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Comparison of factors influencing liquidity of European Islamic and conventional banks

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Keywords: *Islamic banks; conventional banks; capital; liquidity; efficiency*

Abstract

Research background: The innovation in Sharī‘ah-compliant banking products has resulted in the rapidly increasing size of assets in Islamic banks worldwide. The assets of such banks have

been growing twice as fast as those of conventional banks. Islamic banks do not depend on conventional interest, speculation, or complex derivatives stemming from banking operations. Instead, their actions in respect of profit/risk sharing, and the clarity of the contract are consistent with Islamic Sharī'ah principles, which seek to promote a more equal society.
Purpose of the article: This research aims to identify and compare factors influencing the liquidity of Islamic and conventional banks in Europe. Candidate factors are sought amongst profitability, credit quality, credit expansion and capital adequacy indicators.
Methodology: First, relevant financial ratios for 249 observations on Islamic banks and 2,306 observations on conventional banks are selected and compared for the period 2013–2017. Second, liquidity is explained separately for each type of banks by panel data regression to identify its determinants in a comparative context.
Findings & value added: The results indicate that the impact of the net interest margin on the liquidity ratio of Islamic banks is insignificant, which is obviously due to the prohibition of the use of interest (riba). To the contrary, in conventional banking a higher net interest margin results in a reduction in liquidity. Capital adequacy has a positive influence upon liquidity in both types of banks, but in Islamic banking, the influence is 5.4 times greater. The findings strongly suggest that the liquidity of Islamic and conventional banks is affected by different factors.

Introduction

As a main component of the financial system, banking has a broad impact on financial stability and economic strength. It connects economic agents with the financial market by playing a major role in financial intermediation helping to create wealth through multiple economic relationships. Interest is a basic source of bank income, so financial markets and their institutions are sensitive to rate changes, due to its crucial role in generating revenues and profits. Therefore, banks are actively involved in interest rate risk management.

On the other hand, the Islamic financial system has the fundamental purpose of fulfilling the teaching of the Holy Quran, as opposed to maximizing financial returns.

Islamic finance is a special type of financial and debt relationship that is not in conflict with traditional Muslim law (Sharī'ah). It involves the interaction between economic units experiencing a shortage of financial resources, and those with a temporary surplus of funds. Today, the area of Islamic finance is not limited to Muslim countries.

This type of "ethical finance" has spread throughout Europe, because of two seemingly unrelated factors:

– The expansion of European financial institutions in Muslim countries and the desire of Arab oil and gas exporters to invest surplus funds in the EU through the diversification of financial products and target market segments.

– A change in the population structure of many European countries. As the number and proportion of Muslims in Europe has grown, so has their demand for these financial services.

Islamic banking, as a singular and specific industry, reported in 2017 a 4.3% year-on-year growth rate in bank assets, primarily in Iran, Saudi Arabia, the United Arab Emirates and Malaysia (Bitar *et al.*, 2020). Similarly, in 2019, Islamic banking experienced a growth rate of 12.7% compared to the 0.9% growth recorded in 2018 (Islamic Financial Services Board, 2020, p. 4). Typically larger growth rates of Islamic banking as opposed to conventional banks in the past two decades only prove that the market operated by Islamic banks is not saturated yet (Salman & Nawaz, 2018).

Recently, research in the field of Islamic banking has intensified in order to study its impact on: the global banking sector (Zins & Weill, 2017); competition between banks (Meslier *et al.*, 2017); financial stability (Bitar, Hassan, & Walker, 2017; Bitar, Madiès, & Taramasco, 2017); profitability (Mollah *et al.* 2016; Mollah & Zaman, 2015); and capital structure (Bitar *et al*., 2018; Bitar & Tarazi, 2019).

At the beginning of the 21st century, American researchers Warde (2000), and Zaher and Hassan (2001) examined the specifics of Islamic finance in detail, and extended its definition. They understood Islamic banking to be a sector that includes all financial operations for Muslims. However, comprehensive research based on empirical data was still lacking.

Since Warde (2000), and Zaher and Hassan (2001) published their findings, review papers have been compiled by Grais and Iqbal (2004), and by El-Gamal (2006). Some work has been focussed on Islamic finance in individual countries. For example, Wilson (2000) confirmed that in the United Kingdom Islamic banking services penetrated the market through "Islamic windows" in conventional banks (an Islamic window is a separate department in a conventional bank that specializes in developing and offering Sharī'ah-compliant to a special segment of clients). They were also influenced by economic relations between European and Arab countries, by the proliferation of Islamic financial instruments, and by the regulation of Islamic finance in individual European Union countries (Balz, 2007; Belouafi & Belabes, 2010). Finally, the European Central Bank produced an extensive review of the state of Islamic Finance in the European Union (Di Mauro *et al.*, 2013).

