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Qard-al-Hasan-based monetary policy and the role of the central bank as the lender of last resort

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Abstract

Purpose – This paper aims to examine how a central bank (CB) can act as a lender of last resort (LOLR) for both Islamic and conventional interest-based banks by pursuing a Qard-al-Hasan (QH)-based monetary policy (MP).

Design/methodology/approach – The role of the CB as LOLR under QH-based MP and its effects on major macroeconomic variables, including deposits, loan creation and aggregate expenditures, are examined on theoretical grounds by using the aggregate output and aggregate expenditure model under the framework of Islamic MP.

Findings – When the CB acts as LOLR by pursuing QH-based MP, it automatically empowers Islamic banks (IBs) by providing access to borrowing funds from the CB on a QH basis. As a result, IBs will not be required to hold billions of dollars as liquid assets against liquidity risks. Thus, the lending capacity of IBs will increase and deposit expansion, loan creation and aggregate expenditures in the economy will all expand. This will in turn increase real GDP and employment while reducing the unemployment rate.

Originality/value – This is the first paper to analyze CBs acting as LOLR for both IBs and conventional interest-based banks by pursuing a QH-based MP, thus providing equal opportunities and equal access to borrowing facilities from the CB, along with equal partnership and fair competition for all and absolutely no discrimination to anyone. The LOLR service to all banks under QH-based MP will unveil a new horizon of opportunities where all financial institutions are expected to thrive. IBs will escape the constraints of the constant fear of liquidity risks and find a level-playing field.

Keywords Lender of last resort, Qard al-Hasan-based monetary policy, Liquidity risk management, Liquid asset holdings, Central bank

Paper type Research paper

1. Introduction

Islamic banks (IBs) constitute almost 24 per cent of the market (Kahf and Hamadi, 2014), yet they do not have access to the borrowing facilities of the central bank (CB). It is not that the CB is unwilling to extend the LOLR service to IBs. On the contrary, the CB is more than willing to help IBs in any way it can. The difficulty arises because IBs are forbidden to borrow from the CB at positive rates of interest. Even when IBs are in dire need of liquid funds and face substantial liquidity management risks, they still cannot avail themselves of the CB's lender of last resort (LOLR) service because borrowing on interest is prohibited in Islamic law (Q 2:275). As a result, IBs create their own reserves and maintain huge amounts

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of liquid asset holdings (LAHs) to insulate themselves against liquidity risks because they cannot borrow from the CB at times of crisis.

Boumediene (2015) relates that a sample of 127 IBs in 26 countries had accumulated about US$165.005bn as idle cash simply to protect from risks of default. If all LAHs of IBs are loaned out, the potential increase in deposit expansion (DE) and loan creation will be enormous. As a result, the potential aggregate expenditures (AE) line will shift upwards. Real GDP (Y) and employment (E) will increase and unemployment rates (UR) will fall. Boumediene's (2015) study clearly shows that the liquidity risk management instruments developed so far by various CBs, such as the central bank of Bahrain (CBB, 2011) and Bank Negara Malaysia (Bacha, 2008), as well as the international Islamic liquidity management corporation (IILM, 2011) did little to lessen IBs' fear of liquidity risks. In addition, the Basel III international agreement (Al-Hares and Saleem, 2017) also emphasizes that all banks must have adequate capital requirements and stockpile liquid funds to protect against liquidity risks and, especially, against default risks. Now our research question is: How IBs can effectively access to the LOLR service of the CB and at the same time fulfill the *Sharia*-compliancy requirements as well as minimize the liquidity and default risks? All such problems can easily be solved and the solution to our research question can be found if the CB acts as LOLR by pursuing a Qard al-Hassan (QH)-based monetary policy (MP) and offers equal access to borrowing facilities and equal opportunities to IBs, similar to what it offers to conventional interest-based banks (CIBBs). Only then IBs will be able to borrow the required amount of funds whenever they need to, as IBs will only borrow on the basis of QH and without any interest. QH is one of the most important modes of financing in Islamic economics. QH is highly praised both in the Quran, the words of Allah, may He be exalted, and in the Hadith, the sayings and traditions of Prophet Muhammad, may peace and blessings of Allah be upon him. Now we will examine the significance and importance of QH in the light of the Quran and Hadith.

Riba, or usury, is prohibited in Islam, but QH is highly encouraged. Extending QH is many times more rewarding than giving charity or *Sadaqah*. QH is an interest-free loan. In his exemplary life, Prophet Muhammad, may peace and blessings of Allah be upon him, borrowed money on QH basis and repaid generously. Abu Rafi', may Allah be pleased with him, reported that the Prophet, may the blessings and peace of Allah be upon him, had borrowed a young female camel from someone. When he received zakat of camels, he ordered Abu Rafi' to send a young female camel to the man as settlement of the loan. Abu Rafi' said to him, "I could not find among the camels except a female camel which is ready for pregnancy." The Prophet, may blessings and peace of Allah be upon him, said "Give it to him, indeed, the good person among you is he who settles a loan with something better" (*al Muslim*, authentic Hadith No. 1224/3, Kitab Musaqah 22, Bab man istaslafah shayan. See also *al-Muwatta* of Imam Malik, volume 3, Book 47, No. 777).

The rewards for QH is greater than *Sadaqah* (deeds of charity, alms). Prophet Muhammad, may blessings and peace of Allah be upon him, said: "in the night of the journey, I saw on the gate of heaven written, 'reward for *Sadaqah* is ten times and reward for Qard al-Hasan is eighteen times.'" So, I asked the angel, how is it possible? The angel replied, "Because beggar who asked had already had something but a borrower did not ask for loan unless he was in need" (*Ibn Hisham and Ibn Majah*). In another hadith reported by Abu Hurairah, may Allah be pleased with him, the Prophet, may blessings and peace of Allah be upon him, said, "Whoever relieves a believer from a difficulty in this world, Allah will relieve him from his difficulty and Allah will facilitate him in this world and world hereafter" (*al Muslim*). Therefore, QH is a highly rewarding good deed that will bring

success not only in this world but also in the Hereafter, when such good deeds will be even more valuable.

Isma'il bin Abi Rabi'ah Al-Makhzumi, may Allah be pleased with him, narrated from his father, from his grandfather, that the Prophet, may blessings and peace of Allah be upon him, borrowed thirty or forty thousand from him when he fought at Hunain. When the Prophet, may blessings and peace of Allah be upon him, came back and paid the loan, he said to him, "May Allah, may He be exalted, bless your family and your wealth for you. The reward for lending is repayment and words of paradise." Therefore, QH has been a well-established practice during the time of the glorious days of Prophet Muhammad, may blessings and peace of Allah be upon him, and he validated this important QH by practising it by himself.

