

The Effect of Intellectual Capital on Financial Performance: Evidence from Iranian Banks Listed in Tehran's Stock Exchange

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Abstract

This study aimed to investigate the impact of intellectual capital on the financial performance of the banks listed in the Tehran Stock Exchange. For this purpose, the impact of intellectual capital components (Capital Employed Efficiency (CEE), Human Capital Efficiency (HCE) and Structural Capital Efficiency (SCE)) on financial performance (Return on Equity (ROE), Return on Assets (ROA) and Earnings per Share (EPS)) was examined using panel data in 11 banks listed in Tehran Stock Exchange during the years 2009 to 2013. The results showed that the intellectual capital had a positive effect on the financial performance of banks listed on Tehran Stock Exchange. Also, intellectual capital had the greatest impact on the rate of return on assets, return on equity and earnings per share, respectively.

Keywords: Intellectual capital, return on equity, return on assets, earnings per share.

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Introduction

Today, the industrial economy has gone into the knowledge-based economy. In the knowledge-based economy, knowledge or intellectual capital as a source of wealth, compared to other tangible and physical assets, is more preferable (Bontis, Intellectual

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Capital: An Exploratory Study That Develops Measures and Models, 1998). As a result, knowledge as the most important capital has been a complement of financial and physical capital in the today global economy. With the growth of knowledge-based economy, notably we see that company's intangible assets compared to tangible assets are an important factor in maintaining and achieving sustainable competitive advantage (Tayles, 2001). Knowledge-based economy provides potentially unlimited resources because the human capacity to create knowledge is infinite. Intangible assets and intellectual capital quickly become complement of physical assets. Intellectual capital means the total capital stock or royalty based on the knowledge that the company owns it. In other words, the purpose of intellectual capital is development and use of knowledge sources in organizations (Chen Goh, 2005) Thus, in the third millennium, when intellectual capital, but not financial, is foundation for dynamics and future success of the company in a knowledge-based economy, it is necessary that it is being key source and driver of performance and value in organizations by their managers, because the increased recognition and the use of intellectual capital help's organizations characters to be more effective, efficient and innovative (Mitchel Williams, 2000). In current knowledge-based societies, return on employed intellectual capital compared with financial assets has been great important in determining their profitability and financial efficiency. For this reason, tend to measure and apply the real value of intellectual capital intangible assets has increased more than ever. Most companies, shareholders and other interest groups are attempting to find a significant relationship between intellectual capital of organizations and their financial performance (Rostami, 2005). Researchers and those involved in the field of intangible assets (consisting of economists, accountants and managers of organizations) believe that the performance of any organization, especially banks, is a reflection of the state of its intellectual capital.

In this paper, we are trying to study the relationship between intellectual capital and financial performance of banks listed on Tehran Stock Exchange.

Theoretical foundations of research

The first attention to the concept of intellectual capital and its related issues was by Machlup in 1962 (Machlup, 1962), but the term "intellectual capital" was proposed first by John Kenneth Galbraith in 1969. He believed that the intellectual capital is an ideological process, including mental process; but Stewart in 2001 claimed that the issue was first raised in 1958, when he and Itami had worked together on the movement of intellectual capital (Itami published a book on intangible assets in 1980). Various definitions were proposed by different researchers about intellectual capital, but all researchers and intellectual capital experts are agree that intellectual capital is not a one-dimensional structure, rather is a multi-dimensional structure which includes individual, organizational, national and international levels. This means that intellectual capital is not only related to one's knowledge, but it is also related to knowledge stored in organization, business processes, systems and organizational communications (Chang, 2007)

In the 1990s, famous writers like Bontis (1996), Brookings (1996), Edvinsson (1997), Stewart (1997), Edvinsson and Malone (1997) and Sveiby (1997) began to provide a framework for intellectual capital to lead to better understanding of intellectual capital concept and perform future researches better and more comfortable. Bontis classified

intellectual capital into three categories in 1998: human capital, structural capital and relational capital, but in 2000 he modified this classification and changed it to human capital, structural capital, communication capital and spiritual assets (Bontis, 2001) Brooking categorized intellectual capital into four components market assets, assets concentrated in human resources, organization's infrastructure assets and intellectual assets (Brooking, 1996)

Stewart defined intellectual capital in terms of organizational resources, related to wealth creation by investing in knowledge, information, intellectual assets and experience (Stewart, 1997). According to Malone and Edvinsson, intellectual capital is: having knowledge, utilizing experience, organizational technology, customer and supplier relationship as well as the professional abilities which are a competitive advantage in the market for company (Edvinsson, L., & Malone, M.S., 1997).