Research has already shown that higher liquidity ratios improve financial stability in both conventional banks (Vazquez & Federico, 2015) and Islamic banks (Ashraf *et al*., 2016). However, a connection between bank

efficiency and liquidity ratios has yet to be proven for any type of bank. Risk is directed from lenders to borrowers in conventional banks, whereas in Islamic banks the principles of Sharī'ah stipulate that risk is shared. As a result, banks are required to keep liquid assets at a higher level, to decrease capital write-off and thus try to protect depositors, who are likely to be more confident of Islamic banks than of conventional ones (Bitar *et al*., 2020).

This article aspires to increase knowledge of the current state of Islamic finance in Europe. It focuses mainly on the determinants of the liquidity of both conventional European and Islamic banks, including Islamic banks in Europe. Previous research has confirmed that Islamic banks are more efficient in comparison to conventional banks, in terms of total revenues and total costs (Musa *et al*., 2020, pp. 29–58). It may be assumed that the reason lies in a different approach to risk and liquidity management. Since risk management has been addressed by many authors, including Hassan *et al*. (2013), El Tiby (2010), and Effendi and Disman (2017), this paper studies factors influencing liquidity in Islamic and conventional banking.

For the period 2013–2017, two panel data sets are employed and analysed in a regression framework, in which bank liquidity levels are related to four potential factors describing profitability, risk loan expansion and capital adequacy. The sample for Islamic banks contained 249 bank-year observations, and the sample for conventional banks comprised as many as 2,306 bank-years observations, and the fixed effects model proved to be the most suitable descriptor for both types of banks. The results indicate that liquidity in Islamic banks is driven by different factors than in conventional banks.

After a brief literature review, the research methodology is set out and the results are presented. These are then discussed and transformed into a conclusion with a review of research outcomes, and possible future lines of research.

Literature review

Hassan *et al*. (2013) claim that a significant distinction between conventional and Islamic banks is that conventional banking liquidity instruments are debt-based, while Islamic banking liquidity instruments are capital-based. Paltrinieri *et al.* (2020) show that Islamic banks are often smaller and usually have a more limited client base than conventional banks. This may lead to relatively higher fixed costs, lower profitability, and hence stability issues. Moreover, Islamic banks are subject to restrictions in terms

of admissible non-Islamic financial services under the Sharī‘ah. Nonetheless, more mature conventional banks may have already achieved their desired level of diversification, hence explaining the related non-significant results.

Khan and Ahmed (2001) confirm that in Islamic banking, the operational risk is less important than the liquidity risk. Amr El Tiby (2010) notes that there is a key factor determining the liquidity risk for Islamic banks, relative to conventional banks, namely the fact that the latter have access to a wide range of interest-based secondary market financial instruments. In contrast, Islamic banks can only use a limited range of money market instruments.

Banks have been examined from several viewpoints in terms of levels of liquidity. Saunders and Cornett (2006) provide an innovative approach that focuses on managing risk and returns in modern financial institutions. Shen *et al*. (2010) studied twelve advanced economies in 1994–2006, using an unbalanced panel data set of commercial banks. They found that liquidity risk had a reverse impact on bank performance in a market-based financial system. Anam *et al*. (2012), and Almumani and Mohamad (2013) studied the share of liquid assets in total assets, and the share of total deposits in total assets. The former indicator, known also abbreviated as LCR, is employed in this study as a measure of liquidity.

This article takes into consideration the views of various authors concerning the relevance of non-performing loans (measured frequently relative to total assets, which is the NPLS indicator used in the analysis); total loans (Iqbal, 2012); return on assets known as ROA (Akhtar *et al*., 2011); return on equity known as ROE (Anam *et al.*, 2012); size of banks (Iqbal, 2012); the capital adequacy ratio alias CAR (Anam *et al*., 2012); and net working capital (Akhtar *et al*., 2011).

Islam and Chowdhury (2007) verified the liquidity positions of conventional and Islamic banks in Bangladesh for the period 2003–2006. They reviewed both short and long-term liquidity positions, applying regression analysis, and revealed that conventional banks were in worse positions, compared to Islamic banks. Dinger (2009) assumed that developing economies` risk of a liquidity shortage can be eliminated by the presence of international banks that usually hold low liquidity assets, and only keep higher liquidity assets during a crisis. Muhammad *et al*. (2009) compared performance evaluation of Islamic and conventional banks in Pakistan (2005–2009) and found conventional banks excelled in liquidity management. Ika and Abdullah (2011) discussed the differences between conventional and Islamic banks in Indonesia in 2000–2007, in terms of profitability, liquidity and credit capabilities. They found that Islamic banks had

higher liquidity. Akhtar *et al.* (2011, pp. 35-44) found that Pakistani conventional banks were more motivated towards long-term projects compared to Islamic banks, which had better profitability and liquidity as their risk management focused on returns and assets. Anam *et al.* (2012) demonstrated the effectiveness of Islamic banks with model predictions of liquidity risk.