QH can be used as the CB's MP instrument to perform the role of LOLR for IBs as well as for CIBBs. The CB, instead of lending on interest, can lend on the basis of QH, without any interest. Many developed capitalist countries, such as all Eurozone countries, are currently practising this mode of financing, replacing the bank rate with zero interest rates, similar to QH. Japan, Switzerland, Sweden and Denmark have gone one step further – the CBs in these countries have started to lend at negative interest rates, which is compatible with QH-based MP, because in this case, part of the principal amount is deducted. Prophet Muhammad, may blessings and peace of Allah be upon him, said, "Once a man died and was asked, 'What did you used to say (or do) in your life time?'" He replied, "I was a businessman and used to give time to the rich to repay his debt and (used to) deduct part of the debt of the poor." "So he was forgiven (his sins)." Allah, may He be exalted, has said (interpretation of the meaning): "And if the debtor is in a hard time (has no money), then grant him time till it is easy for him to repay" (Q 2:280). Waiving the debt, or part of it, is indeed an act of charity. Allah, may He be exalted, says (interpretation of the meaning), "But if you remit it by way of charity, that is better for you if you did but know" (Q: 2:280).

Muslim (3014) narrated from Abu'l-Yasar, may Allah be pleased with him, that the Messenger of Allah, may blessings and peace of Allah be upon him, said "Whoever allows more time for a debtor who is in difficulty or waives the debt, Allah will shade him with His shade".

QH loans are also called goodly or beautiful loans. Allah, may He be exalted, said in the Quran "Who is it that would loan Allah a goodly loan so He may multiply it for him many times over? And it is Allah who withholds and grants abundance, and to Him you will be returned" (Q: 2:245).

Allah, may He be exalted, also said:

> Indeed, the men who practise charity and the women who practise charity and (they who) have loaned Allah a goodly loan – it will be multiplied for them, and they will have a noble reward (Q: 57:18).

Allah, may He be exalted, promised that extending QH is a good deed, saying:

> Establish the prayer (*salat*) and pay the poor due (*Zakat*), and give to Allah Qard al-Hasan. Whatever good you may send forward for yourselves, you shall find it with Allah. That is best and richest in reward. Seek forgiveness from Allah; indeed Allah is All-Forgiving, All-Merciful (Q: 73:20).

QH loans are extended without any interest because interest is prohibited. Allah, may He be Exalted, has said "Those who devour *Riba* (interest or usury) will not stand (on the Day of Resurrection) except like the standing of a person beaten by *Shaitan* (Satan) leading him to insanity. That is because they say, "Trading is only like *Riba*," whereas Allah has permitted trading and forbidden *Riba*. So whosoever receives an admonition from his Lord and stops

devouring *Riba*, for him is what is in the past; his case is for Allah (to judge); but whoever returns (to *Riba*), such are the dwellers of the Fire- they will abide therein forever. Allah will destroy *Riba* and will give increase for *Sadaqat* (deeds of Charity, alms). And Allah likes not disbelievers, sinners" (Q: 2:275-276).

Because QH is a loan to Allah, it has all the features of a public good. Under a QH-based MP, the CB can successfully act as an LOLR and thus maximize the well-being of the entire nation and beyond. The expansionary effects of QH-based MP and the sound financial system resulting from the effectiveness of the CB's LOLR function will positively influence the prosperity of the domestic economy and the world economy at large.

In Islamic MP, including QH, the money supply (MS) should be circulated to all sections of the economy, not just the big banks as in the conventional interest-based system. Allah, may He be exalted, said:

> What Allah has bestowed on His Messenger from the people of the townships, belongs to Allah - to His Messenger and to kindred and orphans, the needy and the wayfarer; in order that it may not (merely) make a circuit between the wealthy among you. So take what the Messenger assigns to you, and deny yourselves that which he withholds from you. And fear Allah; for Allah is strict in punishment (Q: 59:7).

This paper focuses on the role of the CB as LOLR when the CB pursues QH-based MP. The paper is organized as follows. Section 2 reviews the literature on liquidity risk management for IBs as well as various aspects of Islamic MP, including QH. Section 3 develops a model to explain the effects of the CB's role as LOLR under QH-based MP. Section 4 computes the results and analyzes what effects the CB's LOLR policy under QH-based MP have on multipliers, AEs, and equilibrium real GDP. Section 5 analyzes transmission mechanisms when the CB plays the role of LOLR under QH-based MP. Section 6 presents evidence of QH-based MP from developed capitalist countries. Concluding remarks are summarized in Section 7.

2. Literature review

Kahf and Hamadi (2014) propose three instruments that the CB as LOLR can offer to IBs for mitigating the liquidity crisis. The three instruments include "'short-term *Mudarabah* deposits," "selling the leased assets of IBs to CB when needed" and using "tradable *Sukuk* for open market operations." Such instruments may help IBs but will not completely solve their problems or put IBs at the same competitive level as CIBBs. Only QH-based MP will offer IBs similar edge of competitiveness and advantages as enjoyed by their counterparts in conventional interest-based system.

Zaheer and Farooq (2013) argue that greater financial inclusion of faith-based groups through IBs may increase their economic well-being and guarantee stability in the financial system. However, the role of the CB as LOLR is important in any guarantee of financial stability in the banking system, especially regarding IBs, which often cannot borrow from the CB unless the borrowing and lending are based on QH.

Hassan (2004) argues that the central bank of Sudan (CBS) used *Sukuk* as part of liquidity management and to conduct open-market operations. IBs can buy those *Sukuk* and sell them to the CB whenever they need cash.

The International Islamic Liquidity Management Corporation (IILM) was established on October 25, 2010 to cater the needs of Islamic liquidity management for IBs across borders by "creating and issuing short term *Sharia-compliant* financial instruments." Initially, there were "14 founding members consisting of CBBs, monetary authorities and multilateral international organizations".

Bacha (2008) describes different instruments developed by the CB of Malaysia, known as Bank Negara Malaysia (BNM), for liquidity management of IBs. One such instrument is known as *Wadiah Acceptance*, where IBs are encouraged to keep their surplus funds with BNM and BNM is not required to pay any return to the IBs except as "*hibah*" or gift. If IBs do not receive any satisfactory return for their surplus funds, there will be little incentive for the IBs to place such funds with the CB and, therefore, it will provide hardly any liquidity for the IBs when they need it most. Bacha (2008) also outlines another BNM instrument, called *Ar-Rahnu Agreements* (*RA-1*), under which IBs are entitled to receive loans when needed, but are required to pay the interbank money market rate, which is similar to the interest rate in conventional banks but here it is categorized as a gift, or *hibah*. In addition, BNM also introduced *Sukuk BNM Ijarah*; *BNM Istithmar Notes*; Islamic Negotiable Instruments of Deposits (INID); Sale and Buyback agreement; and Negotiable Islamic Debt certificates. Such instruments may provide some liquidity to IBs, but may be inadequate at times when IBs need much more liquid funds immediately. Only QH-based MP can guarantee sufficient liquid funds immediately.

