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Full Length Article

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 are affected mainly by competition and diversification. In this 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 more pronounced in the banks with lower banks' loan contract diversification and also banks with a higher proportion of profit-and-loss sharing (PLS) lending. However, those impacts diminish when Islamic banks are located in provinces with above-average numbers of Muslims and located outside Java. Our empirical results therefore also suggest that regional differences matter for bank margins.

JEL classifications: G21; D40; L25; O18

Keywords: Bank margins; Competition; Diversification; Islamic rural banks; Indonesia

1. Introduction

Islamic banks have shown substantial growth in the past few decades. Their development also attracts scholars to investigate the behavior of Islamic banks in order to gain a better understanding of their role in the country's financial system. Most of the works on Islamic banks are carried out using a sample of Muslim-majority countries. In this regard, Indonesia provides a unique country setting for a few reasons. First, since Indonesia is the biggest Muslim country in the world, the development of Islamic banks cannot be neglected. Indonesia is part of the group of countries called QISMUT (Qatar, Indonesia, Saudi Arabia, Malaysia, the United Arab Emirates, and Turkey). Islamic banking assets in those countries totaled US$801 billion in 2015, representing 80% of international Islamic banking assets (Ernst and Young, 2016). Second, data on Islamic banks in Indonesia are available from both local sources on the website of Bank Indonesia (the central bank) and Indonesia Financial Services Authority and international sources such as Bankscope. This facilitates the study of Islamic banking development and behavior, whether focused only on Islamic banks or in comparison with their conventional counterparts.

Prior empirical studies have been carried out on several topics 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 the Islamic banking sector contributes to the growth of the Indonesian economy. Hardianto and

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Wulandari (2016) compare the differences in intermediation, fee-based service activity, and efficiency of Islamic banks to those at conventional banks. They show that Islamic banks in Indonesia have a higher intermediation ratio, a higher ratio of fee income to total operating income, and less efficiency. Cupian and Abduh (2017) examine the competitive conditions of Islamic banks in Indonesia for the period 2006 to 2013. Because they have a high degree of market power, Indonesian Islamic banks lead to a less competitive market. Risfandy, Trinarningsih, Harmadi, and Trinugroho (2017) have similar findings, finding that Islamic banks in Indonesia have more market power than their non-Islamic peers. They also find that during the holy month of Ramadan, profit-and-loss sharing (PLS) activities and the presence of a sharia board have a significant impact on Islamic banks' market power.

These studies, in our opinion, are insufficient to cover issues in the development of Islamic banking in Indonesia. Some theoretical and non-empirical studies have been done (Darmadi, 2013; Hassan & Syafri Harahap, 2010; Ismal, 2012; Wulandari, Putri, Kassim, & Sulung, 2016), leaving many areas yet to be investigated that use Indonesia as the country setting. In this paper, using 151 Indonesian Islamic rural banks spread over 21 provinces as a sample, we investigate how they set their bank margins. To the best of our knowledge, our topic has not been addressed in prior studies. Indeed, some studies have investigated the impact of provincial differences in bank behavior or economic development. Trinugroho, Agusman, Ariefiento, Darsono, and Tarazi (2015), 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 level of financial deepening is lower than in developed regions. Trinugroho et al. (2017) address the impact of regions' religiosity on Islamic rural banks' performance. They find that religiosity can increase Islamic rural banks' profitability and stability. Additionally, Islamic rural banks have better performance in regions with a higher religiosity level than in less religious provinces. Our study differs from those two in that we analyze the behavior of Islamic rural banks in setting margins.

Otoritas Jasa Keuangan (Indonesian Financial Services Authority; 2017) shows in its *Indonesian Islamic Banking Development Report* 2016 that, by December 2016, assets of Indonesian Islamic rural banks totaled IDR 9.1 trillion—about 2.5% of the total assets at national Islamic banks or 8% at conventional rural banks.[1] Although Islamic rural banks have a relatively small share compared to conventional rivals, they showed remarkable growth of 20.84% in 2016 (Otoritas Jasa Keuangan, 2017). This small market share at Islamic rural banks might be due to the limited business activities and operational areas (small and medium-size enterprises and local community) compared to commercial banks, which can reach any segment of the banking market. However, rural banks have a vital position in the Indonesian economy because around 99% of business in Indonesia can be classified as small and micro business (Shaban, Duygun, Anwar, & Akbar, 2014). Rural employment covers almost half the Indonesian population and contributes more than 40% of the country's gross domestic product (GDP) (Shaban et al., 2014). Therefore, Islamic rural banks' position in the Indonesian banking market is important because they reach small entrepreneurs who do not want to obtain loans from conventional rural banks because of their religious beliefs. For some Muslims, interest payments at conventional banks are considered *riba* (usury), which is forbidden in Islam.

