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Open innovation in shariah compliance in Islamic banks – Does shariah supervisory board attributes matter?



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ABSTRACT

This study extends the literature on shariah compliance in Islamic banks (IBs) based on interest free returns for Investment Account Holders (IAH) and to examine the role of the attributes of the shariah supervisory board (SSB) on shariah compliance. The study sample included 102 fully-fledged IBs from 27 countries over the period from 2010 to 2019. We use panel data estimation techniques and the system generalized method of moments (GMM) estimation to address potential endogeneity concerns. The results show that banks with more members on their SSBs are likely to have less shariah compliance. The findings also indicate that cross-membership and economic/finance/accounting expertise of SSB has positive impact on shariah compliance. This impact of SSB to increase shariah compliance is more pronounced in unlisted IBs than listed IBs. The results can be used by different stakeholders such as policy makers, bank supervisory agencies, other boards, and managers of IBs to mitigate shariah compliance.

1. Introduction

The main objective when establishing an Islamic bank (IB) is to provide shariah-compliant banking services (ie. free of interest). The presence of the shariah supervisory board (SSB) guarantees shariah-compliant banking operations. The SSB, as a multi-layered board in an IB, in collaboration with the bank's board of directors (BOD), provides advice and consultation to managers in carrying out banking operations. The SSB carries out its duties by conducting audits (ex-ante and ex-post) of all IB transactions on a monthly basis (Mutairi and Quttainah, 2017).

IBs face a difficult challenge in ensuring that their operations comply with shariah requirements. A profit and loss sharing (PLS) scheme is used, instead of an interest system, by IBs. The PLS scheme has the consequence that IBs cannot provide or receive fixed returns like a conventional bank (CB) can. The existing regulatory infrastructure is suitable for CBs. This condition causes IBs to adjust their operations to bring them in line with the IBs' obligation to conduct legal and sharia-compliant transactions (Safullah and Shamsuddin, 2018). In addition, the behavior of customers who demand that IBs provide competitive returns like those of CBs adds to the complexity of Islamic

banking operations. Evidence of a decrease in the return on the deposit rate (RDR) causes IBs to face deposit withdrawals because customers choose to move their deposits to CBs (Ismal, 2011; Aysan et al., 2018), thus encouraging bank managers to provide returns that are as competitive as those of CBs.

Previous studies into the RDR of IBs have tended to conclude that IB deposit products are not interest free. Chong and Liu (Chong and Liu, 2009), using monthly data from IBs in Malaysia, found that there is a correlation between the return deposit rate (RDR) in IBs and the interest rate, in the long or short term. The correlation between the RDR and the interest rate shows that IBs provide an RDR based on the interest rate (Chong and Liu, 2009). Yusof et al (Yusof et al., 2015), using a sample of 18 IBs in gulf countries found that, in the long term, there was no relationship between the RDR and interest rates. But in the short term, the RDR in IBs in Saudi Arabia was correlated with the interest rate. Hamza (Hamza, 2016), using a sample of 60 IBs from around the world, found that interest rates have a positive relationship with the RDR in IBs. Samad (Samad, 2018), using monthly IB data from Bahrain, found that the RDR in IBs and the interest rate are not independent of each other, they both follow one another. Similar findings are also evidenced by Korkut and Özgür (Korkut and Özgür, 2017), Adewuyi

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and Naim (Adewuyi and Naim, 2016), and Cevik and Charap (Cevik and Charap, 2011), who all found that the potential returns of the investment products of IBs are not interest-free. Meanwhile, this correlation between the RDR and the interest rate shows that IBs are not interest free (Chong and Liu, 2009). This is contrary to the main foundation of Islamic finance, which is the avoidance of interest (Šeho et al., 2020).

Research into interest-free IB investment products by previous researchers did not focus on the role of the SSB in avoiding the linkage of the RDR in IB investment products with interest rates. The previous studies emphasized the correlation between the RDR and the interest rate. We complement the previous studies by evaluating the role of the SSB in providing interest-free investment products. In measuring the effectiveness of the SSBs' outcomes, we use five of the SSBs' attributes: the number of members, their education level, their gender, cross-membership, and their expertise in the economics/business/accounting fields. This is the first contribution of this study toward expanding the corporate governance literature; we emphasize the SSBs' attributes regarding bank compliance in accordance with shariah requirements.

Second, following Šeho et al (Šeho et al., 2020), interest rate avoidance is an indicator of a bank's compliance with shariah principles. This research contributes to the expansion of shariah compliance indicators in IBs. Mukhibad et al (Mukhibad et al., 2022a, 2022a), Muhammad et al (Muhammad et al., 2021), Basiruddin and Ahmed (Basiruddin and Ahmed, 2019), Fakhruddin and Jusoh (Fakhruddin and Jusoh, 2018), and Nurkhin et al (Nurkhin et al., 2018). instigated a discussion on shariah compliance in IBs. However, they did not use the level of interest-free investment products as indicators of the banks' compliance with shariah principles. Shariah compliance indicators, developed by previous researchers, include zakat expenditure (Mukhibad et al., 2022a), the non-halal income ratio (Mukhibad, Nurkhin, et al., 2022; Basiruddin and Ahmed, 2019), legal and social requirements (Muhammad et al., 2021), shariah board disclosures (Fakhruddin and Jusoh, 2018), and the profit-loss sharing financing ratio (Nurkhin et al., 2018).

