ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

THE RELATIONSHIP BETWEEN INTELLECTUAL CAPITAL AND PERFORMANCE:
A STUDY ON TURKISH BANKING SECTOR

ENTELEKTÜEL SERMAYE VE PERFORMANS ARASINDAKİ İLİŞKİ:
TÜRK BANKACILIK SEKTÖRÜ ÜZERİNE BİR ÇALIŞMA

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Abstract

In this paper, considering the increasing importance of intellectual capital (IC), we focus on the effects of not only IC but also its three components on Turkish banks' financial performance by using VAIC (Value Added Intellectual Coefficient) model. We use a sample of 20 banks operating in Turkey over the period 2013/Q4 – 2019/Q3. We measure financial performance by two widely accepted accounting ratios; namely, ROA and ROE. The results show that VAIC, human capital efficiency (HCE) and capital employed efficiency (CEE) are positively correlated with the banks' financial performance. In particular, the results indicate the significance of overall intellectual capital, human capital, and financial and physical capital to both increase and sustain banks' profitability.

Keywords: Turkish Banking Sector, Bank Performance, Intellectual Capital, Human Capital, VAIC

JEL Codes: G11, G21, O34

Öz

Bu makalede, entelektüel sermayenin (IC) artan önemi göz önüne alınarak VAIC (Katma Değerli Entelektüel Katsayı) modeli kullanılmış ve entelektüel sermayenin ve bunun üç bileşeninin Türk bankalarının finansal performansı üzerindeki etkilerine odaklanılmıştır. Türkiye'de faaliyet gösteren 20 bankadan oluşan örneklemimiz, 2013/4Ç – 2019/3Ç dönemini kapsamaktadır. Finansal performans, geniş çapta kabul gören iki muhasebe

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oranı olan aktif karlılığı (ROA) ve öz kaynak karlılığı (ROA) ile ölçülmüştür. Sonuçlar, VAIC'in, beşeri sermaye verimliliğinin (HCE) ve işletme sermayesi verimliliğinin (CEE) bankaların finansal performansı ile pozitif korelasyon gösterdiğini belirtmektedir. Özellikle, sonuçlar bankaların kârlılığını artırmak ve sürdürülebilir duruma getirmek için entelektüel sermaye, beşeri sermaye, finansal sermaye ve fiziksel sermayenin önemini göstermektedir.

Anahtar Kelimeler: Türk Banka Sektörü, Banka Performansı, Entelektüel Sermaye, Beşeri Sermaye, VAIC

JEL Codes: G11, G21, O34

Introduction

Intellectual capital has become one of the most attractive topics especially in the twenty first century. While the competition in almost every industry and business increases throughout the world, the importance of intellectual capital also becomes more visible. In addition, value creation is always one of the major headlines in the agendas of companies; namely those of financial institutions and even small and medium sized firms. In order to create value better, intellectual capital is considered as the major and fundamental resource.

There is a consensus regarding the value and the necessity of intellectual capital for organizations. Stewart (1991) declares that IC is getting more precious for the corporate American companies and would provide the best competitive advantage for them. Therefore; the companies, which aim to be successful, need to create value within the organization that can be achieved by using the knowledge in an efficient way (Pulic, 1998). On the other hand, we see many different views regarding what intellectual capital is. While Marr & Moustaghfir (2005) report 22 different definitions, they also state that a good definition of intellectual capital should include the main components, roles, and perspectives of it. In one case, OECD (1999) defines intellectual capital as knowledge and information based intangible resources of companies and points out that it consists of human, structural, and customer capital. Likewise, Roos & Roos (1997) share similar views stating that IC has three categories which are human capital, organizational capital, and customer & relational capital.

Although there are different definitions of intellectual capital, it might be possible to agree on the best definition of IC or it can be redefined by using and integrating all existing definitions. However, it is seen that measuring IC is not as easy as defining it. Pulic (1998) points out that since most of the methods measuring IC have subjective parts, it is a need to create a very common and objective method to measure it. In this respect, Pulic (1998) and Pulic (2004)offer the VAIC (value added intellectual coefficient) model, which measures intellectual capital by using monetary criteria in order to provide an objective and simple way. Accordingly, Pulic's model is used in this study to measure the intellectual capital. This model measures intellectual capital by summing up three components; namely, HCE (human capital efficiency), SCE (structural capital efficiency), and CEE (capital employed efficiency).

