Board Structure and Bank Performance: The Mediating Role of Intellectual Capital

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Abstract

Intellectual capital in the knowledge era is a strategic advantage of board structure, which leads to the improvement of a company's work and the achievement of its goals. The aim of this study is to develop a structural model that connects the corporate governance, intellectual capital and financial performance of the banking sector. Corporate governance is conceptualised by the board of directors as the main internal mechanism of corporate governance, which is measured by the size of the board of directors, the number of independent board members and the female board members. Intellectual capital represents a mediator in this model and its efficiency is calculated through the Value Added Intellectual Coefficient (VAIC) model, while the financial performance of banks is measured through return on assets (ROA) and return on equity (ROE). The results of the study conducted in 22 Serbian banks between 2015 to 2019 show that the size of the board of directors and the number of independent board members have a statistically significant impact on intelectual capital (IC), but there is no impact on total assets (ROA). The number of women in the board of directors does not have a statistically significant effect on either ROA or ROE. The findings also indicate that intellectual capital (HCE, SCE, CEE) has a significant mediating role in the relationship between board structure and bank performance. The results of this study will provide a significant contribution to further investment in intellectual capital as the strongest link in achieving positive effects on bank performance.

Introduction

The most important goal of any organisation is to improve financial performance. Numerous research studies have been dedicated to the analysis of the most important variables that influence these goals. From the corporate governance standpoint, in terms of the roles and responsibilities of the board, those investigating the influence of board structure on financial performance of organisation are among the most relevant.

Based on the view that a solid banking system is a precondition for a strong stock market, it is particularly important to analyse the factors affecting bank performance. Banks are the main pillar of a country's financial system, especially

in the emerging market economies with underdeveloped capital markets (Jovković, Vasić & Bogićević, 2021). In the banking sector, the board of directors – as an internal mechanism of corporate governance – has a significant role, hence research into board effectiveness is very important for improving financial performance. Therefore, the last financial crisis also showed that board of directors did not fulfil their role (Festić, Črepinko & Bratina, 2020), i.e. their effectiveness needs to be improved. According to the traditional research perspective, board effectiveness is contingent upon board composition and board size (Nikolić & Zlatanović, 2018).

The traditional perspective further argues that an understanding of the structural variables of the board was a sufficient basis for defining the principles and the formulation of regulations needed for effective corporate governance (Babić et al., 2012). Since these characteristics determine the effectiveness of the board and consequently the banks' performance, a question arises as to the nature of the relationship between the observed variables. In previous research studies, it is possible to identify two main research directions. The first confirms the negative impact (e.g. Staikouras et al., 2007; Pathan, 2009; Stančić et al., 2014), while the second research stream argues in favour of the positive impact of structural board characteristics on bank performance (e.g., Aebi et al., 2012; Adams & Mehran, 2012; Minton et al., 2011). In other words, the results of empirical studies are often contradictory, therefore it is difficult to draw general conclusions about this interdependence. This ambiguity and inconsistence in conclusions indicate the need for further research efforts in this domain.

Considering that the board of directors itself represents an invaluable human capital resource, while at a same time human capital is one of the key components of intellectual capital, researchers are focusing more attention on the relation between intellectual capital and bank financial performance. The responsibility of corporate governance is to create and develop intellectual capital (Keenan & Aggestam, 2001), which is perceived as a strategic resource that is vital for sustainable growth (Zeghal & Maaloul, 2010). Accordingly, numerous empirical studies on the impact of intellectual capital on financial performance have been conducted (Pulic, 2004; Goh, 2005; Amitava & Santanu, 2012; Nguyen et al., 2017). However, most of those studies have investigated the direct impact of intellectual capital on financial performance or the impact of corporate governance on intellectual capital development, disregarding the mediating effects of intellectual capital in the relationship between corporate governance and financial success.

There is significant gap in research of intellectual capital as a mediator in understanding the relationship between the board of directors as a corporate governance mechanism and financial performance. Research studies in this field are scarce (Makki & Lodhi, 2014; Nkundabanyanga et al., 2014; Bhattacharjee et al., 2017) and the lack of systematic research is particularly noticeable in transition economies, including Serbia. The research purpose of this study is to examine the relationship between board effectiveness measured on the basis of its structural characteristics and the financial performance of banks, with intellectual capital viewed as a mediator in this relation. The main goal is to determine whether or not the selected board structural characteristics have a statistically significant impact on the financial performance of banks. The research focus is to establish whether intellectual capital has a significant mediating role in this relation. The authors' empirical research encompasses 22 out of 26 banks in the Republic of Serbia, observed in the period from 2015 to 2019, which represents 75.8% of the entire banking sector. The sample contains a total of 110 observations during a four-year time interval, which is a good basis for making conclusions relation to the banking sector.

The contribution of the paper is reflected in a reduction of the existing research gap in the relationship between the structural characteristics of the board and the financial performance of banks with the mediating effect of intellectual capital. Previous research conducted in the Republic of Serbia has not dealt with this subject in this way, therefore this research represents a positive scientific contribution and a direction for further research.