The reminder of our paper proceeds as follows. The second part of this paper describes the materials and methods, including the theory, the development of hypotheses, and the methods. The third section describes the results of the data's analysis. The fourth section describes the discussion. The last section is the conclusion.

2. Materials and methods

2.1. Corporate governance in Islamic banking

Corporate governance (CG) is a set of governance systems and structures, involving a series of relationships between a management firm, its board of directors, shareholders, and other stakeholders (OECD, 2004). CG provides a corporate structure to achieve the objectives of the entity and to improve its performance, by involving both the corporate sector and society (Hasan, 2009). In a narrow sense, CG is a system that can reduce agency problems (Felício et al., 2018; Shattarat and Atmeh, 2016). The effectiveness of the CG structure will increase the monitoring and transparency of the entity, and help reduce information asymmetry and agency conflicts between shareholders and agents (Malik et al., 2021; Sudarsanam, 2000).

The agency theory emphasizes the relationship between agents and principles, focusing on the behavior of agents who have self-interests. However, such self-interested behavior can also occur in principals (Panda and Leepsa, 2017). Agency conflicts might also occur between the majority and minority shareholders. Majority shareholders (blockholders) could force the manager to make policies that benefit their interests. Blockholders have greater voting power, can make decisions in their own interests, and hinder the interests of the minority owners (Fama and Jensen, 1983). This conflict between majority and minority owners is known as the second type of agency conflict (Panda and

Leepsa, 2017). A third type of agency conflict occurs between owners and creditors (Kusumadewi and Wardhani, 2020). Owners can use the funds they receive from creditors to finance high-risk projects (Mukhibad et al., 2022a). This policy causes the creditors to face great potential risks because, if the owner's plans fail, this can cause losses to the creditors through delays in interest payments, as well as the restructuring of maturing debts (Panda and Leepsa, 2017).

In the study of Islamic finance, scholars believe that there are agency problems with IBs' products (Beck et al., 2013; Dar and Presley, 2000). The profit and loss sharing system allows customers to report a less than real business performance. In this case, there is a problem of information asymmetry between the customer and the bank (Warninda et al., 2019; Muda and Ismail, 2010) and a moral hazard (Nuddin and Azhar, 2017; Mahmood and Rahman, 2017). In addition, agency conflicts can also occur if the directors of an IB take advantage of investment opportunities that allow for high profits, and neglect shariah compliance (Zainulldin et al., 2018). The absence of direct supervision, by investment account holder (IAH) fund owners, over the policies of a bank's directors increases this opportunity. This is contrary to the goal of IAH fund owners, who seek to obtain a halal income according to shariah requirements (Zainulldin et al., 2018). Thus, this situation creates an agency conflict between the directors and customers who own IAH funds, as the director manages the IAH funds without paying attention to shariah compliance (Mukhibad et al., 2022a).

One approach for reducing this agency conflict is to establish a supervisory board to control the behavior of the directors (Mukhibad et al., 2022a). Effective controls cause the directors to act in the interests of the IAH fund owners. In the CG structure of IBs, the SSB is a unique board in an IB, it has responsibility as a supervisor and consultant to other boards, so that the bank's operations are in accordance with shariah requirements (Mollah and Zaman, 2015). An SSB conducts audits (ex-ante and ex-post) of all IB transactions on a monthly basis (Mutairi and Quttainah, 2017). The Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) describes an SSB as "an independent body of specialized jurists in *Fiqh-al-Muamalat* (Islamic commercial jurisprudence) to ensure that Islamic financial institutions are in compliance with shariah principles" (Khan and Zahid, 2020). The audits are to ensure that the IB's operations are in accordance with shariah principles (Khalid et al., 2018). Thus, the SSBs play a role in reducing the agency problems in IBs (Shattarat and Atmeh, 2016; Khalid et al., 2018).

2.2. Hypotheses development

The main indicator in measuring the effectiveness of an SSB is the number of members it has (Alabbad et al., 2019; Hakimi et al., 2018). Each SSB has the task of monitoring and providing consulting services to other boards when making banking business policies, so that the policies are in accordance with shariah regulations. In carrying out their duties, having more members is more profitable for IBs, because the banks have the ability to choose members with various expertise, education levels, experience, and different networks (Hamza, 2016). In addition, a larger SSB allows a bank to be more efficient in meeting the ever-evolving need for consumer products (Farag et al., 2018). The demand from customers for banking services constantly changes. These changes in consumer needs have become the basis for banks to innovate through the issuance of new products. In the CG structure, new products must be approved by the SSB before being introduced to customers. In the process of granting this approval, the SSB conducts a product review, a larger SSB (ie. more members) increases the effectiveness of the review process because its members can share the tasks. Thus, there is a positive influence between the number of people on the SSB and bank performance (Farag et al., 2018; Nomran et al., 2018; Mutairi and Quttainah, 2017).

H1. : The number of members on an SSB has a positive effect on shariah compliance.

Table 1
Research sample.