In this study, we focus on the Turkish banking industry, where there are 51 banks with a 4.49 trillion TL asset size (approximately 0.75 trillion USD) and 49 billion net income (approximately 8.2 billion USD) as of 2019/Q4. In addition, the sector has a capital adequacy standard ratio of 18% and

total core capital of 528 billion TL (approximately 89 billion USD). The number of branches and employees of the total banking sector are 11.3 thousand and 204 thousand, respectively (BRSA 2020). Since Turkish banking sector has a sound financial structure and sustainable profitability, it also attracts a lot of attention from foreign investors. Accordingly, foreign investors have ownership shares in many banks in Turkey.

In this paper, considering the increasing importance of IC, we investigate the effects of not only intellectual capital but also its three components on Turkish banks' financial performance by using VAIC model. We use two widely accepted accounting ratios, ROA and ROE, as a measure of financial performance. The results show that value added intellectual coefficient (VAIC), human capital efficiency (HCE), and capital employed efficiency (CEE) have positive and significant influence on banks' financial performance in terms of both financial measures. In particular, the results indicate the significance of overall intellectual capital and capacity, human capital, together with financial and physical capital to both increase and sustain banks' profitability.

This is the first study in Turkey which investigates how VAIC affects banks' financial performance by using quarterly data. This paper also contributes to the literature which focuses on the determinants of profitability and the relationship between intellectual capital and financial performance of banks. IC provides best competitive advantage for the companies (Stewart, 1991). Hence, it is critical to increase the understanding of companies about IC to make them willing to look for how and why they should aim to increase IC (Petty ve Guthrie 2000). Accordingly, our results also provide many benefits for managers, investors, and governments. Firstly, this study enables bank managers to gain competitive advantage, increase profits, and ensure sustainable growth by investing on IC. Secondly, investors might also examine and compare the banks in terms of IC and make their decisions accordingly. Thirdly, since banks play a very crucial role in creating a sustainable and sound economy, governments can monitor their intellectual capital performance, and also can take actions if necessary.

The rest of the paper is organized as follows: Section 1 reviews the related literature; Section 2 explains the data and methodology; Section 3 describes our findings; and the last section presents concluding remarks, some policy implications, the recommendations for future studies and limitations in this study.

1. Literature Review

1.1. The Concept of Intellectual Capital

What is intellectual capital? Since there are several definitions of this term, it is not possible to agree on one definition. Marr & Moustaghfir (2005) report 22 different definitions regarding IC in their systematic literature review. According to them, in order to better understand the IC concept, it is needed to examine the main components, roles, and perspectives of IC since a good definition of IC should include all of these.

Organization for Economic Co-operation and Development (OECD) defines IC as knowledge and information based intangible resources of companies (OECD 1999). The OECD states that although these resources are not easily and generally measured, they always have always positive influence on the performance of companies. According to the OECD, IC consists of human, structural, and customer capital. More openly, human capital refers to resources such as competencies, know-how, and knowledge; structural capital refers to the resources such as work processes and information systems; and customer capital refers to the resources such as customer relationships and brands. Likewise, Roos & Roos (1997) point out that IC has three categories which are human capital, organizational capital, and customer & relational capital. According to them, since IC is not completely visible in a company, it is not possible to fully show it on the balance sheet. Furthermore, due to the fact that measuring and following up IC is very beneficial and critical for all companies operating in any sector, managers should be aware of its importance. Similarly; Sveiby (1997) states that intangible assets consist of external structure, internal structure, and human capital. In other words, it is possible to monitor the intangible assets of a company through the combination of customers and suppliers, organization and human competence. Although it seems that the importance of IC has been increasing after 2000s, some studies have already pointed out its value before these years. In one of these papers, Stewart (1991) declares that IC is getting more precious for the corporate American companies and would provide the best competitive advantage for them. The study also mentions that discovering what these firms have and then using it are also two very challenging issues for them. Petty & Guthrie (2000) also pay attention to the importance of IC that the value of human capital and technology is getting higher than the conventional resources and systems in companies. Therefore, it is critical to increase the understanding of companies about IC to make them willing to look for how and why they should aim to increase IC.

