Intellectual capital performance (Evidence from Iranian banks)

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Abstract: Present study aims to investigate some effects of financial ratios on value added of intellectual capital in banking industry. Since the objective of this study is to describe relation between the financial ratios and value added of intellectual capital, the method of choice here is correlation method. Data collection from Stock Exchange Market was done by Rahavard-e Novin software, whereas SPSS and EVIEWS software were used to analyze the data. In this study the banking industry for 2005-2009 periods has been used. Statistical method of the study is by multiple regression models using (pls). In this study, we have used deferred variable of value added from intellectual capital for describing its deferral effects. Results obtained from test of hypotheses do not suggest any significant relation between performance of intellectual capital and relative return of bank, whereas there was found a negatively inverse relation between performance of intellectual capital and barriers to entry in banking industry as well as ratio of staff costs. Furthermore, results suggest that performance of intellectual capital is positively and directly related to bank profitability and bank risk.

Key words: intellectual capital, profitability, risk, coefficient of value added of intellectual capital.

INTRODUCTION

In banking literature, some of the factors with determining effect on performance of intellectual capital include bank efficiency, barriers to entry, efficiency of investment in intellectual capital, bank profitability and bank risk. *Efficiency* refers to employing science to utilize the resources, human force and facilities etc. to its full potential while minimizing production costs, expanding markets, increasing employment, making efforts to increase real wages and improving living standards in a way that the staffs, management and general consumers will enjoy their benefits. Human capital plays an important part in decreasing production costs of bank (by providing cost advantage) and distinguishing products (that hereby gain competition advantage), so it must reflect itself in increasing market share of bank through attracting more customers. It is safe to assume that bank efficiency involves human capital and there must be a positive relation between the performance of human capital and market share of the banks.

In banking literature, bank efficiency is measured based on two criteria of market share namely deposits and assets. However, as there are wide ranges of sources for efficiency including intangible assets, the total assets should be measured relatively under extensive measurement condition. Companies that are protected in their sector by heavy barriers for entry usually fail to take any step to encourage and motivate their employees for innovation and this may negatively affect the performance of employees (human capital).According to Dupris (2000) there are various methods in banking literature that deal with the measurements of barriers to entry. Here, the amount of capital required for entry to the sector is indicated by ratio of fixed assets to total assets. It appears that this ratio represents more the concept of barriers to entry than any other ideas. Thus, ratio of fixed asset to total assets of the bank is used to reflect the barriers for entry to market.

Human capital may refer to sum of values invested on training, competence and future of employees.Human capital is an investment (cost of employees) that is supposed to contribute in creating value for a company (it is indicated by ratio of cost of employees to total bank incomes). Therefore, this investment is comparatively more efficient and deserves a large share of capital in order to produce values, which in turn motivates bank employees (human capital) to keep up with innovation, for instance producing new products and offering new services or providing business procedures in order to maintain efficiency of investment in intellectual capital. Ratio of staff cost to total bank income is used to indicate efficiency of investment in human capital.

Profitability refers to company's ability to produce income and make profit. Income or net profit is the only criterion by which profitability can be measured. In general, financial outcomes of any company can be classified as either positive outcomes, which are the result of gaining incomes, or negative outcomes, which are the result of financial loss. Financial loss may entail efforts conducted by management to examine and identify the causes of the loss. Such losses may be considered as unconventional outcomes and so that managers need to be careful in their handling of the related situation. The more time the managers spend to identify causes of these losses, the less time they can spend to undertake useful activities such as encouraging employees for innovation, which may lead to increased profit. Furthermore, the incomes (profits) can be viewed as typical

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financial products (outcomes) and might allure the managers not to undertake any other useful activities such as encouraging the employees for innovation that may potentially lead to increase of profit. Thus, a positive relation between bank profitability and performance of human capital is expectable. Bank profitability is indicated using ratio of earnings before taxes to equities.

Risk refers to any potential loss either financial or nonfinancial resulting from undertaking any activity. Based on categorization done by Committee risks fall into three groups: credit risk, market risk and operating risk. It is obvious that there is a positive relation between risk level and rate of return on investment. Percentage of intangible assets is a criterion to determine to what extent the future performance of the company rely on risk of assets.

Arguably human capital may be influenced by any increase of intangible assets, which are critical in contributing to company's success and in motivating its employees to keep up with innovation such as producing new products and offering new services, or improving the quality of business procedures in order to bring more profit for the company. Therefore, a positive relation between bank risk and performance of human capital is expectable. Ratio of intangible assets to total assets has been assumed as a criterion to measure bank risk.