Several researchers have observed the connection between liquidity and other microeconomic operations, taking into consideration:

- the instability of bank size, debt and capital (How *et al.*, 2005);
- capital, efficiency and financial performance (Ramzan & Zafa, 2014; Nimsith *et al.*, 2015);
- the ROA, CAR, and non-performing loans to all loans or total assets known as NPF or NPLS, respectively (Sukmana & Suryaningtiyas, 2016);
- the financing loss provision abbreviated as FLP, NPF / NPLS, CAR, new loans relative to total assets known as FEXP, the net interest margin abbreviated as NIM, ROA and size (Effendi & Disman, 2017).

This study focuses on CAR, NPLS, NIM, FEXP and LCR, whilst comparing the inter-connection of these variables between conventional banks and Islamic banks, and studying their influence on LCR as the key variable in question. The five variables act as proxies for capital adequacy (CAR), credit quality (NPLS), profitability of depository and creditory operations (NIM), growth in credit (FEXP) and liquidity (LCR).

Research methodology

This article compares factors influencing the liquidity of conventional and Islamic banks in Europe. The analysis based on a panel data regression model was conducted in the program EViews 10. This is a standard approach in comparisons of Islamic and conventional banking, where it is necessary to identify common influence of multiple variables on a key predictor (e.g., Effendi & Disman, 2017; or Sukmana & Suryaningtiyas, 2016). This predictor here is liquidity.

The reason being, panel data are mostly used to investigate the temporal evolution of different units of the same sector or market, which is characterized by an extensive cross-sectional structure across several time periods. The panel format of data allows analysing time series of every entity in a cross-sectional selection. For a neat exposition of modelling panel data in a regression context, the reader may consult Greene (2003, chapter 13), Baltagi (2005) or Gujarati and Porter (2008, chapter 13).

For the analysis, the following financial indicators were chosen:

$$\text{LCR} = \frac{\text{high liquid assets}}{\text{total assets}} \times 100 \quad (\%), \tag{1}$$

$$\text{NIM} = \frac{\text{investment income} - \text{interest expense}}{\text{average earning assets}} \times 100 \quad (\%), \tag{2}$$

$$\text{NPLS} = \frac{\text{defaulted loans}}{\text{total loans}} \times 100 \quad (\%), \tag{4}$$

$$\text{FEXP} = \frac{\text{new loans}}{\text{total assets}} \times 100 \quad (\%), \tag{3}$$

$$\text{CAR} = \frac{\text{tier 1 capital + tier 2 capital}}{\text{risk weighted assets}} \times 100 \quad (\%). \tag{5}$$

Liquidity is represented LCR and CAR, NIM, NPLS, FEXP are the factors that are believed to affect liquidity. The analysis is performed with variables all measured as percentages using formulas (1) to (5). These variables were entered the following panel data regression model run separately for Islamic banks and conventional banks:

$$\text{LCR}_{it} = \beta_0 + \beta_1 \text{NIM}_{it} + \beta_2 \text{NPLS}_{it} + \beta_3 \text{FEXP}_{it} + \beta_4 \text{CAR}_{it} + \alpha_i + u_{it}, \tag{6}$$

where subscripts i and t indicate the cross-sectional dimension ($i = 1,\ldots,n$) and the temporal dimension ($t = 1,\ldots,T$), respectively. The cross-sectional dimension is embodied here by banks, whereas the temporal dimension personified by years is spread between 2013 and 2017. The panels are unbalanced, as for some banks not all annual observations are available. For Islamic banks, there are 249 bank-year observations with $n = 83$ banks and $T = 5$ year at most. In contrast, the sample for conventional banks consists of 2,306 observations with $n = 768$ banks and $T = 5$ year at most.

In equation (6), LCR is regressed on NIM, NPLS, FEXP and CAR as explanatory variable, and β_0, $\beta_1,\ldots$, β_4 are parameters of interest. The term u_{it} is a random disturbance with zero mean and constant variance that is homoscedastic and uncorrelated across time and cross-section. Depending on the nature of α_i, model (6) incorporates three basic models:

- If $\alpha_i = 0$, model (6) is a common effect model and effectively means that data from different cross-sections can simply be pooled. Ordinary least squares (OLS) is an appropriate estimation method.
- If α_i is a (most likely nonzero) constant, model (6) is a fixed effects model. OLS are again applicable, e.g., after adding a zero-sum constraint.
- If α_i is random with zero mean and constant variance, possibly correlated with u_{it}, model (6) becomes a random effects model and is estimable by feasible generalized least squares (FGLS) by ignoring cross-sectional variation.

The purpose of individual effects α_i is to model diversity that may differ either for individuals or groups from other entities. Individual effects are time invariant.

This panel data model is suitable for the analysis since panel data provide deeper insights into changes in bank level that could not be achieved in cross-section or time series models. As Baltagi (2005, pp. 370) highlights, the problem of multicollinearity can be decreased using a panel data model, as it can increase the number of data points, and hence degrees of freedom.

