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Competition, diversification, and bank margins: Evidence from Indonesian Islamic rural banks

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Abstract

This paper examines the determinants of bank margins in Indonesian Islamic rural banks. We find that bank margins is mainly affected by competition and diversification. In the less competitive market, Islamic rural banks are able to set high margins. Islamic rural banks are also tend set high margins when they do not diversify their revenue, referring to the cross-subsidization strategy. We also find that the impact of competition and diversification on bank margins are affected by Islamic banks' loan contract diversification, the proportion of PLS lending, and whether Islamic banks are in the above-average Muslims provinces and Java provinces. Our empirical results therefore also suggest that regional differences matter for bank margins.

Keywords: bank margins, competition, diversification, Islamic rural banks, Indonesia

JEL classifications: G21, D40, L25, O18

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1. Introduction

Islamic banks have shown substantial growth for the last decades. Their development also attracts scholars to investigate the behavior of Islamic banks in order to have a better understanding of its role in the country's financial system. Most of the works in Islamic banks are carried out using a sample of Muslim-majority countries. In this regard, Indonesia provides a unique country-setting for the researcher because of some reasons. First, since Indonesia is the biggest Muslim country in the worlds, the development of Islamic banks cannot be neglected. Indonesia is part of the QISMUT (Qatar,

Indonesia, Saudi Arabia, Malaysia, UAE, and Turkey). Total Islamic banking assets of those countries were US$ 801 billion in 2015 and had represented 80% of the international Islamic banking assets (Ernst and Young, 2016). Second, data of Islamic banks in Indonesia are available both from local sources in the website of Bank Indonesia (the central bank) or Indonesia Financial Services Authority and from international sources such as Bankscope. It therefore facilitates researchers to study Islamic banking development and behavior, either focus only on Islamic banks or making a comparison with their conventional counterparts.

Prior empirical studies have carried out in several aspects related to the development of Islamic banks in Indonesia. Abduh and Omar (2012) demonstrate a significant relationship in short-run and long-run periods between Islamic banking development and Indonesian economic growth. Domestic financing provided by Islamic banking sector has been found to contribute to the growth of the Indonesian economy. Hardianto and Wulandari (2016) compare the differences of intermediation, fee-based service activity, and efficiency of Islamic banks in comparisons with conventional banks. They show that Islamic banks in Indonesia have a higher intermediation ratio, higher proportion of fee income to total operating income, and less efficient. Cupian and Abduh (2017) examine the competitive conditions of Islamic banks in Indonesia for the period of 2006 to 2013. By having a high degree of market power, Indonesian Islamic banks leads to a less competitive market. A slightly similar finding is also demonstrated by Risfandy et al. (2017). Investigating market power of Islamic banks vis-à-vis conventional banks in Indonesia, they find that Islamic banks have better market power than their peers. They also find that the holy month Ramadan, profit-and-loss sharing activities, and the presence of *Shariah* board have a significant impact on Islamic banks' market power.

The above-mentioned studies, in our opinion, are not enough to cover issues in the development of Islamic banking in Indonesia. Whereas there are also some theoretical and non-empirical studies (Darmadi, 2013; Hassan and Syafri Harahap, 2010; Ismal, 2012; Wulandari et al., 2016), many areas are still available to be investigated using country setting Indonesia. In this paper, by using 151 Indonesian Islamic rural banks dispersed in 21 Indonesian provinces as a sample, we investigate how they set their bank margins. To the best of our knowledge, our topic has not been yet addressed in the prior studies. Indeed, some studies have investigated the impact of provincial differences on the banks' behavior or economic development. Trinugroho et al. (2015) by using provincial-level data for 33 provinces from 2004 to 2010 find that poor local governance significantly impedes financial deepening. They also find that in the socioeconomically less developed regions, the financial deepening level is lower than those developed regions. Trinugroho et al. (2017) address the impact of regions' religiosity on Islamic rural banks' performance. It is found that religiosity can increase Islamic rural banks' profitability and stability. Additionally, in the regions with higher religiosity level, Islamic rural banks have better performance rather than those located in the less religious provinces. Our study will be

different from those two because we analyze the behavior of Islamic rural banks when they set the marginss.

Otoritas Jasa Keuangan (2017) in their Indonesian Islamic Banking Development Report 2016 shows that by December 2016, total assets of Indonesian Islamic rural banks are 9.1 trillion. It is about 2.5% of the national Islamic banking share or 8% of the conventional rural banks total assets.[1] Although Islamic rural banks have relatively small share compared to its conventional rival, they showed remarkable growth 20.84% in 2016 (Otoritas Jasa Keuangan, 2017). Such small market share of Islamic rural banks is possibly due to the limited business activities and operational areas (small and medium enterprises and local community) compared to commercial banks that can reach any segment of the banking market. However, rural banks indeed have a vital position in the Indonesian economy because around 99% business in Indonesia can be classified as small and micro business (Shaban et al., 2014). With total employment almost half of Indonesian population, it contributes more than 40% of the country's GDP (Shaban et al., 2014). Therefore, Islamic rural banks' position in the Indonesian banking market is important because they could reach small entrepreneurs who do not want to obtain loans from the conventional rural banks because of their religious belief. This is because for some Muslims, interest activities in conventional banks are categorized as *Riba* which is forbidden in Islam.