The main purpose of this paper is to investigate the determinants of bank margins at 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 reports overpricing 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-size enterprises that are relatively opaque and financially constrained. Islamic banks therefore require a high risk premium for these types of clients. The evidence of high interest margins is also found by Lin, Chung, Hsieh, and Wu (2012), who indicate that on average Indonesian banks have the highest bank margins among Asian countries. After the 1997–1998 financial crisis, Indonesian bank margins were even higher than before (Lin et al., 2012; Trinugroho, Agusman, & Tarazi, 2014).

Our results suggest that bank margins at Indonesian Islamic rural banks are affected by several factors. Banks' market power and diversification are two bank-level variables that consistently affect banks' margins. Specifically, market competition proxied by the Lerner index of market power positively affects bank margins, which suggests that in a more competitive market, Indonesian Islamic rural banks would have lower margins. This behavior might aim to attract new customers by offering a low lending rate. Bank diversification, in our case, also significantly influences bank margins. Islamic rural banks that diversify their income sources tend to set lower margins. This evidence is in line with "cross-subsidization strategy." Because they are able to obtain income from non-financing activities, they can set low margins. However, in our investigation, the impact of competition and diversification on bank margins is 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 a high level of loan PLS. Moreover, the impact of competition also depends on Islamic banks' location—that is, whether they are in provinces with an above-average Muslim population or on Java island.

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

[1] Based on the exchange rate in May 2018, USD 1 is equivalent to about IDR 14,000.

2. Data, sample, methodology, and variable explanations

2.1. Data and sample

We use data from the Central Bank of Indonesia (www.bi.go.id) and Indonesian Statistical Bureau (www.bps.go.id). The former provides complete balance-sheet and income statement data so we are able to compute bank-level financial ratios. The latter enables us to study provincial-level datasets, such as the growth of provinces' GDP, interest rates, unemployment rates, and the percentage of the Muslim population in each province. From these data sources, we obtain unbalanced panel data on 151 Islamic rural banks in 21 provinces in Indonesia, for the period between 2012Q1 and 2015Q4, resulting in 1914 observations after winsorizing extreme values.

2.2. Methodology and variable explanations

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

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

where i, j, and t refer to the bank, region, and time, respectively. *BM* is bank margins, our dependent variable, calculated as the difference between the income from financing and payment to depositors as well as other investment account holders and therefore scaled by total financing. In the context of conventional banks, the former is widely known as interest income whereas the latter is interest expenses. This measurement is relevant to most studies on conventional banks as a proxy for net interest margins (Trinugroho et al., 2014) and is used by Hutapea and Kasri (2010) to investigate bank margins at Islamic banks. For robustness, we also use a proxy from Lee and Isa (2017), who use the same method as our proxy but with total assets as a denominator.

Following recent works on net interest margin determinants (Entrop, Memmel, Ruprecht, & Wilkens, 2015; Trinugroho et al., 2014), we use the Lerner index to measure banks' market power, calculated as the difference between the price of banking products and marginal cost as a proportion of the price.

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

Price is the ratio of total bank income to total assets. Following Fu, Lin, and Molyneux (2014), marginal costs are obtained from the two-factor translog cost function. Banks with greater market power (usually in less competitive markets) have greater incentive to set higher margins (Trinugroho et al., 2014). Therefore, a positive sign in the Lerner index is expected.

RevDIV is revenue diversification, specifically, 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*).