The CBB has taken several steps to provide liquidity management for Islamic financial institutions (IFIs). For example, CBB issues short term and long term government debt instruments. IFIs can buy such government debt instruments and immediately redeem them from the CBB whenever they need liquid funds. These debt instruments were particularly developed "for liquidity management of Islamic financial institutions" (Central Bank of Bahrain, 2011, p. 4). In addition, *Salam Sukuk* are issued on *Salam* contracts. The *Salam* commodity is aluminum and the government promises to sell aluminum at a specified future date in exchange for full payment of the price in advance. The IFIs can buy the *Salam Sukuk* now, hold it until the delivery date of the *Salam* product (aluminum) and sell the product when they receive the delivery, thus receiving cash plus profit. However, *Salam Sukuk* are not tradable (Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) *Shariah* standard No. 17, para 0.5/2/14; 2010. p. 244).

For liquidity management of IFIs, CBB also issues *Sukuk Al-Ijarah* on behalf of the Ministry of Finance (MOF). IFIs can buy such *Sukuk Al-Ijarah* and redeem them from CBB whenever they need liquid funds. CBB has also developed Islamic repo to help IFIs with liquidity management. All such instruments are obviously excellent gestures of goodwill on behalf of the CBB, but these instruments and mechanisms still appear to be insufficient, as evidenced by 23 IBs in Bahrain having US$10.280bn liquid assets in 2012 (Boumediene, 2015, Table I, p. 331), which demonstrates that IBs still hold substantial amounts of funds as idle cash reserves to protect against liquidity risks. If the CB follows QH-based MP, only then it can offer full support as LOLR to all IFIs and all CIBBs as well. This will also guarantee full fairness for IFIs along with CIBBs. It will also provide IFIs with a level-playing field and, consequently, IFIs can truly compete with all other conventional financial institutions without the fear of any liquidity constraints. In addition, the impact of such QH-based MP in the economy is expected to be expansionary and positive, increasing real GDP and maintaining full employment.

Siddiqui (2008) finds that IBs were able to manage risks better and maintain adequate liquidity, but he did not specify the role of CB as LOLR.

Selim (2015) has examined the effectiveness of *Sukuk* as tools of MP and he has argued that MP based on buying and selling of *Sukuk* in open-market operations is relatively more effective than conventional interest-based MP. Buying and selling *Sukuk* in open-market operations may help IBs in managing liquidity. However, for large-scale liquidity management, QH-based MP will be much more effective than other piecemeal solutions.

Value of b	Value of e_c	Value of e_k	Value of e_g	Value of e_x	Value of e_{ms}	Value of $(t+m)$	Net value of e	Multiplier σ	Rows
0.8	0.00	0.0	0.00	0.0	0.00	$0.3+0.2$	0.30	1.43	(1)
0.8	0.00	0.0	0.00	0.0	0.00	$0.2+0.2$	0.40	1.67	(2)
0.8	0.00	0.0	0.00	0.0	0.00	$0.1+0.2$	0.50	2.00	(3)
0.8	0.00	0.0	0.00	0.0	0.00	$0.0+0.2$	0.60	2.50	(4)
0.8	0.05	0.1	0.05	0.1	0.05	$0.0+0.2$	0.95	20.0	(5)
0.8	0.05	0.1	0.05	0.1	0.05	$0.1+0.2$	0.85	6.66	(6)
0.8	0.05	0.1	0.05	0.1	0.05	$0.2+0.2$	0.75	4.00	(7)
0.8	0.05	0.1	0.05	0.1	0.05	$0.3+0.2$	0.65	2.86	(8)

Notes: In Row 5, the full effect of QH-based MP is shown in an economy when the CB acts as LOLR and the income tax rate (t) is zero. Here, the value of the multiplier is 20, which is the highest. The income tax rate is zero in GCC countries. In Row 1, where countries do not follow the QH-based MP and the income tax rate is 30%, the value of the multiplier is 1.43. If these same countries follow QH-based MP, their multiplier increases to 2.86, as shown in Row 8, which is exactly double that of Row 1. Therefore, QH or interest-free MP will make the AE line steeper. As a result, the higher the slope of AE line (e), the higher the value of multiplier (σ), and the higher will be the increase in equilibrium income, and employment

Table I. Marginal propensities to expend (MPE), multipliers and the twin effects of QH on (AE) and equilibrium real GDP (Y)

Beck *et al.* (2013) find that IBs had higher intermediation ratio, relatively superior asset quality and were better capitalized than CIBBs; as a result, stock performance for listed IBs was better compared to CIBBs during the recent financial crisis. In addition, IBs usually keep relatively higher level of liquid assets for meeting liquidity risks.

Al-Hares and Saleem (2017) argue that that the overall financial performance of Gulf Cooperation Council IBs is highly sensitive to Basel III regulations. However, the support of the CB as LOLR is crucial for IBs to perform better because IBs can freely lend by keeping minimum required cash reserves, and thus can maximize total credit creation and total AEs in the economy will increase.

Zaher and Kabir (2001) evaluate the performance of IBs, focusing on the "regulations, challenges and problems in the Islamic banking market." If the CB extends the service of LOLR to IBs through QH-based MP, much of the challenges and problems in the Islamic Banking market can be mitigated and IBs will be in a better position to compete and thrive in domestic as well as in global market place.

Karbhari *et al.* (2004) investigate some of the main problems, challenges and opportunities for IBs in the UK. Many of these problems and challenges can successfully be solved when the CB effectively acts as LOLR for IBs. The CB can reach out to them and strengthen them even if the IBs operate in overseas markets. In branch banking system, IBs can easily mobilize funds from one branch to another and can take full advantage of the LOLR service from the CB when CB pursues QH-based MP.

Boumediene (2015) shows that a sample of about 147 IBs in 26 countries held over US$165bn as liquid assets in 2012 to protect against liquidity risks. He suggests that such massive liquid funds can be used to finance budget deficits for the organization for Islamic countries (OIC). While such an idea is obviously a noble one, it does little to mitigate the overall risks of IBs unless the CB serves as LOLR for IBs under QH-based MP.

Chapra (1996) argues that the CB should allow newly created money or seigniorage to finance budget deficits. However, budget deficits and financing budget deficits are related to fiscal policy, while MP is a completely separate issue and such policy measures will do little for CB's LOLR service to IBs or to any banks.

Widiyanto *et al.* (2011) have found that QH-based model is relatively more effective in engaging the needy, the poor and the destitute in new economic activities and it has a great potential for poverty alleviation.

Arrif (1996) suggests that QH ratio can be used to control the MS. Here, QH ratio refers to a given percentage of demand deposits (DD) that commercial banks should be instructed to lend as interest-free. However, such small interest-free loans will have little impact on the economy because many commercial banks may not follow such practices or just may ignore. QH-based MP will be comprehensive and it will have greater and significant impact on the economy.

Bhuiyan *et al.* (2012) have recommended that QH-based mode of financing, inspired by spiritual values, may have the potential to alleviate poverty as well as to maintain sustainable livelihood. But if CB adopts QH-based MP, it will have much greater potential positive impact on the overall performance of the economy compared to what Bhuiyan *et al.* (2012) have suggested.

