Journal of
Risk and Financial Management

MDPI

Article

Effects of Ownership Structure on Intellectual Capital: Evidence from Publicly Listed Banks in Bangladesh

Syed Zabid Hossain [1] and Md. Sohel Rana [2,*]

[1] Department of Accounting and Information Systems, University of Rajshahi, Rajshahi 6205, Bangladesh; syed6205@gmail.com
[2] Department of Accounting, Nawab Siraj-Ud-Dowla Govt. College, Natore 6400, Bangladesh
* Correspondence: s2013183506@ru.ac.bd

Abstract: This study explored the impacts of ownership structure (OS) on intellectual capital (IC) and its components. Data were gathered from 31 Dhaka Stock Exchange-listed banks for five years, from 2017 to 2021, consisting of 155 observations as balanced panel data. The study used the modified value-added intellectual coefficient (MVAIC) model to track the IC efficiency. The robust fixed effects model was employed for regression analysis to test the hypotheses. The research found that sponsor director ownership is negatively associated with the MVAIC, human capital efficiency (HCE), and structural capital efficiency (SCE) but positively with relational capital efficiency (RCE). High institutional and public ownership are positively linked with SCE but negatively with RCE. Foreign ownership is only positively associated with banks' MVAIC and HCE. The regression results showed that high institutional ownership (IO) significantly enhanced the MVAIC and HCE. Foreign and public ownership positively influenced banks' MVAIC, HCE, and capital employed efficiency (CEE) but negatively impacted RCE. The findings of this study will help banks' policymakers with ownership mixes for the optimum utilization of banks' resources. Management may assess IC's efficiency level for proper supervision and use of knowledge resources to boost bank profitability. Also, the findings will help investors make prudent investment decisions. This is the first study to focus on OS and IC with diverse elements in Southeast Asia, especially Bangladesh, an emerging market.

Keywords: intellectual capital; ownership structure; sponsor director ownership; institutional ownership; banking companies; Bangladesh

Citation: Hossain, Syed Zabid, and Md. Sohel Rana. 2024. Effects of Ownership Structure on Intellectual Capital: Evidence from Publicly Listed Banks in Bangladesh. *Journal of Risk and Financial Management* 17: 222. https://doi.org/10.3390/jrfm17060222

Academic Editor: Junyi Chai

Received: 18 April 2024
Revised: 20 May 2024
Accepted: 21 May 2024
Published: 24 May 2024

1. Introduction

Ownership structure plays a vital role in the smooth running of the banking sector, which seeks to achieve its goals through the appropriate use of knowledge-based capital (Ika and Widagdo 2021). The knowledge-based infrastructure is critical for businesses to ensure survival at present and in the upcoming competitive world with the best use of traditional tangible resources (Oppong and Pattanayak 2019; Shchepkina et al. 2022). According to the resource-based view, firms' value creation largely depends on the desired use of visible and invisible resources (Wernerfelt 1984). IC can bring value to firms by fostering knowledge creation, sharing and increasing capital, and labor market efficiency (Al-Omoush et al. 2022; Guthrie et al. 2001; Maniruzzaman and Hossain 2019; Rabiul Islam and Hossain 2018). To maximize the wealth of shareholders, managers must understand the value of knowledge and information (Appuhami and Bhuyan 2015). Banks are service-oriented enterprises and vital catalysts of an economy that collect deposits from servers, provide credit to people and firms and also to diversified operations, such as supplying information to clients on trade and economy, advising them on recent economic matters, and boosting global business by opening letters of credit and negotiating bills of exchange. Like other companies, bank leadership is separate from its ownership. However, such owners are expressed in governance and managerial activities to utilize all the organization's resources.

A robust banking system is the driving power of a country's economy, especially in an emerging market like Bangladesh (Nabi et al. 2020; Rabiul Islam 2017). However, among many other causes, banks in Bangladesh presently suffer from diverse crises, such as management problems, poor supervision, poor loan recovery, growing defaults, mounting classified advances, and ownership complexities (Mujeri and Mujeri 2020). In Bangladesh, corporations that do business with the country's banks and non-banking financial institutions (NBFIs) are again the owners of these financial institutions. It induces problems in many cases. For instance, Islami Bank Bangladesh Limited, the largest private sector bank in the country, fell into a severe monetary crisis just 15 months after the change of ownership in January 2017 due to mismanagement and mutual conflicts (The Daily Prothom Alo 2018). Such complications boost non-performing loans (NPL) in banks. Increasing NPL is likely to decrease the operating performance of banks. The NPL rate against total disbursed loans was 8.9 percent in 2013, and stood at 10.3 percent in 2018 and 9 percent in 2022 (Bangladesh Bank 2023).

Additionally, increasing NPL is likely to harm a bank's operating performance. The return on assets (ROA) of Bangladeshi banks has also declined chronologically. In 2015, the ROA of banks was 3.27 percent, and it continuously decreased over the period. It came down to 2.57 percent only in 2022 (Bangladesh Bank 2023). The rate of decline in ROE is also remarkable. While the return on equity (ROE) grew by 10.73 percent in 2013, it declined to 9.37 percent in 2022 (Bangladesh Bank 2023). This report also showed that the net interest margin (NIM) rate gradually decreased from 3.56 percent in 2014 to 2.4 percent in 2022 (Bangladesh Bank 2023). To solve these problems, it is necessary to develop skilled personnel, properly utilize knowledge resources, improve efficient institutional structures, and increase the relationship with all parties related to the organization. To do so, the owner should actively select proper management bodies to run their business efficiently. The role of owners should impact a firm's visible and invisible resource utilization.

Limited studies have been conducted in this respect. Bohdanowicz and Urbanek (2012) studied the impact of ownership patterns on IC of publicly traded companies in Poland and documented that sponsor and institutional ownership has a substantial positive effect on VAIC, HCE, and SCE on VAIC, HCE, and SCE. In contrast, foreign ownership has substantial adverse effects on VAIC, HCE, and SCE. Zanjirdar (2011) studied the association between OS and ICE, adopting the VAIC model to gauge IC efficiency. He found that institutional and managerial ownership has a negative but significant impact on VAIC, and public ownership could not play an important role. Al-Sartawi (2018) found that managerial and general public ownership significantly and adversely impacted IC efficiency. Abor and Biekpe (2007) and Demsetz and Lehn (1985) revealed a positive association between firm performances and managerial ownership. These studies demonstrated mixed outcomes. So, further investigation is necessary to explore the actual situation in the Bangladeshi context. Now, the following questions arise: Is ownership structure associated with a bank's IC performance and tangible resources? If so, does it influence a bank's IC performance?

To answer these questions, the study explores the association between OS and banks' tangible and invisible resources and how much it affects them.

This study is unique in respect of several perspectives. It is the first study in Bangladesh to address the impact of ownership structure on intellectual capital, especially in the banking sector. The modified value-added intellectual coefficient (MVAIC) model measures IC efficiency rather than the VAIC model for finding the effect of relational capital efficiency.

There are six parts to this article. The Section 1 contains the introduction, Section 2 forms the literature review, Section 3 deals with the study methodology, Section 4 depicts the results and arguments, Section 5 presents the study's concluding remarks.

2. Literature Review

In today's competitive world, knowledge capital is required to mobilize physical and financial capital, as these are vital aspects of production. Companies strive to reach

their goals by molding employees' knowledge, mastery, experience, work environment, technological excellence, and interpersonal relationships.

2.1. Conceptualizing Intellectual Capital and Its Components

IC is an intangible asset that combines knowledge and invisible efforts that enhance firm performance and long-term competitive edges for the entity. Edvinsson (1997) stated that IC is "the knowledge that can be converted into value". IC is a company's invisible resources comprising employees' skills and expertise, knowledge, relationships with various parties, organization values, truthfulness novelties, norms, and trust to uplift a company's performance (Faraji et al. 2022; Rana and Hossain 2023b; Yusoff et al. 2019). IC generally consists of three major components: human capital, relational capital, and structural capital (Farooq et al. 2022; Gogan et al. 2016; Shawtari et al. 2017). HC is the sum of an individual's or a group of individuals' skills, competencies, and talents. Some of these are "soft abilities", such as working well in a team or persuading customers (Stewart 1997). Tacit expertise in the organization is known as human capital (Sydler et al. 2014). OC is a phrase that represents the efficiency with which a firm or other institutions can use resources. This hidden resource contains the philosophy and systems of a firm to leverage its ability. After every employee has left the company, what's left is known as organizational capital (Edvinsson and Sullivan 1996). Intellectual property, including patents, copyrights, and trademarks; procedures; methods; models; software; administrative systems; and so forth, are all examples of structural capital (Rana and Hossain 2023a). The phrase "relational capital" describes an organization's proficiency in communicating and collaborating with those beyond its walls. A company's assets that contribute to its connections with its clients, vendors, and other external parties and collaborators go under relational capital (RC) (Adesina 2019).