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

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

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

TLTA is the ratio of total loans to total assets, which measures banks' business orientation or specialization. Banks with higher loans are seen as being more oriented toward traditional banking activities (Lin et al., 2012). *TLTA* could have two effects on bank margins. On the one hand, because traditional banks show that a high *TLTA* leads to higher margins, a positive association with BM could be expected. This argument is similar to that of the variable *RevDIV*. On the other hand, a high *TLTA* might correspond to higher idiosyncratic risk because banks do not diversify their income sources (Baele, De Jonghe, & Vander Vennet, 2007). In this regard, bank margins might 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, Nys, Rous, & Tarazi, 2008; Trinugroho et al., 2014). Banks with a higher degree of risk aversion are likely to be related to higher profit margins because of the banks' required risk premium (Lepetit et al., 2008). For this reason, we use the capital asset ratio (CAR) to measure the degree of risk aversion at Islamic rural banks.

We also incorporate credit risk into the determinants of bank margins following the prior literature (Chortareas, Garza-García, & Girardone, 2012; López-Espinosa, Moreno, & Pérez de Gracia, 2011). We proxy credit risk with the ratio of loan loss provision to total loans (*LLPTL*). A positive sign is expected in *LLPTL* because banks with higher credit risk require a higher risk premium from customers (Maudos & Fernández de Guevara, 2004). However, a negative association might also be found because depositors also require high interest rates at riskier banks, causing these banks to have lower margins (Fungáčová & Poghosyan, 2011).

We use the natural logarithm of total assets (*LogTA*) to proxy for bank size. For robustness, we also use the natural logarithm of total loans (*LogTL*), following Lee and Isa (2017). We expect a negative sign in *LogTA*. Many empirical results in prior studies indicate that larger banks tend to have lower margins because they achieve economies of scale, whereas small banks have higher margins because of their high costs (Trinugroho et al., 2014).

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

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

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

We extend our analysis on the impact of endogenous and exogenous factors on Islamic rural banks' bank margins. One of the main differences between Islamic banks and their conventional peers is the presence of equity financing. This financing type is based on PLS agreement, the main principle at Islamic banks. Although equity financing is risky, it is prevalent in some countries, such as Indonesia (Abedifar, Molyneux, & Tarazi, 2013). Islamic banks might use equity financing to diversify their loan portfolios. We then take into account the impact of two variables: (1) loan diversification (*LoanDIV*) and (2) PLS-based loans (*LoanPLS*). *LoanDIV* is the Herfindahl index of Islamic banks' loan types, whereas *LoanPLS* is the ratio of PLS-based loans to non-PLS loans. The former variable measures whether a loan portfolio is concentrated in a loan type, and the latter variable assesses whether equity financing is popular in Islamic rural banks in Indonesia

Prior regional studies highlight the role of exogenous or regional factors in bank behavior, performance, and regional development. We follow Trinugroho et al. (2017) in including the percentage of Muslims (*PMPOP*) who live in a region. Regions with more Muslims could lead banks to set higher margins. Following Trinugroho et al. (2015, 2017), we also take into account banks' location, whether in Java or not. Because Java is the most populous island in Indonesia, it is the most developed and the center of economic activity. Bank margins could be higher in Java than outside it because of this higher economic activity and because it has a higher number of rural banks than elsewhere in the country. To investigate those regional differences, we split the sample and use an equation similar to equation (1).

3. Results

3.1. Descriptive statistics

Table 1 lists our variable descriptions and statistics. The mean value of *BM* and *AltBM* are 11% and 6% respectively. These values indicate that, on average, Indonesian Islamic rural banks set high margins. Because Islamic rural banks focus on small and medium-size enterprises that might have

Table 1
Descriptive statistics on bank-level variables.

Variable	Description	Obs.	Mean	S.D.	Min	Max
BM	Bank margins, computed as the ratio of financing income to total financing	1914	0.111	0.097	0.012	0.680
AltBM	Alternative proxy of bank margins, computed as the ratio of financing income to total assets	1914	0.069	0.039	0.006	0.204
Lerner	Lerner index to proxy for banks' market power	1914	0.214	0.217	−1.023	0.535
RevDIV	Revenue diversification	1914	0.212	0.093	0.023	0.463
CIR	Cost to income ratio to proxy for bank efficiency	1914	0.042	0.061	0.000	0.408
TLTA	Total loans to total assets	1914	0.699	0.155	0.128	0.933
CAR	Capital assets ratio	1914	0.182	0.124	0.062	0.710
LLRTL	Ratio of loan loss reserves to total loans	1914	0.030	0.040	0.004	0.269
LogTA	Logarithm of total assets	1914	16.750	1.046	14.369	20.239
LLPTL	Ratio of loan loss provision to total loans	1747	0.015	0.034	0.000	0.262