Pablos believes intellectual capital includes all knowledge resources which generate value for organization, but they will be not entered in the financial statements (Pablos, 2004). Intellectual capital must be considered in formulating the company's strategy, and it also must be take into account as one of the major sources of company profitability (Marr, 2003).

Research purposes

1. Explain the relationship between intellectual capital and return on equity
2. Explain the relationship between intellectual capital and return on total assets
3. Explain the relationship between intellectual capital and earnings per share

Hypotheses and framework

H: There is a significant relationship between intellectual capital and financial performance of the bank listed on Tehran Stock Exchange.

H₁: There is a significant relationship between efficiency of capital employed (physical capital) and Return on Equity (ROE) of the bank listed on Tehran Stock Exchange.

H₂: There is a significant relationship between efficiency of capital employed (physical capital) and Return on Assets (ROA) of the bank listed on Tehran Stock Exchange.

H₃: There is a significant relationship between efficiency of capital employed (physical capital) and earnings per share (EPS) of the bank listed on Tehran Stock Exchange.

H₄: There is a significant relationship between human capital and return on equity (ROE) of the bank listed on Tehran Stock Exchange.

H₅: There is a significant relationship between human capital and return on assets (ROA) of the bank listed on Tehran Stock Exchange.

H₆: There is a significant relationship between human capital and earnings per share (EPS) of the bank listed on Tehran Stock Exchange.

H₇: There is a significant relationship between capital structure and return on equity (ROE) of the bank listed on Tehran Stock Exchange.

H₈: There is a significant relationship between capital structure and return on assets (ROA) of the bank listed on Tehran Stock Exchange.

H₉: There is a significant relationship between structural capital and earnings per share (EPS) of the bank listed on Tehran Stock Exchange.

Review the research background implies that there is a relationship between intellectual capital and financial performance in organizations. Conceptual framework in global studies in this area is as follows.