2.2. Ownership Structure and Intellectual Capital

Literature about ownership structure prescribed that various ownership patterns exist in a company. There are managerial, institutional, foreign, government, and public ownerships (Al-Sartawi 2018; Bohdanowicz 2015; Mollah et al. 2012). Moreover, IC has several dimensions. Pedro et al. (2018) researched 777 eminent research articles and found that IC comprises several components. From these, 632 papers noted human capital, 584 used structural capital, 448 used relational capital, and 99 used capital employed. So, our study used the above-stated dimensions as prescribed by (Ulum et al. 2014). A key goal for performing good governance is to enhance the efficiency and efficacy of firms. Through the ownership structure, efficient governance may promote corporate accountability and boost the core value of a firm through improved IC performance. Agency theory established the link between OS and IC performance. Agency theory depicts that when the agency problem increases, then firm costs increase. Hence, the efficiency of the company decreases. Jensen and Meckling (1976) provided a theory about this, which is called agency theory. Prior studies explored the significant association between IC and OS (Al-Sartawi 2018; Celenza and Rossi 2013; Nassar et al. 2018).

2.2.1. Sponsor Director Ownership (SDO) and IC

Under corporate governance (CG) systems, sponsor directors tend to focus on their interests, ignoring the concentration of ownership (Soewarno and Ramadhan 2020). However, among corporate managers, some simultaneously own shares in the firm. These shareholders played dual roles as the owners and the managers at the same time. The reason behind the choice of these managers is to reduce the agency problem. It can enhance a firm's performance by appropriately utilizing organizational resources (Fernández-Rodríguez et al. 2019). In this regard, Noradiva et al. (2016) stated that if the participation of shareholders in management is high, the interests of both shareholders and managers are converged. Leveraging a business's resources is necessary to increase its performance. The resource-based theory implies that using both tangible and intangible resources is essential for the overall prosperity of an

organization. In this respect, Bohdanowicz and Urbanek (2012) found that SDO has an insignificant negative impact on all of the components of IC efficiency. However, VAIC and OC have significant positive influences on the IC components. Cheng et al. (2012) studied listed companies in Hong Kong and found that the medium range (22.19 percent–78.02 percent) of the incentive arrangement influences the performance of the firms. Based on prior literature, we propose the following hypothesis:

H_1. *Sponsor directors' ownership has a positive impact on IC and its components.*

2.2.2. Institutional Ownership and IC

Institutional investors usually own a large number of shares in the company for a relatively long term (Oak and Dalbor 2006). For this, shareholders have more influence over the company's decision-making than individual investors (Colpan and Yoshikawa 2012). Also, their active participation helps to reduce the agency problem (Admati et al. 1994; Shleifer and Vishny 1997). Again, when they withdraw their investment from the company's shares, the stock price starts to fall, negatively increasing its value (Hutchinson et al. 2015). Rashid (2020) found that higher institutional owners help increase firms' accounting performance (ROA) but decrease market performance. According to Al-Musalli (2012), institutional ownership significantly improves organizational IC performance. Bohdanowicz and Urbanek (2012) observed that institutional investors have a positive but insignificant role in firms' VAIC, HCE, and SEC. Abbassi et al. (2021) concluded that institutional ownership increases stock market liquidity. The above review showed that the relationship and impact between institutional ownership, intellectual capital, and organizational performance are multi-faceted and unclear. Nevertheless, most studies have shown that institutional ownership can increase the enterprise's profitability through IC elements. Thus, we propose the following hypothesis:

H_2. *Institutional ownership has a positive impact on IC and its components.*

2.2.3. Foreign Ownership and IC

The presence of foreign investment increases the competitiveness of firms (Goedhuys 2007). Productivity increases if foreign investors acquire a firm (Djankov and Hoekman 2000). Aydin et al. (2007) studied performance disparities between foreign and domestically owned listed companies in Turkey and revealed that foreign ownership facilitates the adoption of new technology, quick decision-making, and monitoring of expenses to foster company performance. A similar study (Kimura and Kiyota 2007) asserted that firm performance and productivity are increased in foreign-owned companies. But, Bohdanowicz and Urbanek (2012) exposed that foreign ownership reduced a company's VAIC, SCE, CEE, and HCE performance. Similar results were evident in the study by Tjendani et al. (2018) on 130 Indonesian companies. Mollah et al. (2012) and Orazalin et al. (2015) determined that foreign ownership can accelerate companies' accounting performance. Rouf and Hossain (2018) found that foreign ownership also helps increase a company's ROA. Rashid (2020) concluded that foreign ownership helps enhance companies' accounting and market performance. Based on the above argument, we propose the following hypothesis.

H_3. *Foreign ownership has a positive impact on IC and its components.*

2.2.4. Public Ownership and IC

Common shareholders are the real owners of a company. In this sense, if one holds a share, s/he also owns the company and has the right to vote in the annual general meeting (AGM) to elect the board of directors (BODs) to make policies, including management. In this case, shareholders have a role in the company's management. But their roles randomly impact the use and improvement of the firm's resources. Many empirical studies show mixed effects of such ownership on IC. Zanjirdar (2011) found that general public ownership (GPO) has a positive but insignificant impact on VAIC. However, Al-Sartawi (2018)

stated that GPO has a statistically extensive adverse effect on IC. Mollah et al. (2012) revealed that GPO significantly reduces a firm's ROA but enhances ROE. Also, market performance and market capitalization insignificantly increase. Hasan et al. (2021) found that public ownership positively influences firms' dividend policies. However, another study by (Moudud-Ul-Huq et al. 2020) concluded that GPO negatively impacts bank diversity but significantly increases firms' Z scores. Rouf and Hossain (2018) concluded that public ownership positively influenced bank accounting performance, such as ROA and ROE. Abbassi et al. (2021) used the fixed effect model and concluded that GPO positively but insignificantly impacts stock market liquidity positions. So, we propose the following hypothesis:

H_4. *Public ownership has a positive impact on IC and its components.*

Based on the literature regarding OS and IC components, the conceptual framework of research is given in Figure 1.

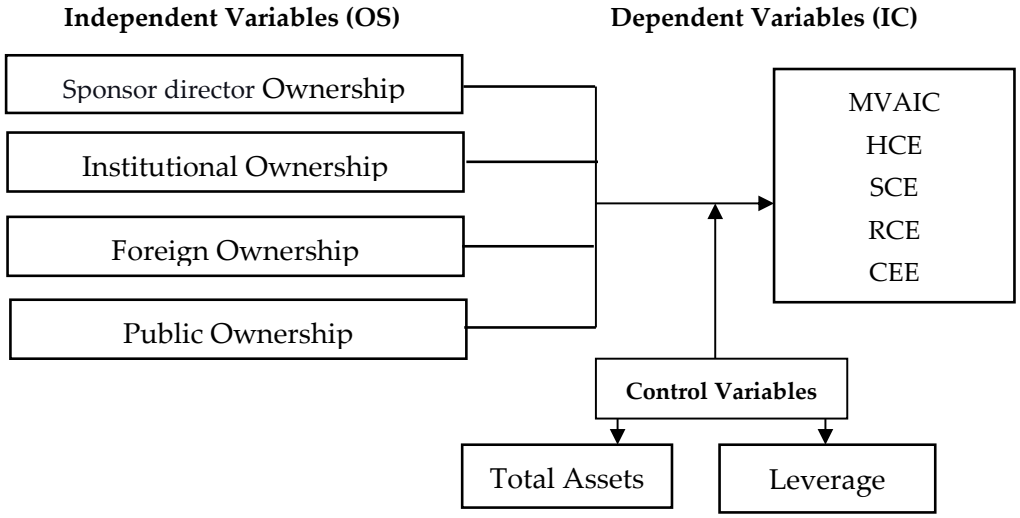

Figure 1. Conceptual framework developed by the researchers based on the literature.