The main purpose of this paper is to investigate the determinants of bank margins in Indonesian Islamic rural banks. Understanding this issue is important because several studies highlight the presence of high-interest margins in Indonesian banks. Shaban's et al. (2014) finding report over pricing behavior by Islamic banks in Indonesia, represented by the substantial improvement in their bank margins and lower capital compared to conventional banks. This could be because most of the Islamic banks' clients are from small and medium enterprises that are relatively opaque and financially constrained. Islamic banks therefore require a high risk premium for these type of clients. The evidence of high interest margins is also supported by Lin et al. (2012) who indicated that Indonesian banks on average has the highest bank margins compared to other Asian countries. After the 1997/1998 financial crisis, Indonesian bank margins even higher than before (Lin et al., 2012; Trinugroho et al., 2014).

Our result suggests that bank margins of Indonesian Islamic rural banks are affected by some factors. Banks' market power and diversification are two bank-level variables that consistently affect banks' margins. Specifically, market competition proxied by Lerner index positively impact bank margins, suggesting that in the more competitive market, Indonesian Islamic rural banks have lower margins. This behavior possibly aimed to attract new customer by offering a low lending rate. Bank diversification, in our case, are also significantly influence bank margins. Islamic rural banks that diversify their income sources tend to set lower margins. This evidence is in line with "cross-

[1] Otoritas jasa keuangan = Indonesian Financial Services Authority. Based on the exchange rate in May 2018, 1 USD is approximately equivalent to 14.000 IDR.

subsidization strategy". Because they are able to get income from non-financing activities, they can set low margins. However, in our investigation, the impact of competition and diversification on bank margins are affected by some endogenous and exogenous factors. Market competition is positively associated with bank margins if only Islamic banks have a low level of loan diversification and high level of loan PLS. Moreover, the impact of competition also depends on Islamic banks' location; whether they are in the above-average Muslim population and whether they are in the Java island or not.

The remainder of this paper is organized as follows. Section 2 highlight data, sample, and methodology we use. Section 3 presents our empirical result as well as the descriptive statistics. Section 4 concludes.

2. Data, sample, methodology, and variable explanations

2.1. Data and sample

We use the data from the central bank of Indonesia (www.bi.go.id) and Indonesia Statistical Bureau (www.bps.go.id). The former provides complete balance sheet and income statement data so that we are able to compute bank-level financial ratios. The latter enables us to provincial-level datasets such as the growth of provinces' GDP, interest rate, unemployment rate, and percentage of Muslim population in each province. From these data sources, we obtain unbalanced panel data of 151 Islamic rural banks from 21 provinces in Indonesia, for the period between 2012Q1 and 2015Q4, resulting in 1,914 observations after winsorizing extreme values.

2.2. Methodology and variable explanations

We employ the following econometric specification in order to investigate the determinants of Islamic rural banks' profit margins in Indonesia.

$$BM_{it} = \alpha_0 + \beta_1 Lerner_{it} + \beta_2 RevDIV_{it} + \beta_3 CIR_{it} + \beta_4 TLTA_{it} + \beta_5 CAR_{it} + \beta_6 LLPTL_{it} + \beta_7 LogTA_{it} + \beta_8 GrGDP_{jt} + \beta_9 HHI_{jt} + \beta_{10} INT_{jt} + \varepsilon_{it} \dots (1)$$

where i, j, and t refer to the bank, region, and time levels, respectively. BM is bank margins as our dependent variable. It is calculated by the differences between the income from financing and the payment to the depositors as well as other investment account holder, and therefore scaled by total financing. In the conventional banks' context, the former is widely-known as interest income whereas the latter is interest expense. This measurement is relevant to the most studies in conventional banks as a proxy for net interest margins (Trinugroho et al., 2014) and also have been used by Hutapea and Kasri

(2010) to investigate bank margins in Islamic banks perspective. For robustness, we will also use a proxy from Lee and Isa (2017) who use the same method as our proxy but using total assets as a denominator.

Following recent works in net interest margins determinants (Entrop et al., 2015; Trinugroho et al., 2014), we use Lerner index to measure market power of banks. It is calculated by the difference between the price of banking product and marginal cost as a proportion of the price.

$$Lerner = \frac{Price - MC}{Price} \dots (2)$$

Price is the ratio of total banks' income to total assets. Marginal costs are obtained from the two-factor trans-log cost function following Fu et al. (2014). The banks with greater market power (usually in the less competitive market) have more incentives to set higher margins (Trinugroho et al., 2014). Therefore, the positive sign from Lerner is expected.

RevDIV is revenue diversification. Specifically, RevDIV is a variation of net operating revenue into net income from financing activities (net financing income, NET) and income from non-financing activities (non-financing income, NON).

$$RevDIV = 1 - \left[\left(\frac{NET}{NET + NON}\right)^2 + \left(\frac{NON}{NET + NON}\right)^2\right] \dots (3)$$

Our computation in equation (3) follows Entrop et al. (2015) and Stiroh and Rumble (2006). RevDIV ranges from 0.0 to 0.5 with a higher value of RevDIV indicate higher revenue diversification. The value of 0.0 means banks' revenue is concentrated to a single source whereas 0.5 indicate that banks' revenue is equally divided between net financing income and non-financing income. We expect that RevDIV will negatively impact bank margins because the more diversified banks trigger banks to set lower margins.

Maudos and Solís (2009) argue that high level of operating costs per unit of income reflects that the banks are not efficient or having poor management quality. We then use cost-to-income ratio (CIR) to measure banks' efficiency or banks' management quality (Maudos and Solís, 2009; Trinugroho et al., 2014). A higher ratio of CIR indicates lower efficiency and it is associated with lower margins that bank able to create. A negative sign therefore is expected.