The selected list consists of Islamic banks in the European area that provide their services on the European territory, both Islamic banks and conventional European banks. With this, all Islamic banks have the status of a foreign bank. The analysis utilizes annual financial data for 83 Islamic banks, and 768 conventional banks for the period 2013–2017. The data were obtained from two banking databases, namely Moody's Analytics Bank Focus and Thomson Reuters.

Descriptive statistics of financial indicators LCR, NIM, FEXP, NPLS, CAR for both Islamic and conventional banking are given below in Table 1 and Table 2.

Capital adequacy is sufficient for both types of banks (CAR > 8%). The median capital adequacy in Islamic banking is 0.85 p.p. lower. Provision of loans seems much more dynamic in Islamic banks than in conventional banks as follows from the median levels of new loans relative to total assets (11.55% for Islamic banks compared to 3.29% for conventional banks). The median level of highly liquid assets is higher by 0.57 p.p. in Islamic banking, but the median interest margin is 0.67 p.p. lower. It is noteworthy that, despite their higher level of financial expansion, Islamic banks have only half the level of non-performing loans as conventional banks. The analysis of classical financial indicators points to a higher profitability of Islamic banks.

The five indicators defined in expressions (1) to (5) were the main input to regression analysis of factors affecting liquidity with the use of micro data panels for the period 2013–2017. The results were evaluated at the 5% level of significance.

First, beginning with correlation analysis of the variables for both types of banks, Tables 3 and 4 summarize correlation statistics that is founded on Pearson correlation coefficients computed from the pooled sample of bank-years without separating banks or years. It is not necessary to resort to hierarchical structuring of correlation analysis as temporal effects are not considered in the analysis. The correlation coefficients in either table are fairly small by common standards, ranging from -0.15 to 0.37 for Islamic banks and from -0.13 to 0.30 for conventional banks. Concerns regarding the multicollinearity are not substantiated in this case. The most intense correlation is found between LCR and CAR or LCR and NPLS for Islamic banks, which is positive (+0.37). A similar finding applies for conventional banks, where the correlation between LCR and CAR is comparatively strongest, and positive (+0.30). Of course, there are numerous links via which the variables can influence each other, but these obviously are not linear.

As model (6) is small and the number of observations is 249 for Islamic banks and as many as 2,306 observations for conventional banks, there is no loss in the number of freedom, and the panel data analysis of this magnitude is perfectly feasible. Equally important is the requirement for data stationarity. The results of the unit root test showed that all variables are stationary.

Results

As was noted in the *Introduction*, several authors examined liquidity risk in Islamic and conventional banks. The influence on the liquidity ratio of various financial indicators such as NPLS, ROA, ROE, CAR, SIZE, and the investment to deposit ratio, was examined by Chowdhury *et al*. (2019). The impact on the liquidity ratio of the said indicators, plus GDP and inflation, was examined by İncekara and İçetinkaya (2019). The list of variables affecting the liquidity ratio is expanded in this article by one important indicator, which is FEXP.

It must first be noted that the examination of the impact of financial expansion (FEXP) on the liquidity ratio is timely in the early 2020s. The reason being, statistical data on the growth of new loans, or financial expansion suggest that, in the past few years, banks have failed to invest their

excess liquidity in the real sector of the economy, which is likely to make banks` lending policy become more "aggressive" (Oxford Analytica, 2019; Schildbach, 2020).

Table 5 provides the output of the estimated regression analysis for Islamic banks. The left-hand part of the table presents estimates for the common effect model arising from (6) and estimated by pooled OLS. The presented results indicate that the four financial ratios considered have an impact on liquidity, excluding NIM. Given that the value of R-squared is only 0.3245, the model accounts for less than a third of the variation in LCR. The middle part of the table submits estimates for the fixed effects model arising from (6). The R-squared shows that the four financial indicators considered account for almost 92% of the variation in LCR. Again, NIM is found insignificant in contrast to the other three variables that are found significant at the 5% level. Finally, the right-hand part of Table 5 completes the trio of estimation results for the fixed effects model that answers to (6). The R-squared is extremely low in this case and the model explains only 20% of the variability of LCR. Also in this case NIM is found insignificant, and so is NPLS at the 5% level of significance. The other two variables retain their significance.

Before evaluating the fixed effects model, the three models must be compared in terms of statistical appropriateness. Gujarati and Porter (2008, p. 606) argue that if the number of periods is relatively small and the number of cross-sectional units is large, then there will probably be a significant difference between the parameter values estimated using fixed effects and random effects models. In this case, if the cross-sectional units are considered to be completely randomly chosen, then the random effects model is preferred, otherwise the application of the fixed effects model is preferred. In the analysis, cross-sectional units were chosen according to economic criteria, which disqualifies random selection.

