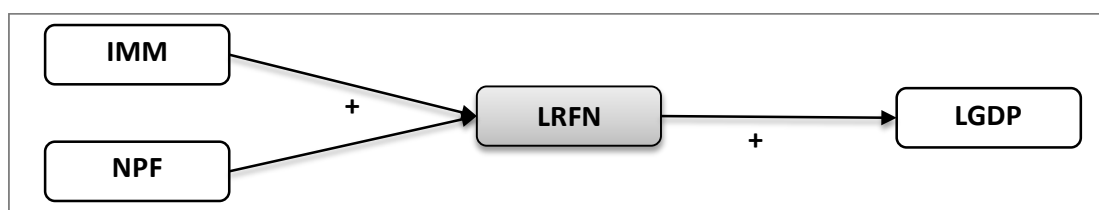
Table 8 presents the main results of Islamic and conventional models (note that Islamic ECM model is not valid, since the ECT is not significant). It shows that Islamic real financing growth (D(LRFN)) will increase more than the increase of conventional real loan growth (D(LRCR)) when real GDP growth (D(LGDP)) increases. These mean that Islamic banking and conventional banking show significant sign of procyclicality, and Islamic banking is more procyclical than conventional banking. Moreover, the increase of ICTA growth will decrease D(LRFN), while the increase of NPF growth in lag-1 (D(NPF)(-1)) will, surprisingly, increase D(LRFN). In addition, the increase of NPL growth (D(NPL)), its lag-1 (D(NPL)(-1)) and CCTA growth (D(CCTA)) significantly will decrease D(LRCR), while the increase of CMM growth (D(CMM) in lag-1 will significantly increase D(LRCR).

## 4.5 Analysis

### 4.5.1 Procyclicality of Islamic and Conventional Banks

Combining Granger causality and long-term ECM results of Islamic model (see Fig. 5) shows some interesting findings. It is implied that there is a coupling between the financial sector (IMM) and the real sector (LRFN), although the financial sector still leads the real sector (IMM causes LRFN). Moreover, it is Islamic financing (LRFN) that causes economic growth (LGDP), not vice versa, so that real sector productive activity that actually induces economic growth.

Additional results on Table 8 shows that the increase of NPF growth (D(NPF)) will not significantly decrease D(LRFN), while Granger causality results show that NPF does not cause LRFN and LRFN does not cause NPF. These imply that NPF does not hinder the LRFN and its growth, and the increase of LRFN and its growth do not induce NPF and its growth, since Islamic financing always finance real sector activities.

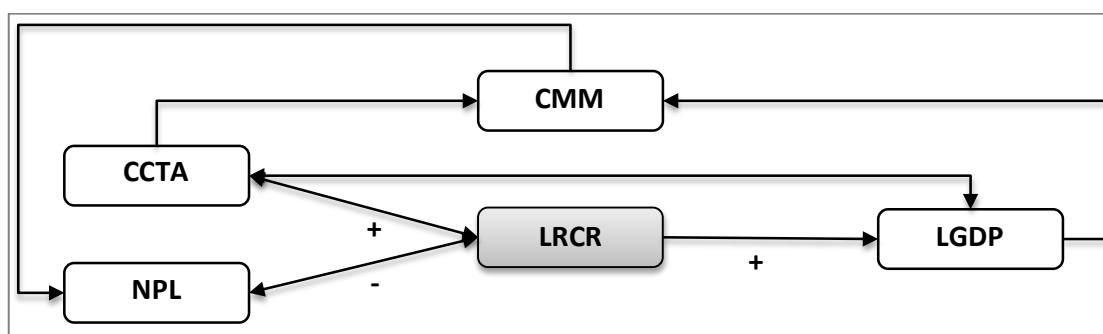


**Fig. 5** Granger causality and Long Term ECM Results of Islamic Model

Therefore, there is no indication that procyclicality of Islamic bank creates credit bubbles, so that it can be concluded that, as mentioned by Landau (2009), the procyclicality of Islamic bank is not categorized as bad procyclicality, which amplifies and increases the amplitude of business cycle, creates bubbles and causes financial instability. Conversely, procyclicality of Islamic bank is a good procyclicality which can be beneficial to long-term economic growth.

Meanwhile, Fig. 6 presents combination of Granger causality and long-term ECM results of conventional model, which also shows interesting findings. Firstly, there is a decoupling between the financial sector (CMM) and the real sector (LRCR), where there is no causality between CMM and LRCR, and CMM causes NPL. Secondly, NPL causes LRCR, and vice versa, in negative way. This means that the increase of LRCR will increase NPL, suggesting that there is an indication of excessive risk taking by agents, insufficient risk monitoring by principals, moral hazard and adverse selection (to name some), which create credit bubbles.

Additional results on Table 8 shows that using OLS, ECM and ARDL methods reveal that the increase of NPL growth (D(NPL)) will decrease D(LRCR), while Granger causality results show that NPL causes LRCR and LRCR causes NPL. In addition, CCTA growth (D(CCTA)) significantly will decrease D(LRCR). These findings strengthen the previous argument that conventional credit creates credit bubbles.



**Fig. 6** Granger causality and Long Term ECM Results of Conventional Model

Therefore, there are indications that procyclicality of conventional bank creates credit bubbles, so that it can be concluded that the procyclicality of conventional bank seems to be closer to the category of bad procyclicality, which amplifies the amplitude of business cycle, creates bubbles and causes financial instability.