Ben Jedidia and Hamza (2014) find that most IBs often use mainly *Murabahah* mode of financing because such banks always try to avoid liquidity risk. If the CB acts as LOLR for IBs and offers adequate liquid assets whenever the need arises, IBs can definitely focus on lending in *Mudarabah*, *Musharakah* or *Istisna*-based long-term projects and thus IBs can truly diversify their investment portfolios.

QH-based MP and the role of the CB as LOLR are basically rooted in Islamic ethical and moral principles. As a result, such policies are anti-recessionary and often prevent all kinds of bankruptcies. If the global financial system plans to be more effective in preventing financial crisis, it should strongly reflect and modify its laws and principles according to Islamic ethical standards (Adebayo and Kabir, 2013).

Ismal (2011) proposes the following asset-backed securities that the CB can buy and sell in open-market operations, thus influencing the supply of money. These securities are:

- certificates of agency and leasing; and
- certificate of agency and leasing-sale.

Because both types of securities are asset-backed and free from interest, the IBs can use them in managing their liquidity.

According to Mojtahed and Hassanzadeh (2009), QH has considerable positive effects on poverty elimination in microfinance and microcredit projects.

Deposit certificates can be issued by the CBs and such certificates can be bought and sold in the open market (Fahmy, 2006; Al-Jarhy, 1981). Such deposit certificates are basically the investments of the CB in different commercial banks. This strategy can be helpful in managing liquidity for the commercial banks. However, IBs can take part in this initiative only if such investments are interest-free.

In the 1990s, Sudan followed Islamic MP (CBS, 2006; Hussen, 2010). The CBS attempted to follow almost all the tools of *Sharia-compliant* MP. Because of the political hegemony in Sudan, it has been difficult to assess the true impact of *Sharia-compliant* MP in Sudan.

Finally, a series of papers deals with quantitative easing of MP and its impact on economic activities, stability of money demand in Islamic and non-Islamic economic systems, and how IBs can contribute to financial stability and economic growth (Ashraf *et al.*, 2017; Hassan and Aliyu, 2018; Hassan *et al.*, 2013; Hassan and Al-Dayel, 1998/1999).

When conventional MP policy is applied in the presence of both IBs and CIBBs, there arises many difficulties, heterogeneity issues and complexities (Khatat, 2016). However, in this study, QH-based MP will be applied for both systems of banking. This will simplify the whole process and both types of banking will have equal access and equal opportunities in

borrowing facilities from the CB. This will also provide IBs a level-playing field so that they will no longer be the underdog nor be deprived of the service of LOLR from the CB.

This paper explores how the CB can act as an LOLR by pursuing QH-based MP. When the CB pursues QH-based MP, IBs are assured and pleased to borrow from the CB without any hesitation. As a result, IBs will lend all their LAHs, thus increasing DE, AEs, equilibrium real GDP and employment. The model also examines the transmission mechanism of QH-based MP when the CB acts as LOLR.

3. The model

This paper focuses on how the CB can act as an LOLR for both IBs and CIBBs. Suppose the CB follows QH-based MP and, as such, announces to both IBs and CIBBs that both types of banks will have equal opportunities in borrowing from the CB. In the past, IBs did not or could not borrow from the CB because it is used to charge a positive CB interest rate or bank rate. Because interest is prohibited, IBs refrained from borrowing from the CB. Instead, IBs have attempted to build up huge liquid reserves against any risks of default because, essentially, IBs are on their own and they must protect themselves by any means. One of the easiest ways to protect themselves was to build up reserves equivalent to billions of dollars. Basically, IBs worldwide have been holding such funds as reserves against liquidity risk. Now as soon as the CB implements QH-based MP, IBs will welcome the chance to borrow funds from the CB without any interest cost. IBs will also be assured by the CB that they will have access to funds from the CB whenever they need, at any time, during any crisis. In other words, the CB will act as an LOLR for IBs. Now IBs can lend all the reserve funds without any fear of default risks. According to Boumediene (2015), 127 IBs in 26 countries are holding over US$165bn worth of reserve funds. This paper will examine the impact of lending such enormous funds to the global economy, its impact on the lives of the global population as well as the global economy, and, above all, its effect on the performance of IBs both in domestic economies and the global economy.

As mentioned above, Boumediene (2015) shows that a sample of 147 IBs in 26 countries had liquid assets of US$165.005 in 2012. However, not all liquid assets of all IBs were included. For example, in Bangladesh, out of seven IBs, only the liquid assets of three IBs were included in the above calculations. If liquid assets of all IBs from all countries are added, the actual amount of liquid assets will exceed US$165.005. Suppose, as a conservative estimate, the liquid assets of all IBs in the world that are usually kept as LAHs will now be given as loans because all CBs of these countries plan to pursue QH-based MP, all IBs have been assured that CBs will act as the LOLR for IBs, and all IBs will be able to borrow funds on the basis of QH whenever they need. Suppose further that the QH-based MP has created confidence in the entire financial system, and as a result, the required reserve ratio has been reduced to just 2 per cent.

Now the MS in the economy will increase because CBs will act as the LOLR for both IBs and CIBBs and lower the required reserve ratio. As soon as all IBs plan to lend their LAHs and if the required reserve ratio (rrr) is 2 per cent, then the new money multiplier (θ) can be calculated as follows:

$$\theta = \frac{1}{rrr} = \frac{1}{0.02} = 50 \tag{1}$$

Now the total loans (most of which will be investment spending), consumption spending and other expenditures will together shift the AE function up, thereby increasing equilibrium income and employment. This raises the question, what will the magnitude of deposit

expansion, or loan creation, or increase in aggregate expenditures (*AE*) be? The total loan creation or DE, or increase in (*AE*), can be computed for the initial deposit (*ID*) of US $165.005bn as follows:

$$DE = (\theta)(ID) = 50 \times 165.005 = US\$8{,}250.25billion \quad (2)$$

Therefore, total DE, or total loans, or increase in AEs will equal US$8,250.25. In addition, because of the QH-based MP, financial institutions, IBs and CIBBs alike will be able to borrow more funds from CBs. As a result, DE or total loans or AEs will increase further. Such increases in AEs can be many times greater than the above amount.

3.1 Twin effects of Qard-al-Hasan-based monetary policy: lending of liquid asset-holdings by Islamic banks plus expansionary monetary policy effects of Qard-al-Hasan for both Islamic banks and conventional interest-based banks

QH-based MP policy will create twin effects. First, it will encourage IBs to lend the accumulated LAHs they have been keeping as reserves against all kinds of risks, including the risk of bank failure or default risk. Second, the QH-based MP will encourage both IBs and CIBBs to borrow more funds from the CBs up to the optimum level of funds, denoted by QF. In QH-based MP, CB will lend to all banks and financial institutions without any interest. As a result, all the financial institutions and banks will lend at the lowest possible rate; the cost of borrowing by the consumers, firms and governments will be the least; the AE will increase; and income will also increase.