There is a consensus among authors that the importance of IC has been increasing. When it comes to the definition of the IC, although some authors have somewhat different views about it, we still see that almost most of these definitions have many intersections with each other. Accordingly, it might be possible to agree on the best definition of IC or it can be redefined by using and integrating all existing definitions. On the other hand, we see that measuring IC is more complex and more difficult than defining it. According to Pulic (1998), because most IC measurement methods have subjective components, a very simple and objective method for measuring it is required. Today, the companies aiming to be successful need to create value within the organization which can be achieved by using knowledge in an efficient way. In order to provide an objective and simple method, Pulic (1998) offers the VAIC model which measures the IC by using monetary criteria.

1.2. VAIC and Financial Performance

The effects of VAIC on financial performance are investigated by several studies all over the world. We see many researches examining the relationship between IC and financial performance of companies. Most of these empirical studies show that IC significantly affects the financial performance of firms. In a study of Singapore firms, Tan et al. (2007) find that IC has a positive impact on financial performance. They also state that the companies having higher IC are more likely to have

better financial performance in the future periods. Furthermore, Nimtrakoon (2015) examines intellectual capital performance of firms from 5 ASEAN (Association of Southeast Asian Nations) countries and presents empirical evidence that IC has positive impact on not only financial performance but also market value of firms. The study also suggests that financial performance of firms is mostly affected by HCE and CEE while SCE is found to have an insignificant effect on financial performance. Another study, which has a sample of 342 companies from London Stock Exchange (LSE), provides empirical evidence that IC and CEE are positively correlated with economic, financial, and market performance where these performances are measured by operating income to sales, ROA, and market to book ratio; respectively (Zéghal ve Maaloul 2010). These results indicate that IC does not only play an important role in reducing production costs but it also contributes to creating value for both stockholders and stakeholders. Although a strong association between IC and financial performance is found by most researchers, there are some others who find a partial association. In one of these studies, Firer & Williams (2003) show that SCE and profitability are moderately correlated with each other though no significant relationship of HCE and CEE is found with profitability. The explanation for such a lack of association between profitability and the components of VAIC might be that the used measure of profitability; namely ROA, is a conceptually different measure than VAIC. Since VAIC does not only show the increase on financial and accounting measures but also the overall potential and wealth of a company, it has only a limited impact on ROA which is a directly financial and accounting ratio.

In addition to the literature regarding firms, the effects of VAIC on banks' financial performance is also widely examined. We see that this topic attracts a lot of attention all over the world. While some studies examine the whole banking industry in one or more countries, some of them provide empirical evidence through comparing different types of banks. Furthermore, as a measure for financial performance, most studies prefer to use ROA or ROE or both of them.

In Europe, El-Bannany (2008) investigates the factors determining banks' intellectual capital performance by using a sample of banks operating in UK from 1999 to 2005. The study reports a positive and significant relationship between banks' performance and VAIC, where the bank performance is measured by ROE. Using a sample of 40 Austrian financial institutions over the period 2006-2008, Joshi et al. (2013) do not find a significant link between VAIC and financial performance indicating that VAIC does not affect ROA. The study also states that even though HCE and SCE are positively correlated with financial performance, their impact on ROA is insignificant. On the other hand, the study provides empirical evidence showing a 5% significant impact of CEE on ROA that the financial institutions with higher CEE are more likely to have better financial performance.

The relationship between intellectual capital and banks' financial performance is also one of the most widespread topics in India. Tiwari & Vidyarthi (2018) examine the effect of IC on Indian private and public banks' performance for the years from 1999 to 2015, where they use both VAIC and MVAIC (modified value added intellectual coefficient). Although the study reports a positive relationship between IC and financial performance, it also finds out that such an effect is more obvious in private banks than in public banks. As well as such a positive link, they show that banks' IC coefficients are low. According to them, this might occur because of inadequate investments of Indian