The paper is structured as follows. First, theoretical considerations based on a literature review related to board structure and bank performance are provided. Second, the connection between intellectual capital, board structure and bank performance is outlined and elaborated. In the following section, the methodology and results of the empirical research are provided. Finally, a critical evaluation of the findings and a discussion are given, including the implications, research limitations and indications for further research directions.

Theory and Hypotheses

Board structure and bank performance

Corporate governance is related to the problem of the separation of ownership and control, i.e. the main problem of ownership dispersion is that owners do not have control, which leads to managers behaving opportunistically (Nikolić & Babić, 2016). According to the agency theory,

large corporations with dispersed ownership face a conflict of interest between owners and managers, or the principal-agent problem (Jensen & Meckling 1976). Consequently, Fama and Jensen (1983) emphasise that monitoring and control of managerial decisions represent a basic role of the board of directors. However, in line with the stakeholder theory, the relevance of the strategic board role is implied, highlighting the protection of interest of not only shareholders but also of other stakeholders (Babić et al., 2020). The responsibility of the board of directors can be observed through the strategic decision-making process (Babić et al., 2011). According to the relevance of board effectiveness for improving performance, board structural characteristics, such as board size and board composition, are an important area of research. Even though different indicators for measuring performance can be used (accounting vs. market measures), most of the studies carried out in emerging countries focus on the monitoring of the traditional accounting measures of bank performance, such as ROA and ROE.

Board size represents the total number of board members who have the right to vote (Ongore et al., 2014). It is often stated that the optimal size of a bank board implies the appointment of between 16 and 18 members (De Andres et al., 2012). Analysing the interdependence between board size and bank performance, the results of existing empirical studies are contradictory and often ambiguous. Some studies indicate that the higher the number of board members, the more effective the board role and improved performance (Jadah & Adzis, 2016). In other words, the most pertinent advantage of a bigger board is an increased capacity to make better strategic decisions and the overall decision-making process more effective (Dalton et al., 2005). Moreover, it has been confirmed that a larger number of board members can have a positive influence on the analysed performance of banks (Adams & Mehran, 2012; Aebi et al., 2012). However, a larger number of board members can also create issues with coordination and communication within an organisation (Lipton & Lorsch, 1992; Bushman et al., 2004; Cerbioni & Parbonetti, 2007). In addition, the decision-making process becomes less efficient, thus deteriorating the ability of the board to identify and exploit new business opportunities (Bantel & Jackson, 1989; Jensen, 1993; Guest, 2005). In such cases, a large number of board members becomes a huge disadvantage, which is reflected in slow and inefficient strategic decisions, consequently negatively affecting corporate performance (Lipton & Lorsch, 1992; Jensen, 1993; Yermack, 1996; Eisenberg et al., 1998). In terms of bank performance, the empirical research results related to the effects of board size on bank performance predominantly confirm a negative impact (Hermalin & Weisbach, 2003; Pathan, 2009; Manaseer et. al, 2012; Babić et al., 2020). In line with the aforementioned, there is a tendency towards optimising board size, keeping it between seven and nine members (Lipton & Lorsch, 1992; Jensen, 1993).

The research studies from transition economies also result in slightly inconsistent and opposing conclusions. A study of 74 banks from seven southeast European countries between 2005 and 2010 revealed a statistically significant negative relationship between board size and financial performance (Stančić et al., 2014). Another study of 14 Serbian banks analysed during a three-year period showed that the number of board members does not have a significant influence on financial performance (Simić, 2018). Using the CAMELS performance measurement model, Babić et al. (2020) agree and confirm the negative impact of board size on bank performance. Based on the given theoretical review, the first research hypothesis was defined:

H1: Board size (BS) negatively affects the financial performance of banks (ROA and ROE).

Board composition represents the relationship between the number of non-executives, independent directors (IND) and the total number of directors (Aebi et al., 2012; Erkens et al., 2012). To date, research studies have been unclear and often inconclusive in relation to the relationship between board composition and performance. The assumptions about the optimal number of independent members differ depending on the perceived role of the board. A positive influence of independent board composition on performance can be identified in the banking sector (Daily & Dalton, 1992; Shungu et al., 2014; Jadah & Adzis, 2016), due to the fact that independent directors perform objective control of managers, consequently leading to a reduction in agency costs (Borokhovich et al., 1996; Singh & Davidson, 2003).

Therefore, Borokhovich et al., (1996) emphasise that independent board members act in the best interest of shareholders, thus reducing agency costs and improving company financial performance. Khan & Awan (2012) also showed a positive relationship between the number of independent board members and some indicators of financial performance. In contrast, one stream of empirical studies builds on the stewardship theory, claiming that managers act in the best interest of owners, hence the composition of a board should have a higher proportion of internal executive directors, i.e. board members should have a clear understanding of their role in corporate governance and be able to make good decisions about the affairs of the bank. Therefore, non-executive directors devoted neither sufficient resources nor time to fulfiling their duties (Festić, Črepinko & Bratina, 2020). Abdullah (2004) confirms

that the number of independent board members does not have a significant influence on financial performance. Moreover, Shukeri et al. (2012) provide evidence that this interdependency is negative.