Panel A: Based on Country				Panel B: Based on Year		
Country	∑ Banks	∑ bank-year observations	%	Year	∑ bank-year observations	%
Bahrain	16	144	16.53	2010	40	4.59
Bangladesh	3	23	2.64	2011	57	6.54
Brunei Darussalam	1	7	0.80	2012	70	8.04
Egypt	1	8	0.92	2013	86	9.87
Indonesia	14	120	13.78	2014	96	11.02
Iraq	2	13	1.49	2015	100	11.48
Islamic Republic of Iran	1	7	0.80	2016	103	11.83
Jordan	1	5	0.57	2017	106	12.17
Kuwait	7	67	7.69	2018	107	12.28
Malaysia	19	181	20.78	2019	106	12.17
Nigeria	1	6	0.69			
Oman	2	11	1.26			
Pakistan	8	70	8.04			
Palestinian Territories	1	10	1.15			
Philippines	1	5	0.57			
Qatar	3	28	3.21			
Saudi Arabia	4	32	3.67			
Seychelles	1	9	1.03			
Singapore	1	7	0.80			
South Africa	1	10	1.15			
Sri Lanka	1	6	0.69			
Sudan	2	18	2.07			
Thailand	1	9	1.03			
Tunisia	1	8	0.92			
Turkey	3	23	2.64			
United Kingdom	5	36	4.13			
United Republic of Tanzania	1	8	0.92			
Total	102	871	100		871	100

The education level of a board’s members is a factor used by scholars when evaluating the board’s effectiveness in monitoring managers and limiting their opportunistic behavior. An SSB, as a consultant and supervisor of bank operations, requires certain qualifications to support it in carrying out its duties. A person’s level of education is the main proxy for measuring human capital, the knowledge base, or intellectual competence (Hambrick and Mason, 1984). Education is also a unique measure of the level of professionalism of the board (Grace et al., 1995). Boards with members who had a higher level of education can help create wealth and provide complex information. The level of education also shapes the way the board’s members think and their views when making decisions (Gago and Garcia, 2018). The process of evaluating the suitability of a product to comply with shariah principles requires adequate intellectual competence, so that the SSB’s decision becomes more precise.

H2. : The education levels of the members of an SSB have a positive effect on shariah compliance.

The limited number of people qualified to be SSB members allows the members to sit on the SSBs of many banks. A board member who sits as a member on other entities is called a busy member (Trinh et al., 2021, 2020). In the approach of the resources dependence theory (RDT), an SSB’s duties enhance the ability, experience, and expertise of its bank. These duties mean SSB members become involved in making business decisions for other entities and discussions with the boards of the other entities. In addition, their duties cause the SSB members to observe the operations of other entities, and they may allow them to be practiced by the banks. Hence, the duties of the SSB increase the performance of the banks (Trinh et al., 2020; Elyasiani and Zhang, 2015).

H3. : The cross-membership of the SSB members have a positive effect on shariah compliance.

To ensure the conformity of bank operations with shariah principles, each SSB conducts monthly ex-ante and ex-post audits of all Islamic banking transactions (Mutairi and Quttainah, 2017). Ex-ante audits are

carried out by evaluating each bank’s products before they are introduced to customers. This evaluation concerns the suitability of the product, in terms of it meeting shariah requirements. However, the evaluation also looks at the economic aspects of the product. Bank products must comply with shariah requirements, meet customers’ needs, and have high economic value to increase the bank’s performance, in accordance with shariah requirements. The expertise of the SSB members in the fields of economics/finance/accounting could increase the SSB’s effectiveness in carrying out its task. An SSB functions as a supervisor and consultant for other boards’ needs for expertise in the business, economics, and finance fields, as well as *fiqhmuamalat* (Anisykurtilillah et al., 2020). Nomran and Haron (Nomran and Haron, 2019), and Grassa and Chakroun (Grassa and Chakroun, 2016) have proven that the expertise of SSB members in finance/banking/accounting increases the effectiveness of that SSB.

H4. : The expertise of SSB members in the finance/banking/accounting fields has a positive effect on shariah compliance.

Cardillo (Cardillo et al., 2021), Đặng et al (Đặng et al., 2020), and Adams and Ferreira (Adams and Ferreira, 2009) use gender as an indicator of board effectiveness, where the presence of women in the boardroom improves the quality of the supervision. In the psychological-economic theory’s approach, women who sit on boards are more effective in substantially monitoring the performance of directors than men’s are (Jabari and Muhamad, 2020). So, the women members of an SSB improve the financial performance of the bank (Cardillo et al., 2021).

An SSB is an independent board which specifically exists in IBs (Khalil and Taktak, 2020), and plays an important role as an internal control mechanism with the task of supervising the activities of the banks (Ajili and Bouri, 2018). Women are considered more conscientious in supervising and auditing bank policies. An SSB acts as an auditor to ensure the conformity of its bank’s operations with shariah principles (Mutairi and Quttainah, 2017). Thus, female SSB members are more effective at supervising and auditing bank policies that are not in accordance with shariah requirements.

Table 2
Measurement variables.

Variable Name	Definition	Measurement	Data source
Dependent Variables			
RRF	Return Rate Flexibility	$RRF_{i,t} = \Delta RDR_{i,t} - \Delta IR_{i,t} / \Delta RDR$ is the change of the RDR in an IB. ΔIR is the change of interest rate in an C.B.A higher RFR indicates that the deposit product of the IB is interest-free	Hand collected from the IBs' annual reports
Independent Variables			
SSBSIZE	SSB size	The total number of members of the SSB	Hand collected from the IBs' annual reports
EDUSSB	Education level of the SSB members	The average score of the education levels of the SSB members. The education level is calculated using five categories: 1 = Technical secondary school and below, 2 = Associate degree, 3 = Bachelor, 4 = Master's and 5 = PhD	Hand collected from the IBs' annual reports
BUSYSSB	Cross-membership of the SSB members	The average score of cross-membership of SSB.	Hand collected from the IBs' annual reports
EXPSSB	SSB expertise	The percentage of SSB members with an economics/business/ accounting education background. It takes a value of 1 when the SSB members have an education background in economics/business/ accounting, zero if otherwise.	Hand collected from the IBs' annual reports
GENSSB	SSB gender	The percentage of women members of the SSB.	Hand collected from the IBs' annual reports
Control Variables			
BODSIZE	BOD size	The total number of members on the BOD	Hand collected from the IBs' annual reports
AUDSIZE	Audit committee size	The total number of members on the audit committee.	Hand collected from the IBs' annual reports
DIV-INCOME	Income diversity	Ratio of non-financing income to total operating income	Bank scope data based – self-processed
IAH	Investment account holder ratio	Ratio of deposit or investment account holders to assets	Bank scope data based – self-processed
SIZE	Total asset bank	Logarithm of natural total asset	Bank scope data based – self-processed
GDP	GDP growth	The percentage annual growth rate of per capita GDP	World bank
Muslim	Muslim population	Percentage of population who are Muslim	Pew Research Center and World Population Review