TLTA is total loan to total assets ratio. It measures banks' business orientation or specialization. Banks with a higher loan is regarded as being more oriented towards traditional banking activities (Lin et al., 2012). The impact of TLTA on bank margins could be twofold. On the one hand, because traditional banks indicated high TLTA tend to set higher margins, a positive association with NPM could be expected. This argument is slightly similar to the variable RevDIV. On the other hand, high TLTA may correspond to higher idiosyncratic risk because banks do not diversify their income sources

(Baele et al., 2007). In this regard, bank margins possibly to be lower in order to attract customers (Lin et al., 2012).

Previous studies take into account of the degree of risk aversion as a determinant of bank net interest margins (Lepetit et al., 2008; Trinugroho et al., 2014). The banks with a greater degree of risk aversion are likely to be related with higher profit margins because of the required risk premium by the banks (Lepetit et al., 2008). For this reason, we employ CAR, or capital asset ratio, to measure risk aversion degree in Islamic rural banks.

We also incorporate credit risk in the determinants of bank margins following some prior literature (Chortareas et al., 2012; López-Espinosa et al., 2011). We proxy credit risk by the ratio of loan loss provision to total loan (LLPTL). A positive sign is expected from LLPTL because banks with a higher credit risk will require a higher risk premium to the clients (Maudos and Fernández de Guevara, 2004). However, a negative association could also happen because depositors will also require high interest rate for riskier banks, causing lower margins for these banks (Fungáčová and Poghosyan, 2011).

We use natural logarithm of total assets (LogTA) to proxy banks' size. For robustness, we will also use natural logarithm of total loan (LogTL) following Lee and Isa (2017). We expect a negative sign from LogTA. Many empirical results from prior studies indicate that larger banks tend to have lower margins because they have reached economies of scale whereas small banks are inclined to have higher margins because of high cost they have to encountered (Trinugroho et al., 2014).

In this paper we also include several provincial-level control variables. We follow Maudos and Solís (2009) by introducing growth of gross domestic product (GrGDP). HHI is also presented in our model because it is a proxy of market structure and has been used as well by prior works (Chortareas et al., 2012; Trinugroho et al., 2014). INT is four-month average interest rate in each province in Indonesia. Previous studies have also highlighted the impact of interest rate on net interest margins (Lee and Isa, 2017; Maudos and Solís, 2009).

We extend our analysis in the impact of endogenous and exogenous factors on Islamic rural banks' bank margins. One of the main difference of Islamic banks compared to its conventional peers is the presence of equity financing. This financing type is based on profit-and-loss sharing (PLS) agreement, the main principle of Islamic banks. Although equity financing is risky in fact equity financing is prevalent in some countries such as Indonesia (Abedifar et al., 2013). Islamic banks use equity financing possibly to diversify their loan portfolio. We then take into account of the impact of two variables: (1) loan diversification (LoanDIV) and (2) PLS-based loan (LoanPLS). LoanDIV is the Herfindahl index of Islamic banks' loan types whereas LoanPLS is the ratio of PLS-based loan to non-PLS loan. The former variable measure whether loan portfolio is concentrated in a loan type and the latter variable assess whether equity financing is popular in Islamic rural banks in Indonesia

$$LoanDIV = \left(\frac{Murabaha}{TL}\right)^2 + \left(\frac{Salam}{TL}\right)^2 + \left(\frac{Istishna}{TL}\right)^2 + \left(\frac{Mudaraba}{TL}\right)^2 + \left(\frac{Musharaka}{TL}\right)^2 + \left(\frac{Ijara}{TL}\right)^2 + \left(\frac{Qardh}{TL}\right)^2 \dots (4)$$

$$LoanPLS = \frac{Mudaraba + Musharaka}{Murabaha + Salam + Istishna + Mudaraba + Musharaka + Ijara + Qardh} \dots (5)$$

Prior regional studies highlight the role of exogenous or regional factors on bank behavior, performance, and regional development. We follow Trinugroho et al. (2017) by introducing percentage of Muslims (PMPOP). Regions with more Muslims could trigger banks to set higher margins. We also take into account of banks' location, Java or non-Java, following Trinugroho et al. (2015, 2017). As the most populous island compared to others, Java is considered as the most developed island and the center of economic activities. Bank margins in Java could be higher than outside Java due to the higher economic activity and a higher number of rural banks. To investigate those region differences, we split the sample and still use the similar equation as equation (1).

3. Results

3.1. Descriptive statistics

Table 1 presents the description and statistic of our variables. The mean value of NPM and AltNPM are 11% and 6% respectively. These values indicate that the Indonesian Islamic rural banks in average set high margins. Since Islamic rural banks focus on small and medium enterprises that possibly have higher risk than big company, they require high risk premium. The mean value of Lerner index is 0.21. It indicates that Islamic rural banks in Indonesia in average are able to set price of their banking product 21% above their marginal cost. RevDIV in average also 0.21, implying that the proportion of revenue from financing activities and non-financing activities are equal. The average value of CIR and TLTA are 4% and 69% respectively. CAR have mean value 18%, indicating that Islamic rural banks in Indonesia similar to the most of Islamic banks that behave to be more conservative by holding higher additional capital buffer. Because rural banks in average have higher risk profile than commercial banks, they need to be protected against possible large loss likely to take place during cyclical downturn (Louhichi and Boujelbene, 2016). The mean of our bank risk measure, LLRTL and LLPTL, are 3% and 1.5% respectively.