banks. Additionally, they declare alike results in measuring the performance of banks by ROA or ROE. They also provide empirical evidence that the results of VAIC and MVAIC models are almost similar. Furthermore, Singh et al. (2016) also analyze Indian banks during a period from 2007 to 2011, which also includes the period of the 2008 global financial crisis. This study argues that higher levels of IC lead to higher levels of ROA in both private and public banks. However, 80% of private banks is found to have positive relationship, while this ratio is 100% in public banks. Moreover, the study reveals that only four of the banks in the sample have a significant correlation coefficient. In another study, Tran & Vo (2018) investigate 16 Thai banks for the years from 1997 to 2016 where they measure profitability by ROA. Even though they do not find out a relationship between VAIC and profitability, they reveal some statistically significant results regarding some of its components' effect on profitability. The study states that there is a positive and significant correlation between CEE and Thai banks' profitability, which might be a result of the fact that Thailand and its banking sector is still developing. Moreover, the study reports an insignificant relationship between SCE and profitability, whereas it shows that HCE reduces profitability. According to the authors, the reason for the negative effect of HCE might result from mergers and acquisitions during the sample period which cause an increase in human resources expenses.

Although there are several studies that focus on total banking industry, some of the studies investigate the effects of VAIC by comparing different bank types or focusing on a specific bank type. In one of these studies, Buallay (2019) focuses on both conventional and Islamic banks operating in Gulf countries (Arab states of the Persian Gulf). The author reveals that although IC positively affects the operational efficiency in conventional banks, it has a positive impact on the financial efficiency in Islamic banks. In addition, whereas the study demonstrates that HCE has a positive and significant effect on financial and market performance of Islamic Banks, there is a positive and significant relationship between SCE and financial efficiency of conventional banks. In another study examining Gulf countries, Al-Musali & Ismail (2016) posit that VAIC has a positive and significant impact to improve financial performances of banks implying that IC is a very important asset for banks, which adds value and provide competitive advantages for them. Moreover, the study also finds SCE and CEE to be positively correlated with financial performance as well as the effect of SCE is higher than CEE. Unlike SCE and CEE, it is found out that an increase in the last component of VAIC; namely HCE, significantly decreases financial performance of banks. One possible explanation for this circumstance is that bank administrations in GCC countries (Gulf Cooperation Council) are not able to use human resources efficiently. In a recent study which has a sample period from 2007 to 2011, Nawaz & Haniffa (2017) investigate the effects of IC on the financial performance of 64 Islamic Banks from 18 different countries by using a widely accepted VAIC model. The results suggest that not only VAIC but also two of its components, CEE and HCE, have a positive relationship with financial performance which is measured by ROA. However, as the major limitation of their study, the authors state that VAIC methodology does not consider human resources expenses as an asset though the methodology considers it as an investment.

Lastly, we conclude this section by summarizing some studies from Turkey. The effects of IC on Turkish banking sector are examined in some recent studies. The results mainly show that VAIC and some of its components are positively correlated with financial performance of Turkish banks. First,

Ozkan et al. (2017) finds that CEE and HCE have a positive and significant impact on Turkish banking sector. The results also show that the effect of CEE is higher than HCE which in turns show that Turkish banks should effectively use their physical and financial capital in order to improve their financial performance. Another study investigating Turkish banks partially confirms these results by showing a positive and significant impact of "VAIC, SCE and HCE" on ROA (Arslan & Kızıl 2019). Similar to these studies, Uslu (2020) examines the relationship between IC and financial performance of Islamic banks operating in Turkey and he reports that Islamic banks with higher VAIC, CEE and SCE are more likely to be more profitable. However, HCE is found to have no significant effect on profitability.

1.3. The Methodology of VAIC

Researchers use different methods in order to measure the efficiency of intellectual capital. One of the most accepted and prevalent methods, VAIC developed by Pulic (2004) aims to estimate business success.

In order to calculate the VAIC, the below steps are followed:

(1) VA = Output – Input

VA = Operating Income + Employee Costs + Depreciation + Amortization

In order to calculate the VA, where VA is "value added" for the bank, input is subtracted from output, where output and input are total sales and expenses of the bank, respectively. However, in order to show the ability of a company to create value; employee, depreciation and amortization expenses are added to operating income.

(2) HCE = VA / HC

After calculating VA, HCE, "human capital efficiency" is calculated by dividing VA by HC where HC refers to the human capital. It is measured as the sum of total salaries and costs.