Estimation method:

$$RRF_{1,t} = \beta_0 + \beta_1 SSBSIZE_{1,t} + \beta_2 EDUSSB_{1,t} + \beta_3 BUSYSSB_{1,t} + \beta_4 EXPSSB_{1,t} + \beta_5 GENSSB_{1,t} + CONTROL_{1,t} + \epsilon$$

Table 3
Descriptive statistics.

Variable	All Banks						Listed Banks		Unlisted Banks		Two-sample t test
	Mean	Std. Dev.	Min.	Max.	VIF	1/VIF	Mean	Std. Dev.	Mean	Std. Dev.	
RRF	0.29	0.64	0.00	8.23	-	-	0.242	0.478	0.326	0.740	-2.081 **
SSBSIZE	3.88	1.21	2.00	6.00	1.400	0.715	3.946	1.109	3.839	1.288	1.444
EDUSSB	3.64	1.52	1.00	5.00	1.830	0.548	3.763	1.184	3.542	1.726	2.431 **
BUSYSSB	3.79	2.04	1.00	9.57	1.360	0.734	4.327	2.269	3.384	1.751	7.288 [†]
EXPSSB	26.25	13.81	0.00	100.00	1.490	0.670	38.819	165.865	16.808	42.818	2.738 ***
GENSSB	4.02	15.03	0.00	100.00	1.590	0.630	1.571	6.994	5.854	18.739	-5.120 [†]
BODSIZE	8.71	2.08	3.00	16.00	1.160	0.862	9.240	1.968	8.312	2.069	7.638 [†]
AUDSIZE	3.64	0.88	2.00	8.00	1.200	0.832	3.685	0.785	3.604	0.949	1.499
DIV-INCOM	21.91	115.52	-3579.14	408.33	1.280	0.782	24.920	25.034	19.645	151.518	0.727
LNSIZE	14.38	1.86	7.53	18.44	1.180	0.851	14.739	1.859	14.103	1.818	5.523 [†]
IAH	58.09	27.60	0.01	158.66	1.300	0.768	63.499	25.270	54.005	28.590	5.649 [†]
GDP	3.83	3.07	-17.00	19.59	1.070	0.938	3.611	3.558	3.992	2.640	-2.021 **
MUSLIM	71.07	25.74	1.06	99.80	1.310	0.765	80.739	15.054	63.752	29.469	12.084 [†]

[†], ***, **, * significantly different from zero at 0.1%, 1%, 5% and 10% levels

H5. : The gender of the members of an SSB has a positive effect on shariah compliance.

2.3. Method

This study used 102 IBs in 27 countries. The banks were observed for a period of 10 years (2010–2019). Financial and SSBs' demographic data were hand collected from the IBs' annual reports, while data for GDP growth and interest rate is taken from the World Bank website. We detail the study's sample in Table 1. (Table 2).

This research focused on interest free IBs products. Our data sources presented the annual data and profit-sharing expenses issued by the IBs to the owners of IAH funds, regardless of the type of the IAH fund's

products (e.g deposit products, savings products). Based on these limitations, we measured the return deposit rate (RDR) for IAH funds with the following formula:

$$RDR = \frac{\text{Profit} - \text{sharing expenses for IAH fund}_{i,t}}{\text{Average of IAH fund}_{i,t}} \times 100$$

We identified changes in the RDR of the IAH funds compared to changes in the interest rate (hereafter the return rate flexibility-RRF), to use as indicators to evaluate interest free IAH products. A low RRF score indicated that the IAH product tended not to be interest free, due to the small difference between the changes in the interest rate (IR) and changes in the RDR. A low RRF score indicated that a change in the IR was followed by a change in the RDR, otherwise. we use absolute score

to avoid a negative score of RRF.

$$RRF = |\Delta RDR_{i,t} - \Delta IR_{i,t}|$$

3. Result

3.1. Descriptive Analysis

Table 3 presents the descriptive variables. The smallest RRF score was zero and indicated that there were samples that were not interest free (less shariah compliance) because there was no difference between the RDR and IR. The average RRF score of 0.29 indicated that the sample showed a small difference between the changes to the RDR and IR. These results indicated that the IAH of the product from the IBs was indicated to be no interest free or less shariah compliance. However, there were samples that had an RDR of 8.23 which showed the IBs that there was a difference between the changes to the RDR and IR of 8.23% (high shariah compliance).