The Chow test whose results are presented for Islamic banks in Table 6 compares the common effect model (the null hypothesis) against the fixed effects model (the alternative hypothesis. The Hausman test whose results are displayed in Table 7 confronts random effects (the null hypothesis) with fixed effects (the alternative hypothesis). In both cases the small p-values points to the rejection of the null hypotheses and justify the use of fixed effects. Fixed effects are obviously preferable also in terms of residual correlation and pass the Durbin-Watson (DW) test. The DW statistics for indicate an evident or possible difficulty with residual autocorrelation for common effects and random effects, respectively.

The estimated fixed effects model results in the following equation, in which fixed effects appertaining to single banks are suppressed for brevity:

$$\begin{aligned} \text{estLCR}_{it} = 21.686 - 0.178\text{NIM}_{it} + \\ +0.142\text{NPLS}_{it} - 0.020\text{FEXP}_{it} + 0.152\text{CAR}_{it}, \end{aligned} \tag{7}$$

where estLCR_{it} represents a fitted value of LCR for bank i and time t.

Through the estimated coefficients, the equation gauges the effect of each explanatory variable on LCR. The constant 21.686 can be viewed as favourable as a tendency of Islamic banks to a positive (high) liquidity. If there was a zero net interest margin, no new or defaulted loans and if capital adequacy were at a zero level, the ratio of highly liquid assets to total assets would be 21.69%. The condition of a zero capital adequacy ratio is extremely unrealistic, but any realistic value of CAR pushes the liquidity level measured by LCR up. NPLS with coefficient 0.142 shows a positive effect on LCR, and every new 1 % of newly made loans relative to total assets increases the liquidity ratio on average by 0.142 p.p. FEXP has a negative effect upon liquidity. Higher values of FEXP reduce the level of liquid assets relative to total assets, but these effects seem not to be of relevance, if statistically significant. On the contrary, capital adequacy boosts liquidity of Islamic banks. A 1 p.p. increase in CAR is on average associated with an increase of the liquidity ratio on average by 0.15 p.p. Islamic finance is more sensitive to capital adequacy, and capital adequacy exerts a much more marked effect than is discovered for conventional banks and reported in Table 8. The net interest margin does not significantly affect liquidity in Islamic banking. This is logical, because in Islamic banking interest is prohibited, and the functioning of the banking system is based on the principle of profit/loss sharing.

The R-squared in the fixed effects model is 0.9172, indicating that variations in the four regressors account jointly for 92% of the variation in LCR, while the other 8% is down to unspecified variables such as GDP or inflation found of importance by İncekara and Çetinkaya (2019). Nonetheless, the influence of macro factors is not explored here.

The results for conventional banks obtained with the use of model (6) are declared in Table 8, Table 9 and Table 10 that are organized exactly in the same fashion as the outputs for Islamic banks. Specifically, Table 8 compares the regression results for a common effect (the first columns), fixed effects (the middle columns) and random effects (the last columns). The R-squared values are 0.1049, 0.8970 and 0.0281 for a common effect, fixed effects and random effects, respectively. Fixed effects with an R-squared of 0.8970 come as most competitive not also in terms of the ex-

plained variability in LCR, but also in light of formal testing of the nature of effects. Table 9 suggests that fixed effects are favourable in comparison with a common effect as the p-values of the Chow test are virtually nil and motivate rejection of the null hypothesis that there is a common effect between the banks. In like manner, Table 10 indicates a preference of fixed effects over random effects as the p-value is almost nil as well, which results in rejecting the hypotheses of the Hausman test that random effects present themselves. Eventually, better descriptive validity is also revealed by the DW statistics in Table 8 that point to a problem with autocorrelation in the residuals for the common effect and random effects models.

Hence, having opted for fixed effects, the estimated equation for conventional banks takes the following form without estimated bank-specific fixed effects displayed:

$$\begin{aligned} \text{estLCR}_{it} = {} & 24.850 - 0.193\text{NIM}_{it} + \\ & +0.024\text{NPLS}_{it} - 0.021\text{FEXP}_{it} + 0.028\text{CAR}_{it}. \end{aligned} \tag{8}$$

Unlike Islamic banks, conventional banks have liquidity affected by NIM at the 5% level of significance, but not by NPLS. Liquidity and the net interest margin are negatively related as a 1 p.p. increase in NIM decreases on average LCR by 0.19 p.p. Note that for Islamic banks the impact of NIM on LCR was earlier found to be insignificant. Liquidity is negatively affected by issues of new loans, but helped by capital adequacy. On average, when a conventional bank makes an additional 1 p.p. of new loans relative to total assets, it decreases liquidity by 0.02 p.p. on average. On the other hand, an increase in CAR by 1 p.p. helps liquidity assets relative to total assets on average by 0.03 p.p. For Islamic banks, the effect of CAR on liquidity was discovered to be more pronounced.