3. Materials and Methods

3.1. Data Sources, Population, and Sample

This research sought to disclose the impact of ownership structure on IC. To achieve the research objectives, we used the quantitative research approach. We collected secondary data from the annual reports of the sampled banks. Based on Dhaka Stock Exchange (DSE) Ltd., Dhaka, Bangladesh, 34 listed commercial banks are in Bangladesh. Out of these 34 banks, we selected 31 as a sample based on the availability of sufficient data. We used data for a period of 5 years, ranging from 2017 to 2021. Thus, the total number of observations was 155.

3.2. Employed Variables

The study tests diverse types of hypotheses to accomplish its objectives. The study showed the interrelationship between dependent, independent, and control variables. The ownership structure includes the composition of sponsor directors, institutions, and foreign and general public ownership as independent variables. The MVAIC model is used to measure IC efficiency as the dependent variable. The study used total assets and leverage as control variables. Detailed variable descriptions are presented in Table 1.

Table 1. Variable Descriptions.

Variables Descriptions	Variable	Measurement
Modified Value Added Intellectual Coefficient	MVAIC	HCE + SCE + RCE + CEE
Human Capital Efficiency	HCE	VA/HC
Structural Capital Efficiency	SCE	OC/VA
Relational Capital Efficiency	RCE	RC/VA
Capital Employed Efficiency	CEE	VA/CE
Value Added	VA	Operating Profit + Employee Expenses + Depreciation + Amortization
Human Capital	HC	Expenses Related to Employee
Structural Capital	SC	VA-HC-RC
Relational Capital	RC	Selling, Distribution and Other External Expenses
Capital Employed	CE	Total Assets—Current Liabilities
Sponsor Director Ownership	SDO	Shares Held by SDO/Total Outstanding Share
Institutional Ownership	IO	Shares Held by IO/Total Outstanding Share
Foreign Ownership	FO	Shares Held by FO/Total Outstanding Share
Public Ownership	PO	Shares Held by PO/Total Outstanding Share

3.2.1. Dependent Variables

The original value-added intellectual coefficient (VAIC) model was developed by (Pulic 2000) and modified by (Ulum et al. 2014) as the modified-VAIC (MVAIC) model. We employed MVAIC and all of its components as dependent variables. Prior studies also used these variables as dependent variables (Al-Sartawi 2018; Bohdanowicz and Urbanek 2012).

Modified Value-Added Intellectual Coefficient (MVAIC)

MVAIC combines human, structural, customer, and employed capital efficiency. Here, MVAIC = HCE + SCE + RCE + CEE

Human Capital Efficiency (HCE)

HCE denotes the ratio of value-added and human capital. HC is the sum of the amount the firm spends for its employees as wages and salaries, training, remunerations, skill development activities, and other allowances. It measures the ability of expenses for employees to produce value-added for the firm. Mathematically, we can denote it as HCE = VA/HC.

Structural Capital Efficiency (SCE)

Structural capital combines two important capital types—innovation and process. The cost connected with intellectual property, research and development, database, process, technology, and management is an example of SC. So, we can express the efficiency of structural capital as SCE = SC/VA.

Relational Capital Efficiency (RCE)

Marketing expenses, such as all costs associated with external relational purposes and customers' costs, are used as a proxy of relational cost (RC). Advertising, selling, distribution, and other external expenses are examples of relational capital. The efficiency of RC is the relationship between RC and value-added. So, RCE = RC/VA.

Capital Employed Efficiency (CEE)

The employed capital is the difference between total assets and current liabilities, and capital employed efficiency is the association of value-added with CE. CEE measures the firm's ability to generate value-added from its total tangible capital employed. Mathematically, we denote that CEE = VA/CE.

3.2.2. Independent Variables

To test the different hypotheses for this study, we employed four dimensions of independent variables from ownership structure based on several studies (Al-Sartawi 2018; Bohdanowicz and Urbanek 2012; Md. S. Hasan et al. 2015; Orazalin et al. 2015).

Sponsor Director Ownership (SDO): Sponsor director owners are the agents elected as board members to operate the business. SDO is the ratio of total shares the director holds to total outstanding shares.

Institutional Ownership (IO): Institutional owners are the company's investors, not individuals. The proportion of the total number of shares held by institutions to the total shares outstanding is the indicator of IO.

Foreign Ownership (FO): The shares held by foreign investors to the total shares outstanding of the company are the proxy of FO.

Public Ownership (PO): Shares held by the general public to total shares outstanding are the proxy of PO.

3.2.3. Control Variables

The study adds leverage and total assets as control variables to shrink the influence of additional factors that could explain IC and its components, resulting in model misspecifications.

Total assets (TA): The study used the book value of total assets to adjust for the impact of business size on wealth maximization. Large firms have more assets, intellectual resources, and ownership mixes. The flexibility of the ownership structure has a strong connection with the organization's invisible and visible resources. Other studies used total assets as a control variable (R. K. Dey and Hossain 2020; Jahid et al. 2020; Md. H. U. Rashid and Hossain 2022).

Leverage (LEV): Leverage is the ratio of total debt to book value of equity. According to Riahi-Belkaoui (2003), the leverage ratio is a cornerstone of a company's success and value generation. Moreover, the leveraged firm contained many stakeholders like creditors/lenders who acted as a pressure group of the company. Their active monitoring affected the quality utilization of companies' resources (IC and tangible capital). These reasons motivated us, as several other studies have often used leverage as a control variable (R. Dey et al. 2018; Md. S. Hasan et al. 2013; Zheng et al. 2022).

3.3. Econometric Model Specification

We used all three panel data regression models—pooled ordinary least squares, random effects, and fixed-effects models—to determine how the ownership structure affected IC and its components. Using Dougherty (2011)'s method, we chose the best econometric model for hypothesis testing. The study gathered data non-randomly from the target population. Due to the strongly balanced panel data of purposive sampling techniques, we first employed the pooled OLS and then the random effects model. The Breusch and Pagan Lagrangian multiplier (LM) test guided us to choose the random effects model rather than pooled OLS. Then, we applied the fixed effects model. The rejection of the null hypothesis of the Hausman test results ($p < 0.05$) indicates that the fixed effect model provides the best measurement. However, the robust FE model was used to mitigate the issues of autocorrelation and heteroskedasticity problems after performing the Durbin–Watson (DW) test and modified Wald test, respectively.

The regression model equation is as follows:

$$\text{For pooled OLS}: \; Y_i = \alpha + \beta_i X_i + \varepsilon_i$$

$$\text{For fixed effects}: \; Y_{it} = \alpha + \beta_i X_{it} + \varepsilon_{it}$$

$$\text{For random effects}: \; Y_{it} = \alpha + \beta_i X_{it} + u_{it} + \varepsilon_{it}$$

where Y denotes the dependent variables as MVAIC, HCE, SCE, RCE, and CEE; X denotes the independent and control variables as SDO, IO, FO, PO, TA, and LEV; α = intercept; β = beta coefficient; ε = error term; $i = 1, 2, \ldots\ldots, n$, $t = 1, 2, \ldots\ldots\ldots, n$ year represents banks and year correspondingly; u = bank's individual effects that are non-measurable variables.

4. Results and Discussion

4.1. Descriptive Statistics

We used StataSE version 14.2 to expose descriptive statistics as mean, maximum, minimum, and standard deviation. All of these can help perform basic comparisons across variables.

Table 2 shows the descriptive statistics from 2017 to 2021 among different variables. The average percentage of sponsor director ownership was 39.6678 percent, which fluctuated between 5.92 percent and 90.19 percent. Institutional investors owned one-fifth (about 20.25 percent) of the shares of banks in Bangladesh. Around one-third (34.518 percent) of banks' shares were owned by the general public, with a maximum limit of 70 percent. Foreign owners were likely small investors in Bangladeshi banks, with an average shareholding of below 5 percent. However, sometimes, they became the concentrated share owners in the bank.

Table 2. Descriptive Statistics.

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
MVAIC	155	3.279419	1.154002	1.084743	9.57001
HCE	155	2.606762	1.01571	1.010014	8.33576
SCE	155	0.466312	0.176911	−0.24302	0.850847
RCE	155	0.101973	0.049557	0.029188	0.273728
CEE	155	0.104373	0.130257	−0.657	0.587
SDO	155	0.396678	0.159894	0.0592	0.9019
IO	155	0.202486	0.120845	0	0.5436
FO	155	0.04278	0.104511	0	0.5302
PO	155	0.34518	0.150153	0.0055	0.6998
TA	155	349,583.7	204,010.2	11,240.14	1,635,993
LEV	155	13.72975	5.282486	−2.1276	38.36

Source: Researcher calculations from StataSE version 14.2 output. Note: Obs. = Observations, Min. = Minimum, Max. = Maximum, Std. Dev. = Standard Deviation, Skew. = Skewness, Kurt. = Kurtosis.