The IBs had an average of 3.88 members on their SSBs. The largest number of SSB members was six people and the smallest number was two. The average education level of the SSBs' members was 3.64, the minimum score was one and the maximum score was five. These results indicated that most of the SSBs' members had a master's degree level of education (score four). However, there were SSB members who had a technical secondary school education level.

The CROSSSSB average score was 3.79. These results indicated that the SSBs' members sat on the SSBs of four banks. However, there were also IB members who sat on the SSBs of nine banks. These results indicated that some SSB members were very busy. Regulators in some countries require certain qualifications to become a member of an SSB. This requirement causes a shortfall in the number of people qualified to be SSB members. The lack of SSB members has caused several members to be SSB members in many IBs.

The number of SSB members who had expertise in finance/banking/accounting was low because the average EXPSSB score was 26.25%. There were IBs that had an EXPSSB score of zero. This indicated that the IB did not have any SSB members with expertise in finance/banking/accounting. The low EXPSSB score was because expertise in finance/banking/accounting is not the main requirement to becoming an SSB member. The IB regulators require that IB members must be experts in *muamalat fiqh* (Khan and Zahid, 2020). The presence of women as SSB members was also low, at 4.02%. The low number of women sitting on the SSBs was because the members of SSBs are usually Islamic religious experts (ulama), and most of these are men (Jabari and Muhamad, 2021).

3.2. Regression panel data analysis

Table 4 shows the correlation scores between the independent variables. This table is the result of a multicollinearity test. A correlation score of < 0.8 indicated there was no multicollinearity. The biggest correlation between the independent variables was - 0.507 (correlation between EDUSSB and GENSSB). These results indicated that there was no multicollinearity in the model. The variance inflation factor (VIF) score also confirmed our results. Table 5 shows that the model had an average VIF score of 1.350. The VIF score of all the variables (Table 3) was less than 10, indicating that there was no multicollinearity problem.

The Breusch and Pagan Lagrangian multiplier test resulted in a p-value of 0.000 and indicated that there was heterogeneity of the data between the samples. This test recommends using random-effects GLS regression. The Woolridge test for autocorrelation in the data panel yielded an f-score of 1.153 and a probability of 0.286. The results of this test showed that there was no autocorrelation in the model. The modified Wald test produced a chi2 score of 7640.65 and a probability of 0.000. The results of this test indicated that there was

Table 4
Matrix correlation.

	RRF	SSBSIZE	EDUSSB	BUSYSSB	EXPSSB	GENSSB	BODSIZE	AUDSIZE	DIV-INCOME	LNSIZE	IAH	GDP	MUSLIM
RRF	1												
SSBSIZE	-0.171	1											
EDUSSB	-0.042	0.085	1										
BUSYSSB	0.113	-0.212	-0.201	1									
EXPSSB	0.069	0.225	-0.350	-0.193	1								
GENSSB	0.061	0.011	-0.507	0.041	0.374	1							
BODSIZE	0.026	0.152	0.025	-0.154	-0.065	-0.146	1						
AUDSIZE	-0.122	0.280	0.104	-0.128	-0.005	-0.243	0.111	1					
DIV-INCOME	0.003	0.081	0.337	0.113	-0.116	-0.157	0.018	0.075	1				
LNSIZE	-0.236	0.236	-0.037	0.123	0.025	0.024	0.001	0.120	0.065	1			
IAH	-0.016	0.020	-0.153	0.169	0.194	0.055	-0.138	-0.010	-0.101	0.263	1		
GDP	-0.040	0.023	-0.044	0.028	-0.105	-0.064	-0.103	0.016	0.029	0.060	0.072	1	
MUSLIM	0.099	-0.274	-0.221	0.203	-0.012	0.167	-0.028	-0.198	0.094	0.046	0.232	-0.060	1

Table 5
Regression model findings.

RRF	Pooled Regression Method (Model 1)			GLS Regression Method (Model 2)		
	Coef.	Robust Std. Err.	Prob.	Coef.	Robust Std. Err.	Prob.
SSBSIZE	-0.144**	0.061		-0.161*	0.083	0.054
EDUSSB	0.068	0.056	0.018	0.043	0.067	0.520
BUSYSSB	0.107***	0.036	0.226	0.111***	0.040	0.005
EXPSSB	0.096***	0.032	0.003	0.097**	0.045	0.032
GENSSB	0.003	0.004	0.003	0.003	0.005	0.573
BODSIZE	0.030	0.032	0.527	0.037	0.031	0.233
AUDSIZE	-0.067	0.066	0.352	-0.064	0.063	0.314
DIV-INCOME	0.011	0.055	0.316	0.036	0.065	0.584
LNSIZE	-0.227†	0.044	0.843	-0.226†	0.064	0.000
IAH	0.000	0.003	0.000	0.000	0.003	0.891
GDP	-0.001	0.022	0.962	0.007	0.022	0.752
MUSLIM	0.004	0.003	0.981	0.003	0.004	0.467
_cons	0.383	0.800	0.209	0.378	1.002	0.706
Breusch & Pagan LM (Prob.)	0.000		0.632			
Mean VIF	1.350					
Wooldridge (Prob.)	1.153					
Modified Wald test (Prob.)	0.000					
Hausman	0.661					
R-sq	0.107			0.106		

†, **, *, **, * significantly different from zero at 0.1%, 1%, 5% and 10% levels

heteroscedasticity in the model. Following Chamberlain et al (Chamberlain et al., 2020). and Almutairi and Quttainah (Mutairi and Quttainah, 2017), we used pooled ordinary least squares (OLS) and GLS regressions with robust standard errors to overcome the problem of heteroscedasticity in the model (Hoechle, 2007). Table 5 shows the results of the OLS and GLS regression methods with robust standard errors.

