The purpose of this study is to analyze the relationship between the intellectual capital performance and financial performance of 44 banks operating in Turkey between 2005 and 2014. The intellectual capital performance of banks is measured through the value added intellectual coefficient (VAIC) methodology. The intellectual capital performance of the Turkish banking sector is generally affected by human capital efficiency (HCE). In terms of bank types, development and investment banks have the highest average VAIC. When VAIC is divided into its components, it can be observed that capital employed efficiency (CEE) and human capital efficiency (HCE) positively affect the financial performance of banks. However, CEE has more influence on the financial performance of banks compared to HCE. Therefore, banks operating in the Turkish banking sector should use their financial and physical capitals if they wish to reach a higher profitability level.

KEYWORDS: Intellectual capital; Value added intellectual coefficient (VAIC); Financial performance; Return on asset; Turkish banking sector
diminishing (Lev & Zarowin, 1999). In today’s world, sources of economic value and wealth include not only the products manufactured by enterprises but also their intangible assets, i.e. their intellectual capital (Chen, Cheng, & Hwang, 2005; Goldfinger, 1997). It is widely believed that intellectual capital will play a greater role in creating value (Powell, 2003). In the knowledge based socio-economic period where intellectual capital has become one of the production factors, performance measurements for firm may not be possible with traditional accounting practices anymore. Therefore, there is a growing need to develop new methods taking account of the intellectual capital, as well (Berzkalne & Zelgalve, 2014; Gan & Saleh, 2008). 

After it has been realized that intellectual capital has an impact on creating value and increasing the financial performance of firms, various methods have been developed to measure it (Edvinsson, 1997; Kaplan & Norton, 1996; Roos, Roos, Dragonetti, & Edvinsson, 1997; Steward, 1991; Sveiby, 1997). Most of the recent studies analyzing the relationship between the intellectual capital performance and financial performance of the firms use the value added intellectual coefficient (VAIC) model developed by Pulic (1998), Chen et al. (2005), Ercan, Intellectual coefficient (VAIC) model developed by Pulic (1998, 2005), Chen et al. (2005), Ercan, Öztürk, & Demirgűneş (2003), Joshi, Cahill, Sidhu, & Kansal (2013), Kayacan & Özkan (2015), Mondal & Ghosh (2012), and Yalama (2013). Firer and Williams (2003) state that VAIC is an easily applicable and effective model to measure firms’ intellectual capital performance and make comparisons between firms.

Studies investigating the link between the VAIC model and financial performance suggest that intellectual capital contributes to the profitability, efficiency and earnings per share of firms (Firer & Stainbank, 2003; Makki, Lodhi, & Rohra, 2009; Tan, Plowman, & Hancock, 2007). Appuhami (2007) highlights the positive relationship between intellectual capital and capital gain of investors. Moreover, some of the studies reveal that there is a delayed relationship between investments in intellectual capital and return on investments (Vaisanen, Kujansivu, & Lönnqvist, 2007). Results of the studies (Tseng & Goo, 2005; Wang, 2008) exploring the relationship between market value and intellectual capital show that there is a positive relationship between these two variables. In some studies (Maditinos, Chatzoudes, Tsairidis, & Theriou, 2011; Mosavi, Nekoueizadeh, & Ghaedi, 2012), on the other hand, it has been suggested that human capital efficiency (HCE) is the only component of the VAIC model which has a relationship with the market value of a firm. There are also various studies (Ferraro & Veltri, 2011; Mehralian, Rajabzadeh, Sadeh, & Rasekh, 2012; Şamiloglu, 2006) pointing out the non-existence of a relationship between intellectual capital and market value or financial performance.