Ulum et al. (2014) prescribed a standard for measuring intellectual capital. They showed that organizations with an MVAIC of 3.5 or more are called top performers, termed outstanding quality institutions. A score between 2.5 and 3.5 is considered that of a good performer, and between 1.5 and 2.5 is that of an average performer. Moreover, a score of less than 1.5 denotes a bad performer.

In practice, the average MVAIC of banks in Bangladesh is 3.279, which suggests a good performer. This value is a maximum of 9.57 and a minimum of 1.08, which indicates that some banks have utilized intellectual resources efficiently, and some have suffered severely. The organizations' average human capital efficiency score is 2.61, which suggests Bangladeshi banks can generate more than two and a half times value-added from their investment in employee expenses. The average efficiency of banks in OC is 46.63 percent, i.e., nearly half of the value added by banks was from their investments in structural capital. However, some banks suffered due to adding more value to SCE with negative efficiency. Banks achieved a small extent of RC, about 10.2 percent of total value-added on their relational activities, which needs to increase the performance of the banks. However, relational activities should create more value for the organization. The average CEE of Bangladeshi banks is approximately 10.44 percent, coincident with RC. Banks can add only one-tenth the value from the tangible capital they invest. Banks in Bangladesh use an average of BDT 349,583.7 million in assets. This amount varies from bank to bank, ranging from BDT 11,240.14 to 1,635,993 million. Therefore, the value of the standard deviation is very high. The minimum leverage value is −2.1276, indicating that the bank had negative equity capital during that period. The average leverage ratio of banks in Bangladesh is 13.72975 times of their equity capital. In this case, the banks provide more than thirteen and a half times their equity capital through loan funds. It is the most dangerous because companies focus more on sustaining their business with debt funds or later money rather

than relying on their own money. Therefore, it will be challenging for the banks to survive if any emergency arises.

4.2. Pearson Correlation Matrix

Table 3 shows that the dependent variables of MVAIC, HCE, SCE, RCE, and CEE were correlated with independent and control variables. Results indicate that SDO significantly reduced all components of intellectual efficiency, i.e., MVAIC, HCE, SCE, and CEE, except RCE. The higher presence of institutional owners enhances SCE efficiency but reduces RCE. The increasing shares of foreign owners positively and significantly augment the bank's MVAIC and HC efficiency. Public ownership is only positively related to SCE while assisting in reducing RCE. The most exciting association was that between banks' tangible and intellectual capital. The result indicates that more investment in tangible assets (total assets) leads to lower intellectual efficiency. Almost the same results were evident between banks' leverage and intellectual efficiency. They correlate negatively with MVAIC, HCE, and SCE but act positively with RCE and CEE. From this table, we also find that the correlation of HCE with MVAIC is 0.991, which is nearly one. Again, SCE also correlated with this variable with more than 82 percent. It indicates that HCE and SCE are mainly converted to MVAIC.

Table 3. Correlation matrix of the dependent, independent, and control variables.

	MVAIC	HCE	SCE	RCE	CEE	SDO	IO	FO	PO	TA	LEV	VIF
MVAIC	1											
HCE	0.991 ***	1										
SCE	0.829 ***	0.791 ***	1									
RCE	−0.365 ***	−0.315 ***	−0.677 ***	1								
CEE	0.142 *	0.031	0.076	−0.232 ***	1							
SDO	−0.306 ***	−0.279 ***	−0.424 ***	0.461 ***	−0.134	1						8.6
IO	0.083	0.073	0.197 **	−0.165 **	−0.045	−0.388 ***	1					6.41
FO	0.138 *	0.137 *	0.079	0.043	0.031	−0.171 **	−0.193 **	1				5.17
PO	0.006	−0.014	0.142 *	−0.334 ***	0.098	−0.511 ***	−0.280 ***	−0.330 ***	1			8.76
TA	−0.187 **	−0.210 ***	−0.126	−0.056	0.178 **	−0.107	0.041	0.460 ***	−0.228 ***	1		1.92
LEV	−0.327 ***	−0.358 ***	−0.349 ***	0.157 **	0.307 ***	0.340 ***	−0.201 **	−0.063	−0.133 *	0.418 ***	1	1.68

Note: * indicates 10 percent, ** indicates 5 percent, and *** indicates 1 percent significant level.

4.3. Diagnostic Test

Prior to selecting a suitable econometric model, we conducted multiple tests. We started by performing a panel unit root test. Due to the balanced panel data, we considered the Fisher-type unit-root test based on Phillips–Perron (PP) tests. The results for all of the deployed variables confirmed that all of the variables (except for RCE and TA, whose *p*-values are significant at the 5 percent level) were significant at the 1 percent level of significance. The variables did not have unit roots, and the results suggested that at least one panel was stationary in the variables. Secondly, we applied a correlation matrix and VIF test for detecting multicollinearity problems. Table 3 shows that no independent variables were correlated by over 80 percent. Kennedy (1998) stated that multicollinearity existed when independent variables correlated by more than 0.80. This study showed a positive correlation between MVAIC, HCE, and SCE variables of more than 0.80. However, it was not affected by the multicollinearity problem. Because this variable has not been used in the same model as the independent variable, it is unrelated to the multicollinearity problem.

We also tested multicollinearity using the variable inflation factor (VIF) test. The results from Table 3 reflected and asserted that the limit of VIF value ranges from 1.68 to 8.76. Generally, multicollinearity exists if the VIF value is more than 10 and the minimum value is 1 (Gujarati and Porter 2009). The study found that the average value of VIF is 5.42. So, we asserted that the multicollinearity problem had not affected our data and expected to predict reliable output from regression analysis. Before further analysis, several researchers conducted these two types of tests (Shahzad et al. 2022; Weqar and Haque 2022; Yao et al. 2019).

We then used the pooled OLS and random-effects regression techniques. The Breusch and Pagan Lagrangian multiplier (LM) test served as the basis for the technique selection. The significant result ($p < 0.05$) of the LM test's statistics suggested that we use RE as the best regression model over pooled OLS. After running the FE regression model, the estimation was matched with the RE model using the Hausman (DWH) test. FE was chosen as the best model to determine the systematic difference in coefficients ($p < 0.05$) of the Hausman test. If not, the RE model was picked. After that, the modified Wald test was applied to perceive a group-wise heteroskedasticity issue. The findings of this test, which were significant ($p < 0.05$), supported the presence of the heteroskedastic issue. The Durbin–Watson test was carried out to detect the issues with autocorrelation. To resolve these two problems (heteroskedasticity and autocorrelation), we finally used the robust FE regression model (where appropriate) (Yao et al. 2019).

4.4. Regression Results

Tables 4–8 show that LM test results guided us to avoid the pooled OLS due to rejecting the null hypothesis, which means that all of the models had random effects. Hausman test (DWH) results from Tables 4 and 5 showed that the robust FE method were suitable over RE which except for Table 6 (whose *p*-value failed to reject the null hypothesis). So, we used the robust RE model to reflect the effects of OS on SCE. Again, Tables 7 and 8 also eligible for FE method are best fit due to Hausman test results. We performed a modified Wald test using the fixed model to detect the group-wise heteroskedasticity problem. Results indicate that all of the models suffered from heteroskedastic problems because the chi-square of the Wald test ($p < 0.05$) rejected the null hypothesis. Again, the Durbin–Watson test scored below 2 (ranging from 0.6626531 to 1.313379), indicating that all of the models had autocorrelation problems. So, we considered the robust fixed-effect regression output of various dimensions of ownership structure in the models to mitigate the unequal residual variance across measured values. Also, the F-Stat (Wald chi-square for RE model) results from Tables 4–8 were statistically significant ($p < 0.05$), implying that all of the regression models were fit for analysis. R^2 values from Tables 4–8 ranged from 0.0601 to 0.1917, which showed that the changes in one unit of the employed independent and control variables could change only less than one-fifth of the dependent variables at best. In this case, the combination of OS was likely to have a lower influence on IC and its elements.

Table 4. Regression results of OS on MVAIC.