4. Discussion

Table 5 shows that *SSBSIZE* had a coefficient of -0.144 (model 1) and -0.161 (model 2) with a probability of 0.018 (model 1) and 0.054 (model 2). A probability score of < 0.10 would reject the null hypothesis and indicate that *SSBSIZE* had a negative effect on the shariah compliance. The results of this test indicated that the number of SSB members encouraged banks to provide RDR equal to the interest rate. From the perspective of the agency theory, having more SSB members increases the effectiveness of the SSB. Having more SSB members also means the IBs have members with different backgrounds, experiences, and expertise (Hamza, 2016). However, having too many members causes ineffective coordination and communication between the members and allows free riders to exist (Abou-el-sood, 2019; Ben Zeineb and Mensi, 2018). This does not positively or negatively affect the performance of the board (Mukhibad et al., 2022a).

Our study shows that having a large number of SSB members causes the IB not to have interest free products, because the bank provides RDR according to the interest rate. SSBs are responsible for ensuring that all transactions and bank products comply with shariah principles. The assessment of whether a transaction or product complies depends on the collective interpretation of each of the SSB's members (Alabbad et al., 2019). The interpretation of an IB's policy to provide RDR according to the IR may differ between SSB members. Having more members can make it more difficult for the SSB to reach an agreement on a legal issue in the IB's policy (Alabbad et al., 2019). In addition, disagreements between SSB members mean it can take a long time and be costly to reach agreement among the members. This condition causes an SSB with many members to be less effective in carrying out its supervisory duties (Mukhibad et al., 2022a). This result is support of Muhammad et al (Muhammad et al., 2021), which show that the SSB size negatively influences shariah compliance of IBs.

The regression test resulted in *EDUSSB* coefficient scores of 0.068 (model 1) and 0.043 (model 2). Both models produced a probability score of more than 0.10, which indicated that the education levels of the SSB members had no effect on the shariah compliance. SSBs have supervisory and consultancy functions for other boards, which requires knowledge, and intellectual competence. The level of a person's education is an indicator of his/her intellectual competence (Hambrick and Mason, 1984), as well as the level of professionalism of the board (Grace et al., 1995). However, not all intellectual competencies can support the effectiveness of an SSB in carrying out its duties. A higher education for SSB members in fields other than *fiqh muamalat* causes an SSB to reduce its ability to evaluate the suitability of bank policies/products against shariah principles. Thus, the academic abilities and competencies of an SSB's members are not easily applied to the supervision of bank operations (Jabari and Muhamad, 2021). SSB members who have a higher educational level and an educational background in Islamic law/shariah increase the effectiveness of the SSB and ensure that the bank has halal product innovations that can meet consumers' needs. We is reinforced by the findings of Jabari and Muhamad (Jabari and Muhamad, 2021) and Mukhibad and Setiawan (Mukhibad et al., 2022a) that the educational level of SSB members does not influence SSB outcomes.

Table 5 shows that *BUSYSSB* had coefficients of 0.107 (model 1) and 0.111 (model 2). The test of both models resulted in p-values of 0.003 (model 1) and 0.005 (model 2). The results of this test indicated that SSB members who were employed on more than one board had a

positive effect on the shariah compliance. Those who sit as SSB members for many IBs are busy members (Alabbad et al., 2019). In the RDT approach, a busy board member is a superior resource because he/she causes the SSBs to frequently be involved in decision making for the various entities. The member's involvement in many entities enhances the SSBs' capabilities as supervisors and consultants for the managers and other boards in Islamic banking business decision-making. Busy SSB members also cause other SSB members to be involved in the operations of various banks, they can observe these banks' operations and eventually gain new knowledge and understanding. Hence busy SSB members reduce the agency costs between directors and customers by increasing bank operational guarantees, in accordance with shariah principles. This result is in support of Mukhibad and Setiawan (Mukhibad and Setiawan, 2022) who found that SSB busyness has been effectively used as access to resources that can increase the ability of SSB to control liquidity, strategic, and shariah compliance risk.

The regression test of model 1 in Table 5 showed that *EXPSSB* had a coefficient of 0.096 and a p-value of 0.003. Model 2 produced a coefficient of 0.097 and a p-value of 0.032. The test of both models produced positive coefficient values and p-values of < 0.5 , which indicated that the SSB members' expertise in economics/business/accounting had a positive effect on the shariah compliance, at the 5% level. Each SSB must ensure that its bank's products comply with shariah requirements. One indicator of a product's conformity to shariah principles is that the bank provides RDR, which is not related to interest. SSBs conduct audits (ex-ante and ex-post) on a monthly basis on all IB transactions (Mutairi and Quttainah, 2017). The expertise of the SSB members in finance/banking/accounting enables them to evaluate products and identify transactions or policies that are not interest-free. In practice, IBs make contract modifications, especially to contracts that use the profit and loss sharing (PLS) system (Hidayah et al., 2019). To be able to evaluate these products' modifications, the SSB members need to have academic competence in finance/banking/accounting, so that the expertise of the members reduces the directors' opportunities to adopt policies that ignore shariah principles. Similarly, Muhammad et al. and Mnif et al. assert that expertise of SSB members in finance/economic positively influences shariah compliance of IBs (Muhammad et al., 2021) and AAOIFI's disclosure requirements (Mnif and Tahari, 2021).