This study analyzes the relationship between the intellectual capital performance and financial performance of 44 banks operating in Turkey between 2005 and 2014 using the VAIC model. Panel data regression analysis, which incorporates the horizontal section and time dimension into the analysis, is used in the study. While previous studies (Çalışır, Altın Gümüşsoy, Cirit, & Bayraktaroglu, 2011; Çalışır, Altın Gümüşsoy, Cirit, & Bayraktaroglu, 2010; Ercan et al., 2003; Kayacan & Özkan, 2015; Yalama, 2013) are covering banks as group, such as participation banks, private banks, development and investment banks, banks listed on Istanbul Stock Exchange (currently known as Borsa Istanbul) and analyze just one group at a time; we aim to find out if there is significant difference between our results and previous studies’ results. In this study, we purpose to fill this gap and contribute to the literature. Therefore, it can be said that this is one of the first studies exploring the relationship between the intellectual capital performance and financial performance by incorporating all the banks which operate within the Turkish banking sector into the dataset. The results provide some clues for banks in Turkey about in which component(s) of the intellectual capital they should invest to increase their financial performance. Findings indicate that VAIC (measurement for the total intellectual capital) has not statistically significant effect on the financial performance of banks. On the other hand, when VAIC is divided into its components, it can be observed that CEE and HCE positively affect the financial performance of banks. However, findings suggest that CEE has more influence on the financial performance of banks compared to HCE. Therefore, banks operating in the Turkish banking sector should use their financial and physical capitals if they wish to reach a higher profitability level.

This study is composed of five sections. The second section explains the concept of intellectual capital and focuses on literature reviews investigating the relationship between the intellectual capital performance and financial performance of banks. In the third section, data, variables, and methods are explained and hypothesis for the study is laid down. In the fourth section, empirical results of the study are reviewed. The final section summarizes the results of the overall study.

2. Literature review

2.1. Intellectual capital

Researchers define the concept of intellectual capital in different ways. Therefore, there is no single definition explaining the concept of intellectual capital. However, intellectual capital may be interpreted as the intangible assets which are not listed explicitly on a firm’s balance sheets but positively impact the performance and success of it (Brooking, 1996; Kayacan & Alkan, 2005; Mondal & Ghosh, 2012).

As there is no consensus in the literature on the definition of intellectual capital, researchers have not agreed upon the components of intellectual capital, either. Yet, it is widely acknowledged that intellectual capital encompasses three components, i.e. human capital, structural capital and relation/customer capital. Human capital can be defined as know-how which leaves an organization when people leave and it includes skills, capabilities, experience and expertise of employees. Structural capital covers the system, structure and processes of an organization and it involves non-physical components such as databases, organization chart, management processes and business strategies. However, customer
capital refers to all intangible assets which regulate and manage the relationships of an organization. It comprises the organization's relationships with its customers, suppliers, shareholders and other stakeholders (Joshi et al., 2013; Kurt, 2008; Mondal & Ghosh, 2012).

After it has been realized that intellectual capital has an impact on creating value and increasing the performance of firms, various methods have been developed to measure it. Methods used to measure intellectual capital includes market-to-book ratio, Tobin's Q ratio, calculated intangible value (Steward, 1997), balanced scorecard (Kaplan & Norton, 1996), Skandia IC Navigator (Edvinsson, 1997), intellectual capital services IC-index (Roos et al., 1997), the technology broker's IC audit (Brooking, 1996), the intangible asset monitor (Sveiby, 1997), economic value added (Steward, 1991), market value added, and value added intellectual coefficient (VAIC) model (Celikkol, 2008; Karacan & Ergin, 2011; Pulic, 1998, 2004; Yalama & Coskun, 2007).

This study uses the VAIC model developed by Pulic (1998, 2004) which measures the intellectual capital performances of firms. The VAIC model reveals the intellectual capability of an organization and whether its sources are used efficiently or not. In other words, VAIC measures the newly-created value per monetary unit invested in each source. The higher the VAIC value of an organization is, the more is the value added created by overall sources of that organization (Pulic, 2004).