The empirical evidence from transition economies predominantly indicates the insignificant or negative impact of a higher number of independent board members on financial performance. According to Stančić et al. (2014), the number of independent board members does not have a significant impact on ROA. Another conclusion of the study is that the higher proportion of independent board members has a negative influence on financial performance in the Serbian banking sector (Simić, 2018). Even though most studies could not identify any evidence of a positive influence, there is one partial exception. Babić et al. (2020) argue that a positive influence can be observed for certain indicators of performance in the banking sector. Based on the stewardship theory and the conceptual foundation of the aforementioned empirical research studies, the authors hypothesise:

H2: The higher number of independent directors (IND) negatively affects bank financial performance (ROA and ROE).

The number of women (WOM) as board members has been receiving more attention from researchers recently, especially in terms of the increasing relevance for improving board effectiveness. The traditional conservative perception about the negative influence of female board members on company financial performance (ROA and ROE) has been corroborated by some research studies. For example, two relevant studies were conducted in the USA; the first analysed the financial performance of 127 of the biggest companies (Shrader et al., 1997), while the other tracked the financial indicators of companies between 1996 and 2003 (Adams & Ferreira, 2009). However, a research study conducted in Great Britain (Haslam & Ryan, 2008) showed that the researchers were unable to identify any significant relation between the number of female board members and ROA/ROE indicators.

Female board members tend to not only demonstrate innovativeness and creativity in strategic decisions, but also substantial empathy (Saeed et al., 2015). Erhardt et al. (2003) analysed 500 companies in the USA over a five-year period and concluded that a higher proportion of women in board structure has a positive impact on financial performance measured by ROA and ROE indicators. Selvam et al. (2006) conducted research of selected banks in India, confirming the positive impact of female board members on financial performance. Even though similar conclusions were made based on a research study analysis of 25 Italian groups between 2006 and 2010, the number of female directors on the boards of Italian banks is still remarkably low (Romano et al., 2012). Some researchers have found evidence of a positive impact on one of the ROA/ROE indicators. For example, Abdullah et al. (2012) conducted research on 841 publicly listed IPO companies and found evidence of a positive impact on overall assets (ROA). At approximately the same time, Fidanoski et al. (2014) analysed 35 South European companies from Macedonia, Serbia, Croatia, Bosnia and Greece, and came to a similar conclusion, i.e. that there is positive influence of a higher number of female board members on ROA, however, they were unable to find any relevant evidence of the influence on ROA. In line with the aforementioned theoretical background, the following hypothesis was developed:

H3: The higher number of female board members (WOM) positively affects the financial performance of banks (ROA and ROE).

Intellectual capital, board structure and bank performance

In the scientific domain of strategic management, the concept of intellectual capital (IC) has a significant role, however, in the field of corporate governance it has been gaining more attention from researchers of late. According to the OECD, IC is defined as a combination of structural and human capital (Tan, Plowman & Hancock, 2008). This classification has been recently revised; therefore, the key components of IC are human capital, organisational capital and customer capital (Stewartna, 1997).

In this article, IC is analysed using the Value Added Intelectual Coefficient (VAIC) methodology, which is designed to determine the contribution of human capital efficiency (HCE), structural capital efficiency (SCE) and capital employed efficiency (CEE) to value creation in the company (Pulić, 2004), i.e. the VAIC methodology concerns the efficiency of three types of capital (Marzo, 2021): human capital (HC), measured by the cost of employees; structural capital (SC), equal to the diference between the value added generated by the firm and human capital; and physical and financial capital employed (CE), i.e. the amount of fnancial capital available to the firm. The guiding principle of this model is to determine the contribution of all company resources (human, structural and physical) to value creation (VA), which is obtained as follows: VA = OP + EC + A (OP = Operating profit; EC = Employment cost; A = Amortisation). Therefore, the VAIC is the result of the sum of three efficiency ratios, all obtained through a combination of the value added (VA) with the three types of aforementioned capital (Marzo, 2021).

Human Capital Efficiency (HCE) is obtained as follows: HCE

= VA/HC, i.e. it refers to the amount of earnings of employees during one fiscal year. Structural Capital Efficiency (SCE) is calculated as follows: SCE = SC/VA. Intellectual Capital Efficiency (ICE) is obtained as the sum of HCE and SCE: ICE = HCE+SCE. Finally, Capital Employed Efficiency (CEE), is derived from the relationship between value added and the net assets of the company: CEE = VA/CE. Capital Employed (CE) is capital already invested in the business and represents the net assets of the company. In order to ensure the comparability of the overall value creation of the banks, the two aforementioned indicators must be combined: VAIC = ICE+CEE (Peković et al., 2020).