GENSSB produced a coefficient of 0.003 and a p-value of 0.527 (model 1). Testing model 2 produced a coefficient of 0.003 and a p-value of 0.573. The test results of both models produced p-values of more than 0.10, indicating that the percentage of women SSB members had no effect on the shariah compliance. SSBs guarantee that banking operations are in accordance with shariah requirements. An SSB can act as an auditor to carry out its duties (Mutairi and Quttainah, 2017). Female auditors are more conscientious when auditing than male ones are (Cardillo et al., 2021; Dăng et al., 2020; Adams and Ferreira, 2009), but we did not find that female SSB were able to increase shariah compliance. The female SSB was not able to avoid the director's opportunistic policy of providing RDR in accordance with the interest rate. Moreover, this study showed that gender differences between the SSB members did not cause differences in identify interest free return for IAH product. Studies into the gender diversity of SSBs also provide evidence that there is no difference in the performance of SSBs with male and female members (Jabari and Muhamad, 2020, 2021), especially in ensuring the compliance of bank operations with shariah. This result is in support of Jabari and Muhamad (Jabari and Muhamad, 2021) and Mukhibad et al (Mukhibad et al., 2022b). who not found that the interaction effect of gender SSBs and SSB outcomes.

4.1. Sub-sample regression test

Previous studies into corporate governance have reported differences between IBs that are listed and unlisted (Jabari and Muhamad, 2021; Hamid et al., 2020). The difference in the effectiveness of the CG

Table 6
Regression of listed and unlisted IBs.

RRF	Listed			Unlisted		
	Coef.	Robust Std. Err.	Prob.	Coef.	Robust Std. Err.	Prob.
SSBSIZE	-0.221 *	0.117	0.058	-0.142	0.114	0.214
EDUSSB	-0.096	0.100	0.337	0.136 *	0.077	0.077
BUSYSSB	0.131 **	0.059	0.026	0.166 **	0.069	0.016
EXPSSB	0.081	0.074	0.272	0.145 **	0.057	0.011
GENSSB	0.010	0.008	0.193	0.003	0.005	0.557
BODSIZE	-0.066	0.050	0.184	0.059	0.040	0.141
AUDSIZE	-0.138	0.114	0.224	-0.016	0.084	0.848
DIV-INCOME	0.061	0.081	0.451	0.020	0.087	0.815
LNSIZE	0.011	0.097	0.906	-0.367 [†]	0.082	0.000
IAH	-0.003	0.004	0.545	0.002	0.003	0.469
GDP	0.036	0.035	0.303	-0.018	0.028	0.518
MUSLIM	0.009	0.006	0.177	0.006	0.005	0.219
_cons	-1.597	1.409	0.257	1.230	1.341	0.359
Breusch & Pagan LM (Prob.)	0.023			0.000		
Mean VIF	1.43			1.560		
Wooldridge (Prob.)	0.985			0.712		
Modified Wald test (Prob.)	0.000			0.000		
Hausman	0.929			0.625		
R-sq	0.105			0.155		
N	249			372		

[†], ***, **, * significantly different from zero at 0.1%, 1%, 5% and 10% levels

on listed and unlisted banks is because the two types have different characteristics, including in their information disclosures (Loderer and Waelchli, 2010), differences in the effectiveness of their BOD (Long et al., 2005) and their SSB (Jabari and Muhamad, 2021). The differences in the characteristics of listed and unlisted IBs are shown in the descriptive statistics for all the variables in Table 3.

The GLS regression of listed and unlisted IBs (Table 6) showed that the number of members an SSB had caused a negative effect on the shariah compliance for listed banks. Listed IBs experience a lot of pressure from their shareholders, investors, and IAH fund owners to match the competitive performance their CB counterparts enjoy. This pressure encourages IBs managers to adopt a policy of providing an RDR which is equal to the interest rate. These results indicate that an SSB with many members leads to ineffective coordination and communication between its members, causing a decrease in the SSB's outcomes (Mukhibad et al., 2022a; Aslam and Haron, 2021).

However, for unlisted IBs, we found that the SSB members' education level, how many other SSBs they sat on, and their expertise in economics/business/accounting had a positive effect on the shariah compliance. Unlisted IBs had fewer total assets than listed banks (Table 3). Less total assets cause managers to make policies that can increase customer loyalty and attract prospective customers by providing RDR that is not related to the interest rate. This commitment to maintaining banking compliance with shariah principles causes SSBs to carry out their duties more effectively. Members of SSBs at unlisted IBs who have higher education levels, are busy on more than one board and have expertise in the fields of economics/business/accounting could increase the banks' shariah compliance.

4.2. Sensitivity analysis and endogeneity

The effect of the RRF and SSB can be influenced by endogeneity issues. The endogeneity bias arises because of unobserved factors, omitted variables, simultaneity between the dependent variable and independent variable, and measurement error of the variable (Roberts and Whited, 2013). In this subsection, we discuss possible endogeneity issues using the dynamic panel GMM estimator. Endogeneity bias must be resolved as endogeneity causes inconsistent estimates (eg. study results based on the number of samples), which potentially leads to wrong inferences, misleading conclusions, and incorrect theoretical interpretations (Ullah et al., 2018).