[Table 1]

Regarding the provincial level variables, we display the statistics in Table 2. We only use 21 out of 33 Indonesian provinces because 12 provinces do not have Islamic rural banks. The average regions' GDP is 5.4%. We could see that some provinces have the maximum value of HHI, 1, implying that some province only have one Islamic rural banks. The mean of HHI is 0.7 and this indicates that

Islamic rural banks in Indonesia are quite concentrated. The interest rate (INT) have mean 6.9% and we could see that the differences among provinces are not prominent, with the lowest value 6.3% (the capital, DKI Jakarta) and the highest value 7.5% (Kalimantan Tengah and Maluku Utara). The average PMPOP is 94%, suggesting that Muslim proportion in Indonesia is considerably high. Indeed, there is a touristic island Bali with only having 13% Muslim because this island inhabited mostly by Hindus.

[Table 2]

We also provide correlation matrix of our main variables in Table 3. It shows that our model does not have multicollinearity problem. We also check the collinearity using variance inflation factor (VIF) but the maximum value of our explanatory variables is 1.85, far from the rule of thumb 10 (results are available upon request). It indicates that multicollinearity is not a serious problem in our model.

[Table 3]

3.2. Baseline regressions

To estimate equation (1), to check the consistency of the results, we use three different estimators: ordinary least squares (OLS), fixed-effect (FE), and random effect (RE). OLS have been used by prior regional studies (Trinugroho et al., 2015, 2017), but the panel data regression (FE and RE) have advantage because it could help the researchers to avoid omitted variable problems (Studenmund and Johnson, 2017). Moreover, Gujarati (2004) explain that panel data analysis can take into account of the individual heterogeneity (i.e., bank or region heterogeneity) that cannot be observed by the OLS. Therefore, the consideration of using FE and RE are tested using Hausman test. The significant value of chi-square indicates that the FE are preferred because RE is inconsistent (Cameron and Trivedi, 2009).

[Table 4]

Table 4 displays the baseline results. As expected, our results show that Lerner index positively associated with bank margins of Indonesian Islamic rural banks. The coefficients are significant across different estimators. The result suggests that banks with high market power also have more ability to set high margins. This evidence could be because in some regions, rural banks only face competition from a single rural bank or even without having any competitors. Also, in these regions, there are only few branches of private commercial banks, allowing them to charge high fees. This result are consistent to Entrop et al. (2015). Another possible explanation could be traced back from the dealership model of Ho and Saunders (1981). Because of relatively inelastic demand-supply function in the market, banks are able to exercise their monopoly power by setting high margins (Trinugroho et al., 2014).

RevDIV are negatively impact bank margins. The more diversified banks led the banks to set lower margins, referring to “cross-subsidization strategy”. Diversified banks are able to obtain high

income from the non-financing activities (Trinugroho et al., 2014) and expected to offer its traditional products with very small or even negative margins to keep or attract clients (Maudos and Solís, 2009). This result is also strengthened by the negative sign of TLTA. To attract customers, banks set lower margins when their loan proportion are high. This result is similar to Lin et al. (2012). Higher TLTA could correspond higher idiosyncratic risk, meaning that in the case of economic shocks, banks with a higher proportion of loan will be impacted more than other banks with lower loan proportion (Baele et al., 2007).

Meanwhile, we do not find strong evidence of CIR, CAR, and LLRTL. CIR and CAR are only significant in the OLS estimators whereas LLRTL is significant in both FE and RE. Those variables are significant only in the OLS or RE estimators. Except for CIR, the sign of these variables is according to our expectations. LLRTL positively impact NPM, indicating that banks tend to charge higher lending rates for riskier loans (Lepetit et al., 2008). A positive sign is also appeared from CAR, suggesting that banks having high degree of risk aversion require high risk premium (Lepetit et al., 2008). Regarding CIR, we find a positive sign, suggesting that inefficient banks try to attract customers by offering lower lending rates.

Now we turn to the region-level variables. GrGDP, HHI, and INT are significantly influence bank margins. This evidence could imply that region heterogeneity matters for margins of Islamic rural banks. In the region with higher growth of GDP, Islamic rural banks exhibit higher margins. A positive sign of HHI strengthens our result from Lerner index. In the more concentrated market or when there is less number of Islamic rural banks in the province, they tend to set higher margins. Market interest rate positively affects bank margins, implying that how Islamic rural banks set their margins are also related to the region interest rate. Islamic rural banks enjoy high margins when market interest rate is high too.

3.3. Further investigation

In the baseline regressions, the result of Hausman test indicates that we should consider FE rather than RE. A significant value of Chi-square indicates that the RE is inconsistent. Therefore, in the further analysis, we will only use FE. We first investigate the impact of various Islamic banks contract (some of them are categorized as PLS contract) on the bank margins. Table 5 presents the results. We find that Lerner and diversification that we find significant across estimators in the baseline regressions are no longer significant in the banks with high loan contract diversification (column (1)) and banks with a low proportion of PLS-based loan (column (4)). Lower market competition indicated by the higher value of Lerner index is associated with greater bank margins especially when Islamic banks have lower loan contract diversification. Islamic banks who focus on only one contract, e.g., *murabaha* contract, are significantly affected by market competition. This evidence possibly related to the fact that

other competitors also use *murabaha* because it is the most popular and less risky contract (Chong and Liu, 2009; Khan, 2010; Shaban et al., 2014). The *murabaha* loan market, therefore, is very competitive and Islamic banks need to set their margins following the current competitive condition. Subsequently, Lerner positively impact bank margins when banks have a high PLS-based loan. Because this loan type is very risky, Islamic banks need to set higher lending rate (hence higher bank margins) to offset the high risk originated from *mudaraba* and *musharaka.*

[Table 5]