The estimated intercept 24.850 is a potential value of LCR in percent if an average conventional bank were capable of operating at zero NIM, NPLS, FEXP and CAR. By comparing the intercepts presented in equation (7) for Islamic banks and in equation (8) for conventional banks with the average levels of LCR in Table 1 for Islamic banks and in Table 2 for conventional banks, it may be concluded that liquidity in Islamic banking is more exposed to influence by NIM, NPLS, FEXP and CAR than is liquidity in conventional banking. In Islamic banks, the baseline liquidity level is 21.69% and the difference to the mean value 24.23% of LCR shown in Table 1 is due to variation in the four factors under examination. In contrast, in conventional banks, the baseline liquidity level is the estimated intercept 28.85% and the "distance" to the mean LCR 24.93% reported in Table 2 is owing to variation in NIM, NPLS, FEXP and CAR. In other

words, these factors are of greater joint importance for liquidity in Islamic banking.

To sum up, the results obtained reveal that the variable NIM has no effect on liquidity in Islamic banks. Nor does NPLS have a significant impact on liquidity in conventional banks. The variables that have an impact on the liquidity ratio of Islamic banks are CAR, FEXP, and NPLS, while the variables that are important for explaining the liquidity of conventional banks are CAR, FEXP, and NIM. The impact of independent variables on liquidity in both banking systems is also significant, particularly for CAR and NIM. The best performing model is fixed effects for both Islamic and conventional banking, but the same conclusions would be established were the other two variants of model (6) selected.

Discussion

The results shed more light on the conditions under which Islamic banks operate in comparison to the conditions symptomatic of conventional banks. For conventional banks, Islamic banks are market rivals that adopt different strategies and reach out to partly different and partly overlapping market segments. Regardless of the global financial crisis, growth rates of Islamic banks sustained with constancy in the three main segments (Islamic banking, Islamic capital and takāful) show that that the market potential of Islamic banks is not depleted, and operated market segments are far from being saturated. The Islamic Financial Services Stability Report for 2020 (but also earlier editions) prepared by the Islamic Financial Services Board (2020) evidences the self-assured and unchallenged expansion of Islamic banking all over the world that is doubtless to continue. This is owing to different principles and regulations by which Islamic business is run. Obviously, it is not owing to a different clientele that economic results and their structure of Islamic banks is different from those of conventional banks. It is an unsurprising discovery that performance differs between Islamic banking and conventional banking, but specifically Salman and Nawaz (2018) impute Islamic banks greater success. In spite of the acclaimed growth potential of Islamic banks and findings of their comparatively higher technical efficiency, there are also views that they underperform in cost efficiency owing to technological constraints that take the form of higher costs incurred by Sharī‘ah advisors, Sharī‘ah auditors, and individual product specifics such as in the musharakah project (Abdul-Majid *et al.,* 2017).

This article studies and compares sources of liquidity of Islamic and conventional banks in order to discover how they are related to profitabil-

ity, credit risk, credit expansion and capital adequacy. Each of these areas is proxied and represented by a specific financial ratio: liquidity by LCR, profitability by NIM, credit risk by NPLS, credit expansion by FEXP and capital adequacy by CAR. The quintet of indicators is defined by expressions (1) to (5).

The findings indicate that liquidity in Islamic banking is more sensitive to other areas of performance than liquidity in conventional banking. There are also differences in the structure of impact. Whereas credit expansion measured by FEXP seems of the same magnitude of impact upon liquidity in Islamic banks (estimated coefficient –0.020) as in conventional banks (estimated coefficient –0.020), Islamic banks are more sensitive to capital adequacy represented by CAR than conventional banks. For the former, the estimated coefficient is about 5.4 times higher, which means that their liquidity responds to capital adequacy regulations with greater strength. The reasons may be seen in a double screening process that holds for Islamic banks. On the one hand, there are universal capital adequacy regulations that are applicable to all types of banks and lead to stricter capital regulations and sterner standards for liquidity management. On the other hand, Sharī‘ah compliance stipulates a stricter screening process for new borrowers, which limits lending and financing activities, and finally lowers the level of liquidity. Finally, whereas profitability measured by NIM in Islamic banking is not a factor of liquidity, in conventional banking this role is inherited by low credit quality represented by NPLS. The responsiveness of liquidity to the net interest margin for Islamic banks is apparently linked with the stern doctrine of Islamic finance than interest (riba) is prohibited by the traditions and principles of Sharī‘ah. This also tallies with the finding of Abedifar *et al*. (2013) who maintain that Islamic banks do not charge higher rates for offering Sharī‘ah compliant products, and there is no further link between liquidity and profitability. As to the insensitivity of liquidity to non-performing loans in conventional banks, this is just a consequence of sophisticated practices and procedures developed in liquidity and credit risk management. For conventional banking, non-performance of loans is a fairly common issue and the fact that non-performing loans by their relative size do not affect liquidity is a sign of tight liquidity management. It may be argued that Sharī‘ah rules make Islamic banks deem low credit quality with greater anxiety, and their response is an increase of liquidity to protect all parties involved (estimated coefficient +0.142). In contrast Abedifar *et al*. (2013), Beck *et al*. (2013) and Alqahtani *et al*. (2016) point out that the credit risk level of Islamic bans is much lower compared to conventional banks. This difference calls for further investiga-

tions of the relationship between credit risk and liquidity in Islamic banking.