(3) SCE = SC / VA

Thirdly, SCE, "structural capital efficiency" is calculated by dividing SC by VA where SC equals to the structural capital. SC is calculated by subtracting HC from VA (SC = VA – HC).

(4) CEE = VA / CE

Fourthly, CEE, "capital employed efficiency" is calculated by dividing VA by CE where CE is capital employed and measured as the book value of net assets.

(5) VAIC = HCE + SCE + CEE

Finally, VAIC, "value added intellectual coefficient" is calculated by summing up HCE, SCE and CEE.

2. Data and Methodology

2.1. Sample

The sample includes quarterly data of 20 banks operating in Turkey and covers the period of 2013/Q4 – 2019/Q3. As of 2019/Q3, the asset size of these 20 banks comprise 97% of the total deposit banking sector of Turkey. Due to missing observations, we have an unbalanced data set which consists of 445 observations. The definitions of variables are given in Table-1.

Table 1: Definitions of Variables

ROA	Net Income to Total Assets
ROE	Net Income to Total Equity
VAIC	HCE + SCE + CEE
HCE	VA / HC (HC = Employee Costs, VA= Opr. Inc. + HC + Depreciation + Amortization)
SCE	SC / VA (SC = VA – HC).
CEE	VA / CE (CE= Total Assets – Total Liabilities)
LEVERAGE	Total Liabilities to Total Assets
SIZE	Natural logarithm of asset size

2.2. Descriptive Statistics

The descriptive statistics of variables which are ROA, ROE, VAIC, HCE, SCE, CEE, leverage and size are presented in the table below. The mean ratios of ROA and ROE are 0.007 and 0.07; respectively, and the standard deviations of these ratios are found to be low. As shown in table the mean ratios of control variables; namely, leverage and size, are 0.896 and 25.029; respectively. We also see that the standard deviations of independent variables are between 1 and 2 except CEE. However, these numbers are also consistent with the related literature (Buallay, 2019; Tiwari & Vidyarthi, 2018).

Table 2: Descriptive Statistics

Variable	Observation	Mean	Std. Dev.	Min	Max
ROA	445	0,007	0,006	-0,010	0,020
ROE	445	0,070	0,049	-0,160	0,210
VAIC	445	3,244	1,875	-26,560	6,630
HCE	445	2,596	1,009	-0,450	5,710
SCE	445	0,485	1,324	-26,590	3,240
CEE	445	0,162	0,083	-0,030	0,410
LEVERAGE	445	0,896	0,062	0,130	0,960
SIZE	445	25,029	1,198	20,473	27,150

Note: ROA is the ratio net income to total assets; ROE is the ratio net income to total equity; VAIC is the sum of HCE, SCE and CEE; HCE is the ratio of VA to HC where VA is sum of operating income, employee costs, depreciation and amortization and where HCE equals to employee costs; SCE is the ratio of SC to VA where SC equals to VA minus HC; CEE is the ratio of VA to CE where CE equals to total assets minus total liabilities; LEVERAGE is the ratio of total liabilities to total assets; SIZE is the natural logarithm of total assets.

2.3. Correlation Matrix

The correlation matrix is presented in the Table-3. As it is seen, there is not any high correlation among the independent variables. Accordingly, the correlation coefficient between ROA and ROE is 0.85 which is as already expected. As both of them are dependent variables and we do not include them in the same model, such a high correlation is not considered a problem in our analysis. Furthermore, we see that there is another high correlation between VAIC and SCE. Due to the fact that different regressions are performed with them, this is not regarded as a problem either. Other than these, there is not any high correlation between any other variables which might constitute a problem.