In line with the aforementioned, human capital is seen as an investment rather than an expense (Janošević et al., 2013), structural capital efficiency is considered from the perspective of adding value, while capital employed efficiency reflects capital already invested and represents the net assets of the company. A number of studies confirm that either IC or some of its components have a positive impact on company performance, these are most commonly measured with ROA and ROE indicators (Pulic, 2004; Goh, 2005; Cardoza, 2006; Amitava & Santanu, 2012; Nguyen et al., 2017).

Several research studies have been conducted in Serbian companies in this scientific area. The majority of them, mainly in the banking sector, provide evidence of a positive influence of individual IC components on certain indicators of financial performance, especially on ROE. Peković et al. (2020) note a high correlation between the components of IC, HCE and CCE on one side, and ROA and ROE on the other. However, some researchers came to more ambiguous conclusions. Janošević et al. (2013) claim that even though components of VAIC have an influence on ROE, apart from HCE, they do not affect ROA at all. A recent study of 27 banks in the Serbian banking sector between 2008 and 2016 indicates that the efficient use of IC has a positive impact on ROE but a negative effect on ROA (Radić, 2018).

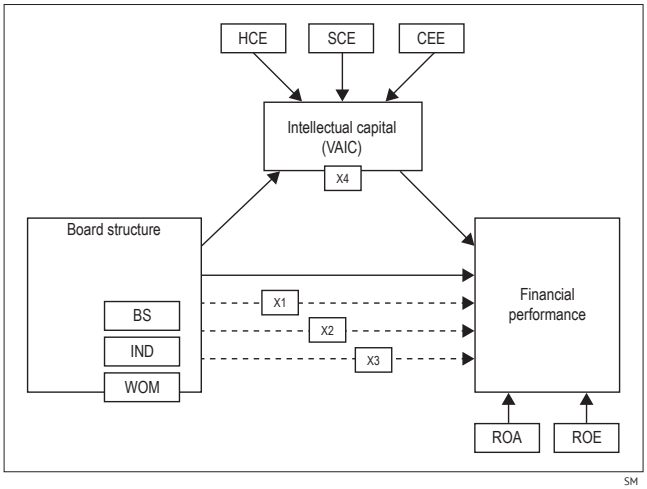
Considering the relationship between IC and performance, numerous research studies have focused on analysing the relationship between IC and corporate governance. Abidin et al. (2009) found a positive relationship between board size, the number of independent board members and IC. Similar conclusions were made by Zamani et al. (2012), who highlighted that not only board size and the number of independent members, but also the duality of the leadership position have a positive impact on IC. Appuhami & Bhuyan (2015) showed that the number of independent board members has a positive impact on IC, however, they were unable to identify any significant relevance of board size.

Taking a closer look at the connection between IC and corporate governance, in recent years the relevance of IC as a mediator in the relationship between board effectiveness and financial performance has been increasingly emphasised. Several empirical studies confirmed the positive impact of the IC mediating role. Makki & Lodhi (2014), Nkundabanyanga (2016) and Bhattacharjee et al. (2017) argue that board composition has a positive influence on company financial performance, as well as IC as a mediator. Bala et al. (2019) confirm that board size and the independence of board members affect financial performance, with a mediating effect of IC. Iqbal & Zaib (2017) showed that in the banking sector, corporate governance reflected through the certain characteristics of the board has a significant positive impact on IC, and vice versa, i.e. IC also has a positive impact on the financial performance of the observed banks.

Based on the aforementioned, it can be concluded that an adequately structured board of directors, with IC as a mediator, can significantly contribute to an improvement in company financial performance. It is possible to identify a significant research gap in this respect in Serbia, not only in terms of the direct influence of the board or IC on financial performance, but also a more fine-grained understanding of the relevant of IC mediating. In accordance with the previous considerations, the following hypothesis was formulated:

H4: Intellectual capital (HCE, SCE, CEE) has a significant mediating role in the relationship between board structural characteristic (BS, IND, WOM) and bank financial performance (ROA and ROE).

Figure 1
Conceptual model



Source: Authors' own research

Based on the given hypotheses, Figure 1 shows the defined conceptual research model. The model investigates the

direct impact of selected board structure characteristics – the size (BS), the number of independent board members (IND) and the participation of women (WOM) – on financial performance in the banking sector, measured by ROA and ROE. Intellectual capital is a central component of the model (composed of HCE, SCE and CEE), with a mediating role between board structure and financial performance.

Research Methodology

Sample structure

The empirical research was carried out on a sample of 22 banks in the Republic of Serbia. The sample size is relevant, considering the substantial change and fluctuations of the financial market structure, as well as numerous mergers and acquisition. As a result, the number of actively operating banks in Serbia is constantly changing. This means that collecting longitudinal data about board structure and measuring financial bank performance is very challenging. In this study, 22 out of the total of 29 banks operating between 2015 and 2019 were observed, which represents 75.8% of the entire banking sector. The sample contains a total of 110 observations during the four-year time interval. Accordingly, the sample is representative and the findings can be generalised. Pursuant to the provisions of the Law on Banks, banks are obliged to publish annual statements of business, apart from regular financial statements, at quarterly and annual intervals. For the purpose of this research, the data published in these reports are used, while the information about board structure (board size and composition) was collected via the online available database of the National Bank of Serbia. A statistical analysis was conducted using STATA (Software for Statistic and Data Science).