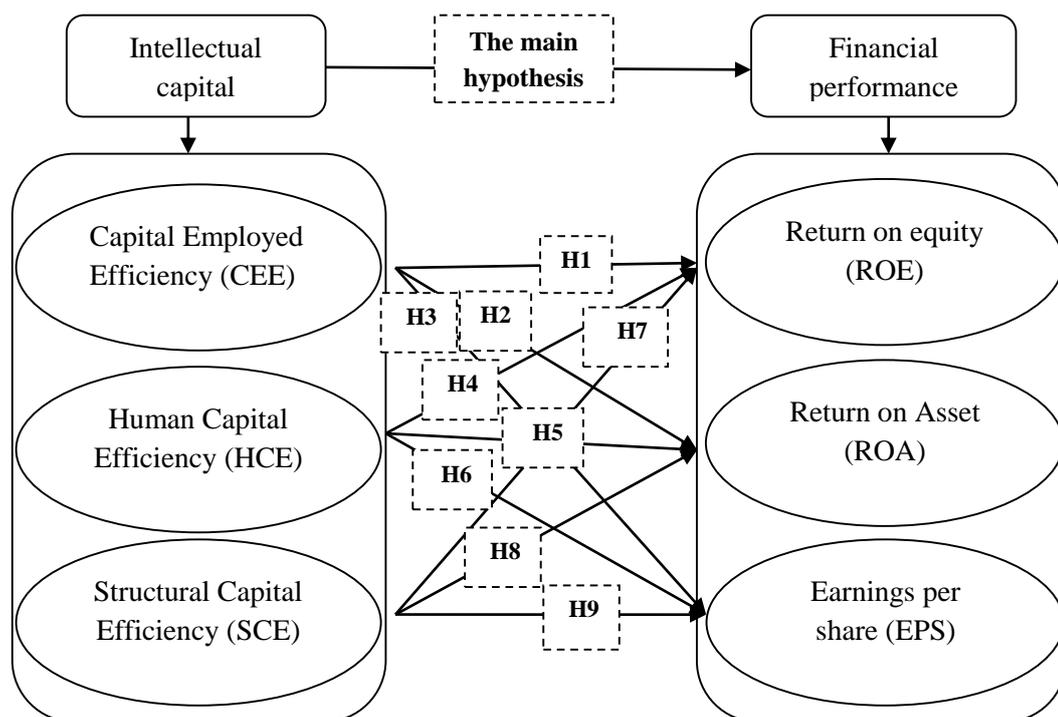


Figure 1 Conceptual framework

Methods

In the present study, according to the existing theoretical foundations, nine hypotheses based on the existence or non-existence of the relationship between the components of intellectual capital and financial performance, including return on equity, return on assets and earnings per share, are tested. The main method of statistical analysis is correlation coefficient and regression analysis. In this study, statistical sample is the bank listed on

the Tehran Stock Exchange (including 11 banks) and a period of research is considered during the years 2009 to 2013. Required data for analyzing has been collected from the annual financial statements and audited of sample banks and Tehran Stock Exchange data in the above-mentioned period. (Financial reports of banks, 2015) (Financial reports of banks, 2015) (Financial reports of banks, 2015)

Intellectual capital measurement using model Pulic

Pulic presented the Intellectual Capital (VAIC) in 1997, developed it in 1998 and completed it in 2000 (Pulic, 2000). Pulic used Value Added Intellectual Coefficient (VAIC) to measure the intellectual capital of Australia's listed companies.

Pulic Model: This model has five stages are as follows:

The first step: determining the value added

$$VA = OUT - IN \quad (1)$$

VA: Enterprises' Value Added;

OUT: The entire income from sale of goods and services

IN: The total cost of materials, components and services purchased.

In this model, salary costs are not included in the entrance due to the active role of human resources in the process of creating value. Therefore, cost of employees is not considered as a cost, but it is considered as an investment. The value added can be calculated using the information in the annual reports as follows:

$$VA = OP + EC + D + A \quad (2)$$

OP: operating profit EC: employees cost D: depreciation,

A: amortization of intangible assets.

Pulic measures an intellectual capital of the company by three criteria, value added capital employed, value added human capital and value added structural capital.

Second step: calculation of the value added capital employed coefficient

This equation shows the value added created by the capital employed in the enterprise, including physical capital and financial capital.

$$CEE = VA / CE \quad (3)$$

CEE: Capital Employed Efficiency

CE: Capital employed is equal to the book value of total assets minus that intangible assets.

The third step: determining the value of human capital factor

It is the relationship between value added and human capital, and indicates that for every Rial spent on staff, how much value added is created. According to this model, all costs of employees are considered as human capital. As a result, we have:

$$HCE = VA / HC \quad (4)$$

HCE: Human Capital Efficiency

HC: human capital that is equal to the total cost of salary in company.

Step Four: Determination of the value added structural capital

This ratio represents the share of structural capital in creating the value that can be obtained from the following equation:

$$SCE = SC / VA \quad (5)$$

SCE: Structural Capital Efficiency

SC: structural capital of the company, which is calculated as follows.

$$SC = VA - HC \quad (6)$$

Step Five: determination of the Value Added Intellectual Coefficient:

The last stage, the added value of intellectual capital is calculated as the sum of the coefficients previously obtained and intellectual capital measurement tool is Pulic model.

$$VAIC = CEE + HCE + SCE \quad (7)$$

VAIC: Value Added Intellectual Coefficient

Value added= operating profit (loss) + employees cost + depreciation cost + cost of doubtful accounts

Note: In this study, given that the statistical population is the banks, therefore in calculation of value added, cost of doubtful accounts is considered instead of intangible assets amortization.

Estimated research method

The structure of data used in the research is a panel, which is different from common regression (cross-sectional) and time-series data structure, and in fact it is a combination of both. Therefore, for modeling this data, models should be used that are suitable for this type of data. Two common methods for modeling panel data is fixed and random effects models. To select one of these two methods, either Hausman or Limer tests must be used.

The procedure is that first, either the common effects or fixed-effects models will be chosen using limer test. If you choose second model, using Hausman test, decide about cross-sectional effects that they are fixed or random.