2.2. VAIC and financial performance

The VAIC model is widely utilized to measure the intellectual capital performance of firms in various countries and within different sectors. Therefore, there is a wide range of studies investigating the impact of intellectual capital on the performance of firms by means of the VAIC model. While some of these studies (Chen et al., 2005; Chu, Chan, & Wu, 2011; Gan & Saleh, 2008; Kamath, 2008; Pal & Soriya, 2012; Tan et al., 2007) suggest that intellectual capital has positive impacts on the financial performance of firms, others (Chan, 2009a, 2009b; Ghosh & Mondal, 2009; Oztürk & Demirgünes, 2007) fail to produce adequate evidence showing this positive relationship.

In the international literature, studies using the VAIC model predominantly focus on the banking and finance sectors. The very first study sifting through the impacts of intellectual capital on the banking sector by using the VAIC model belongs to Ante Pulic and Manfred Bornemann. In their study, the authors offer valuable information on the efficiency of the intellectual capital held by banks on their profitability with the data envelopment analysis. Furthermore, the authors created a portfolio based on the intellectual capital in order to test the impact of intellectual capital on profitability. As a result of the study, the authors revealed that the banks included in the analysis succeeded to turn the intellectual capital into profitability by 61.3% and that the portfolio using the intellectual capital as an input achieved maximum return. Between 1995 and 2006, Yalama (2013) surveyed the relationship between the investment in intellectual capital and bank profitability on a short and long term basis by means of the panel data regression analysis. According to the results of the study, the intellectual capital increases profitability of banks, especially in the long run. Kayacan and Özkan (2015) suggest there is a positive correlation between the intellectual capital performance of the participation banks operating in Turkey and their profitability ratio. In addition, the authors argue that CEE has a greater impact on the profitability of participation banks compared to other VAIC components. Similarly, Çalışık (2015) demonstrate that CEE has a greater impact on the profitability of 14 banks traded on Borsa İstanbul. Çalışır et al. (2010, 2011) calculate the values of the VAIC and its components of commercial, development and investment banks operating in the Turkish banking system and make comparative analyses between the banks according to these values. Apart from the above-mentioned ones, there are also several studies investigating the impact of intellectual capital on the financial performance of the Turkish banking.
sector by using different methodologies (Karacan & Ergin, 2011; Yıldız, 2011).

There are studies that examine the relationship between the intellectual capital criteria and market-to-book ratio of banks or the efficiency rates. For the period 1998—2001, Şamiloğlu (2006) argue there is no significant correlation between the VAIC (and its components) of 12 banks whose shares were traded on Borsa İstanbul and their market-to-book ratio. Ercan et al. (2003) demonstrate that there is a positive but statistically insignificant relationship between the VAIC components and market-to-book ratio. Moreover, the authors suggest that the VAIC components negatively affect the efficiency of banks. On the other hand, Yalama (2013) indicates that intellectual capital increases the market value and efficiency of banks in the long term. Çalışkan (2015) claims that HCE is more effective on the efficiency and market-to-book ratio of banks compared to SCE. The author argues that with increased investment in human capital, the difference between the book values and market values of banks may be reduced. Öztürk and Demirgüneş (2005) note that while CEE has a negative impact on the market value of banks, HCE affects it in a positive way.

3. Data and methodology

By the end of 2015, there are a total of 52 banks operating in the Turkish banking system. As demonstrated in Fig. 1, banks can be divided into three main groups according to their scope, which are (1) deposit banks, (2) development and investment banks, and (3) participation banks. Deposit banks may be examined under four types, namely “state-owned”, “privately-owned”, “banks under The Savings Deposit Insurance Fund”, and “foreign” banks. Foreign deposit banks are split into two groups: “banks founded in Turkey” and “banks having branches in Turkey”. Development and investment banks can be divided into three categories, which are “state-owned”, “privately-owned”, and “foreign” banks. Finally, participation banks are composed of “state-owned”, “domestic” and “foreign” banks. Of the 34 deposit banks operating in Turkey as of 2015, a total of three are “state-owned”, a total of 11 are “privately-owned”, one is a “bank under the Savings Deposit Insurance Fund”, and 19 are “foreign” banks. While 13 of the foreign deposit banks have been established in Turkey, six of them have branches in Turkey. Of the 13 development and investment banks operating in Turkey, a total of three are “state-owned”, six are “privately-owned”, and four are “foreign” banks. Of the 5 participation banks operating in Turkey, one is “state-owned”, one is “domestic”, and three are “foreign” banks. The fact that 26 banks out of 52 operating in Turkey are foreign banks demonstrates the foreign capital investments aimed at the Turkish banking sector.