An increase in the MS by the CB as part of the QH-based expansionary MP will have twin positive effects on the AE function. It will cause an upward shift in the AE function and, as a result, equilibrium income (*Y*) and employment (*E*) will increase and the unemployment rate (*UR*) will fall.

Now to find the twin positive effects, consider the macroeconomic equilibrium as follows:

$$Y = \sigma A \quad (3)$$

Equation (3) is the reduced form of the macroeconomic equilibrium condition, where Y is the equilibrium real GDP, σ is the multiplier and A is the autonomous AEs. Multiplying by Δ on both sides of equation (3) yields:

$$\Delta Y = \sigma \Delta A \quad (4)$$

When the CB acts as LOLR in QH-based MP, the positive effects of the twin factors will cause multiple increases in LAH and QF. Incorporating the expansionary effects of the twin factors into autonomous expenditures (A) in equation (4) yields:

$$\Delta A = \Delta LAH + \Delta QF \quad (5)$$

Now substituting equation (5) into equation (4) yields:

$$\Delta Y = \sigma(\Delta LAH + \Delta QF) \quad (6)$$

If CB pursues QH-based MP, then the CB also acts as the LOLR for IBs, thus offering assurance and opening many possibilities and opportunities for the IBs. As a result, IBs will spontaneously lend their LAH without fear, and eventually, total DE or total loan creation

will equal the change in total investment expenditures, consumption expenditures and other components of AEs. Therefore, equation (2) can be written as follows:

$$DE = \Delta AE1 = US\$8250.25 billion \tag{7}$$

Substituting equation (7) into equation (6) yields:

$$\Delta Y = \sigma(\Delta AE1 + \Delta QF) = \sigma(8250.25 + \Delta QF) \tag{8}$$

Now to find the additional increase in real GDP (Y) caused by the expansionary effects of the twin factors, we must find the values of σ and ΔQF.

The value of the multiplier σ can be found from the slope of the AE function, where σ can be defined as:

$$\sigma = \frac{1}{1-e} \tag{9}$$

In equation (9), e is the slope of the AE function and can be written as follows:

$$e = \frac{\Delta AE}{\Delta Y} \tag{10}$$

If the income tax rate is zero and the components in AE function, such as investment spending (Ig), government spending (G), exports (X) and imports (M) are autonomous, then the slope of the AE function is equal to the slope of the consumption function, and equation (10) can be written as:

$$e = \frac{\Delta AE}{\Delta Y} = b = \frac{\Delta C}{\Delta Y} \tag{10.a}$$

If the slope of the AE function equals to the slope of consumption function in simple model, as shown in equation (10.a), then equation (9) can be written as:

$$\sigma' = \frac{1}{1-e} = \frac{1}{1-b} \tag{9.a}$$

In equation (9.a), σ' indicates simple multiplier.

As (e), the slope of AE, increases, the value of the multiplier σ will increase as well. From equation (6), we see that equilibrium income (Y) will increase and the unemployment rate will fall. The slope of the AE function depends on the slopes of consumption function (C), investment spending function (I), government spending function (G) and net export function (Nx). The QH-based MP lowers the overall cost of borrowing, and as such, the propensity to spend on C, I, G and Nx are likely to increase. Thus, (e) is likely to increase and σ will increase further. According to equation (6), there will be a further increase in real GDP, i.e. $\Delta Y > 0$.

The main focus of this article is to analyze the impact of LAHs of IBs on the AE function when the CB pursues QH-based MP. However, QH-based MP influences three factors in the macroeconomic equilibrium condition, as shown in equation (6). These three factors from equation (6) are as follows:

(1) one multiplier, or $\sigma = \frac{1}{1-e}$;

(2) ΔLAH, total DE or loan creation out of LAHs by IBs. This equals Δ*AE*1, or total change in AEs; and

(3) ΔQF, or increase in quantity of funds borrowed by both IBs and CIBBs.

On the basis of our analysis above, now we can establish Theorem 1 for the first factor, or the multiplier, as follows:

Theorem 1. If the CB acts as LOLR by pursuing QH-based MP, $\rightarrow e\uparrow \rightarrow \sigma\uparrow$. *In equation (6) above,* $\Delta Y = \sigma(\Delta LAH + \Delta QF)$, *the new* ΔY, *say* ΔY^*, *will be greater than* ΔY. *Therefore, if* $e\uparrow \rightarrow \sigma\uparrow$, $\Delta Y^* > \Delta Y$. *For new equilibrium income (Y) and employment (E), say* Y^* *and* E^*, *then* $Y^* > Y$ *and* $E^* >$ *and UR*↓.

For the second factor, we have shown in equation (7) that there will be additional increase in AEs, and, as a result, the AE function will shift up. This fact can be established in Theorem 2 as follows.

Theorem 2. If the CB pursues QH-based MP, then IBs can borrow funds from the CB at any time at zero rate of interest and IBs will lend all excess cash reserves, including LAHs, LAH → DE ↑ → AE ↑ because in equation (7), DE = ΔLAH = AE1 = US$8,250.25bn,where in equation (2), DE = (θ)(ID) = 50 × 165.005 = US$8,250.25bn, and in equation (6), $\Delta Y = \sigma(\Delta LAH + \Delta QF)$. The new ΔY, say ΔY^*, will be greater than ΔY. Therefore, if IBs will lend all excess cash reserves, then LAH → DE↑ → AE↑, →$\Delta Y^* > \Delta Y$. For new Y and E, say Y^* and E^*, $Y^* > Y$ and $E^* > E$ and UR↓.

Regarding the third factor, under the QH-based MP, both IBs and CIBBs will borrow more funds. Suppose IBs borrow QF1 and CIBBs borrow QF2. The total increase in funds borrowed from the CB can be written as:

$$\Delta QF = \Delta QF1 + \Delta QF2 \tag{11}$$

IBs lend ΔQF1 in such a way that all such funds in essence create additional AEs (ΔAE1) instantaneously.

3.2 An example of expansionary monetary policy effects resulting from Qard-al-Hasan on both Islamic banks and conventional interest-based banks

If IBs lend on the basis of *Murabaha*, IBs essentially spend such funds to buy the product and then resell it to the borrower. If IBs lend on the basis of *Mudaraba*, the funds they will lend as *Rabbul Mal* are investment expenditures and, therefore, such expenditures are part of AEs and all such expenditures from IBs will be denoted as AE2. Similarly, the borrowed funds from CIBBs are also part of AEs, and will be denoted by AE3 Now following the QH-based MP, let us make the following assumptions about the borrowing behavior of both IBs and CIBBs:

(1) IBs will likely borrow at least LAH = US$165.005bn or more, so DE = (θ)(ID) = 50 × 165.005 = US$8,250.25bn or more. These are basically AEs that we have defined and named as AE2.

(2) CIBBs are, on average, twice the size of the IBs or more. Therefore, CIBBs will likely borrow at least two times more than IBs. Supposing CIBBs will borrow two times the amount of IBs, DE = $(\theta)(IDX2)$ = 50 × 165.005*X*2 = US$16,500.5bn, which we have denoted above as AE3.