An important thing about estimation the research models is that residuals of the estimated model have not autocorrelation. If there is a correlation between the residuals of the estimated models, AR (1) can be added to model to keep the Durbin–Watson statistic in the mentioned range. So in the next section wherever it is necessary AR (1) must be added to the model.

Analyses hypotheses

Sub-hypothesis 1, 4 and 7

In sub-hypotheses 1, 4 and 7, relationship between intellectual capital components and return on equity is tested. The model used for this purpose is as follows:

$$ROE = a + b_1HCE + b_2SCE + b_3CCE + e \quad (8)$$

The results of the mentioned model estimation using a common effect are illustrated in the Table 1. According to the table, since level of significance is lower than level of error and t-statistic is calculated negative, there is a significant inverse relationship between human capital and return on equity human capital (ROE) ($t = -4.24$, Sig. <0.05). However, structural capital has a direct and significant relationship with ROE ($t = 2.41$, Sig. <0.05). And structural capital has a direct and significant relationship with ROE ($t = 6.75$, Sig. <0.05).

F statistic indicates that an estimated model is significant ($F = 16.22$, Sig. <0.05) and 50/8% of changes in return on equity is explained by components of intellectual capital ($R^2 = 50.8\%$). Durbin–Watson statistic shows that there is an autocorrelation between the remains of the estimated model. To correct Durbin–Watson statistic, results of model estimation with fixed effects have been reported in table 1. As can be seen, by adding phrase AR (1) to model, Durbin–Watson statistic indicates that there is no serial correlation between the remains of model. Moreover, this time since level of significance is lower than level of error level and the t-statistic is positive, there is a statistically significant direct relationship between structural capital and return on equity ($t = 3.421$, Sig. <0.05). According to the results, among the hypotheses 1, 4 and 7, only 7th hypothesis is confirmed and there is no sufficient evidence to prove this hypothesis.

Table 1 the results of the regression model between the components of intellectual capital and return on equity

Variable	F Test		Coefficient of determination (R ²)	Durbin–Watson statistic (DW)	T Test		Regression coefficient
	test statistic	significance level			Test statistic	Significance level	
Common effects							
Fixed coefficient	16.22	0.000	0.508	1.371	-2.024	0.048	-11.04
Human Capital Efficiency (HCE)					-4.24	0.000	-1.334
Structural Capital Efficiency (SCE)					6.75	0.000	45.425
Capital Employed Efficiency (CEE)					2.414	0.019	187.896
Fixed effects							
Fixed coefficient	10.817	0.000	0.552	2.183	-1.035	0.307	-7.042
Human Capital Efficiency (HCE)					-0.756	0.454	-0.46
Structural Capital Efficiency (SCE)					3.421	0.001	34.83
Capital Employed Efficiency (CEE)					1.416	0.165	144.102
AR(1)					2.481	0.018	0.36

Sub-hypothesis 2, 5 and 8

In hypotheses 2, 5 and 8, relationship between intellectual capital components with the return of the assets is tested.

The model used for this purpose is as follows:

$$ROA = a + b_1HCE + b_2SCE + b_3CCE + e \quad (9)$$

The results of the mentioned model estimation using fixed effects are shown in Table 2. According to the table 2, since level of significance is lower than error level and t-statistic is calculated positive, there is a direct significant relationship between physical capital and return on assets physical capital (ROA) ($t = 2.628$, Sig. < 0.05).

F statistic indicates that the estimated model is significant ($F = 24.632$, Sig. < 0.05) and 90 percent of changes in the return of assets is explained by the components of intellectual capital ($R^2 = 90.1\%$).

According to the results, among the hypotheses 2, 5, 8, only hypothesis 8 is confirmed and there is no sufficient evidence to prove other hypotheses.

Table 2 the results of the regression model between the components of intellectual capital and return on equity

Variable	F Test		Coefficient of determination (R ²)	Durbin–Watson statistic (DW)	T Test		Regression coefficient
	Test statistic	Significance level			Test statistic	Significance level	
Random effects							
Fixed coefficient	24.632	0.000	0.901	2.203	0.242	-1.19	-0.957
Human Capital Efficiency (HCE)					0.307	1.036	0.079
Structural Capital Efficiency (SCE)					0.137	1.52	1.946
Capital Employed Efficiency (CEE)					0.013	2.628	26.317

Sub-hypothesis 3, 6 and 9

In hypotheses 3, 6 and 9, relationship between intellectual components of capital and earnings per share is tested. The model used for this purpose is as follows:

$$EPS = a + b_1HCE + b_2SCE + b_3CCE + e \quad (10)$$

The results of the mentioned model estimation using a common effect are illustrated in the Table 3.