Table 3: Correlation Matrix

VARIABLES	ROA	ROE	SCE	HCE	CEE	VAIC	LEV.	SIZE
ROA	1,00							
ROE	0,85	1,00						
SCE	0,14	0,20	1,00					
HCE	0,56	0,56	0,25	1,00				
CEE	0,65	0,80	0,13	0,18	1,00			
VAIC	0,42	0,48	0,85	0,73	0,23	1,00		
LEVERAGE.	0,03	0,10	-0,03	-0,03	0,22	-0,02	1,00	
SIZE	0,41	0,35	0,14	0,57	0,05	0,40	0,23	1,00

2.4. Dependent Variables

In order to measure the financial performance of banks, two common and widely accepted ratios are used in the models. In consistency with the related literature (Tiwari & Vidyarthi, 2018; Tran & Vo, 2018; Singh et al., 2016; Nawaz & Haniffa, 2017; Joshi et al. 2013; Meles et al., 2016; Nimtrakoon, 2015), ROA is used as the first proxy of financial performance in our models, where it is calculated as net income to total assets. Considering the similar studies (Tiwari & Vidyarthi, 2018; El-Bannany, 2008), another common ratio; namely ROE, is used to measure financial performance where it is calculated as net income to total equity.

2.5. Independent Variables

Independent variables are determined by following Pulic (2004) and in line with the related literature (Tran & Vo, 2018; Ozkan et al., 2017; Joshi et al., 2013). Independent variables consist of (1) VAIC which is defined as overall value creation efficiency and (2) HCE, (3) SCE and (4) CEE which refer to other value creation efficiency ratios from the aspects of human capital, structural capital, and capital employed respectively as in the study of Pulic (2004).

2.6. Control Variables

Following prior studies (Tran & Vo, 2018; Ozkan et al., 2017; Tiwari & Vidyarthi, 2018; Nawaz & Haniffa, 2017; Zéghal & Maaloul, 2010) two control variables, bank size and leverage, are used in the

analyses. Whereas bank size is measured as the natural logarithm of total assets, leverage is measured as total loans to total assets.

2.7. Methodology and Hypothesis Development

Panel data method is used in analysis. In panel data approach, it is possible to implement fixed effects model or random effects model. In order to decide which model is to be used, the mostly preferred way is using the Hausman test, which determines the more efficient model to be applied. After running the Hausman test accordingly, the fixed assets model is chosen to be utilized for the regression models.

In order to find the effect of VAIC and its components on banks' financial performance, where ROA and ROE are used as financial proxies, 4 regression models are established. In the first and second regressions, we examine how VAIC affects ROA and ROE, respectively. Following the related literature (Buallay, 2019; Tiwari & Vidyarthi, 2018; Singh et al., 2016; Nawaz & Haniffa, 2017; Al-Musali & Ismail, 2016; El-Bannany, 2008), we expect that banks with higher VAIC tend to be more profitable in terms of ROA and ROE. In the third and fourth regressions, we investigate the effects of the components of VAIC namely HCE, SCE, and CEE on ROA and ROE, respectively. Considering the related literature, we estimate a positive link between these three components of VAIC and banks' performance.

The following estimations are run:

(Model 1) $ROA_{it} = B_1 VAIC_{it} + B_2 SIZE_{it} + B_3 LEVERAGE_{it} + \alpha_t + u_{it}$

(Model 2) $ROE_{it} = B_1 VAIC_{it} + B_2 SIZE_{it} + B_3 LEVERAGE_{it} + \alpha_t + u_{it}$

(Model 3) $ROA_{it} = B_1 HCE_{it} + B_2 SCE_{it} + B_3 CEE_{it} + B_4 SIZE_{it} + B_5 LEVERAGE_{it} + \alpha_t + u_{it}$

(Model 4) $ROE_{it} = B_1 HCE_{it} + B_2 SCE_{it} + B_3 CEE_{it} + B_4 SIZE_{it} + B_5 LEVERAGE_{it} + \alpha_t + u_{it}$

3. Empirical Results

The results of Model-1 and Model-2 are presented in the Table-4 below. In consistency with our expectations and related literature (Tiwari & Vidyarthi, 2018; Singh et al., 2016; Nawaz & Haniffa, 2017; Uslu, 2020; Arslan & Kızıl, 2019), we find a positive and significant relationship between VAIC and ROA. These results suggest that the banks which have higher VAIC tend to have higher financial performance in terms of ROA. Furthermore, similar to prior studies (Tiwari & Vidyarthi, 2018; El-Bannany, 2008), we also expect and find a positive and significant effect of VAIC on ROE. The results indicate that although VAIC of Turkish banks is positively and significantly correlated with both ROE and ROA, the coefficient of ROE is 9 times higher than ROA as well as it is still around 0.1%. Regarding control variables, we see that bank size has a significant and positive impact on both measures of financial performance while leverage is found to have no significant relationship with them.