higher risk than large companies, they require a high risk premium. The mean value of the Lerner index is 0.21, which indicates that on average Islamic rural banks in Indonesia are able to set prices for their banking products 21% above their marginal cost. *RevDIV* on average is also 0.21, implying that the proportion of revenue from financing activities and non-financing activities is equal. The average values of *CIR* and *TLTA* are 4% and 69% respectively. *CAR* has a mean value of 18%, indicating that Islamic rural banks in Indonesia, like most Islamic banks, behave more conservatively by maintaining an additional capital buffer. Because rural banks on average have a higher risk profile than commercial banks, they need protect themselves against possible large losses during cyclical downturns (Louhichi & Boujelbene, 2016). The means of our bank risk measures, *LLRTL* and *LLPTL*, are 3% and 1.5% respectively.

Table 2 lists statistics on provincial-level variables. We use only twenty-one out of thirty-three Indonesian provinces because twelve provinces do not have Islamic rural banks. Average regional GDP is 5.4%. Some provinces have the maximum value of HHI, 1, implying that some provinces have only one Islamic rural bank. The mean of HHI is 0.7, which indicates that Islamic rural banks in Indonesia are very concentrated. The mean of interest rates (*INT*) is 6.9%, and differences among provinces are not great, with the lowest value 6.3% (the capital, Jakarta) and the highest value 7.5% (Kalimantan Tengah and Maluku Utara). The average *PMPOP* is 94%, which suggests that the proportion of the Muslim population in Indonesia is quite high, however, the Muslim proportion of the population of Bali is only 13%, as most of this island's inhabitants are Hindu.

Table S1 (See the Supplementary Material, available online) provides a correlation matrix of our main variables. It shows that our model does not have multicollinearity problems. We also check for collinearity using the 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), which indicates that multicollinearity is not a serious problem in our model.

3.2. Baseline regressions

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

Table 3 displays the baseline results. As expected, our results show that the Lerner index is positively associated with bank margins at Indonesian Islamic rural banks. The coefficients are significant across different estimators. The results suggest that banks with high market power also have a greater ability to set high margins. This could be the case because in some regions, rural banks face competition from only a single rural bank or may not have any competitors. Also, these regions have only few branches of private commercial banks, allowing them to charge high fees. This result is consistent with that of Entrop et al. (2015). Another possible

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
Baseline regressions: Determinants of bank margins.

	OLS (1)	FE (2)	RE (3)
Lerner	0.120*** (7.92)	0.0606** (2.45)	0.0851*** (3.59)
RevDIV	−0.102*** (−5.05)	−0.0756** (−2.15)	−0.0840*** (−2.92)
CIR	0.137*** (3.03)	0.0786 (0.80)	0.106 (1.18)
TLTA	−0.281*** (−12.86)	−0.243*** (−7.32)	−0.266*** (−7.64)
CAR	0.0315* (1.81)	0.0631 (1.23)	0.0476 (1.51)
LLRTL	0.707*** (7.11)	0.240 (1.62)	0.405** (2.53)
LogTA	−0.00259 (−1.37)	−0.000808 (−0.11)	−0.00351 (−0.81)
GrGDP	0.00313*** (3.55)	0.00191* (1.75)	0.00222* (1.91)
HHI	0.0160*** (2.58)	0.0306* (1.87)	0.0241** (2.20)
INT	1.179*** (5.50)	1.205*** (5.42)	1.234*** (5.87)
Constant	0.204*** (5.83)	0.160 (1.28)	0.215*** (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 descriptions of variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

explanation relates to the dealership model of Ho and Saunders (1981). Because of the relatively inelastic demand and supply in the market, banks are able to exercise their monopoly power by setting high margins (Trinugroho et al., 2014).