Independent and Control Variables	Pooled OLS		Random Effect		Fixed Effect		Robust Fixed Effect	
	Coef.	*t*-Value	Coef.	*z*-Value	Coef.	*t*-Value	Coef.	*t*-Value
SDO	−9.05009	(−6.37) ***	1.991733	(1.36)	6.589908	(4.55) ***	6.589908	(2.96) ***
IO	−7.878918	(−4.86) ***	2.786404	(1.57)	5.459298	(2.77) ***	5.459298	(1.83) *
FO	−5.42005	(−3.22) ***	4.304289	(2.64) ***	8.518113	(5.34) ***	8.518113	(3.77) ***
PO	−8.484427	(−5.56) ***	2.84703	(1.78) *	7.171406	(4.43) ***	7.171406	(2.98) ***
TA	-1.46×10^{-6}	(−2.74) ***	-6.18×10^{-7}	(−1.07)	-4.92×10^{-7}	(−0.74)	-4.92×10^{-7}	(−1.1)
LEV	−0.030177	(−1.59)	−0.027534	(−1.08)	0.005359	(0.16)	0.005359	(0.3)
Constant	12.54983	(8.65) ***	1.352069	(0.91)	−3.181867	(−2.18) **	−3.181867	(−1.39)
R^2 (Overall)	0.3066		0.1275		0.0773		0.0773	
F-statistics	12.35 ***		14.93 ** (Wald χ^2)		5.32 ***		5.14 ***	
Observations	155		155		155		155	
DWH Test	37.15 ***							
LM Test	56.02 ***							
DW Test	1.304375							
Wald Test (χ^2)	7933.19 ***							

Note(s): ***, ** and * indicate $p < 0.01$, $p < 0.05$, and $p < 0.10$ two-tailed significance level, respectively. MVAIC is modified VAIC, used as the dependent variable; SDO represents *sponsor director* ownership; PO denotes public ownership; IO is institutional ownership; FO is foreign ownership; TA is used for total assets; and Lev is used for leverage; DW = Durbin–Watson; LM = Breusch and Pagan Lagrangian multiplier; DWH = Hausman Test; and Coef. = coefficient.

Table 5. Regression results of OS on HCE.

Independent and Control Variables	Pooled OLS		Random Effect		Fixed Effect		Robust Fixed Effect	
	Coef.	*t*-Value	Coef.	*z*-Value	Coef.	*t*-Value	Coef.	*t*-Value
SDO	−7.895779	(−6.4) ***	2.72404	(2.28) **	6.276399	(5.57) ***	6.276399	(3.16) ***
IO	−7.157948	(−5.08) ***	3.01487	(2.06) **	4.929286	(3.21) ***	4.929286	(1.91) *
FO	−4.935425	(−3.37) ***	4.058921	(3.05) ***	7.225521	(5.81) ***	7.225521	(3.62) ***
PO	−7.698843	(−5.8) ***	3.145096	(2.4) **	6.448901	(5.11) ***	6.448901	(3.04) ***
TA	-1.30×10^{-6}	(−2.81) ***	-3.60×10^{-7}	(−0.75)	-2.97×10^{-7}	(−0.57)	-2.97×10^{-7}	(−0.81)
LEV	−0.035074	(−2.12) **	−0.029324	(−1.36)	0.005012	(0.19)	0.005012	(0.34)
Constant	10.99249	(8.72) ***	0.184586	(0.15)	−3.381399	(−2.98) ***	−3.381399	(−1.67)
R^2 (Overall)	0.3238		0.1612		0.1172		0.1172	
F-statistics	13.29 ***		14.41 ** (Wald χ^2)		6.35 ***		3.71 ***	
Observations	155		155		155		155	
DWH Test	52.70 ***							
LM Test	59.14 ***							
DW Test	1.295908							
Wald Test (χ^2)	8687.37 ***							

Note(s): ***, ** and * indicate $p < 0.01$, $p < 0.05$, and $p < 0.10$ two-tailed significance level, respectively.

Table 6. Regression results of OS on SCE.

Independent and Control Variables	Pooled OLS		Random Effect		Fixed Effect		Robust Random Effect	
	Coef.	*t*-Value	Coef.	*z*-Value	Coef.	*t*-Value	Coef.	*z*-Value
SDO	−0.819988	(−3.57) ***	−0.065947	(−0.28)	0.18621	(0.71)	−0.06595	(0.607)
IO	−0.403364	(−1.54)	0.318132	(1.11)	0.526416	(1.46)	0.318132	(0.185)
FO	−0.323785	(−1.19)	0.17683	(0.67)	0.349739	(1.2)	0.17683	(0.208)
PO	−0.505737	(−2.05) **	0.264149	(1.02)	0.548249	(1.86) *	0.264149	(0.20)
TA	-1.18×10^{-7}	(−1.37)	-6.36×10^{-8}	(−0.67)	-1.02×10^{-7}	(−0.84)	-6.36×10^{-8}	(0.359)
LEV	−0.005559	(−1.81) *	−0.005777	(−1.37)	−0.002999	(−0.48)	−0.00578	(0.09)
Constant	1.179244	(5.03) ***	0.430817	(1.79) *	0.158428	(0.6)	0.430817	(0.008)
R^2 (Overall)	0.2289		0.1917		0.1152		0.1917	
F-statistics	8.62 ***		14.99 *** (Wald χ^2)		11.29 ***		15.69 *** (Wald χ^2)	
Observations	155		155		155		155	
DWH Test	6.61							
LM Test	111.0 ***							
DW Test	0.8030062							
Wald Test (χ^2)	80,407.52 ***							

Note(s): ***, ** and * indicate $p < 0.01$, $p < 0.05$, and $p < 0.10$ two-tailed significance level, respectively.

Table 7. Regression results of OS on RCE.

Independent and Control Variables	Pooled OLS		Random Effect		Fixed Effect		Robust Fixed Effect	
	Coef.	*t*-Value	Coef.	*z*-Value	Coef.	*t*-Value	Coef.	*t*-Value
SDO	0.126371	(1.94) *	−0.01078	(−0.18)	−0.050693	(−0.78)	−0.050693	(−1.38)
IO	0.007522	(0.1)	−0.094917	(−1.28)	−0.093471	(−1.05)	−0.093471	(−0.96)
FO	0.072713	(0.94)	−0.088505	(−1.34)	−0.132884	(−1.85) *	−0.132884	(−3.26) ***
PO	−0.02992	(−0.43)	−0.136852	(−2.08) **	−0.147083	(−2.02) **	−0.147083	(−3.01) ***
TA	-3.36×10^{-8}	(−1.37)	-3.00×10^{-8}	(−1.21)	-3.69×10^{-8}	(−1.23)	-3.69×10^{-8}	(−0.75)
LEV	0.000723	(0.83)	0.001668	(1.47)	0.002397	(1.56)	0.002397	(1.39)
Constant	0.059341	(0.89)	0.164038	(2.7) ***	0.177421	(2.71) ***	0.177421	(4.05) ***
R^2 (Overall)	0.2109		0.1944		0.1292		0.1292	
F-statistics	7.86 ***		19.03 *** (Wald χ^2)		22.08 **		12.02 ***	
Observations	155		155		155		155	
DWH Test	13.71 **							
LM Test	159.08 ***							
DW Test	0.6626531							
Wald Test (χ^2)	1059.23 ***							

Note(s): ***, ** and * indicate $p < 0.01$, $p < 0.05$, and $p < 0.10$ two-tailed significance level, respectively.

The regression results from Tables 4–8 exhibited that SDO has significant positive effects on MVAIC and HCE (coef. = 6.589908, *t*-value 2.96 and coef. = 6.276399, $t = 3.16$ respectively, $p < 0.01$), which implies that the sponsor director owners help to enhance IC performance by utilization of human resources. Further, we also found that SDO has no significant effects on SCE (beta value = −0.06595, *z*-value = −0.51, $p > 0.10$), RCE (*t*-value = −1.38, $p > 0.10$), and CEE (*t*-value = 1.25, $p > 0.10$). So, we concluded from this situation that SDO only enhances human efficiency rather than other intellectual and tangible resources (SCE, RCE, and CEE) of banking companies in Bangladesh. Thus, our hypothesis 1 is partially accepted, agreeing with the Nassar et al. (2018) study and contradicting the Bohdanowicz and Urbanek (2012) study.

Table 8. Regression results of OS on CEE.