Variables

ROA and ROE were used as relevant indicators of bank financial performance. Although typical for this type of research, the Tobin Q indicator was not used due to the lack of information about the market capitalisation of banks. Therefore, the ROA and ROE indicators of profitability were used as the dependent variables.

The independent variables are board size (BS - total number of board members), board composition (IND - number of independent board members) and number of female

Table 1
Variables

			Symbol	Measuring
Dependent variables	Financial performance	Return on assets	ROA	$\frac{\text{Net income}}{\text{Total asset}}$
		Return on equity	ROE	$\frac{\text{Net income}}{\text{Average shareholders' equity}}$
Independent variables	Board structure	Board size	BS	Number of directors on board
		Independent board members	IND	$\frac{\text{No. of independent directors}}{\text{No. of directors on the board}} \times 100$
		Number of female board members	WOM	$\frac{\text{No. of female board directors}}{\text{No. of directors on the board}} \times 100$
Mediator	Intellectual capital	Human capital efficiency	HCE	VA/HC
		Structural capital efficiency	SCE	SC/VA
		Capital employed efficiency	CEE	VA/CE
		Intellectual capital	VAIC	HCE+SCE+CEE

Source: Authors' own research

board members (WOM). Intellectual capital (IC) is used as mediator and its efficiency was measured using the VAIC methodology. Table 1 shows all the variables used.

Model specification

This research paper was carried out in order to examine the statistical significance and intensity of the impact of the board structural characteristic on the indicators of profitablility as dependent variables. The regressors in the multiple linear regression models are board size (BS), independent board mememberss (IND) and number of female board members (WOM), while profitability was measured by ROA and ROE. The same entities (banks) are observed for each period, therefore the panel data set is a fixed panel (Greene, 2008).

To verify the direction of causality and to control the endogeneity bias, the lagged value of a regressor is included and the model accounted for the heteroscedasticity problem (Andries et al., 2018). To test H1, H2 and H3, which predict the effect of the independent variables on banking performance, the authors estimated a series of equations (6) using the following regressions:

Hypothesis 1

$ROA_{it} = \alpha + ß_1 * BS_{it} + \mu_i + \lambda_t + \varepsilon_{it}$; $ROE_{it} = \alpha + ß_2 * BS_{it} + \mu_i + \lambda_t + \varepsilon_{it}$;

Hypothesis 2

$ROA_{it} = \alpha + ß_3 * IND_{it} + \mu_i + \lambda_t + \varepsilon_{it}$; $ROE_{it} = \alpha + ß_4 * IND_{it} + \mu + \lambda_t + \varepsilon_{it}$;

Hypothesis 3

$ROA_{it} = \alpha + ß_5 * WOM_{it} + \mu_i + \lambda_t + \varepsilon_{it}$; $ROE_{it} = \alpha + ß_6 * WOM_{it} + \mu + \lambda_t + \varepsilon_{it}$;

OR

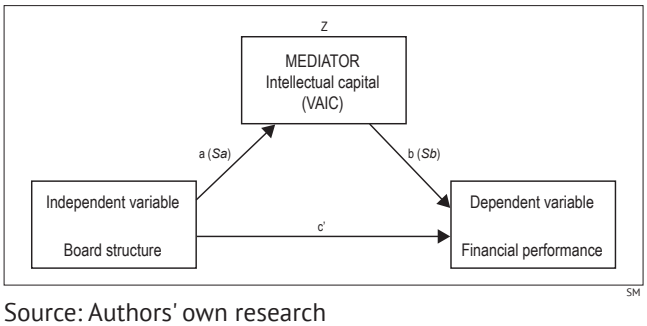
$ROA_{it} = \alpha + ß_n * IV_{it} + \mu_i + \lambda_t + \varepsilon_{it}$; $ROE_{it} = \alpha + ß_n * IV_{it} + \mu_i + \lambda_t + \varepsilon_{it}$;

In the equations, ROA refers to return on asset and ROE refers to return of equity for bank i at time t. The independent IV variables (BS, IND, WOM) are already explained, α and ß are regression parameters, $\mu_i + \lambda_t$ are individual and time fixed effects, and ε refers to the error term.

In order to test H4, the authors applied the Baron and Kenny (1986) method to assess the mediation effect of IC on the relationship between the board structural characteristic (BSC) and Serbian banking performance. The impact of board size, independent board members and number of female board members (independent variables) on intellectual capital (mediator) was evaluated by estimating a series of regressions of IC on CG and banking performance by using the Sobel test. Figure 2 shows an illustration of mediation using the Sobel test, where a, b, and c' are the path coefficients. The values in parentheses are standard errors of these path coefficients.