This study uses data of 44 banks operating in Turkey between 2005 and 2014. They consist of 28 deposit banks, 12 development and investment banks and 4 participation banks. Data have been obtained from the statistical reports uploaded directly from websites of banks or the Public Disclosure Platform (PDP). The total number of observations is 440. Given the fact that there are 52 banks operating in Turkey as of the end of 2015, it is noteworthy that a significant number of banks were included in the sample. Seven banks have been excluded from the sample due to the lack of data for analysis. The banks and their types included in the analysis are shown in Table 2.

Value-added intellectual coefficient (VAIC) developed by Pulic (1998) and Pulic (2004) is used to measure the intellectual capital performance of the banks. The VAIC model reveals the intellectual capability of a firm and whether its sources are used efficiently or not. In other words, VAIC measures the newly-created value per monetary unit invested in each source. The higher the VAIC of a firm, the more the value added created by overall sources of that firm (Pulic, 2004).

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3.1. Dependent variable

In the study, return on assets (ROA), one of the traditional performance measures, is used to represent the financial performance of banks. ROA is the key measure of bank profitability (Dietrich & Wanzenried, 2011; Pasiouras & Kosmidou, 2007), and often utilized in similar studies (Joshi et al., 2013; Ting & Lean, 2009; Yalama, 2013). ROA is calculated by dividing the net profit (the loss) for the current year by total assets.

3.2. Independent variables

Components of the VAIC model are used as independent variables in this study. VAIC is calculated as follows (Ghosh & Mondal, 2009; Pulic, 1998, 2004; Yalama, 2013):

\[ VAIC_i = CEE_i + HCE_i + SCE_i \]  

(1)

In equation (1), VAIC refers to the value added intellectual coefficient of the bank i; CEE refers to the capital employed efficiency coefficient of the bank i; HCE refers to the human capital efficiency coefficient of the bank i, and SCE refers to the structural capital efficiency coefficient of the bank i. In order to calculate these variables, the total value added (VAi) created by banks needs to be calculated. Total VAi is calculated as follows (Al-Musalli & Ku Ismail, 2014; Alipour, 2012; Chu et al., 2011; Pulic, 2004):

\[ VA_i = OP_i + EC_i + A_i \]  

(2)

In equation (2), VAi refers to the total value added created by the bank i; OPi refers to the operating profit of the bank i; ECi refers to the employment cost of the bank i, and Ai refers to the amortization and depreciation of the bank i.

Following the calculation of the total VAi, the components of VAICi (CEEi, HCEi, and SCEi) are calculated. CEE, the first component of VAIC, is calculated as follows:

\[ CEE_i = VA_i / CE_i \]  

(3)

In equation (3), CEi refers to the capital employed (book value of assets) of the bank i; in other words, equity value of the bank i. HCEi and SCEi are calculated as follows:

\[ HCE_i = VA_i / HC_i \]  

(4)

\[ SC_i = VA_i - HC_i \]  

(5)

\[ SCE_i = SC_i / VA_i \]  

(6)

In equations (4)–(6), HCi refers to the personnel expenses of the bank i and SCi refers to the difference between VAi and HCi.