Regarding RevDIV, a negative value in column (2) indicates that Islamic rural banks decrease their margins when they have high revenue diversification and low loan diversification. The negative sign of diversification as explained earlier implies cross-subsidization strategy, but this only works when Islamic rural banks possess low loan contract diversification. Non-significant value of RevDIV in Column (1) implies that Islamic rural banks do not need to use cross-subsidization strategy by lowering their margins when they already have high contract diversification offered to their clients. In columns (3) and (4), we could see cross-subsidization strategy is absent when Islamic banks have low LoanPLS. The strategy only presence when Islamic banks have great proportion of loan based on PLS-contract. Because banks' consideration to set high or low margins is related to the willingness of the customers (whether their clients will stay or leave the bank; whether new clients will join the bank or not) he high proportion of PLS-based loan can offset Islamic banks' need to set high margins in order to attract customers. This is because PLS-based loan could be an Islamic banks tools to magnetize new customers or to help Islamic banks maintain their current clients (Risfandy et al., 2017). Undeniably, most of the Islamic banks' clients are Muslims and they prefer PLS loan rather than others.

In the baseline regression, we find a significant impact of all provincial-level variables on bank margins, suggesting that regional differences matter for rural banks margins. We then investigate the effect of other provincial characteristics: percentage of Muslim population (PMPOP) and banks location (Java and non-Java). The results are presented in Table 6. It shows that our main variable of interests, Lerner and RevDIV, shows significant differences between high and low Muslim population and between Java and outside Java. Specifically, competition and diversification significantly influence Islamic rural banks' margins in the regions with a low proportion of Muslims and Java Island. This evidence could also be explained by Islamic banks behavior in maintaining their clients. The effect of competition is missing in the predominantly Muslim population because Muslims reported by some studies are positively affect Islamic banks' performance (Baele et al., 2014; Trinugroho et al., 2017). Religious Muslims are unwilling to leave the banks although Islamic banks are more expensive than conventional banks. This explanation is supported by Meslier et al. (2017) who find a pattern of asymmetric competition between Islamic and their conventional rivals. When setting the rate of deposit, Islamic banks do not consider their market power whereas conventional banks set higher rate when they

have lower market power. Moreover, Meslier et al. (2017) find that conventional deposit rate are affected by the Muslim population, Islamic banks' market share, and Islamic banks' market power. The impact of Lerner on bank margins is also significant only in Java Island. Our results support Trinugroho et al. (2015, 2017) who also find a significant impact of regional differences on financial deepening and rural banks' performance. Since Java is considered socioeconomically developed regions due to the higher economic activity, it significantly impacts Islamic rural banks' margins.

[Table 6]

3.4. Robustness checks

In the present paper we also provide several robustness tests. First, we test whether our results are still consistent if we use alternative proxy following Lee and Isa (2017). This proxy uses total assets as a denominator instead total financing. The results are depicted in Table 7. From the column (1), (2), and (3), we could see that Lerner and RevDIV still significant across three different estimator techniques.

[Table 7]

Second, we examine whether by changing the controls we still obtain a robust result. We provide the results in Table 8. We change LLRTL by LLPTL following Lepetit et al. (2008) and López-Espinosa et al. (2011). Our result in Table 8 column (1) indicates that the result does not change. We also change the size measure. We follow Hawtrey and Liang (2008) and Islam and Nishiyama (2016) by using logarithm of the total loan (LogTL) instead of total assets (LogTA). From column (2), we could observe that Lerner and RevDIV still significantly affect Islamic rural banks margins. Third, we incorporate time fixed-effect in our model. As consequences, we have to drop quarterly interest rate (INT) because of multicollinearity problem. Table 8 column (3) indicates that the result is consistent. Fourth, one might say that HHI and Lerner should not be introduced simultaneously in the model because both of them could be interpreted as the similar proxy for competition. For this reason, we consider HHI and Lerner separately in Table 8 column (4) and (5). Our result still consistent. Lerner and HHI still positively affect bank margin although they are not introduced at the same time.

[Table 8]

Fifth, several prior studies highlight the endogeneity problem in the model with bank margin as dependent variable (Claessens et al., 2017). The use of instrumental variable technique thus is encouraged. Table 9 displays the result of our estimation using two stages least squares (2SLS) and generalized method of moments. In column (1) we use 2SLS and incorporating three instruments that are first lagged value of Lerner, second lagged value of Lerner, and the z-score. The result shows that Lerner and RevDIV are still statistically significant. The value of Kleibergen Paap F.statistics and Hansen test indicates that our instruments are strong and valid. In column (2) we use two step GMM

based on (Blundell and Bond, 1998). Column (2) differs with column (3) in terms of the consideration of endogenous variable we use. In column (2) we only consider Lerner as endogenous whereas in column (3) we also add RevDIV, CAR, LLPTL, and HHI. In overall our results are still hold. In the presence of lagged value of dependent variable in the model, Lerner and RevDIV still significantly affect bank margin. The non-significant value of Hansen test suggest that our instrument is valid. However, as we could see in the endogeneity test, it shows insignificant result, suggesting that Lerner and other suspected endogenous variables are not statistically proven as endogenous. For this reason, in our main estimation, we rely on fixed effects technique.

[Table 9]

Sixth, Soedarmono et al. (2017) highlight the importance of bank capital ratio on financial intermediation specifically in Islamic banks. Therefore, it might be interesting as well to see whether in the different capitalization levels, competition and diversification differently affect bank margins. We then re-estimate equation (1) by splitting sample based on low and high capitalization levels. From the results presented in Table 10, we could see that Lerner significantly and positively impact bank margins both in the below and above median. The role of competition on bank margins does not affected by the capitalization levels. Nevertheless, we do find different effect of diversification, that is, diversification does not significantly affect bank margins when they have high capital ratio. Islamic banks with low capitalization levels do not seems to be able to diversify their revenue because their income is mostly generated from low-risk investment and fee income (Cihak and Hesse, 2010). In overall, our results are consistent across various robustness check method.