RevDIV negatively affects bank margins. The more diversified banks lead banks to set lower margins, in a "cross-subsidization strategy". Diversified banks are able to obtain high income from their non-financing activities (Trinugroho et al., 2014) and expect to offer traditional products with very small or even negative margins to keep or attract clients (Maudos & Solís, 2009). This result is also strengthened by the negative sign of *TLTA*. To attract customers, banks set lower margins when their loan proportion is high—a result similar to that found by Lin et al. (2012). A higher *TLTA* could correspond to higher idiosyncratic risk, meaning that, in the event of economic shocks, banks with a higher proportion of loans will be affected more than banks with a 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 consistent with our expectations. *LLRTL* positively affects *BM*, indicating that banks tend to charge higher lending rates for riskier loans (Lepetit et al., 2008). *CAR* also has a positive sign, which suggests that banks with a high degree of risk aversion require high risk premiums (Lepetit et al., 2008). *CIR* has a positive sign, which shows that inefficient banks try to attract customers by offering lower lending rates.

Now we turn to regional-level variables. *GrGDP*, *HHI*, and *INT* significantly influence bank margins. This result could imply that regional heterogeneity matters with respect to margins at Islamic rural banks. In regions with higher GDP growth, Islamic rural banks have higher margins. A positive sign of *HHI* strengthens our result from the Lerner index. More concentrated markets and provinces with fewer Islamic rural banks tend to set higher margins. Market interest rates positively affect bank margins, implying that the margin set by Islamic rural banks is also related to the regional interest rate. Islamic rural banks enjoy high margins when the market interest rate is high.

3.3. Further investigation

In the baseline regressions, the results of the Hausman test indicate that we should consider FE, rather than RE. A significant chi-square value indicates that RE is inconsistent. Therefore, in our further analysis, we use only FE. We first investigate the impact of various Islamic bank contracts (some of which are categorized as PLS contracts) on bank margins. Table 4 presents the results. We find that the Lerner index and diversification that is significant across estimators in the baseline regressions are no longer significant at banks with high loan contract diversification (column 1) and banks with a low proportion of PLS-based loans (column 4). Lower market competition, indicated by a higher Lerner index, is associated with higher bank margins, especially when Islamic banks have less loan contract diversification. Islamic banks that focus on only one kind of contract, e.g., *murabaha* contract, are significantly affected by market competition. This evidence may be related to the fact that competitors also use *murabaha* because it is a popular and less risky kind of contract (Chong & Liu, 2009; Khan, 2010; Shaban et al., 2014). The *murabaha* loan market, therefore, is very competitive, and Islamic banks need to set their margins according to the current competitive conditions. Subsequently, the Lerner index positively affects

Table 4
The impact endogenous factors on bank margins: Loan diversification and PLS-based loans.

	LoanDIV		*LoanPLS*	
	High (1)	Low (2)	High (3)	Low (4)
Lerner	0.0397 (1.30)	0.103*** (3.54)	0.113*** (3.86)	0.0455 (1.49)
RevDIV	−0.0759 (−1.31)	−0.0777* (−1.93)	−0.0727* (−1.79)	−0.0725 (−1.28)
CIR	−0.0779 (−0.64)	0.214* (1.82)	0.209 (1.56)	−0.0462 (−0.42)
TLTA	−0.292*** (−6.13)	−0.200*** (−5.17)	−0.225*** (−5.00)	−0.296*** (−5.95)
CAR	0.0166 (0.18)	0.172*** (3.57)	0.164*** (3.78)	0.0118 (0.13)
LLRTL	0.134 (0.85)	0.305** (2.01)	0.336** (2.44)	0.238 (1.35)
LogTA	−0.00852 (−0.76)	0.0170* (1.71)	0.0207** (2.26)	−0.00949 (−0.85)
GrGDP	0.00169 (1.12)	0.00199 (1.06)	0.00160 (1.00)	0.00177 (1.12)
HHI	0.000234 (0.01)	0.0523** (2.34)	0.0406* (1.82)	0.0258 (1.27)
INT	1.310*** (4.19)	0.821*** (3.45)	0.627*** (2.71)	1.495*** (4.53)
Constant	0.365* (1.98)	−0.197 (−1.23)	−0.218 (−1.51)	0.345* (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 descriptions of variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

bank margins when banks have a high proportion of PLS-based loans. Because this loan type is risky, Islamic banks need to set higher lending rates (hence higher bank margins) to offset the high risk from using *mudaraba* and *musharaka*.