Independent and Control Variables	Pooled OLS		Random Effect		Fixed Effect		Robust Fixed Effect	
	Coef.	*t*-Value	Coef.	*z*-Value	Coef.	*t*-Value	Coef.	*t*-Value
SDO	−0.460691	(−2.58) **	−0.200702	(−0.97)	0.177993	(0.72)	0.177993	(1.25)
IO	−0.32512	(−1.59)	−0.018374	(−0.08)	0.097086	(0.29)	0.097086	(0.65)
FO	−0.233545	(−1.1)	0.424802	(1.81) *	1.075746	(3.93) ***	1.075746	(5.85) ***
PO	−0.249923	(−1.3)	0.070235	(0.31)	0.321357	(1.16)	0.321357	(2.34) **
TA	-9.11×10^{-9}	(−0.14)	-1.27×10^{-7}	(−1.63)	-5.60×10^{-8}	(−0.49)	-5.60×10^{-8}	(−1.93) *
LEV	0.009733	(4.07) ***	0.010381	(3.25) ***	0.00095	(0.16)	0.00095	(1.00)
Constant	0.318753	(1.75) *	0.047198	(0.22)	−0.136327	(−0.55)	−0.136327	(−1.01)
R^2 (Overall)	0.1406		0.1065		0.0601		0.0601	
F-statistics	5.20 ***		29.58 *** (Wald χ^2)		7.77 ***		18.50 ***	
Observations	155		155		155		155	
DWH Test	20.26 ***							
LM Test	33.43 ***							
DW Test	1.313379							
Wald Test (χ^2)	1.8×10^6 ***							

Note(s): ***, ** and * indicate $p < 0.01$, $p < 0.05$, and $p < 0.10$ two-tailed significance level, respectively.

Similar results were evident in the case of institutional ownership. More investment from institutions only fosters uplifted human resources and overall IC efficiency but not organizational, relational, and employed capital. Regression results show that the impact of IO on IC performance influenced only HCE at a 10 percent significance level (β = 4.929286, *t*-value = 1.91), which led to overall IC effectiveness through MVAIC (coef. = 5.459298, *t*-value = 1.83, $p < 0.10$). The positive effect of IO and the positive relationship with IC performance implied that the IO presence fosters the utilization of HC. Results also revealed that other IC elements like SCE (*z*-value = 0.185, $p > 0.10$), RCE (*t*-value = −0.96, $p > 0.10$), and CEE (*t*-value = 0.65, $p > 0.10$) were not affected significantly. However, among them, RCE was impacted negatively. So, our second hypothesis is proved partially. These findings support the prior studies of Al-Musalli (2012); Al-Sartawi (2018); and Bohdanowicz and Urbanek (2012) but not with the Zanjirdar (2011) study.

FO showed a significant positive impact on bank MVAIC (*t*-value = 3.77, $p < 0.01$), HCE (*t*-value = 3.62, $p < 0.01$), SCE (*z*-value = 0.208, $p > 0.10$), and CEE (*t*-value = 5.85, $p < 0.01$) but negatively impacted RCE (*t*-value = −3.26, $p < 0.01$). The results revealed the massive influencing power exhibited by foreign owners so that the banks could utilize their IC resources. More investment by foreign investors promotes the efficiency of banks' tangible and intangible resources, which assists banks in operating smoothly in the long term. However, the presence of foreign ownership failed to utilize the relational resources of Bangladeshi banks. So, our third hypothesis is proved partially. These results support the prior study from (Orazalin et al. 2015) but not with the Al-Musalli (2012) and Tjendani et al. (2018) studies.

Public owners have almost no power to influence banks' operations directly. Nevertheless, their indirect role assists banks in utilizing resources efficiently. The study results found that PO positively influences MVAIC (*t*-value = 2.98, $p < 0.01$), HCE (*t*-value = 3.04, $p < 0.01$), SCE (*z*-value = 0.20, $p > 0.10$), and CEE (*t*-value = 2.34, $p < 0.05$) and negatively influences RCE at the 1 percent significance level (*t*-value is −3.01). The results revealed that more public owners significantly influence banks' overall IC performance, human resources, and tangible capital. However, they are unable to utilize relational opportunities. Hence, our fourth hypothesis is proved partially. These results support the prior studies of Orazalin et al. (2015) and Zanjirdar (2011) and contrary to the findings of the studies of Al-Musalli (2012); Bohdanowicz and Urbanek (2012) and Tjendani et al. (2018).

The study's two control variables exhibited a negative affinity with the banks' overall IC, HCE, and SCE performance, meaning that the assets led to a decline in IC efficiency of banks in Bangladesh. Additionally, higher leverage, i.e., debt capital, decreased IC efficiency except for RCE. However, regression results showed that total assets could enhance the banks' intellectual efficiency for all cases except for SCE, which was affected negatively and insignificantly (*t*-value > 0.10). In contrast, higher leverage insignificantly reduced

banks' MVAIC, HCE, and CEE performance. The leverage of banks significantly uplifts RCE performance but insignificantly affected SCE.

5. Conclusions

Owners and managers generally act in different roles in a company. The owners appoint managers as their agents to run their businesses effectively. Institutional and concentrated family owners' decisions have more importance in using a firm's resources. Thus, the ownership structure is vital for the productive use of the firm's resources. IC appraisal techniques depend heavily on the knowledge and competency of the top management and board. Corporate managers should be capable of using all of the business resources effectively and efficiently. The concentrated/controlling owners make the board decisions regarding their business operations. They are responsible for choosing the agent to execute the general functions of their firms. Nevertheless, the controlling owners choose their firms' managers from among themselves or are closely related to their surroundings. In most cases, managers played the dual role of agents and owners in their companies. That is why sponsor directors' ownership has more control over the firm for thriving operations.

The study explored the idea that SDO and IO can only utilize their human resources rather than other IC resources such as SCE, RCE, and tangible capital efficiency (CEE), whereas more involvement of FO and PO significantly and positively enhances a bank's intellectual efficiency as HCE, SCE, and CEE but reduces RCE. The study findings suggest that the sponsor directors and institutional owners of banks in Bangladesh failed to utilize invisible resources except human resources. Hence, the study suggests reducing the ratio of managers to sponsor/institutional stockholders. As the foreign and public owners extend IC efficiency, the banks should retain them.

The study contributes to the existing IC literature by extending the affinity between OS and IC efficiency, using all four types of ownership combinations (SDO, IO, FO, and GPO). The outcome of this study helps policymakers of banks regarding ownership combinations for optimum utilization of banking resources (both tangible and IC). Management can evaluate IC efficiency to manage, supervise, and utilize the knowledge resources to increase a bank's profitability. Also, prevailing and potential investors will make desired decisions regarding their investments.

Further study is essential for manufacturing, service, and tech companies separately or through random sampling combining all sectors to generalize the concept. Also, a comparative study might be conducted based on different countries, economies, markets, etc. Moreover, with the ability to accommodate the persistence and clustering frequently found in real-world data, generalized autoregressive conditional heteroscedasticity (GARCH) models can be considered a potent tool for comprehending and predicting the dynamic behavior of financial time series volatility for future research.

Author Contributions: Conceptualization, M.S.R.; methodology, M.S.R.; software, M.S.R.; validation, S.Z.H.; formal analysis, M.S.R.; investigation, M.S.R. and S.Z.H.; resources, M.S.R.; data curation, M.S.R.; writing—original draft preparation, M.S.R. and S.Z.H.; writing—review and editing, M.S.R. and S.Z.H.; supervision, S.Z.H.; project administration, S.Z.H.; funding acquisition, S.Z.H. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: Data are available on request for reasonable purposes.

Conflicts of Interest: The authors declare no conflicts of interest.