Table 4: Regression Estimations of Model-1 and Model-2

Variables	ROA	ROE
VAIC	0.001***	0.009***
	(6.27)	(6.72)
SIZE	0.002***	0.015**
	(5.88)	(2.17)
LEVERAGE	-0.003	0.053
	(-0.69)	(1.17)
Constant	-0.034***	-0.381**
	(-5.08)	(-2.55)
Observation	445	445
R^2	0.25	0.24

Standard errors are given in parentheses.
* Significant at 10% level, * * Significant at 5% level, * * * Significant at 1% level

The results of Model-3 and Model-4 are given in the Table-5 below. In line with our expectations and related literature (Buallay, 2019; Nawaz & Haniffa, 2017; Joshi et al., 2013; Arslan & Kızıl, 2019; Ozkan et al., 2017), HCE has been positively and significantly correlated with banks' financial performance. We see that HCE is correlated not only with ROA but also with ROE. Similar to the Model-1 and the Model-2, the results point out that the coefficient of ROE is almost 10 times higher than ROA. These results suggest that human capital is one of the significant determinants of banks' financial performance.

Regarding SCE, the regression results show that its effect on ROA is negative at 5% significance level where the coefficient is 0.1%. Meles et al. (2016) also report a negative but insignificant relationship between SCE and ROA. However, in consistency with the Tran & Vo (2018), we also find that SCE has no significant impact on ROE. Taking into consideration both of these findings, we can conclude that there is not an obvious correlation between SCE and banks' financial performance.

Table 5: Regression Estimations of Model-3 and Model-4

Variables	ROA	ROE
HCE	0.002***	0.019***
	(8.08)	(12.92)
SCE	-0.001**	-0.001
	(-2.30)	(-0.89)
CEE	0.048***	0.447***
	(21.93)	(38.96)
SIZE	0.001***	0.005**
	(5.01)	(2.43)
LEVERAGE	-0.015***	0.056***
	(-4.91)	(-3.26)
Constant	-0.024***	-0.120***
	(-4.32)	(-2.82)
Observation	445	445
R^2	0.67	0.83

Standard errors are given in parentheses.

* Significant at 10% level, * * Significant at 5% level, * * * Significant at 1% level

Note: ROA is the ratio net income to total assets; ROE is the ratio net income to total equity; VAIC is the sum of HCE, SCE and CEE; HCE is the ratio of VA to HC where VA is sum of operating income, employee costs, depreciation and amortization and where HCE equals to employee costs; SCE is the ratio of SC to VA where SC equals to VA minus HC; CEE is the ratio of VA to CE where CE equals to total assets minus total liabilities; LEVERAGE is the ratio of total liabilities to total assets; SIZE is the natural logarithm of total assets.

According to the results, similar to the related literature (Joshi et al., 2013; Nawaz & Haniffa, 2017; Buallay, 2019; Ozkan et al., 2017; Uslu, 2020), the third component of VAIC; namely CEE, is found to have a positive and significant effect on banks' financial performance. We declare such a significant impact of CEE on both ROA and ROE. Although its association level is significant at 1% like HCE and VAIC, we see that the coefficients of CEE are higher in comparison to them. This finding shows that CEE has the largest impact on banks' financial performance as compared to the others and this finding is consistent with the study of Oppong & Pattanayak (2019). In addition, similar to the results of HCE and VAIC, the effect of CEE is more obvious on ROE than ROA. This also shows that Turkish banks use their physical and financial capitals more efficiently than their human capital.

Conclusion, Future Research, Limitations and Policy Implications

In this study, we examine the effects of not only intellectual capital but also its three components on Turkish banks' financial performance by using VAIC model developed by Pulic (2004). The sample includes quarterly data of 20 banks operating in Turkey and covers the period of 2013/Q4 – 2019/Q3. As of 2019/Q3, the asset size of these 20 banks comprise 97% of the total deposit banking sector of Turkey. Due to missing observations, we have an unbalanced data set, which consists of 445 observations.