[Table 10]

4. Conclusion

This paper investigates the determinants of Islamic rural banks' margins in Indonesia. We are interested in investigating this issue because Islamic rural banks in Indonesia dispersed in 21 provinces, hence, the regional differences might matter for the banks' margins. Moreover, Indonesia is recorded as a country with the highest bank margins for the last decades. Islamic rural banks in Indonesia even could have higher banks margins than the commercial banks because of the risks typically from their lending activities. Additionally, Indonesia is the most prominent Muslim countries with around 200 million Muslim population. Using a sample of 151 Indonesian Islamic rural banks, our results show that their margins are affected by both bank-level and region-level variables. Competition and revenue

diversification are two main bank-level variables significantly affect bank margins. Islamic rural banks will increase bank margins in the less competitive environment and when they have less diversification in their revenue. Our results also show that all region-level variables significantly affect bank margins, implying that regional differences play an essential role for the margins consideration. Bank margins increase in the region with the higher economic growth, market concentration, and interest rate. Since the regional differences matter, we also investigate the impact of regional Muslim population and the location on bank margins. Our finding reveals that these variables significantly alter the impact of competition and diversification on bank margins.

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Table 1. Descriptive statistics of the bank-level variables

Variable	Description	Obs.	Mean	S.D.	Min	Max
BM	Bank margins, computed as the ratio of financing income to total financing	1,914	0.111	0.097	0.012	0.680
AltBM	Alternative proxy of bank margins, computed as the ratio of financing income to total assets	1,914	0.069	0.039	0.006	0.204
Lerner	Lerner index to proxy banks' market power	1,914	0.214	0.217	-1.023	0.535
RevDIV	Revenue diversification	1,914	0.212	0.093	0.023	0.463
CIR	Cost to income ratio to proxy bank efficiency	1,914	0.042	0.061	0.000	0.408
TLTA	Total loan to total assets	1,914	0.699	0.155	0.128	0.933
CAR	Capital assets ratio	1,914	0.182	0.124	0.062	0.710
LLRTL	Ratio of loan loss reserve to total loan	1,914	0.030	0.040	0.004	0.269
LogTA	Logarithm of total assets	1,914	16.750	1.046	14.369	20.239
LLPTL	Ratio of loan loss provision to total loan	1,747	0.015	0.034	0.000	0.262

Table 2. Descriptive statistics of provincial level variables

No	Province	GrGDP: Growth of GDP	HHI: Herfindahl index	INT: Interest rate	PMPOP: Percentage of Muslims	Island: Java or Non-Java
1	DI Aceh	0.018	0.797	0.068	0.982	Non-Java
2	Bali	0.066	1	0.068	0.134	Java
3	Bangka Belitung	0.049	1	0.068	0.890	Non-Java
4	Banten	0.061	0.625	0.068	0.947	Java
5	Bengkulu	0.058	1	0.068	0.973	Non-Java
6	DI Yogyakarta	0.052	0.402	0.070	0.919	Java
7	DKI Jakarta	0.063	1	0.063	0.854	Java
8	Jawa Barat	0.057	0.700	0.069	0.970	Java
9	Jawa Tengah	0.053	0.661	0.069	0.967	Java
10	Jawa Timur	0.060	0.723	0.069	0.964	Java
11	Kalimantan Selatan	0.051	1	0.068	0.967	Non-Java
12	Kalimantan Tengah	0.065	1	0.075	0.743	Non-Java
13	Kepulauan Riau	0.067	1	0.069	0.793	Non-Java
14	Lampung	0.055	0.958	0.070	0.955	Non-Java
15	Maluku Utara	0.059	1	0.075	0.743	Non-Java
16	Nusa Tenggara Barat	0.082	0.832	0.069	0.965	Non-Java
17	Riau	0.023	1	0.068	0.880	Non-Java
18	Sulawesi Selatan	0.077	0.663	0.069	0.896	Non-Java
19	Sumatera Barat	0.059	0.876	0.069	0.974	Non-Java
20	Sumatera Selatan	0.054	1	0.067	0.969	Non-Java
21	Sumatera Utara	0.055	0.688	0.071	0.661	Non-Java
	Mean	0.054	0.729	0.069	0.940	

Table 3. Correlation matrix of the main independent variables

	Lerner	RevDIV	CIR	TLTA	CAR	LLRTL	LogTA	GrGDP	HHI	INT
Lerner	1									
RevDIV	-0.107	1								
CIR	-0.237	0.148	1							
TLTA	0.061	-0.165	-0.194	1						
CAR	0.126	-0.038	0.172	-0.194	1					
LLRTL	-0.280	0.073	0.206	-0.349	0.042	1				
LogTA	-0.032	-0.063	-0.127	0.198	-0.286	-0.135	1			
GrGDP	0.064	0.065	0.027	0.032	0.016	-0.033	0.068	1		
HHI	0.089	-0.103	-0.004	-0.060	0.147	0.063	-0.018	-0.033	1	
INT	-0.115	-0.138	-0.009	-0.042	0.049	0.085	0.098	-0.116	-0.027	1