References

Abbassi, Wajih, Ahmed Imran Hunjra, Suha Mahmoud Alawi, and Rashid Mehmood. 2021. The Role of Ownership Structure and Board Characteristics in Stock Market Liquidity. *International Journal of Financial Studies* 9: 74. [CrossRef]

Abor, Joshua, and Nicholas Biekpe. 2007. Corporate Governance, Ownership Structure and Performance of SMEs in Ghana: Implications for Financing Opportunities. *Corporate Governance: The International Journal of Business in Society* 7: 288–300. [CrossRef]

Adesina, Kolade Sunday. 2019. Bank Technical, Allocative and Cost Efficiencies in Africa: The Influence of Intellectual Capital. *The North American Journal of Economics and Finance* 48: 419–33. [CrossRef]
Admati, Anat R., Paul Pfleiderer, and Josef Zechner. 1994. Large Shareholder Activism, Risk Sharing, and Financial Market Equilibrium. *Journal of Political Economy* 102: 1097–130. [CrossRef]
Al-Musalli, Mahfoudh Abdul Karem. 2012. Corporate governance, bank specific characteristics, banking industry characteristics, and intellectual capital (IC) performance of banks in arab gulf cooperation council (GCC) countries. *Asian Academy of Management Journal of Accounting and Finance* 8: 20.
Al-Omoush, Khaled Saleh, Daniel Palacios-Marqués, and Klaus Ulrich. 2022. The Impact of Intellectual Capital on Supply Chain Agility and Collaborative Knowledge Creation in Responding to Unprecedented Pandemic Crises. *Technological Forecasting and Social Change* 178: 121603. [CrossRef]
Al-Sartawi, Musleh. 2018. Ownership Structure and Intellectual Capital: Evidence from the GCC Countries. *International Journal Learning and Intellectual Capital* 15: 277–91. [CrossRef]
Appuhami, Ranjith, and Mohammed Bhuyan. 2015. Examining the Influence of Corporate Governance on Intellectual Capital Efficiency: Evidence from Top Service Firms in Australia. *Managerial Auditing Journal* 30: 347–72. [CrossRef]
Aydin, Nurhan, Mustafa Sayim, and Abdullah Yalama. 2007. Foreign Ownership and Firm Performance: Evidence from Turkey. *International Research Journal of Finance and Economics* 11: 103–11.
Bangladesh Bank. 2023. *Annual Report 2021–2022*. Dhaka: Bangladesh Bank. Available online: https://www.bb.org.bd/pub/annual/anreport/ar2122.pdf (accessed on 24 February 2024).
Bohdanowicz, Leszek. 2015. The Impact of Ownership Structure on Supervisory Board Size and Diversity: Evidence from the Polish Two-Tier Board Model. *Procedia Economics and Finance* 23: 1420–25. [CrossRef]
Bohdanowicz, Leszek, and Grzegorz Urbanek. 2012. Corporate Ownership and Intellectual Capital Efficiency: Evidence from Polish Listed Companies. In *Management Sciences in Kazakhstan and in Poland*. Cracow and Astana: Cracow School of Business, Cracow University of Economics.
Celenza, Domenico, and Fabrizio Rossi. 2013. Ownership Concentration, Intellectual Capital, and Firm Performance: Evidence From Italy. *China-USA Business Review* 12: 18. [CrossRef]
Cheng, Peter, Lixin Nancy Su, and Xindong Kevin Zhu. 2012. Managerial Ownership, Board Monitoring and Firm Performance in a Family-Concentrated Corporate Environment: *Accounting and Finance*. *Accounting & Finance* 52: 1061–81. [CrossRef]
Colpan, Asli M., and Toru Yoshikawa. 2012. Performance Sensitivity of Executive Pay: The Role of Foreign Investors and Affiliated Directors in Japan: Performance Sensitivity of Executive Pay in Japan. *Corporate Governance: An International Review* 20: 547–61. [CrossRef]
Demsetz, Harold, and Kenneth Lehn. 1985. The Structure of Corporate Ownership: Causes and Consequences. *Journal of Political Economy* 93: 1155–77. [CrossRef]
Dey, Ripon Kumar, and Syed Zabid Hossain. 2020. Financial Risk Exposure of Publicly Traded Manufacturing Companies: Bangladesh Perspective. *Journal of Risk and Financial Studies* 1: 229–64.
Dey, Ripon, Syed Hossain, and Zabihollah Rezaee. 2018. Financial Risk Disclosure and Financial Attributes among Publicly Traded Manufacturing Companies: Evidence from Bangladesh. *Journal of Risk and Financial Management* 11: 50. [CrossRef]
Djankov, Simeon, and Bernard Hoekman. 2000. Foreign Investment and Productivity Growth in Czech Enterprises. *The World Bank Economic Review* 14: 49–64. [CrossRef]
Dougherty, Christopher. 2011. *Introduction to Econometrics*, 4th ed. Oxford: Oxford University Press.
Edvinsson, Leif. 1997. Developing Intellectual Capital at Skandia. *Long Range Planning* 30: 8. [CrossRef]
Edvinsson, Leif, and Patrick Sullivan. 1996. Developing a Model for Managing Intellectual Capital. *European Management Journal* 14: 356–64. [CrossRef]
Faraji, Omid, Kaveh Asiaei, Zabihollah Rezaee, Nick Bontis, and Ehsan Dolatzarei. 2022. Mapping the Conceptual Structure of Intellectual Capital Research: A Co-Word Analysis. *Journal of Innovation & Knowledge* 7: 100202. [CrossRef]
Farooq, Umar, Mosab I. Tabash, Suhaib Anagreh, and Khurshid Khudoykulov. 2022. How Do Market Capitalization and Intellectual Capital Determine Industrial Investment? *Borsa Istanbul Review* 22: 828–37. [CrossRef]
Fernández-Rodríguez, Elena, Roberto García-Fernández, and Antonio Martínez-Arias. 2019. Influence of Ownership Structure on the Determinants of Effective Tax Rates of Spanish Companies. *Sustainability* 11: 1441. [CrossRef]
Goedhuys, Micheline. 2007. Learning, Product Innovation, and Firm Heterogeneity in Developing Countries; Evidence from Tanzania. *Industrial and Corporate Change* 16: 269–92. [CrossRef]
Gogan, Luminita Maria, Alin Artene, Ioana Sarca, and Anca Draghici. 2016. The Impact of Intellectual Capital on Organizational Performance. *Procedia—Social and Behavioral Sciences* 221: 194–202. [CrossRef]
Gujarati, Damodar N., and Dawn C. Porter. 2009. *Basic Econometrics*, 5th ed. The McGraw-Hill Series Economics; Boston: McGraw-Hill Irwin.
Guthrie, James, Richard Petty, and Ulf Johanson. 2001. Sunrise in the Knowledge Economy: Managing, Measuring and Reporting Intellectual Capital. *Accounting, Auditing & Accountability Journal* 14: 365–84. [CrossRef]
Hasan, Md. Bokhtiar, Abu N. M. Wahid, Md. Ruhul Amin, and Md. Delowar Hossain. 2021. Dynamics between Ownership Structure and Dividend Policy: Evidence from Bangladesh. *International Journal of Emerging Markets* 18: 588–606. [CrossRef]