Therefore, both IBs and CIBBs will likely borrow the following amounts of funds when the CBs of 26 countries pursue QH-based MP. From equation (11), we can write:

$$\Delta QF = \Delta QF1 + \Delta QF2 = AE2 + AE3 = US\$8250.25 + US\$16,500.5 = US\$24,750.75$$

Recalling equation (6), the total new increase in equilibrium income for the 26 countries when CBs act as an LOLR for both IBs and CIBBs by pursuing QH-based MP can be calculated as:

$$\begin{aligned} \Delta Y &= \sigma(\Delta LAH + \Delta QF) = \sigma(\Delta AE1 + [\Delta AE2 + \Delta AE3]) \\ \Delta Y &= \sigma(US\$8250.25 + US\$24,750.75) \\ &= \sigma x US\$33,001.00\, billion \end{aligned} \tag{12}$$

Now we will examine the factors that influence the value of the multiplier. Depending on the value of the multiplier, we can calculate the increase in real GDP (Y) in equation (6) when the CB acts as LOLR under QH-based MP.

The value of the multiplier $\sigma = \frac{1}{1-e}$ depends on the value of e, where e is the slope of AE. e is called marginal propensity to expend (MPE). MPE is the slope of the AE line and depends on the slopes of the consumption function (C), investment spending function (I), government spending function (G) and net export function (Nx).

- Slope of consumption function: Slope of the consumption function is the marginal propensity to consume (MPC), usually denoted by b. However, if the CB pursues QH-based MP, it is expected that the cost of financing may decrease and, as a result, consumption habits may increase. If consumers have access to interest-free loans and if the cost of borrowing is zero, then MPC may increase in excess of b, say. However, the increase in taxes, such as sales tax (st), may have a negative effect on the MPC. The net effect can be written as:

$$MPC = b + \gamma - st \tag{13}$$

Equation (13) shows that if the tax structures of the economy remain the same, MPC will be higher because $\gamma > 0$. If MPC is higher, the slope of AE will be steeper and the value of the multiplier will be higher and the equilibrium income will increase further under QH-based MP.

- Slope of investment spending: With QH-based MP, firms and business may plan to spend more on capital goods. As a result, MPE on capital goods, denoted by e_k, may increase.
- Slope of government spending function: When the CB pursues QH-based MP, the overall cost of financing public spending will fall, and thus MPE by the government, denoted by e_g, may go up.
- Slope of net exports: QH-based MP will help minimize the cost of exports. Thus, MPE on the export industry, denoted by e_x, will increase. Marginal propensity to import, denoted by m, will negatively affect the slope of the net export function. However, QH-based MP policy will increase investment spending in the import substitution industry. As a result, MPE in import substitution, denoted by e_{ms}, will increase. Therefore, the slope of the net export function can be written as follows:

$$Slope\ of\ NX = e_x - m + e_{ms} \tag{14}$$

Now we can find the slope of the AE function e by adding the slopes of consumption function, investment spending function, government spending function and net export function as follows:

$$e = b + e_c - t + e_k + e_g + e_x - m + e_{ms}$$
$$or,\ e = b + e_c + e_k + e_g + e_x + e_{ms} - (t + m) \quad (15)$$

Equation (15) indicates that if the CB pursues QH-based MP and acts as LOLR, it is expected that $e_c > 0$; $e_k > 0$; $e_g > 0$; $e_x > 0$; and $e_{ms} > 0$. Further, $b > 0$ and the value of b may increase. The income tax rate and the marginal propensity to import together $(t + m)$ will negatively affect the slope of the (AE) function.

3.3 Results and the computations of the effects of Qard-al-Hasan-based monetary policy on the multiplier when the central bank acts as lender of last resort

When the CB acts as LOLR for IBs under QH-based MP, the total DE and loan creation in the economy will increase. The AE line will shift upwards. Equilibrium income (Y) and employment (E) will increase while the unemployment rate (UR) will fall. In addition, the overall financing rate in the economy will fall because both the IBs and CIBBs will borrow from the CB at zero interest rate and, therefore, the cost of borrowing by consumers, firms, government and other actors in the economy will be the least, and lending as well as AEs, including investment spending, will be the highest Consequently, MPE on consumption (e_c) and marginal propensity to invest (e_k) will increase. MPE on government purchases (e_g), marginal propensity to export (e_x) and marginal propensity to import substitution (e_{ms}) will increase, but the income tax rate (t) and marginal propensity to import (m) together $(t + m)$ will have a negative impact on the slope of AE line (e). The net effect of the above factors on the slope of the AE line (e) is given by equation (15) and is calculated in Table I.

In Table I, the value of MPC or b is assumed to be 0.8. However, the value of MPC can be lower as b = 0.7 and, in that case, the value of the multiplier will be lower. However, in reality, MPC is expected to be higher than 0.8 as shown in equation (13), where $\gamma > 0$ because QH-based MP will lower the cost of borrowing across the board and consumption spending habits of the people will increase and, consequently, MPC will increase above 0.8. In Table I, the value of MPC equal to 0.8 is still a conservative estimate, and under QH-based MP, the value of MPC is expected to be higher than 0.8.

3.4 Computations of the effects of Qard-al-Hasan-based monetary policy on multiplier, liquid asset holdings, deposit expansions of Islamic banks, aggregate expenditures and income when the central bank acts as lender of last resort

If the CB pursues QH-based MP and acts as LOLR, the multiplier effect will be higher, IBs will be able to lend LAHs, DE as well as loan creation in the economy will be higher, the AE (AE1) line will shift upwards, equilibrium income (Y) and employment (E) will increase, and the unemployment rate (UR) will fall, as shown in Theorem 2. The total effects are calculated in Table II.

3.5 Computations of the effects of Qard-al-Hasan-based monetary policy when the central bank acts as the lender of last resort on the multiplier, aggregate expenditures and equilibrium income

When the CB acts as the LOLR under QH-based MP, the value of the multiplier will increase. In addition, AEs, AE1 and AE2, will increase because of the expansionary actions of IBs and AE3 will increase because of the expansionary actions of CIBBs. The AE line, which is the sum of AE1, AE2 and AE3, will shift up. Equilibrium income Y and employment level E will further increase and unemployment rate UR will fall. This scenario is shown by equation (12) and calculated in Table III.

3.6 The effects of Qard-al-Hasan-based monetary policy when the central bank acts as lender of last resort on liquid asset holdings of Islamic banks and the transmission mechanism

When the CB acts as the LOLR under QH-based MP, IBs are assured the access to borrow funds from the CB on a QH basis without any interest. Thus, IBs will no longer keep liquid assets as idle cash reserves and will consequently lend to firms, consumers and other agents. Therefore, the transmission mechanism of such QH-based MP when the CB acts as LOLR will lead from the lending of LAHs (LAH by the IBs to an increase in loans). The increase in loans will increase the DD as well as DE in the entire banking system. As a result, the MS in the economy will increase because $M1$, or base MS, is the sum of currency in circulation (CC) and DD. The transmission mechanism is shown in equation (16).

$$\uparrow Loans\ from\ LAH \rightarrow DD \uparrow\rightarrow DE \uparrow\rightarrow MS \uparrow\rightarrow AE \uparrow\rightarrow AE\ shifts\ \uparrow\rightarrow (Y, E) \uparrow\rightarrow UR \downarrow \tag{16}$$

As DD increases, $M1$ will also increase. MS will increase; the AE line will shift up; and both equilibrium real GDP (Y) and employment (E) will increase, while unemployment (UR) will fall.