Following (Safiullah, 2021), we first used differenced variables as instruments in the dynamic panel GMM approach and accommodated the possible dynamic endogeneity, unobserved factors heterogeneity and the simultaneity between the RRF and SSB variables. Table 7 presents the results of the GMM system test. We report the result of the AR (1) first-order, AR (2) second-order serial correlation tests, Sargan test of overidentifying restrictions and Hausman specification tests (Arellano and Bond, 1991). We found that the p-value was statistically significant and as such we received null hypotheses. The AR (2) second-order serial correlation test result's p-value was statistically insignificant (0.791) and rejects the null hypotheses. This result showed that no serial correlation at second order (AR 2) existed. The Sargan test result's p-value of 0.878 was also statistically insignificant and rejects the null hypotheses, so our instruments were valid. As shown in Table 7, how busy the members of the SSB were and their expertise in the fields of finance/banking/accounting once again reduced the number of banks providing RDR not based on IR (high shariah compliance). The results of the GMM test on the Table 7 determined the results of the regression test in Table 5.

Table 7
Endogeneity problems-system generalized method of moments (GMM).

	Coef.	Std. Err.	Prob.
L1. RRF	-0.077	0.047	0.102
SSBSIZE	-0.202 **	0.237	0.039
EDUSSB	0.085	0.185	0.647
BUSYSSB	0.467 **	0.221	0.035
EXPSSB	0.238 *	0.134	0.076
GENSSB	0.000	0.019	0.997
BODSIZE	0.004	0.074	0.956
AUDSIZE	-0.155	0.120	0.198
DIV-INCOME	0.062	0.124	0.614
LNSIZE	-0.609 **	0.297	0.040
IAH	-0.004	0.012	0.762
GDP	-0.036	0.045	0.429
MUSLIM	0.001	0.021	0.955
_cons	4.071	4.840	0.400
Sargan test (Prob.)	0.878		
AR (1) (Prob.)	0.000 [†]		
AR (2) (Prob.)	0.791		

[†], ***, **, * significantly different from zero at 0.1%, 1%, 5% and 10% levels

5. Conclusion

Providing bank products that avoid interest is the main guarantee provided by IBs and this is the responsibility of each bank's SSB. This study proves the role played by the attributes of the members of the SSBs in guaranteeing interest-free deposit products. We use five attributes of an SSB (the number of members, their education levels, how many other boards they are members of their expertise in finance/banking/accounting, and their gender) and use the RRF as a proxy for interest free returns for IAH and shariah compliance. A lower RRF indicates that an IB is not interest free and less shariah compliance. The results of the regression test found that how busy the SSB's members are, and their expertise in finance/banking/accounting increases shariah compliance, while the number of members of an SSB decreases it. The members' education levels and gender have no effect on the shariah compliance. Testing the GMM system to overcome the endogeneity issue confirms the results of this study.

The results of the subsample test show that the role of an SSB in controlling its bank's management to provide RDR that is free of interest is different between listed and unlisted IBs. The SSBs of unlisted IBs are more effective in ensuring their banks' compliance with shariah principles by providing interest-free profit-sharing investments. However, in listed IBs, there is greater pressure to have a competitive performance like CBs; this causes their SSBs to be less effective in maintaining shariah compliance.

This study suggests some theoretical implications. First, this study contributes to the growing literature on the Islamic banking sector, by explaining the factors that influence the IAH products IBs offer. In addition, this study provides a better understanding for banks' shareholders, regulators, IB customers and stakeholders about the effects of the governance structure and IB variables (SSB attributes) have on the shariah compliance. The stakeholders of IBs should take advantage of the positive relationship between the SSB and RRF and pay attention to managing IAH funds, as they have an adverse impact on RRF with Islamic law. They should also consider the attributes of the SSBs' members in supporting the SSBs to carry out their supervisory and advisory functions for the boards and managers, to check their management of the banks' assets, and to ensure guarantee shariah compliance for the IBs' products. Therefore, it is advisable for IBs to adopt good governance practices to promote shariah compliance, particularly regarding interest-free banking products.

The study also suggests some important practical implications for regulators. The SSBs have to be increased monitoring power to increase shariah compliance of IB by providing RDR based on bank income and avoid based on interest rate. Furthermore, there is a need to increase the number of SSB with economics, business, and accounting education background. We find that cross-memberships of SSB members are associated with high shariah compliance. Hence, our evidence supports the view that there could be negative SSB outcomes from restrict the number of cross-memberships because imposing these restrictions potentially cause the appointment of less experienced scholars to SSB members.

This study has some limitations. First, we limit our study to IAH products. In addition, we do not specify the types of IAH products, such as savings and deposits, owing to the lack of, or difficulty in, collecting the data. The data sources that we use do not differentiate the cost-sharing for each IAH product (such as savings, deposits). Second, we have our focus on interest and exclude some indicators of shariah compliance such as *gharar*, *maysir* and others. Future researchers may conduct studies into the role of governance variables on Islamic compliance by incorporating other indicators of Islamic compliance in other products, such as financing products, working capital and consumer loans products, and IB investment products. In addition, research can be undertaken to examine the diversity of the attributes of the members of the SSBs and how they affect the banking products' shariah compliance.

CRedit authorship contribution statement

Conceptualization, HM.; Methodology, HM, AN; Software and Validation, HM.; Formal Analysis, HM, IA.; Investigation, IA.; Resources, HM, AN.; Data Curation, AN.; Writing – Original Draft Preparation, HM, IA.; Writing – Review & Editing, HM, IA.; Visualization, AN.; Supervision, HM.; Project Administration, HM.; Funding Acquisition, AN.

Conflicts of Interest

No potential conflict of interest was reported by the author(s).

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