3.3. Control variables

As in other studies in the literature (Alipour, 2012; Mondal & Ghosh, 2012; Yalama, 2013), bank size (LNTA – Natural Log of Total Assets) and leverage (LEV – Ratio of Long-Term Debt to Total Assets) are included in the regression models (Model 2 and 4) as control variables. In addition, dummy variables (DEPOSIT and PARTICIPATION) are used to demonstrate the influence of the bank types on the bank profitability. In the models 2 and 4, DEPOSIT (PARTICIPATION) takes value 1 for banks classified as deposit (participation) banks, according to the Banking Regulation and Supervision Agency (BRSA), and 0 otherwise.

3.4. Regression models and hypothesis

Models to be tested in the study are demonstrated in Table 1. Models 1 and 2 in Table 1 test the relationship between the financial performance measure (ROAi) of banks and VAICi; Models 3 and 4 examine the association between ROAi and components of VAICi (CEEi, HCEi, and SCEi). Control variables are also included in Model 2 and Model 4.

Models in Table 1 are used to test the following hypothesis:

H1. There is a significant positive relationship between the value added intellectual capital coefficient (VAIC) of the banks operating in Turkey and their financial performance measure (ROA).

H2. There is a significant positive relationship between the capital employed efficiency coefficient (CEE) of the banks operating in Turkey and their financial performance measure (ROA).

H3. There is a significant positive relationship between the human capital efficiency coefficient (HCE) of the banks operating in Turkey and their financial performance measure (ROA).

H4. There is a significant positive relationship between the structural capital efficiency coefficient (SCE) of the banks operating in Turkey and their financial performance measure (ROA).

4. Empirical results

Table 2 demonstrates the average value of the variables concerning the intellectual capital performance of the banks in the 2005–2014 period. In Table 2, Panel A shows the average value of VAIC and its components for deposit banks, Panel B
average VAIC values are evaluated on the basis of bank groups, development and investment banks have the highest average VAIC (4.4553) and participation banks have the lowest average VAIC (3.4036). Deposit banks are in the second place with the average VAIC value of 3.7122. If the VAIC components in Table 2 are analyzed, it can be concluded that the most important component of the VAIC value for the banks operating in the Turkish banking sector is HCE. This result is also consistent with many other studies in the literature (Goh, 2005; Joshi, Cahill, & Sidhu, 2010; Joshi et al., 2013).

Table 3 presents the average annual values of the variables (CCE, HCE, SCE and VAIC) used in the analysis concerning the impact of intellectual capital on the financial performance of banks. The average VAIC of all banks is 3.8868 for the 2005–2014 period. When this value is compared with the results of studies conducted in other countries (Al-Musalli & Ku Ismail, 2014; El-Bannany, 2008, 2012; Joshi et al., 2013; Ting & Lean, 2009), it can be observed that it is lower than the average VAIC of the banks operating in the United Kingdom (10.80) and the United Arab Emirates (7.94); but higher than the banks operating in Australia (3.67), Saudi Arabia (3.65) and Malaysia (1.78). Only 15 of the 44 banks included in the analysis have a higher average VAIC than this one (see Table 2). Moreover, average VAIC values for the years apart from 2006, 2007 and 2009 are lower than this value. Table 3 demonstrates that the most important component for the VAIC is HCE.

Pearson correlation analysis results related to the variables used in the analysis are shown in Table 4. There is a statistically significant positive correlation between ROA and VAIC, CCE and HCE. Among independent variables, HCE is the variable with the highest correlation with ROA (r = 0.5593). SCE has a negative but statistically insignificant relationship with ROA. It is observed that there is no strong correlation between independent variables. This result suggests that multicollinearity problem between independent variable is weak or non-existent. Table 5 demonstrates the results concerning the Model (1, 2, 3 and 4) which show the relationships between the profitability of the banks operating in Turkey and their intellectual capital performance. Regression results suggest that all models put forward in the study are statistically significant. When explanatory power of the models is compared, it can be concluded that