Hasan, Md. Shamimul, Omar Normah, and Hossain Syed Zabid. 2015. Corporate Attributes and Market Capitalization. Evidence from Bangladesh. *Aestimatio* 11: 92–105. [CrossRef]
Hasan, Md. Shamimul, Syed Zabid Hossain, and Robert J. Swieringa. 2013. Corporate Governance and Financial Disclosures: Bangladesh Perspective. *Research Journal of Finance and Accounting* 4: 14.
Hutchinson, Marion, Michael Seamer, and Larelle (Ellie) Chapple. 2015. Institutional Investors, Risk/Performance and Corporate Governance. *The International Journal of Accounting* 50: 31–52. [CrossRef]
Ika, Siti Rochmah, and Ari Kuncara Widagdo. 2021. Ownership Structure and Intellectual Capital Performance: Evidence From Indonesian Banking Companies. In *Corporate Leadership and Its Role in Shaping Organizational Culture and Performance*. Hershey: IGI Global, pp. 203–28.
Jahid, Abu, Harun Ur Rashid, Syed Zabid Hossain, Siswoyo Haryono, and Bambang Jatmiko. 2020. Impact of Corporate Governance Mechanisms on Corporate Social Responsibility Disclosure of Publicly-Listed Banks in Bangladesh. *Journal of Asian Finance Economics and Business* 7: 13. [CrossRef]
Jensen, Michael C., and William H. Meckling. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3: 305–60. [CrossRef]
Kennedy, Peter. 1998. *A Guide to Econometrics*, 4th ed. Cambridge: The MIT Press.
Kimura, Fukunari, and Kozo Kiyota. 2007. Foreign-Owned versus Domestically-Owned Firms: Economic Performance in Japan. *Review of Development Economics* 11: 31–48. [CrossRef]
Maniruzzaman, Md., and Syed Zabid Hossain. 2019. Board Independence and Firm Financial Performance: Context of Publicly Traded Manufacturing Companies in Bangladesh. *European Journal of Business and Management* 11: 8. [CrossRef]
Mollah, Sabur, Omar Al Farooque, and Wares Karim. 2012. Ownership Structure, Corporate Governance and Firm Performance: Evidence from an African Emerging Market. *Studies in Economics and Finance* 29: 301–19. [CrossRef]
Moudud-Ul-Huq, Syed, Tanmay Biswas, Brishti Chakraborty, and Md. Al Amin. 2020. Effect of Ownership Structure on Bank Diversification and Risk-Taking Behavior in Bangladesh. *The Journal of Asian Finance, Economics and Business* 7: 647–56. [CrossRef]
Mujeri, Mustafa K., and Neaz Mujeri. 2020. *Bangladesh at Fifty: Moving beyond Development Traps*. Palgrave Studies in Economic History. Cham: Springer International Publishing. [CrossRef]
Nabi, Md Nur, Qijie Gao, Md Takibur Rahman, Shaun O. Britton, and Mohammad Muzahidul Islam. 2020. Intellectual Capital and Corporate Performance: Evidence From Banking Industry of Bangladesh. *International Journal of Human Resource Studies* 10: 234. [CrossRef]
Nassar, Sedeaq, Mahmoud Ashour, Ömer Faruk Tan, and Sezer Külah. 2018. The Effect Of Ownership Structure On Intellectual Capital Efficiency: Evidence From Borsa Istanbul. Paper presented at the 7th International Conference on Business Administration (ICBA), Canakkale, Turkey, May 3.
Noradiva, Hamzah, A. Parastou, and A. Azlina. 2016. The Effects of Managerial Ownership on the Relationship between Intellectual Capital Performance and Firm Value. *International Journal of Social Science and Humanity* 6: 514–18. [CrossRef]
Oak, Seonghee, and Michael C. Dalbor. 2006. Institutional Investor Preference For Lodging Stocks. *The Journal of Hospitality Financial Management* 14: 82. [CrossRef]
Oppong, Godfred Kesse, and J. K. Pattanayak. 2019. Does Investing in Intellectual Capital Improve Productivity? Panel Evidence from Commercial Banks in India. *Borsa Istanbul Review* 19: 219–27. [CrossRef]
Orazalin, Nurlan, Monowar Mahmood, and Keun Jung Lee. 2015. Bank Ownership and Performance: Evidence from Russia in a Post Crisis Period. *Journal of Accounting, Finance and Economics* 5: 11.
Pedro, Eugénia, João Leitão, and Helena Alves. 2018. Back to the Future of Intellectual Capital Research: A Systematic Literature Review. *Management Decision* 56: 2502–83. [CrossRef]
Pulic, Ante. 2000. VAIC™ an Accounting Tool for IC Management. *International Journal of Technology Management* 20: 702. [CrossRef]
Rabiul Islam, Md. 2017. Creating Shared Value at Dutch-Bangla Bank Limited in Bangladesh. *American Journal of Theoretical and Applied Business* 3: 54. [CrossRef]
Rabiul Islam, Md., and Syed Zabid Hossain. 2018. Creating Shared Value through Mobile Financial Services in Bangladesh. *International Journal of Development and Sustainability* 7: 620–38.
Rana, Md. Sohel, and Syed Zabid Hossain. 2023a. Intellectual Capital, Firm Performance, and Sustainable Growth: A Study on DSE-Listed Nonfinancial Companies in Bangladesh. *Sustainability* 15: 7206. [CrossRef]
Rana, Md. Sohel, and Syed Zabid Hossain. 2023b. Intellectual Capital Valuation of DSE-Listed Non-Financial Companies in Bangladesh. *Archives of Business Research* 11: 129–44. [CrossRef]
Rashid, Md Mamunur. 2020. Ownership Structure and Firm Performance: The Mediating Role of Board Characteristics. *Corporate Governance: The International Journal of Business in Society* 20: 719–37. [CrossRef]
Rashid, Md. Harun Ur, and Syed Zabid Hossain. 2022. Does Board Independence Moderate the Effect of Politician Directors on CSR Disclosure? Evidence from the Publicly Listed Banks in Bangladesh. *Social Responsibility Journal* 18: 935–50. [CrossRef]
Riahi-Belkaoui, Ahmed. 2003. Intellectual Capital and Firm Performance of US Multinational Firms: A Study of the Resource-based and Stakeholder Views. *Journal of Intellectual Capital* 4: 215–26. [CrossRef]
Rouf, Md. Abdur, and Mohammad Sharif Hossain. 2018. Ownership Distribution and Value of the Banks in Bangladesh. *International Journal of Managerial and Financial Accounting* 10: 378. [CrossRef]

Shahzad, Khuram, Syed Quaid Ali Shah, Fong-Woon Lai, Ahmad Ali Jan, Syed Azmat Ali Shah, and Muhammad Kashif Shad. 2022. Exploring the Nexus of Corporate Governance and Intellectual Capital Efficiency: From the Lens of Profitability. *Quality & Quantity* 57. [CrossRef]
Shawtari, Fekri Ali, Buerhan Saiti, Muslim Har Sani Mohamad, and Hafiz Majdi Abdul Rashid. 2017. Does Intense Monitoring Matter? A Quantile Regression Approach. *Borsa Istanbul Review* 17: 75–85. [CrossRef]
Shchepkina, Natalia, Natalia Meshkova, Makka Goigova, Leila Maisigova, and Lida Tochieva. 2022. Intellectual Capital as a Factor in Ensuring the Competitiveness of the Railway Transport Enterprises. *Transportation Research Procedia* 63: 1444–53. [CrossRef]
Shleifer, Andrei, and Robert W. Vishny. 1997. A Survey of Corporate Governance. *The Journal of Finance* 52: 737–83. [CrossRef]
Soewarno, Noorlailie, and Achmad Hilal Akbar Ramadhan. 2020. The Effect of Ownership Structure and Intellectual Capital on Firm Value with Firm Performance as an Intervening Variable. *International Journal of Innovation* 10: 22.
Stewart, Thomas A. 1997. *Intellectual Capital: The New Wealth of Organizations*. New York: Bantam Doubleday Dell Publishing Group.
Sydler, Renato, Stefan Haefliger, and Robert Pruksa. 2014. Measuring Intellectual Capital with Financial Figures: Can We Predict Firm Profitability? *European Management Journal* 32: 244–59. [CrossRef]
The Daily Prothom Alo. 2018. Islami Bank in Crisis 15 Months into Changeover. *The Daily Prothom Alo*, April 25. Available online: https://en.prothomalo.com/business/Islami-Bank-in-crisis-in-just-one-and-a-half-yrs (accessed on 15 August 2023).
Tjendani, Ratna Dewi, Ari Kuncara Widagdo, and Muthmainah Muthmainah. 2018. Digital Banking, Corporate Governance, Ownership Structure, and Intellectual Capital Performance: Evidence from Indonesia. *Jurnal Keuangan Dan Perbankan* 22. [CrossRef]
Ulum, Ihyaul, Imam Ghozali, and Agus Purwanto. 2014. Intellectual Capital Performance of Indonesian Banking Sector: A Modified VAIC (M-VAIC) Perspective. *Asian Journal of Finance & Accounting* 6: 103. [CrossRef]
Weqar, Faizi, and SM Imamul Haque. 2022. The Influence of Intellectual Capital on Indian Firms' Financial Performance. *International Journal of Learning and Intellectual Capital* 19: 169–88. [CrossRef]
Wernerfelt, Birger. 1984. A Resource-Based View of the Firm. *Strategic Management Journal* 5: 171–80. [CrossRef]
Yao, Hongxing, Muhammad Haris, Gulzara Tariq, Hafiz Mustansar Javaid, and Muhammad Aamir Shafique Khan. 2019. Intellectual Capital, Profitability, and Productivity: Evidence from Pakistani Financial Institutions. *Sustainability* 11: 3842. [CrossRef]
Yusoff, Yusmazida Mohd, Muhamad Khalil Omar, Maliza Delima Kamarul Zaman, and Sarminah Samad. 2019. Do All Elements of Green Intellectual Capital Contribute toward Business Sustainability? Evidence from the Malaysian Context Using the Partial Least Squares Method. *Journal of Cleaner Production* 234: 626–37. [CrossRef]
Zanjirdar, Majid. 2011. Examining Relationship between Ownership Structure and Performance of Intellectual Capital in the Stock Market of Iran. *Indian Journal of Science and Technology* 4: 1369–78. [CrossRef]
Zheng, Yubin, Md. Harun Ur Rashid, Abu Bakkar Siddik, Wei Wei, and Syed Zabid Hossain. 2022. Corporate Social Responsibility Disclosure and Firm's Productivity: Evidence from the Banking Industry in Bangladesh. *Sustainability* 14: 6237. [CrossRef]