In consistency with the related literature (Tran & Vo, 2018; Singh et al., 2016; Nawaz & Haniffa, 2017; Joshi et al. 2013; Meles et al., 2016; Nimtrakoon, 2015; Tiwari & Vidyarthi; 2018; El-Bannany, 2008), we use two widely accepted accounting ratios, ROA and ROE, as a measure of financial performance. Similar to the other studies (Tiwari & Vidyarthi, 2018; Singh et al., 2016; Nawaz & Haniffa, 2017; El-Bannany, 2008), we find out a positive and significant relationship between VAIC and both ROA and ROE. In addition, we also report that the coefficient of ROE is 9 times higher than ROA as well as it is still around 0.1%.

The results also show a positive and significant association between financial performance and the components of VAIC except SCE. In line with our expectations and related literature (Buallay, 2019; Nawaz & Haniffa, 2017; Joshi et al., 2013), HCE has been positively and significantly correlated with both ROA and ROE as well as the coefficient of ROE is 10 times higher. Furthermore, parallel to similar studies (Joshi et al., 2013; Nawaz & Haniffa, 2017; Buallay, 2019), CEE is also found to have a positive and significant relationship on the financial performance of banks in terms of ROA and ROE. Our results show that CEE has the highest impact on bank's financial performance. Accordingly, it seems that Turkish banks use their physical and financial capitals more efficiently than their human capital.

When it comes to SCE, contrary to our expectations, no positive influence has been detected on financial performance. Although SCE has a negative and significant relationship at 5% level with ROA, the correlation coefficient is 0.1%. Furthermore, no significant link is found between SCE and ROE. We see that these results are somehow consistent with those of Meles et al. (2016) and Tran & Vo (2018).

In future studies, it would also be possible to examine the impact of VAIC on the financial performance of banks by categorizing banks into categories like government, private, Islamic etc. In our study, we use two widely accepted financial ratios (ROA and ROE) as proxies of performance. Moreover, some other financial measures related with market value might be used as a dependent variable in the forthcoming studies. Additionally, the dataset can also be extended to include other developing markets with similar indicators as Turkey to attain comparative results.

Our sample includes the data of 20 banks in a 5-year period. However, the asset size of these 20 banks comprises 97% of the total deposit banking sector of Turkey. It might be possible to extend the period of the sample and to increase the number of observations. On the other hand, since there are some studies which have a similar or lower number of banks (Joshi et al., 2010) and a shorter sample period (Mavridis 2004), our study is in consistent with the literature in terms of these issues.

There is, of course, a limitation regarding the measurement of intellectual capital and its components. There is not a consensus even in the definition of intellectual capital and 22 different definitions are reported in the literature review provided by Marr and Moustaghfir (2005). Accordingly, measuring the intellectual capital is not as simple and easy as defining it. Although the VAIC method developed by Pulic (1998) aims to provide a very common and objective method to measure intellectual capital, there are some critiques to it. Ståhle et al., (2011) finds out low connection between VAIC and company financial performance and, therefore, they claim that it is not clear to understand what the VAIC measures. Besides, changes in value added, which is the main element of VAIC, cause fluctuations in VAIC. Another study asserts that even though both company and IC value also depend on the level of financial leverage, VAIC has a deficiency of not taking this fact into consideration (Maditinos et al., 2011).

This paper presents the positive effects of intellectual capital and two of its components, CEE and HCE, on bank's financial performance. Intellectual capital provides the best competitive advantage for the companies (Stewart, 1991). Hence, it is critical to increase the understanding of companies about IC to make them willing to look for how and why they should aim to increase IC (Petty ve Guthrie 2000). Considering the increasing value of IC, there are some implications for managers, investors, and governments. Firstly, bank managers should look for monitoring the intellectual capital and potential of their banks to gain competitive advantage, increase profits, and ensure sustainable growth. Besides IC, managers should also aim to increase HCE and CEE. Secondly, investors should also examine and compare the banks in terms of IC and might make their decisions accordingly. In other words, they can invest in banks which have higher VAIC, HCE, and CEE. Thirdly, there are also some benefits for government and regulation authorities in Turkey. Since banks play a very crucial role in creating a sustainable and sound economy, governments can monitor their intellectual capital and performance, and also can take actions if necessary.

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