Table 3 the results of the regression model between the components of intellectual capital and return on equity

Variable	F Test		coefficient of determination (R ²)	Durbin–Watson statistic (DW)	T Test		Regression coefficient
	test statistic	significance level			test statistic	significance level	
Common effects							
Fixed coefficient	4.732	0.006	0.232	1.244	0.962	0.047	6.862
Human Capital Efficiency (HCE)					0.048	-2.033	-17.058
Structural Capital Efficiency (SCE)					0.001	3.555	637.833
Capital Employed Efficiency (CEE)					0.875	0.158	327.313
Fixed effects							
Fixed coefficient	4.394	0.000	0.711	1.823	0.92	0.102	22.686
Human Capital Efficiency (HCE)					0.141	12.52	34.844
Structural Capital Efficiency (SCE)					0.858	1.18	67.281
Capital Employed Efficiency (CEE)					0.332	0.99	2672.31
AR(1)					0.41	0.837	0.136

According to the table, since level of significance is lower than level of error and t-statistic is calculated negative, there is a significant inverse relationship between human capital and earnings per share (EPS) ($t = -2.033$, Sig. < 0.05). While structural capital has a direct and significant relationship with the EPS ($t = 3.555$, Sig. < 0.05).

F statistic indicates that the model is significant ($F = 4.732$, Sig. <0.05) and 23.2 % of changes in earnings per share is explained by components of intellectual capital ($R^2 = 23.2\%$). Durbin–Watson statistic shows that there is a serial correlation between the remains of the estimated model. To correct Durbin–Watson statistic, model estimate results with fixed effects have been reported in table 1. As can be seen, by adding the phrase AR (1) to model, Durbin–Watson statistic indicates that there is no serial correlation between remains of model ($1.5 <DW <2.5$). Meanwhile, this time, none of the intellectual capital components have a significant relationship with earnings per share.

According to the results, among the hypotheses 3, 6 and 9, none of the hypotheses has been confirmed and there is no sufficient evidence to prove these hypotheses.

Discussion and Conclusion

According to statistical analysis, the impact of intellectual capital on the financial performance of banks listed on Tehran Stock Exchange has been confirmed. So that by studying research hypotheses, intellectual capital has the greatest impact on the rate of return on assets, return on equity and earnings per shares, respectively. The results are also consistent with the findings of Arslan and Zaman (2015) (Arslan, 2015), Abdullah and Sofian (2012) (Abdullah D. F., 2012), Zeghal and Maaloul (2010) (Zeghal, 2010) and Tan et al. (2007)(Tan, 2002).

According to the results and mentioned above issues, it seems that the special nature of the banking industry in where, on one hand, a main part of the assets is financing from attracted deposits (debt) and capital is a small part of the bank's capital structure; and on the other hand, human resources (human capital) is one of the most important factors affecting on banks performance, these two factors have a significant role in estimating hypotheses results; Thus, as mentioned, the highest relationship is between intellectual capital (especially human capital) and ratio of return on assets (ROA), whereas intensity of the relationship between the components of intellectual capital and ratio of return on equity (ROE) and earnings per share (EPS) is either very poor or is not significant.

Suggestions of this article are as follows:

1. The bank managers should pay attention to strengthen the Structural capital. Structural reforms, reforming the processes, regulations observation, performing the operational programs, strengthening strategies and infrastructures reform, improve the organization and methods of work and obtaining scores from innovations and introductions brands are useful in strengthening the structural capital and thereby they can help to improve financial performance in the future.

2. Using the process of influence on employees, human resources views and values governing management, bank managers can find appropriate channels for optimum use of the capitals and apply them.

3. Benefit from an update and appropriate technical knowledge can play important role in increasing the bank's operating cash flows.

4. Banks can calculate immaterial intangible assets including intellectual capital (human, structural and physical) and state the results in reports. Announcing an intangible balance sheet and off balance sheet assets report will help analysts to improve financial performance.

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