Table 4. Baseline regressions: Determinants of bank margins

	OLS	FE	RE
	(1)	(2)	(3)
Lerner	0.120***	0.0606**	0.0851***
	(7.92)	(2.45)	(3.59)
RevDIV	-0.102***	-0.0756**	-0.0840***
	(-5.05)	(-2.15)	(-2.92)
CIR	0.137***	0.0786	0.106
	(3.03)	(0.80)	(1.18)
TLTA	-0.281***	-0.243***	-0.266***
	(-12.86)	(-7.32)	(-7.64)
CAR	0.0315*	0.0631	0.0476
	(1.81)	(1.23)	(1.51)
LLRTL	0.707***	0.240	0.405**
	(7.11)	(1.62)	(2.53)
LogTA	-0.00259	-0.000808	-0.00351
	(-1.37)	(-0.11)	(-0.81)
GrGDP	0.00313***	0.00191*	0.00222*
	(3.55)	(1.75)	(1.91)
HHI	0.0160***	0.0306*	0.0241**
	(2.58)	(1.87)	(2.20)
INT	1.179***	1.205***	1.234***
	(5.50)	(5.42)	(5.87)
Constant	0.204***	0.160	0.215***
	(5.83)	(1.28)	(3.18)
N	1914	1914	1914
N banks	151	151	151
R-sq.	0.458		
R-sq. within		0.157	
R-sq. overall			0.448
Hausman test FE vs. RE			
Chi-sq.			51.97
p-value			0.000

Notes: Dependent variable is bank margins. See Table 1 for description of variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 5. The impact endogenous factors on bank margins: Loan diversification and PLS-based loan

	LoanDIV		LoanPLS	
	High	Low	High	Low
	(1)	(2)	(3)	(4)
Lerner	0.0397	0.103***	0.113***	0.0455
	(1.30)	(3.54)	(3.86)	(1.49)
RevDIV	-0.0759	-0.0777*	-0.0727*	-0.0725
	(-1.31)	(-1.93)	(-1.79)	(-1.28)
CIR	-0.0779	0.214*	0.209	-0.0462
	(-0.64)	(1.82)	(1.56)	(-0.42)
TLTA	-0.292***	-0.200***	-0.225***	-0.296***
	(-6.13)	(-5.17)	(-5.00)	(-5.95)
CAR	0.0166	0.172***	0.164***	0.0118
	(0.18)	(3.57)	(3.78)	(0.13)
LLRTL	0.134	0.305**	0.336**	0.238
	(0.85)	(2.01)	(2.44)	(1.35)
LogTA	-0.00852	0.0170*	0.0207**	-0.00949
	(-0.76)	(1.71)	(2.26)	(-0.85)
GrGDP	0.00169	0.00199	0.00160	0.00177
	(1.12)	(1.06)	(1.00)	(1.12)
HHI	0.000234	0.0523**	0.0406*	0.0258
	(0.01)	(2.34)	(1.82)	(1.27)
INT	1.310***	0.821***	0.627***	1.495***
	(4.19)	(3.45)	(2.71)	(4.53)
Constant	0.365*	-0.197	-0.218	0.345*
	(1.98)	(-1.23)	(-1.51)	(1.83)
N obs.	942	972	975	939
N banks	105	101	102	108
R-sq. within	0.168	0.129	0.136	0.199

Notes: Dependent variable is bank margins. See Table 1 for description of variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 6. The impact of exogenous factors on bank margins: Muslim population and Java Island

	MPOP		Java	
	High	Low	Java	Non-Java
	(1)	(2)	(3)	(4)
Lerner	0.0419	0.0869***	0.0949***	-0.00547
	(1.23)	(3.43)	(3.96)	(-0.13)
RevDIV	-0.0226	-0.133**	-0.0935**	-0.0590
	(-0.48)	(-2.36)	(-2.21)	(-0.90)
CIR	0.0915	0.0965	0.190	-0.147
	(0.96)	(0.69)	(1.61)	(-0.89)
TLTA	-0.219***	-0.247***	-0.213***	-0.314***
	(-6.49)	(-6.32)	(-6.13)	(-5.84)
CAR	0.0788	0.0539	0.131**	-0.00876
	(1.06)	(0.79)	(2.44)	(-0.08)
LLRTL	0.0282	0.481***	0.323**	0.119
	(0.16)	(3.26)	(2.30)	(0.64)
LogTA	0.0138	-0.0138	0.0102	0.000124
	(1.59)	(-1.17)	(1.40)	(0.01)
GrGDP	0.00626***	0.00114	0.00888***	0.000965
	(3.93)	(1.25)	(4.64)	(0.95)
HHI	0.0341	0.0389	0.0307	0.0240
	(1.32)	(1.59)	(1.53)	(0.79)
INT	1.087***	1.636***	1.151***	1.134***
	(3.83)	(4.52)	(4.59)	(3.21)
Constant	-0.123	0.350*	-0.105	0.248
	(-0.84)	(1.81)	(-0.89)	(1.44)
N obs.	966	948	1277	637
N banks	73	78	99	52
R-sq. within	0.139	0.195	0.189	0.173

Notes: Dependent variable is bank margins. See Table 1 for description of variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 7. Robustness test: Using alternative proxy of bank margins