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. A negative sign for diversification, as explained earlier, implies a cross-subsidization strategy, but this works only when Islamic rural banks have low loan contract diversification. A non-significant value of *RevDIV* in column 1 implies that Islamic rural banks do not need to use a cross-subsidization strategy by lowering their margins when they already offer their clients high contract diversification. In columns 3 and 4, the cross-subsidization strategy is absent when Islamic banks have low *LoanPLS*. The strategy is used only when Islamic banks have a high proportion of loans based on PLS contracts. Because banks' decision to set high or low margins is related to the willingness of customers (regardless of whether their clients stay at or leave the bank and whether new clients are attracted to the bank) the high proportion of PLS-based loans can offset Islamic banks' need to set high margins in order to attract customers. This is because PLS-based loans could be a tool for Islamic banks to attract new customers or to help Islamic banks hold on to their current clients (Risfandy et al., 2017). Undeniably, most of the Islamic banks' clients are Muslims, and they prefer PLS loans over all other types.

In the baseline regression, all provincial-level variables have a significant impact on bank margins, suggesting that regional differences matter for rural bank margins. We then investigate the effect of other provincial characteristics: the percentage of the Muslim population (*PMPOP*) and bank location (Java and non-Java). The results in Table 5 show that our main variables of interest, Lerner and *RevDIV*, show significant differences between *PMPOP* and bank location. Specifically, competition and diversification significantly influence Islamic rural banks' margins in regions with a low proportion of Muslims and in Java. This result could also be explained by Islamic bank behavior to keep their customers. The effect of competition is missing in the predominantly Muslim population because in some studies Muslims positively affect Islamic banks' performance (Baele, Farooq, & Ongena, 2014; Trinugroho et al., 2017). Religious Muslims are unwilling to leave Islamic banks even though they are more expensive than conventional banks. This explanation is supported by Meslier, Risfandy, and Tarazi (2017), who finds a pattern of asymmetric competition between Islamic banks and their conventional rivals. When setting deposit interest rates, Islamic banks do not consider their market power whereas conventional banks set higher rates when they have lower market power. Moreover, Meslier et al. (2017) find that the conventional deposit rate is affected by the Muslim population, Islamic banks' market share, and Islamic banks' market power. The impact of the Lerner index on bank margins is also significant only in Java. Our results support Trinugroho et al. (2015, 2017), who also find that regional differences have a significant impact on financial deepening and rural bank performance. Because Java is considered a socioeconomically developed region because of its higher economic activity, Islamic rural banks' location there significantly affects their margins.

3.4. Robustness checks

We also conducted several robustness tests. First, we test whether our results are consistent if we use alternative proxies following Lee and Isa (2017). This proxy (*AltBM*) uses total assets, instead of total financing, as a denominator. The results are depicted in Table S2 (See the Supplementary Material, available online). Columns 1, 2, and 3 show that the Lerner index and *RevDIV* remain significant across three different estimator techniques.

Second, we examine whether we still obtain a robust result after changing the controls. We provide the results in Table S3

Table 5
The impact of exogenous factors on bank margins: Muslim population and Java Island.

	MPOP		Java	
	High (1)	Low (2)	Java (3)	Non-Java (4)
Lerner	0.0419 (1.23)	0.0869*** (3.43)	0.0949*** (3.96)	−0.00547 (−0.13)
RevDIV	−0.0226 (−0.48)	−0.133** (−2.36)	−0.0935** (−2.21)	−0.0590 (−0.90)
CIR	0.0915 (0.96)	0.0965 (0.69)	0.190 (1.61)	−0.147 (−0.89)
TLTA	−0.219*** (−6.49)	−0.247*** (−6.32)	−0.213*** (−6.13)	−0.314*** (−5.84)
CAR	0.0788 (1.06)	0.0539 (0.79)	0.131** (2.44)	−0.00876 (−0.08)
LLRTL	0.0282 (0.16)	0.481*** (3.26)	0.323** (2.30)	0.119 (0.64)
LogTA	0.0138 (1.59)	−0.0138 (−1.17)	0.0102 (1.40)	0.000124 (0.01)
GrGDP	0.00626*** (3.93)	0.00114 (1.25)	0.00888*** (4.64)	0.000965 (0.95)
HHI	0.0341 (1.32)	0.0389 (1.59)	0.0307 (1.53)	0.0240 (0.79)
INT	1.087*** (3.83)	1.636*** (4.52)	1.151*** (4.59)	1.134*** (3.21)
Constant	−0.123 (−0.84)	0.350* (1.81)	−0.105 (−0.89)	0.248 (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 descriptions of variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