The ascertained patterns are in some contrast with the findings by Bitar *et al.* (2017), who examined divergent outputs for problems with liquidity and profitability. They claim that the liquidity component in Islamic banks is not significantly different from conventional banks. On the contrary, the descriptive statistics, calculated here separately for Islamic banks and conventional banks, show that there are not notable differences between the groups. For Islamic banking, the average level of LCR was 24.23% ± 21.17%, and for conventional banking these figures were very similar in terms of level and variability, 24.93% ± 97.30%.

Conclusions

This article, using annual data on conventional and Islamic banks operating in Europe between 2013 and 2017, focused on factors that affect liquidity. The estimated panel data regression models explain 92% of the variation in the ratio of highly liquid assets to total assets for Islamic banks, and 90% for conventional banks.

The results suggest that for Islamic banks the NIM variable has no impact on liquidity, whilst for conventional banks the NPLS variable does not affect liquidity. For both types of banking, the fixed effects model performs best. For Islamic banks, the CAR, NPLS, and FEXP variables have an impact on the liquidity ratio. For conventional banks, the key variables are CAR, NIM and FEXP. The variables CAR and NIM have significant impacts on liquidity in both models of banking.

Bank liquidity performs the key role in both banks and in the entire financial system`s performance. The worldwide financial crisis of 2007–2008 showed that failure in liquidity risk management can lead to bankruptcy. This study has practical significance for banks in the area of liquidity management, as it shows weaknesses in the liquidity management policies of both conventional and Islamic banks. However, if banks focus on financial ratios, such as CAR and NIM, a positive effect on the whole financial system should be expected.

This study also emphasises the importance of credit policy: namely the impact of the FEXP indicator on liquidity management in Islamic and conventional banking systems. Access to the interbank capital market is still limited for Islamic banking, which explains why credit policy in Islamic banking is of greater importance than in conventional banking.

Regulatory authorities should consider the high dependency ratio of liquidity on capital adequacy measured by CAR in Islamic banking. First, in countries where Islamic banking is dominant, high Basel capital adequacy requirements can reduce the efficiency of banks, and cut economic growth. Second, Basel capital requirements disadvantage Islamic banks, and ignore the fact that Islamic banks as financial market participants do not have access to interest rate based fiscal instruments. A solution could involve collaboration between the Basel Committee and the Islamic Financial Services Board.

In conclusion, in both banking systems a 1 p.p. increase in new loans reduces the liquidity ratio by 2 p.p. At minimum it is a signal for banks to think about their lending policy. In connection with the current events, specifically the measures taken by European governments, and the bankruptcy of large global companies such as One Web, Hertz, Pioneer Energy, Intelsat, Diamond Offshore Drilling, and Flybe, a mistaken credit policy by banks may trigger a new financial crisis, but the right credit policy will help overcome the crisis.

This study explored the factors that affect liquidity in conventional and Islamic banks. This study was limited to a four-year period, due to the coverage of the BankFocus data base, which held data on 83 Islamic banks. That database now covers 217 Islamic banks, which will help us to continue the research and get more, and more reliable results. The present investigations may be extended in several ways. First, there are many unresolved issues concerning liquidity in relation to profitability of Islamic and conventional banks. Bitar *et al.* (2017) find that Islamic banks are significantly more profitable than conventional banks, whilst at comparatively similar levels of liquidity. Nonetheless, there are dissenting voices in studies by Abedifar *et al*. (2013), Mollah and Zaman (2015), and Mollah *et al.* (2016). Another unclear problem is the existence of links between liquidity and efficiency. The former is investigated here, whereas the latter was explored in Musa *et al.* (2020), but it must be discovered yet as to how a meaningful analysis can be done, the reason being Johnes *et al.* (2014) and Bitar *et al.* (2017) both emphasizing that while efficiency comparisons among Islamic banks and among conventional banks are possible, comparisons across the two groups are impossible. This is because it is not possible to distinguish between managerial ineffectiveness and the rules under which a bank operates (conventional or Sharī‘ah) as sources of inefficiency.

A limitation of the present study, shared also by other studies on the topic, is that it examines Islamic and conventional banks as micro-units, and some patterns may remain hidden in consequence. To make the investigation complete, perhaps a holistic approach is needed to complement the

present research. One example in this respect is Boďa and Zimková (2021a) who perform an analysis first for micro-units, and then in aggregate form for the entire financial sector. Similarly, Boďa and Zimková (2021a) analyse banking systems and compare them by using aggregate financial indicators. However, such an undertaking requires that Islamic and conventional banks may be considered as different banking systems. Formally, Islamic banks or conventional banks cannot be thought of as systems, notwithstanding that the terminology of some authors is extremely careless in this respect.