<table>
<thead>
<tr>
<th>Year</th>
<th>CEE</th>
<th>HCE</th>
<th>SCE</th>
<th>VAIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>0.2918</td>
<td>2.9179</td>
<td>0.4265</td>
<td>3.6362</td>
</tr>
<tr>
<td>2006</td>
<td>0.2690</td>
<td>2.6977</td>
<td>1.9498</td>
<td>4.9164</td>
</tr>
<tr>
<td>2007</td>
<td>0.3043</td>
<td>3.1922</td>
<td>0.7536</td>
<td>4.2501</td>
</tr>
<tr>
<td>2008</td>
<td>0.2777</td>
<td>3.0547</td>
<td>0.3796</td>
<td>3.7120</td>
</tr>
<tr>
<td>2009</td>
<td>0.2788</td>
<td>3.4521</td>
<td>0.4784</td>
<td>4.2092</td>
</tr>
<tr>
<td>2010</td>
<td>0.2483</td>
<td>2.9793</td>
<td>0.5257</td>
<td>3.7533</td>
</tr>
<tr>
<td>2011</td>
<td>0.2443</td>
<td>3.0326</td>
<td>0.5492</td>
<td>3.8260</td>
</tr>
<tr>
<td>2012</td>
<td>0.2503</td>
<td>2.9385</td>
<td>0.5463</td>
<td>3.7351</td>
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<tr>
<td>2013</td>
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<td>2.5603</td>
<td>0.5134</td>
<td>3.2905</td>
</tr>
<tr>
<td>2014</td>
<td>0.2085</td>
<td>2.7016</td>
<td>0.6289</td>
<td>3.5391</td>
</tr>
<tr>
<td>2005–2014</td>
<td>0.2590</td>
<td>2.9527</td>
<td>0.6751</td>
<td>3.8868</td>
</tr>
</tbody>
</table>

Table 3: VAIC and its components from 2005 to 2014.

<table>
<thead>
<tr>
<th>Year</th>
<th>CEE</th>
<th>HCE</th>
<th>SCE</th>
<th>VAIC</th>
</tr>
</thead>
<tbody>
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<td>3.8868</td>
</tr>
</tbody>
</table>
Regression results.

Table 5

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.0098 (1.3179)</td>
<td>0.0160 (0.6778)</td>
<td>−0.0233 (−3.3425)</td>
<td>0.0182 (0.9241)</td>
</tr>
<tr>
<td>VAIC</td>
<td>0.0025 (1.2695)</td>
<td>0.0023 (1.2407)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HCE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HCE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LNTV</td>
<td>0.0028 (1.6257)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LNTV</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEPOSIT</td>
<td>0.0014 (0.1811)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PARTICIPATION</td>
<td>0.0066 (0.9869)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.0818</td>
<td>0.1718</td>
<td>0.5235</td>
<td>0.5123</td>
</tr>
<tr>
<td>F-statistics</td>
<td>50.1159</td>
<td>17.9999</td>
<td>11.4863</td>
<td>66.8880</td>
</tr>
<tr>
<td>p-value</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

The figures in the parentheses are $t$-statistics. After applying several tests (F test, LM test and Hausman test) with respect to panel data analysis, Models (1, 2, and 4) are estimated using one-way individual-specific random effect model and Model (3) is estimated using one-way individual-specific fixed effect model. In order to deal with heteroscedasticity for all four models, White (1980) heteroscedasticity-consistent standard errors are used.

$ROA_{it} = \beta_0 + \beta_1 VAIC_{it} + \epsilon_{it}$ (Model 1)

$ROA_{it} = \beta_0 + \beta_1 VAIC_{it} + \beta_2 LNTV_{it} + \beta_3 LEV_{it} + \beta_4 DEPOSIT_{it} + \beta_5 PARTICIPATION_{it} + \epsilon_{it}$ (Model 2)

$ROA_{it} = \beta_0 + \beta_1 CEE_{it} + \beta_2 HCE_{it} + \beta_3 SCE_{it} + \epsilon_{it}$ (Model 3)

$ROA_{it} = \beta_0 + \beta_1 CEE_{it} + \beta_2 HCE_{it} + \beta_3 SCE_{it} + \beta_4 LNTV_{it} + \beta_5 LEV_{it} + \beta_6 DEPOSIT_{it} + \beta_7 PARTICIPATION_{it} + \epsilon_{it}$ (Model 4)

* Represents statistical significance at 1% level.