2. Previous research:

In this section, results obtained from some similar investigations on intellectual capital conducted in and out of Iran have been presented:

Table 1: important studies conducted in foreign countries on intellectual capital in banking industry

Author/authors	Year of study	Time period of the study	Subject	conclusion
Maverdis Dimitrius	2004	1st of April through 31st of March	Performance of intellectual capital in banking sector of Japan	There is a significant variation between the performance of intellectual capital of Japanese banks, in addition Japanese banks vary from some European banks such as Greek and Austrian banks
Chen Gu	2005	2001 through 2003	Intellectual capital performance of Malaysian commercial banks	Although Hong Kong Bank holds lower physical capital than "Mi" Bank, however since it had the highest coefficient of intellectual capital it was the most efficient domestic bank
Abdullah Yalama and Matin Kaskan	2007	1995 through 2004	Intellectual capital performance of the banks active in Istanbul Stock Exchange	Effect of intellectual capital on profitability in banking sector of Istanbul Stock Exchange is about 61.3% at average and portfolio level
Majd Al-Baneni	2008	1999 through 2005	Study on factors effective on intellectual capital performance in banks: case study on British Banks	Systems of information technology, barriers to entry and return on investment in intellectual capital have negative effect on performance of human capital, whereas bank profitability and bank risk had a positive effect on performance of human capital
Mahish Joushi, Daril Chayli	2010	2005 through 2007	Intellectual capital performance on banking sector: assessment on Australian banks	Human force cost and its value added have a significant relation with value added of intellectual capital. Profitability of human capital is relatively higher than that of structural capital and bank size has a little or no effect on performance

				of intellectual capital in terms of total asset, number of employees and total equities.

Table 2: important studies conducted in Iran on intellectual capital

Author/authors	Year of study	Time period of study	Subject	conclusion
Anvari Rostami and Hasan Sarabi	2005	2003 through 2007	Assessment of intellectual capital and investigation on relation between intellectual capital and stock market value of companies in Tehran Stock Exchange	Calculating intellectual capital by using difference between market value and book value of
Mohammad Namazi & Shahla Ebrahimi	2007	2004 through 2006	Study on effect of intellectual capital on future and current financial performance of companies accepted in Tehran Stock Exchange	Irrespective of the size of company, debt structure and past performance, there is a positively significant relation between current and future financial capital and performance at all levels of the companies and industries
Mehrdad Madhoushi & Mehdi Asghari Nejad Amiri	2008	2001 through 2006	Assessment of intellectual capital and study on its relation with financial return of companies	Intellectual capital is positively and significantly related with financial return, future financial return and growth rate of future financial return of the companies that have invested in Tehran Stock Exchange
Hasan Hemmati & Amin Mehrabi	2010	2004 through 2008	Study on relation between intellectual capital and financial return of the companies accepted at Tehran Stock Exchange	Intellectual capital is positively correlated with financial performance of the company. In addition, contribution of intellectual capital on future performance of the company varies in different industries and there is no relation between capital growth rate and performance of the company.

3. Hypotheses Development:

Based on the subject of the research, the following hypotheses are developed:

H_1: there is a positive relation between relative bank efficiency and intellectual capital performance in the banks accepted in Tehran Stock Exchange (TSE).

H_2 : there is a negative relation between barriers to entry in industry of a sector and intellectual capital performance in the banks accepted in TSE.

H_3: there is a positive relation between the ratio of staff costs and intellectual capital performance in the banks accepted in TSE.

H_4: there is a positive relation between bank profitability and intellectual capital performance in the banks accepted in TSE.

H_5: there is a positive relation between bank risk and performance of human capital in the banks accepted in TSE.

4. Sampling and variable definition:
4-1. Sampling:

Statistical society of the study includes banks accepted in TSE which have done activities for five years from 2005 through 2009 in TSE. Since the society being studied was limited, all the society was studied and sampling was avoided. Companies active in banking industry were selected and studied, which included 7 companies as follow:

Bank Parsian	Bank Egtesad Novin	Bank Tejarat	Bank Saderat Iran
Bank Sina	Bank Mellat	Bank Karafarin	

4-2.Variables:

As a rule, identification of variables is one of the main stages in every research. Variable, as its name implies, is a character that can change in quantity and usually can assume various numerical value. It actually represents features that researcher can observe, control and manipulate them. Variables generally fall into two categories: independent variable and dependent variable.The main and dependent variable of the present study is value added (performance) of intellectual capital in bank *i* at year *t*… .We will use Value Added Intellectual Capital (VAIC) method developed by Pulic to measure intellectual capital performance, because application of this method is more convenient compared to other methods. As shown below, in this study 5 important financial ratios have been used, which have been calculated using information listed in financial statements of companies accepted in the stock market:

Table 3: Financial ratios and calculation of independent variables and their relation with dependent variables

Financial ratio	Method of Calculation
	Type of relation with dependent variable (value added of intellectual capital)
HASSit = efficiency (return) in bank *i* at year t	Book value for assets of bank *i* at year *t* divided by total market value of assets of bank *i* at year t
	There is a positive and direct relation between return (efficiency) of bank and performance of intellectual capital.
FASSit = barriers to entry in bank *i* at year t	Book value for ratio of fixed assets to total assets of bank *i* at year *t*
	There is a negative and inverse relation between barriers to entry in banking industry and performance of intellectual capital.
SREVit = return on investment in intellectual capital in bank *i* at year *t*	Book value for ratio of staff costs to total income of bank *i* at year *t*
	There is a positive and direct relation between staff costs and performance of intellectual capital
ROEit = bank profatibility of bank *i* at year *t*	Book value for net annual profit before <u>division tax</u> divided by equities of bank *i* at year *t*
	There is a direct and positive relation between bank profitability and performance of intellectual capital
ITAGASSi = risk in bank *i* at year *t*	Ratio of intangible assets to total assets of bank *i* at year *t*
	There is a positive and direct relation between bank risk and performance of intellectual capital