	OLS	FE	RE
	(1)	(2)	(3)
Lerner	0.141***	0.0656*	0.0943***
	(6.99)	(1.87)	(2.75)
RevDIV	0.0482*	0.0814*	0.0720**
	(1.77)	(1.97)	(2.08)
CIR	0.156***	0.00757	0.0645
	(2.62)	(0.05)	(0.48)
TLTA	-0.372***	-0.359***	-0.374***
	(-12.59)	(-7.06)	(-7.24)
CAR	0.0318	0.0577	0.0479
	(1.45)	(0.87)	(1.16)
LLRTL	0.914***	0.230	0.455*
	(6.85)	(0.96)	(1.84)
LogTA	-0.00122	-0.00763	-0.00392
	(-0.50)	(-0.73)	(-0.67)
GrGDP	0.00358***	0.00185	0.00225
	(3.34)	(1.48)	(1.63)
HHI	0.0209***	0.0342*	0.0292**
	(2.63)	(1.89)	(2.20)
INT	1.576***	1.776***	1.687***
	(5.87)	(5.79)	(6.02)
Constant	0.191***	0.306	0.250**
	(4.34)	(1.64)	(2.53)
N	1914	1914	1914
N banks	151	151	151
R-sq.	0.468		
R-sq. within		0.192	
R-sq. overall			0.450

Notes: Dependent variable is alternative proxy of bank margins. See Table 1 for description of variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 8. Robustness check: Using various measurements

	(1)	(2)	(3)	(4)	(5)
Lerner	0.156***	0.0619**	0.0515**	0.0612**	–
	(6.75)	(2.58)	(2.25)	(2.48)	
RevDIV	-0.0908**	-0.0781**	-0.136***	-0.0749**	-0.0714*
	(-2.60)	(-2.23)	(-5.04)	(-2.14)	(-1.94)
CIR	0.153	0.0801	0.0862	0.0749	-0.0111
	(1.61)	(0.82)	(1.08)	(0.75)	(-0.13)
TLTA	-0.204***	-0.231***	-0.191***	-0.244***	-0.227***
	(-6.80)	(-7.33)	(-5.21)	(-7.36)	(-7.08)
CAR	0.0784*	0.0528	0.0410	0.0667	0.0737
	(1.68)	(1.03)	(0.89)	(1.30)	(1.42)
LLRTL	–	0.227	0.210	0.244	0.117
		(1.55)	(1.37)	(1.65)	(1.08)
LLPTL	1.054***	–	–	–	–
	(6.13)				
LogTA	0.00118	–	-0.0287***	-0.000496	0.00422
	(0.15)		(-3.61)	(-0.07)	(0.49)
LogTL	–	-0.00770	–	–	–
		(-0.87)			
GrGDP	0.00382**	0.00194*	0.0000346	0.192*	0.186*
	(2.51)	(1.81)	(0.10)	(1.75)	(1.67)
HHI	0.00825	0.0306*	-0.0104	–	0.0327**
	(0.48)	(1.89)	(-1.32)		(1.98)
INT	1.292***	1.329***	–	1.169***	1.025***
	(5.44)	(5.31)		(5.27)	(4.19)
Constant	0.0701	0.258*	0.668***	0.179	0.0931
	(0.54)	(1.86)	(4.59)	(1.40)	(0.67)
Time FE	–	–	√	–	–
N obs.	1747	1914	1914	1914	1918
N banks	149	151	151	151	151
R-sq. within	0.318	0.157	0.672	0.155	0.144

Notes: Dependent variable is bank margins. See Table 1 for description of variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 9. Robustness check: IV and GMM

	(1)	(2)	(3)
Lag BM		-0.249***	-0.335***
		(-5.42)	(-4.18)
Lerner	0.0988***	0.128***	0.253***
	(3.40)	(3.70)	(5.44)
RevDIV	-0.0732**	-0.0986	-0.187**
	(-2.22)	(-1.13)	(-2.50)
CIR	0.172*	0.257	0.728**
	(1.77)	(0.89)	(2.08)
TLTA	-0.267***	-0.459***	-0.556***
	(-7.77)	(-5.92)	(-3.79)
CAR	0.103**	0.0670	0.0489
	(2.16)	(0.56)	(0.51)
LLRTL	0.0477	0.661***	1.941***
	(0.25)	(2.68)	(4.85)
LogTA	-0.0183*	0.00585	0.0248
	(-1.87)	(0.35)	(0.85)
GrGDP	0.182***	0.129	0.542
	(2.70)	(0.62)	(1.44)
HHI	0.0396**	0.0395	0.00481
	(2.44)	(1.22)	(0.26)
INT	0.871***	1.687***	3.883***
	(2.91)	(4.07)	(4.96)
Constant		0.165	-0.288
		(0.58)	(-0.48)
N	1318	1617	1480
Kleibergen-Paap F-stat.	86.253		
Hansen test (p-value)	0.7886	0.718	0.839
AR (2) test (p-value)		0.000	0.000
Endogeneity test (p-value)	0.088	0.485	0.836

Notes: Dependent variable is bank margins. See Table 1 for description of variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 10. Robustness: Split sample based on the capitalization

	(1)	(2)
Lerner	0.0414**	0.0811**
	(2.16)	(2.42)
RevDIV	-0.0266	-0.137**
	(-0.67)	(-2.40)
CIR	0.0826	0.109
	(1.03)	(0.76)
TLTA	-0.200***	-0.259***
	(-4.63)	(-6.77)
CAR	0.144	0.0537
	(1.19)	(0.99)
LLRTL	0.169	0.270
	(1.45)	(1.50)
LogTA	0.00520	-0.00229
	(0.70)	(-0.20)
GrGDP	0.738***	0.115
	(4.40)	(1.15)
HHI	0.0411**	0.0297
	(2.35)	(0.95)
INT	0.974***	1.532***
	(4.16)	(3.95)
Constant	-0.00803	0.186
	(-0.06)	(1.01)
N obs.	942	972
N banks	96	112
R-sq.	0.143	0.152

Notes: Dependent variable is bank margins. See Table 1 for description of variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.