3.7 The role of central bank as lender of last resort under Qard-al-Hasan-based monetary policy and the transmission mechanism of exports (X) and foreign currency reserves

When IBs increase loans from their LAHs because of the QH-based MP and IBs are assured of LOLR support by the CB, and as a result the transmission mechanism will trach from an increase in DD to an increase in loans and DE. Consequently, the MS will increase, the AE line will shift up and real GDP (Y) will increase. An increase in real GDP will cause an increase in exportable surplus ($ExpS$) along with exports (X). This will cause a further increase in real GDP (Y) and employment (E) while the unemployment rate (UR) will fall, as shown in equation (17A).

Total LAH	Value of θ	ΔAE1	Multiplier σ	ΔY	Rows
165.005	50	8,250.25	1.43	11,797.86	(1)
165.005	50	8,250.25	1.67	13,777.92	(2)
165.005	50	8,250.25	2.00	16,500.50	(3)
165.005	50	8,250.25	2.50	20,625.63	(4)
165.005	50	8,250.25	20.00	165,005.00	(5)
165.005	50	8,250.25	6.66	54,946.67	(6)
165.005	50	8,250.25	4.00	33,001.00	(7)
165.005	50	8,250.25	2.86	23,595.72	(8)

Notes: In Row 5, the full effect of QH-based MP is shown when the CB acts as LOLR for IBs. If the income tax rate (t) is zero and the value of the multiplier is 20, and if LAH = 165.005*, then the increase in AE1 by IBs will be 8,250.25 and the total increase in income Y will be US$165,005.00bn for the 26 countries. This is the highest possible increase in Y, as shown in Row 5. In Row 1, the increase in income is the lowest because the countries do not follow QH-based MP, the income tax rate is 30% and the value of the multiplier is 1.43. These same countries can double the increase in income if they follow QH-based MP because of the increase in the multiplier effect, as shown in Row 8. *Boumediene (2015), Table I. Calculations are done by the authors

Table II. The role of CBs as LOLR under QH-based MP for a sample of 147 IBs in 26 countries*, their effects on the change in liquid asset holdings (ΔLAH) of IBs and the subsequent effects on the change in aggregate expenditures ($\Delta AE1$) and the increase in real GDP (ΔY), in billions of US$

$$\uparrow Loans\ from\ LAH \rightarrow DD \uparrow\rightarrow DE \uparrow\rightarrow MS \uparrow\rightarrow AE \uparrow\rightarrow AE\ shifts\ \uparrow\rightarrow (Y) \uparrow\rightarrow ExpS \uparrow \rightarrow X \uparrow\rightarrow (Y,E) \uparrow\rightarrow U \downarrow \quad (17A)$$

However, the transmission mechanism will go from the increase in exports (X) to the increase in export earnings and FCR with the CB. The MS will increase because the CB will keep its foreign currencies as reserves and will supply the equivalent amount in domestic currencies to exporters. As MS increases, the aggregate demand curve (AD) will shift to the right and both real GDP (Y) and employment (E) will increase while the unemployment rate (UR) will fall, as shown in equation (17B).

$$As\ X \uparrow\rightarrow FCRS \uparrow\rightarrow MS \uparrow\rightarrow AD \gg Right\ or,\ AE\ shifts\ \uparrow\rightarrow (Y,E) \uparrow\rightarrow UR \downarrow \quad (17B)$$

3.8 The role of the central bank as lender of last resort under Qard-al-Hasan-based monetary policy and the transmission mechanism, and its effects on trade deficits

The transmission mechanism of QH-based MP when the CB acts as LOLR flows from three sources. First, the LAHs of IBs are transformed into loans. In addition, IBs borrow more funds from the CB on the basis of QH, which allows them to lend more funds. Finally, CIBBs also borrow more funds and continue to lend more funds. The combined effects of all three lending activities will lead to an increase in DD and DE. As a result, the MS will increase, as will AE = AE1 + AE2 + AE3 in producing import substitutions. The AE line shifts upwards and real GDP (Y) increases. The supply of import substitute products will also increase. Imports will fall because domestically produced import substitute products will replace imports. Net exports will increase and the trade balance will improve. The FCR of the CB will increase, as will the MS because of the release of an equivalent amount of domestic currency to exporters. As MS increases, the AD curve will shift to the right and real GDP (Y), price level and employment (E) will increase while the unemployment rate (UR) will fall, as shown in

ΔAE1	ΔAE2	ΔAE3	ΔAET	Multiplier σ	ΔY	Rows
8,250.25	8,250.25	16,500.50	33,001.00	1.43	47,191.43	(1)
8,250.25	8,250.25	16,500.50	33,001.00	1.67	55,111.67	(2)
8,250.25	8,250.25	16,500.50	33,001.00	2.00	66,002.00	(3)
8,250.25	8,250.25	16,500.50	33,001.00	2.50	82,502.50	(4)
8,250.25	8,250.25	16,500.50	33,001.00	20.00	660,020.00	(5)
8,250.25	8,250.25	16,500.50	33,001.00	6.66	219,786.66	(6)
8,250.25	8,250.25	16,500.50	33,001.00	4.00	132,004.00	(7)
8,250.25	8,250.25	16,500.50	33,001.00	2.86	94,382.86	(8)

Table III. CBs as LOLR under QH-based MP for a sample of 147 IBs in 26 countries* and their effects on the multiplier (σ), change in aggregate expenditures ($\Delta AE1$), (ΔAE2), ($\Delta AE3$) and the total increase in real GDP (ΔY), in billions of US$

Notes: In Row 5, the full effect of QH-based MP is shown when the CB acts as LOLR for IBs and CIBBs. If the income tax rate (t) is zero and the value of the multiplier is 20, the total change in AE = US$8,250.25bn + US$8,250.25bn = US$16,500.00bn by IBs and US$16,500.00 by CIBBs, and the total increase in income Y will be US$660,020.00bn for the 26 countries*. Such an increase in Y would be the highest, as shown in Row 5. The increase in income will be the lowest when the income tax rate is 30% and QH-based MP is not followed, as shown in Row 1. However, even the high income tax countries can double their increase in real GDP, Y, if they follow QH-based MP, as shown in Row 8.*Boumediene (2015), Table I. Calculations are done by the authors

equation (18). However, the price level may not increase because of the supply side effect, as shown in equation (19).