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Annex

Table 1. Descriptive statistics of the financial indicators for Islamic banks

	LCR (%)	NIM (%)	NPLS (%)	FEXP (%)	CAR (%)
Mean	24.228	2.659	7.413	21.454	21.734
Median	21.172	2.408	3.009	11.548	16.670
Maximum	91.146	11.944	77.518	576.232	455.000
Minimum	4.895	-4.682	0.000	-73.344	-108.490
Std. Dev.	15.817	2.561	12.787	59.929	38.172
Skewness	2.076	0.878	3.538	5.807	7.586
Kurtosis	8.334	4.942	16.726	44.432	84.290
Observations	249	249	249	249	249

Source: own elaboration based on financial statements of Islamic banks for 2015–2017, BankFocus.

Table 2. Descriptive statistics of the financial indicators for conventional banks

	LCR (%)	NIM (%)	NPLS (%)	FEXP (%)	CAR (%)
Mean	24.932	4.302	13.326	5.460	22.485
Median	20.601	3.078	6.853	3.293	17.520
Maximum	97.301	64.738	146.603	652.404	837.000
Minimum	0.089	-1.245	0.000	-99.989	-20.270
Std. Dev.	17.730	4.246	18.441	28.612	24.464
Skewness	1.240	3.767	2.865	6.345	18.574
Kurtosis	4.671	30.936	12.864	125.990	555.159
Observations	2,306	2,306	2,306	2,306	2,306

Source: own elaboration based on financial statements of Islamic banks for 2015–2017, BankFocus

Table 3. Correlation matrix of variables (Islamic banks)

	LCR	NIM	NPLS	FEXP	CAR
LCR	1.00				
NIM	-0.06	1.00			
NPLS	0.37	-0.05	1.00		
FEXP	0.02	-0.01	-0.15	1.00	
CAR	0.37	0.05	-0.11	-0.06	1.00

Table 4. Correlation matrix of variables (conventional banks)

	LCR	NIM	NPLS	FEXP	CAR
LCR	1.00				
NIM	0.18	1.00			
NPLS	0.10	0.16	1.00		
FEXP	-0.03	-0.10	-0.13	1.00	
CAR	0.30	0.25	0.25	-0.06	1.00

Table 5. Estimation results for Islamic banks

	Pooled OLS		Fixed effects (FEM)		Random effects (REM)	
Regressor	**Coeff.**	**Prob.**	**Coeff.**	**Prob.**	**Coeff.**	**Prob.**
NIM	-0.35322	0.1285	-0.17783	0.4300	-0.12532	0.5042
NPLS	0.524141	0.0000	0.142205	0.0081	0.227233	0.0000
FEXP	0.033081	0.0138	-0.01955	0.0045	-0.01299	0.0507
CAR	0.19661	0.0000	0.152327	0.0006	0.168907	0.0000
C	17.27704	0.0000	21.68578	0.0000	19.93907	0.0000
R-square	0.3245		0.9172		0.2029	
DW statistic	0.3291		2.0331		1.4593	

Note: Estimated bank-specific coefficients are not presented with the fixed effects model to conserve the output.

Table 6. Chow test for Islamic banks

Redundant Fixed Effects Tests			
Test cross-section fixed effects			
	Statistic	**Degrees of freedom**	**Prob.**
Cross-section F	19.569463	(97,265)	0.0000
Cross-section Chi-square	770.564797	97	0.0000

Table 7. Hausman test for Islamic banks

Correlated Random Effects - Hausman Test			
Test cross-section random effects			
	Chi-Square Statistic	**Degrees of freedom**	**Prob.**
Cross-section random	18.686889	4	0.0009

Table 8. Estimation results for conventional banks

	Pooled OLS		**Fixed effects (FEM)**		**Random effects (REM)**	
Regressor	**Coeff.**	**Prob.**	**Coeff.**	**Prob.**	**Coeff.**	**Prob.**
NIM	0.506915	0.0000	-0.19259	0.0210	0.095992	0.1610
NPLS	0.007288	0.6582	0.02445	0.1209	0.036901	0.0074
FEXP	-0.00345	0.7127	-0.02112	0.0001	-0.01609	0.0021
CAR	0.183877	0.0000	0.028132	0.0275	0.086051	0.0000
C	18.50438	0.0000	24.84975	0.0000	23.39133	0.0000
R-square	0.1049		0.8970		0.0281	
DW statistic	0.2735		2.1209		1.3881	

Note: Estimated bank-specific coefficients are not presented with the fixed effects model to conserve the output.

Table 9. Chow test for conventional banks

Redundant Fixed Effects Tests			
Test cross-section fixed effects			
	Statistic	**Degrees of freedom**	**Prob.**
Cross-section F	16.956364	(1076.2371)	0.0000
Cross-section Chi-square	7465.840565	1076	0.0000

Table 10. Hausman test for conventional banks

Correlated Random Effects - Hausman Test			
Test cross-section random effects	**Chi-Square Statistic**	**Degrees of freedom**	**Prob.**
Cross-section random	104.158471	4	0.0000