Figure 2

Sobel test (an illustration of mediation)



Source: Authors' own research

Description of numbers:

a = raw (unstandardised) regression coefficient for the association between independent variable and mediator

s_a = standard error of a

b = raw coefficient for the association between the mediator and the dependent variable (when the independent variable is also a predictor of the dependent variable)

s_b = standard error of b

c' the direct effect of the irrationality on the self-reported anxiety

z = the mediated effect divided by its standard error yields a z-score of the mediated effect

SQRT = Square root

* s_a and s_b should never be negative

Hypothesis 4

z-value = $a * b / SQRT(b^{2} * s_a^{2} + a^{2} * s_b^{2})$

Research Results

Table 2 illustrates the results of the descriptive analysis of ROA and ROE as dependent variables, and three independent variables (BS, IND, WOM) for the entire sample, within and between the observed banks.

Table 2 shows the low mean score for ROA (overall) indicating that there was a minor increase in banks' profit within the period of observation. The standard deviation further depicts a slight variation between the sample banks. The ROE has a mean score of 2.78%, while the result of ROE shows that the deviation from the standard deviation has a higher variation between the sample banks compared to ROA. BS indicates that the average size is six, while the maximum number is

Table 2

Descriptive statistics of dependent and independent variables

Depend. Var.	Mean	Std. Dev.	Min	Max
		ROA		
Overall	0.00055733	0.019596	-0.12523	0.12100
Between		0.006892	-0.06848	0.02260
Within		0.019363	-0.08079	0.02678
		ROE		
Overall	0.027818	0.133471	-0.23822	0,283655
Between		0.105745	-0.20732	0.136008
Within		0.122774	-0.21828	0.189470
Indep. Variables	**Mean**	**Std. Dev.**	**Min**	**Max**
		Board size (BS)		
Overall	6.072727	0.5550358	5	9
Between		0.59082594	5	8.2
Within		0.3426823	3.872727	6.872727
		Indep. Board (IND)		
Overall	2.318182	0.4533633	1	5
Between		0.4346112	1	4
Within		0.318418	1.518182	2.918182
		Women (WOM)		
Overall	1.090909	1.310126	0	4
Between		1.039647	0	3.4
Within		0.8217234	0.309091	3.290909

Source: Results of analysis conducted by the authors in STATA software

nine. The IND variable shows that, on average, there are two independent board members (the maximum is four). The analysis shows that there, on average, there is one woman on the board (WOM) (the maximum is four).

Table 3 shows the descriptive statistics for the VAIC model (overall) and the IC components (SCE, CEE and HCE) individually. The results show that the mean value of VAIC is 3.17 and its S.D is 0.319316. All three of the components of VAIC have a significant value for the given results.

Table 4 shows the results of multiple regression used to analyse the structural board characteristics (BS, IND, WOM) on bank financial performance (ROA and ROE). The results indicate that the board size and number of independent directors have a significant influence on ROE, however, they do not have a statistically significant influence on ROA.

The authors used the Sobel test to evaluate the mediating influence of IC (HCE, SCE и CEE) in the relation between board structure characteristics (BS, IND, WOM) and bank financial performance (ROA and ROE). First, a simple regression analysis was conduced to test the influence of BS, IND and WOM on IC (Table 5). The value of the coefficient of determination (R^2) is 0.281, which means that 28.1% of the IC variability is explained by the defined regression model. Board structure characteristics (ß=0.311, p=0.000) have a positive statistically significant influence on intellectual capital.

Next, in order to analyse board structure characteristics and IC components on bank financial performance, a multiple regression analysis was conducted. The results are shown in Table 6.

Table 3
Descriptive statistics, mediating variable components

Mediating Variable	Mean	Std. Dev.	Min	Max
HCE				
Overall	1.99905	0.128365	-3.025052	17.20192
Between		0.085657	-0.9059412	6.899722
Within		0.0894186	-1.599324	14.42544
SCE				
Overall	0.850859	0.156312	-4.730294	19.55603
Between		0.303047	-0.3491662	5.997965
Within		0.736104	-3.759164	11.73104
CEE				
Overall	0.3494002	0.7594304	-0.2228807	4.766916
Between		0.3666695	-0.109158	1.815902
Within		0.6775965	-0.2193201	3.300414
VAIC				
Overall	3.170164	0.319316	-4.54887	19.4995
Between		0.011836	-0.208771	8.071101
Within		0.668127	-2.193201	7.6868

Source: Results of an analysis conducted by the authors in STATA software

Table 4
Multiple regression analysis

Variable	ROA			ROE		
	Coefficient	T-value	Sig	Coefficient	T-value	Sig
BS	-0.82	-0.26	0.784	-2.55*	-2.84	0.003
IND	-0.74	-0.22	0.811	-2.66*	-3.01	0.001
WOM	0.69	0.19	0.853	3.88	0.25	0.565

Note: a statistically significant level of 0.01
Source: Authors' own research

Table 5
Simple regression analysis (dependent variable: Intellectual capital)

Independent variables		B	p value
BS	Board structure characteristics	0.311*	0.000
IND			
WOM			