(See the Supplementary Material, available online). We substitute *LLRTL* with *LLPTL*, following Lepetit et al. (2008) and López-Espinosa et al. (2011). Our result in Table S3, 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 the logarithm of total loans (*LogTL*), instead of total assets (*LogTA*). Column 2 shows that the Lerner index and *RevDIV* still significantly affect Islamic rural bank margins. Third, we include a time-fixed effect in our model. As a consequence, we have to omit the quarterly interest rate (*INT*) because of multicollinearity problems. Table S3, column 3, indicates that the result is consistent. Fourth, HHI and the Lerner index should not be introduced simultaneously in the model because both of them could be interpreted as a similar proxy for competition, so we consider HHI and the Lerner index separately in Table S3, columns 4 and 5. Our results remain consistent. These two variables still positively affect bank margins even though they are not introduced at the same time.

Fifth, several prior studies highlight the endogeneity problem in a model with bank margins as a dependent variable (Claessens, Coleman, & Donnelly, 2017). The use of the instrumental variable technique thus is encouraged. Table S4 (See the Supplementary Material, available online) displays the results of our estimation using two-stage least squares (2SLS) and the generalized method of moments (GMM). In column 1, we use 2SLS and incorporating three instruments that are first lagged values of the Lerner index, the second lagged value of the Lerner index, and the z-score. The results show that the Lerner index and *RevDIV* are still statistically significant. The value of Kleibergen Paap F-statistics and the 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 from column 3 in terms of the endogenous variable we use. In column 2, we only consider the Lerner index endogenous, whereas in column 3 we also add *RevDIV*, *CAR*, *LLPTL*, and *HHI*. Overall, our results still hold. In the presence of lagged values of the dependent variable in the model, the Lerner index and *RevDIV* still significantly affect bank margins. The non-significant value of the Hansen test suggests that our instrument is valid. However, the endogeneity test has an insignificant result, suggesting that the Lerner index and other suspected endogenous variables are not statistically proven to be endogenous. For this reason, in our main estimation, we rely on the FE technique.

Sixth, Soedarmono, Pramono, and Tarazi (2017) highlight the importance of the bank capital ratio in financial intermediation, specifically at Islamic banks. Therefore, it might be interesting as well to see whether at different capitalization levels, competition and diversification affect bank margins differently. We then re-estimate equation (1) by splitting the sample into low and high capitalization levels. Table S5 (See the Supplementary Material, available online) shows that the Lerner index significantly and positively affects bank margins both above and below the median. The role of competition in bank margins is not affected by the capitalization level. Nevertheless, we find different effects of diversification, that is, diversification does not significantly affect bank margins at banks with a high capital ratio. Islamic banks with low capitalization levels do not seem to be able to diversify their revenue because their income is generated mostly from low-risk investment and fee income (Cihak & Hesse, 2010). Overall, our results are consistent across various robustness tests.

4. Conclusion

This paper investigates the determinants of Islamic rural bank margins in Indonesia. We are interested in investigating this issue because Islamic rural banks in Indonesia are dispersed across twenty-one provinces, hence, regional differences might matter for bank margins. Moreover, in the past few decades Indonesia has had the highest bank margins.

Islamic rural banks in Indonesia even have higher margins than commercial banks because of the typical risks from their lending activities. Additionally, Indonesia has a Muslim population of around 200 million, which is the largest of any country. Using a sample of 151 Indonesian Islamic rural banks, our results show that their margins are affected by both bank-level and regional-level variables. Competition and revenue diversification are two main bank-level variables that significantly affect bank margins. Islamic rural banks increase bank margins in less competitive environments and when they have less diversification in their revenue. Our results also show that all regional-level variables significantly affect bank margins, implying that regional differences play an essential role in determination of the margins. Bank margins increase in regions with higher economic growth, market concentration, and interest rates. Because the regional differences matter, we also investigate the impact of regional Muslim populations and bank location on bank margins. Our findings reveal that these variables significantly alter the impact of competition and diversification on bank margins.

Conflicts of interest

The views expressed in this paper are the authors' only and do not necessarily reflect those of Indonesia Deposit Insurance Corporation. All errors, of course, remain with us.

Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.bir.2018.07.006.

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