The relationship between intellectual capital and financial performance of banks has been the subject of countless studies in the recent studies (Maditinos et al., 2011; Mehralian et al., 2012) present various findings showing that ROA is not affected by VAIC.

Results concerning the Models 3 and 4 presented in Table 5 show the relationship between the components of VAIC (CEE, HCE and SCE) and ROA. Findings imply there is a statistically significant positive relationship between CEE and ROA. In other words, an increase in CEE enhances the profitability of banks. There is also a statistically significant positive relationship between HCE and ROA. However, CEE has a greater statistically significant effect on profitability compared to HCE. These results suggest that the profitability of banks in Turkey is affected by CEE rather than HCE. In other words, banks operating in the Turkish banking sector use their financial and physical assets efficiently in an attempt to reach a higher profitability level.

According to the results of Model 3 and Model 4 imply that there is no statistically significant relationship between SCE and ROA. Ting and Lean (2009) and Joshi et al. (2013) also suggest that SCE does not have a statistically significant effect on the profitability of financial institutions in Malaysia and Australia.

Finally, the empirical evidence obtained regarding the control variables in Model 2 and 4 shows that bank size and bank type do not have a positive or negative effect on the profitability of banks. Leverage ratio, on the other hand, has a statistically significant effect on the profitability of banks in a negative way.

5. Conclusion

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studies. If the literature on this subject is reviewed, it is observed that the intellectual capital has a positive impact on financial performance of banks. In this study, the intellectual capital efficiency of 44 banks operating in Turkey between 2004 and 2015 is calculated by means of value added intellectual coefficient (VAIC) and it analyses how intellectual capital affects the financial performance of these banks (ROA). The study provides significant inputs to the current literature by including 44 banks (out of 52) in the sample and analyzing the VAIC values according to bank types. Considering that most of the studies in Turkey focus only on the banks traded on Borsa Istanbul (Ercan et al., 2003; Şamiloğlu, 2006; Yalama, 2013; Yalama & Coskun, 2007), this study is a step forward in the relevant field.

The findings of the study suggest that intellectual capital of the Turkish banking sector is primarily affected by human capital efficiency coefficient (HCE). On the other hand, capital employed efficiency coefficient (CEE) and structural capital efficiency coefficient (SCE) is less effective in creating value in the banking sector compared to HCE. Goh (2005), and Joshi et al. (2010, 2013) have drawn similar conclusions for the financial institutions in Malaysia and Australia. Average VAIC of all banks in the analyzed period is 3.8868 and approximately 34% of the banks included in the analysis have a higher average VAIC than this value. In terms of bank types, development and investment banks has the highest average VAIC.

The regression results show that both CEE and HCE affect the financial performance of banks in a positive way. On the other hand, contrary to expectation, CEE has more influence on the financial performance compared to HCE. Therefore, banks operating in the Turkish banking sector should use their financial and physical capitals if they wish to reach a higher profitability level. SCE does not have a significant effect on the financial performance of banks. These results are also consistent with other studies in the literature (Joshi et al., 2013; Ting & Lean, 2009).

While the banking sector, the key component in the Turkish financial system, is analyzed, other financial institutions (such as insurance companies and investment trusts) have not been included in this study. In addition, there are various methods (i.e. market-to-book ratio, Tobin's Q ratio, balanced scorecard) other than VAIC to measure the intellectual capital performance. Thus, future studies may cover all companies operating in the finance sector and apply to other methods to measure intellectual capital performance of financial institutions. Therefore, the foregoing study will constitute an important reference point for future studies.

References