Note: significance level 0.01 R^2 = 0.281
Source: Authors' own research

Table 6
Multiple regression analysis (dependent variable: Financial performance of banks)

Independent variables	B	p value	VIF
BS / IND / WOM	0.284	0.000	1.325
HCE / SCE / CEE	0.368	0.000	1.241

Note: significance level 0.01 R^2 = 0.451
Source: Authors' own research

The value of the coefficient of determination (R^2) is 0.451, therefore 45.1% of the variability of banks' financial performance is explained by the regression model. The value of VIF is always less than 5 (Aiken & West, 1991), therefore there is no problem of multicollinearity. Board structural characteristics (ß=0.284, p=0.000) and intellectual capital (ß=0.368, p=0.000) have a statistically significant influence on bank statistical performance.

Table 7 shows the Sobel test used for analysis of the mediating role of IC in relation to board structure characteristics and bank financial performance.

Table 7
Sobel test (mediator: Intellectual capital)

Inputs	Value	Sobel test results	Value
a	0.311	z-score	4.43
b	0.368	Std. deviation	0.025
Sa	0.059	p value	0.00
Sb	0.045		

Source: Authors' own research

The results indicate that the z-score is 4.43 (if the z-score is greater than 1.96 it can be concluded that the effect is larger than would be expected by chance, thus the effect can be classed as significant (Krull & MacKinnon (1999)) and the p value=0. Therefore, based on the Sobel test, the authors concluded that intellectual capital has a significant mediating role. Mediation occurred (Sobel, 1982; Baron & Kenny, 1986) because the independent variable board structure significantly affects the mediator IC, the board structure significantly affects the dependent variable financial performance in the absence of the IC, the mediator has a significant unique effect on the financial performance and the effect of board structure financial performance shrinks upon the addition of IC to the model. The Sobel test clearly demonstrates the relevance of IC mediation (Preacher & Hayes, 2004).

Discussions

According to the analysed data related to hypothesis H1, it can be concluded that board size does not have a significant influence on overall invested assets (ROA), whereas it not only has a significant but also a negative impact on invested capital (ROE). Therefore, the hypothesis in relation to the influence of board size on ROE is *partially confirmed*. In other words, boards with fewer board members tend to be more effective in the decision-making process, since critical strategic decisions are made promptly and more efficiently. These findings are in line with prior similar empirical studies (Yermack, 1996; Hermalin & Weisbach, 2003; Staikouras et al., 2007; Manaseer et al., 2012,), especially studies of bank corporate governance in emerging economies (e.g. Pathan et al., 2007; Pathan, 2009, Stančić et al., 2014; Simić, 2018). The results support the view that excessive boards often experience problems with coordination, control and flexibility in decision-making. It means that smaller boards are more effective in monitoring managers, thus contributing to overall profitability.

Hypothesis H2, relating to the influence of independent board members on ROE, is also *partially confirmed*. The results indicate that a higher proportion of independent board members does not have a significant impact on ROA. At a same time, evidence was found that a substantial negative impact on ROE can be found. This means that an improvement in bank performance can be attained through the definition of standards referring to board size, as well as the number of independent board directors. These conclusions are aligned with other previous studies conducted by Abdullah (2004), Shukeri et al., (2012), Simić (2018), while some researchers claim that board structure has no influence on bank profitability in South European economies (Stančić et al., 2014). This is surprising given the findings of previous studies that find a significant and often positive influence of board independence over bank profitability in emerging economies (Bektas & Kaymak, 2008; Pathan et al., 2007). A lack of interdependence between board independence and bank profitability implies that in emerging economies, due to weak legislation, boards tend to be overruled by their dominant shareholder, imposing their own interests and exercising excessive control.

Therefore, hypothesis H3 is completely *rejected*, because the number of female board members does not have a significant impact on either ROA or ROE. A partial explanation for this conclusion might be the fact that women are heavily underrepresented as board members in the Serbian banking sector. Consequently, it is difficult to adequately assess and evaluate their contribution to board effectiveness and financial performance. Based on the research results, the recommendation would be not only to increase the number of female members, but also to focus more on their realistic contribution to the decision-making process. Better communication, improved interpersonal relations and increased diligence in persuading or problem solving are the key benefits deriving from a higher number of women on the board, including a positive impact on the effectiveness of the board.

The empirical results reveal that intellectual capital has a significant mediating role between the characteristics of corporate governance and the financial performance of banks, thus *confirming* hypothesis H4. The identified relations between board structure and composition on the one side, and financial performance on the other, are consistent with Makki & Lodhi (2014), Nkundabanyanga (2016) and Bhattacharjee et al. (2017). Firm performance can be increased by leveraging IC and insisting on effective board governance, however, numerous studies explaining firm performance via board governance ignored and neglected the potential synergistic effects. The authors also note that IC is not only generated by company staff, but also board members through contributing with knowledge, experience and networking to build IC, and consequently supporting the company through effective monitoring, advising and providing resources. In this sense, the board serves as a source of IC for a company, being the main internal corporate governance mechanism triggering value creation.