$$\uparrow (Loans\ from\ LAH + Borrowing\ from\ CB\ by\ IBs\ and\ lending + borrowing\ from\ CB\ by\ CIBBs\ and\ lending) \rightarrow DD \uparrow\rightarrow DE \uparrow\rightarrow MS \uparrow\rightarrow AE\ in\ Msubs \uparrow\rightarrow AE\ shifts \uparrow Y \rightarrow Msubs \uparrow\rightarrow M \downarrow\rightarrow Xn \uparrow\rightarrow FCRS \uparrow\rightarrow MS \uparrow\rightarrow AD \gg Right \rightarrow (Y, P, E) \uparrow\rightarrow UR \downarrow \quad (18)$$

3.9 The central bank acting as lender of last resort under Qard-al-Hasan-based monetary policy and the transmission mechanism on the aggregate supply curve and price level

As soon as the CB is able to act as an LOLR for IBs and CIBBs under a QH-based MP, the transmission mechanism will run from the increase in loans from the LAHs of IBs. Furthermore, IBs and CIBBs will be able to borrow more funds from the CB on a QH basis without any interest. Thus, loans, DD, DE and the MS will all increase. As MS increases, the cost of borrowing will fall across the economy and the aggregate supply curve (AS) will shift to the right. As a result, both real GDP (Y) and employment (E) will increase but the price level (P) and unemployment rate (UR) will fall.

$$\uparrow (Loans\ from\ LAH + QH\ loans) \rightarrow DD \uparrow\rightarrow DE \uparrow\rightarrow MS \uparrow\rightarrow Cost\ of\ borrowing \downarrow\rightarrow AS \gg Right \rightarrow (Y, E) \uparrow\rightarrow (P, UR) \downarrow \quad (19)$$

The price level will fall because the AS curve will shift to the right. The entire process of the transmission mechanism is shown in equation (19).

3.10 The role of central bank as lender of last resort under Qard-al-Hasan-based monetary policy and the transmission mechanism on foreign direct investment

When the CB acts as LOLR by pursuing QH-based MP, the transmission mechanism runs from the increase in loans from IBs and CIBBs to an increase in DD in the entire banking system, which then leads to an increase in DE. This will lead to an increase in the MS, which will increase total AEs. The AE line will shift up, real GDP (Y) and employment (E) will increase and the economy will be in full employment. The booming and lucrative economy where the firms are making super normal profits will definitely attract foreign firms and foreign direct investments (FDI). Increase in FDI in domestic economy will increase FCRS with the CB and, therefore, MS will increase. As a result, aggregate demand curve (AD) will shift to the right; potential income and employment will increase and unemployment rate will fall, as shown in equation (20), by the transmission mechanism of QH-based MP when CB acts as LOLR:

$$\uparrow (Loans\ from\ LAH + QH\ loans) \rightarrow DD \uparrow\rightarrow DE \uparrow\rightarrow MS \uparrow\rightarrow (AE1 + AE2 + AE3) \uparrow \rightarrow (Y, E) \uparrow\rightarrow Firms\ are\ making\ super\ Normal\ Profits \rightarrow FDI \uparrow\rightarrow FCRs \rightarrow MS \uparrow\rightarrow AD \gg Right \rightarrow (Y, E) \uparrow\rightarrow UR \downarrow \quad (20)$$

3.11 Evidence of Qard-al-Hasan-based monetary policy and lender of last resort with zero or negative interest rates from the Eurozone and a few prominent Organization for Economic Cooperation and Development (OECD) countries

Eurozone countries are currently applying zero interest-based MPs. Japan, Switzerland, Sweden and Denmark are even pursuing negative interest-based MPs. These are shown in Table IV. Both zero and negative interest-based MPs are similar to QH-based MP. In addition, the CBs of Eurozone countries and four prominent members of the OECD are also acting as LOLR for all banks by lending at zero or negative interest rates. This is obviously a vivid example of how QH-based MP can be applied and a CB can act as the LOLR for both IBs and CIBBs.

If Eurozone countries, Japan, Switzerland, Sweden and Denmark, can successfully apply MP based on zero or negative interest rate or QH for one year or even more, surely all other countries can do the same. Particularly, the OIC should take the lead in doing so because Allah, may He be exalted, has permitted trading and forbidden *Riba* (interest) (Q 2:275).

4. Conclusion

This study focuses on how CBs can pursue QH-based MP and act as an LOLR for both IBs and CIBBs. When the CB acts as LOLR by applying QH-based MP, IBs are assured of full and equal access to borrowing facilities on a QH basis without interest. Currently, IBs do not borrow from CBs because CBs charge positive interest rates, which have been clearly prohibited in Islam. Because IBs cannot borrow from the CB in times of liquidity crisis, IBs usually build their own empire of LAHs, which are often huge. For instance, a sample of 147 IBs in 26 countries accumulated over US$165bn (Boumediene, 2015). The current study suggests that IBs will not

Table IV.
Evidence of QH-based MP and LOLR with zero or negative interest rates from the Eurozone and a few prominent OECD countries

OECD/Eurozone countries	Bank rates/CB interest rates	Policy in effect in years	LOLR interest rates
Denmark	−0.65	1.33	−0.65
Japan	−0.10	1.33	−0.10
Sweden	−0.50	1.25	−0.50
Switzerland	−0.75	1.33	−0.75
Austria	0.00	1.25	0.00
Belgium	0.00	1.25	0.00
Cyprus	0.00	1.25	0.00
Estonia	0.00	1.25	0.00
Finland	0.00	1.25	0.00
France	0.00	1.25	0.00
Germany	0.00	1.25	0.00
Greece	0.00	1.25	0.00
Ireland	0.00	1.25	0.00
Italy	0.00	1.25	0.00
Latvia	0.00	1.25	0.00
Lithuania	0.00	1.25	0.00
Luxemburg	0.00	1.25	0.00
Malta	0.00	1.25	0.00
Netherlands	0.00	1.25	0.00
Portugal	0.00	1.25	0.00
Slovakia	0.00	1.25	0.00
Slovenia	0.00	1.25	0.00
Spain	0.00	1.25	0.00

Source: List of countries by central bank interest rate from Wikipedia

be required to keep US$165bn or more as idle cash reserves if the CB acts as LOLR under QH-based MPs because IBs can easily borrow under QH-based MPs, which are fair to IBs and CIBBs alike. In addition, the Eurozone and four other prominent members of the OECD countries have been successfully pursuing zero or negative interest rate or QH-based MPs over a one-year time period. The results and findings of this study on QH-based MP when the CB acts as LOLR are truly phenomenal: AEs will increase, the value of the multiplier will increase, equilibrium real GDP will increase, employment level will increase and the unemployment rate will fall. Furthermore, price stability will be guaranteed by supply side effects when QH-based MP lowers the overall cost of financing in every sector of the economy and the aggregate supply curve shifts to the right. It is high time for all countries of the world to implement a QH-based MP where the CB can play its active role as LOLR to establish fairness and healthy competition and minimize the risks of bankruptcies and financial crisis.

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