#### 4.5.2 Inherent Stability of Islamic Finance and Banking

The findings on the good procyclicality of Islamic bank are consistent with the characteristics of Islamic finance and Islamic banking in particular, where Islamic finance is inherently stable. Basic Principles of Islamic Finance which contribute towards the stability of Islamic financial system, among others, are as follows:

1. The prohibition of interest (riba'). Prohibition of usury - a term which literally means "excess" and is defined as "any unjustifiable increase of capital whether in loans or sales"
2. Money is treated as a "potential" capital. Money is not a commodity, but a medium of exchange, a store of value and unit of measurement. Money has purchasing power and cannot be used unless for promoting productive activities. Islamic Finance supports wealth creation through commerce and trade.
3. Risk-sharing. Since interest is strictly prohibited, suppliers of funds become investors, rather than lenders.

4. Prohibition of speculative behavior. Islamic finance discourages hoarding and prohibits transactions featuring excessive uncertainty (gharar), and gambling (maysir).
5. Sanctity of contracts. Islamic finance upholds contractual obligations and disclosure of information as a sacred task. This feature is intended to reduce the risk of asymmetric information and moral hazard.
6. Shariah approved activities. Only the business activities that do not violate the rules of Shariah qualify for investment. For example, any investments in businesses related to alcohol or gambling is prohibited.
7. Social Justice. Every transaction that leads to injustice and exploitation is prohibited.

The intrinsic strength of Islamic finance is derived from the Syariah principles, where essential features of Islamic finance include (Aziz 2010): 1) Ethical (avoidance of unethical activities, avoidance of excessive leveraging, and economic empowerment for the less fortunate); 2) Real Activities (must be accompanied by underlying productive economic activities and close link between financial transactions and productive flows); 3) Partnership (equity based & risk sharing transactions and due diligence); and 4) Governance (greater transparency & disclosure, effective risk management & good governance practices).

Islamic Finance advocated some transactions based on profits and risks sharing. This encourages participatory financing or active participation in business, through mudharabah contract (partnership and capital participation) and musharakah (joint-venture). These approaches encourage extensive participation in risk-reward and profit-loss sharing of these efforts. This risk sharing requires IFS to conduct appropriate due diligence process on the feasibility of the business proposal. The supervision and review by related parties such as the board of Shariah or Shariah compliance review process provides additional protection against practices that are not in line with Shariah. In contrast, conventional financial instruments generally separate the risk from the underlying assets.

Financial intermediation through IIFS involves mobilizing funds from savers or investors with excess liquidity, using a combination of non-return-paying current or demand accounts and profit sharing investment accounts (PSIA), and providing these funds to firms or individuals for financing assets or business activities. The banker-customer relationship is not the conventional debtor-creditor relationship but is based on different contracts that are entered into by the IIFS and the customer.

However, it should be noted that contemporary Islamic finance has not been able to apply the ideal Islamic finance, so that Islamic finance is still creating financial bubbles through multiplier and leverage of fractional reserve banking system (FRBS). Islamic finance is still vulnerable to liquidity risk, as it is still practiced mismatch (including maturity and nominal mismatches), as well as other common risks in finance, such as business risk, financial risk, operational risk, fiduciary risk, event risk and displaced commercial risk.

## **5. CONCLUSION AND RECOMMENDATION**

### **5.1 Conclusion**

Based on previous thorough discussions and analyses on the procyclicality of Islamic and conventional banks, including their empirical tests, some conclusions can be drawn.



1. Empirical tests using Ordinary Least Square (OLS), Error Correction Model (ECM) and Autoregressive Distributed Lag (ARDL) show that Islamic bank is more procyclical than conventional bank, where real GDP growth coefficients in Islamic model are always higher than those in conventional model. These suggest that both Islamic bank and conventional bank are procyclical to the economic or business cycle.
2. The procyclicality of Islamic bank, based on additional results from Granger causality and Islamic model, does not create credit bubbles, so that it can be concluded that, as mentioned by Landau (2009), the procyclicality of Islamic bank is not categorized as bad procyclicality, which amplifies and increases the amplitude of business cycle, creates bubbles and causes financial instability. Conversely, procyclicality of Islamic bank is a good procyclicality which can be beneficial to long-term economic growth.
3. The procyclicality of conventional bank, based on additional results from Granger causality and Islamic model, does create credit bubbles, so that it can be concluded that the procyclicality of conventional bank seems to be closer to the category of bad procyclicality, which amplifies the amplitude of business cycle, creates bubbles, builds up systemic risk and causes financial instability.
4. Good procyclicality of Islamic bank are consistent with the characteristics of Islamic finance and Islamic banking in particular, where Islamic finance is inherently stable and does not create bubbles, due to the basic principles of Islamic finance and banking which contribute towards the stability of Islamic financial system, including riba-maysir-gharar prohibitions, money as potential capital, profit-loss-and-risk sharing, sanctity of contract, shariah approved activities, and social justice.
5. These results suggest that Islamic bank has closer link to the real sector, so that measures for Islamic macroprudential should be less than those for conventional macroprudential.

## 5.2 Recommendation

Developing Islamic macroprudential policy for countries adopting Islamic financial system or dual financial system is unavoidable, since contemporary Islamic financial system is still far from ideal and still creates financial bubbles, due to the adoption of fractional reserve banking system, fiat money, imperfect Islamic contracts, etc., so that Islamic finance and banking are still prone to imbalances, instability and systemic risk.

Procyclicality as one of the main causes of systemic risk should be well understood, where Islamic bank procyclicality and conventional bank procyclicality should be clearly differentiated, so that macroprudential instruments to be developed for Islamic and conventional financial systems would be unique and effective tools to prevent systemic risk and financial crisis.

Further studies on all aspects of Islamic macroprudential policy are desperately needed to develop solid framework and effective instruments of Islamic macroprudential policy or macroprudential policy under dual financial system.

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