Conclusion and Implications

The results have important scientific and practical implications, providing evidence to support theories relevant to explaining the financial performance of banks. The study proved that the combination of IC can be explored through a multi-theoretical approach to the agency theory and resource-based theories. A unique contribution of this study is the investigation of the mediating role of IC in the relationship between the characteristics of corporate governance and financial performance of the banking sector in the Republic of Serbia. This is especially relevant considering that the mechanisms of corporate governance in Serbia are still developing, with IC capital still largely neglected. Considering that these kind of research studies in Serbia are still insufficient and scarce, this study is of greater scientific relevance. The significant practical implications shed more light on IC, its components and interdependence with the structural characteristics and effectiveness of the board, subsequently affecting overall financial outcome.

The obtained results show that the board structure is an important determinant of bank success. More precisely, an effective board of directors – as an internal corporate governance mechanism – is a necessary precondition for improving the performance of banks, which can consequently mitigate the negative effects of the financial crisis and the overall turbulence facing the financial sector. At the same time, considering that intellectual capital is a priceless intangible asset that brings game-changing value to a company, it is not only necessary to effectively manage the board of directors, but also IC. The size and independence of the board combined with human capital – as one of the three components of IC – can significantly contribute to the improved financial performance of banks. Accordingly, the conclusions relating to the interdependence between the board structure, and the components of IC and financial performance as indicators of business success provide a significant recommendation for defining guidelines to improve corporate governance that will lead to better financial results.

This study has certain limitations. First, it only focuses on the banking sector, disregarding other financial and non-financial institutions, hence the conclusions cannot be used as generalisation for entire financial sector. Next, for the purpose of measuring financial performance, only ROA and ROE were applied. In further studies other indicators should be considered: Tobin's Q, ROI, profit margin, earning per share (EPS) and other, relevant for the banking sector (overall risk and yield). Even though a time span of five years is relevant, future studies should cover a longer period and appropriate statistical tools, panel regression with fixed and random effects. The VAIC method is widely recognised and implemented in IC research, but researchers have also recognised substantial disadvantages. Using this methodology is justified predominantly for the purpose of comparability with other similar studies, however in future other methods, such as CIV (Calculated Intangible Value) and EVA (Stewart, 1997), could also be used.

Even though mainstream research finds that board structure is the key board effectiveness factor, the empirical research dichotomy indicates that it is a significant but not the only relevant factor. Furthermore, those studies mainly focus on a limited number of board structural characteristics. Simultaneously with the development of the behavioural perspective, research turned more toward the individual characteristics of board members and the processes inside the board (Babić et al., 2012). Within the behavioural perspective, IC emerged as a significant factor for a more fine-grained understanding of the relationship between board structure and financial performance. Starting from the ownership structure and boards of directors as complementary mechanisms of corporate governance, as well as their relation to strategic management (Ravasi & Zattoni, 2006; Pugliese et al., 2009; Nikolić & Babić, 2016), further research efforts should focus more on ownership activism and ownership type as variables that influence the relationship between board structure, intellectual capital and financial performance.

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Struktura upravnega odbora in uspešnost bank: posredniška vloga intelektualnega kapitala

Izvleček

Intelektualni kapital v dobi znanja je strateška pridobitev strukture upravnega odbora, ki vodi k izboljšanju dela podjetja in doseganju njegovih ciljev. Cilj te študije je razviti strukturni model, ki povezuje korporativno upravljanje, intelektualni kapital in finančno uspešnost bančnega sektorja. Korporativno upravljanje je zasnovano z upravnim odborom kot glavnim notranjim mehanizmom korporativnega upravljanja, ki se meri z velikostjo upravnega odbora, številom neodvisnih članov upravnega odbora in številom žensk v upravnem odboru. Intelektualni kapital je v tem modelu posrednik, njegova učinkovitost pa se izračuna z modelom intelektualnega koeficienta dodane vrednosti (VAIC), medtem ko se finančna uspešnost bank meri z donosnostjo sredstev (ROA) in donosnostjo kapitala (ROE). Rezultati študije, izvedene v 22 srbskih bankah med letoma 2015 in 2019, kažejo, da imata velikost upravnega odbora in število neodvisnih članov upravnega odbora statistično značilen vpliv na intelektualni kapital (IC), ni pa vpliva na celotna sredstva (ROA). Število žensk v upravnem odboru nima statistično značilnega vpliva niti na ROA niti na ROE. Ugotovitve kažejo tudi, da ima intelektualni kapital (HCE, SCE, CEE) pomembno posredniško vlogo v odnosu med strukturo upravnega odbora in uspešnostjo banke. Rezultati te študije bodo pomembno prispevali k nadaljnjemu vlaganju v intelektualni kapital kot najmočnejšim členom pri doseganju pozitivnih učinkov na uspešnost bank.

Ključne besede: upravljanje podjetij, upravni odbor, struktura upravnega odbora, intelektualni kapital, finančna uspešnost, bančni sektor