5. Tests of hypotheses:
5-1.Normality test of dependent variable:

Normality of the data, particularly dependent variables, is especially important during the application of statistical methods. Kolmogorov-Smirnov Test is used to test the normality of the data. This test is a simple non-parametric method to determine the standardization of empirical information using selected statistical distributions.When the level of significance of the statistics is smaller than α, H_0 hypothesis is rejected, whereas when it is greater than α, H_0 is accepted. The following histogram is used to reexamine the normality of residuals.

Table 4: Kolmogorov-Smirnov test

			lnvaic	ROEit	FASSIT	ITAGASSit	HASSIT	SREVit
		N	35	35	35	35	35	35
Normal Parameters[a,b]		Mean	8.3447	.4377	.3216	.3308	.3319	6.9950
		Std. Deviation	1.89405	.26942	.23066	.20706	.26735	6.19602
Most Extreme Differences		Absolute	.087	.107	.188	.229	.229	.199
		Positive	.067	.107	.188	.229	.229	.199
		Negative	-.087	-.103	-.140	-.139	-.172	-.130
Kolmogorov-Smirnov Z			.513	.635	1.112	1.355	1.355	1.175
Asymp. Sig. (2-tailed)			.955	.815	.168	.051	.051	.126
a. Test distribution is Normal.								
b. Calculated from data.								

If the level of significance of a variable, based on result from KS test, is greater than 5%, the hypothesis of its normality is accepted, whereas if the level is smaller than 5%, H_0 i.e. claim of distribution normality of the variable is rejected. So, based on forgoing explanation and result of the test we conclude that variable of intellectual capital has normal distribution due to level of significance being greater than 5%.

5-2.Co linearity test between the variables:

Now that the normality of the variables is established, in order to establish the common effects of variables on each other, i.e. to establish collinearity between the variables, we used inflation factor index of variance. Values of this index were not significant for the variables, since the inflation factor of variance was less than 5 for all the variables.

Table 5: collinearity test between the variables

Collinearity Diagnostics^a									
Model	*Dimension*		*Eigenvalue*	*Condition Index*					*Variance Proportions*
					(Constant)	*VAR00002*	*VAR00003*	*VAR00004*	*VAR00005*	*VAR00006*

Model	*Dimension*		*Eigenvalue*	*Condition Index*	*(Constant)*	*VAR00002*	*VAR00003*	*VAR00004*	*VAR00005*	*VAR00006*
dimension 0	*1*	*1*	*4.566*	*1.000*	*.00*	*.01*	*.01*	*.01*	*.01*	*.01*
		2	*.521*	*2.961*	*.00*	*.07*	*.21*	*.08*	*.13*	*.06*
		3	*.394*	*3.404*	*.00*	*.01*	*.05*	*.11*	*.13*	*.60*
		4	*.252*	*4.253*	*.00*	*.06*	*.29*	*.28*	*.49*	*.06*
		5	*.209*	*4.679*	*.01*	*.43*	*.10*	*.23*	*.22*	*.26*
		6	*.058*	*8.850*	*.98*	*.42*	*.34*	*.30*	*.02*	*.01*
a. Dependent Variable: lnvaic										

Table 6: correlation between variables

							Coefficients^a	
Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	9.271	1.137		8.151	.000		
	ROEit	.473	1.369	.067	.345	.733	.758	1.320
	FASSIT	-1.523	1.497	-.186	-1.017	.318	.861	1.161
	ITAGASSit	.562	1.590	.061	.354	.726	.953	1.050
	HASSIT	-.310	1.276	-.044	-.243	.810	.884	1.131
	SREVit	-.104	.054	-.340	-1.918	.065	.915	1.093
a. Dependent Variable: lnvaic								

This output indicates Eigen values and positional index. Values closer to zero indicate that the predicted internal correlation is high. As shown in Table 6, the internal correlation between the data is not close to zero, thus the internal correlation between the data is not high. Positional index higher than 15, indicates the potential collinearity between independent variables. As shown by the Table, independent variables in the study have no collinearity with each other.

5-3. Test of correlation matrix on variables:

Table 7: Test of correlation matrix on variables

Correlations		lnvaic	ROEit	FASSIT	ITAGASSit	HASSIT	SREVit
lnvaic	Pearson Correlation	1	.030	-.216	.084	-.041	-.349[*]
	Sig. (2-tailed)		.865	.212	.632	.813	.040
	N	35	35	35	35	35	35
ROEit	Pearson Correlation	.030	1	-.341[*]	-.183	.321	.221
	Sig. (2-tailed)	.865		.045	.293	.060	.202
	N	35	35	35	35	35	35
FASSIT	Pearson Correlation	-.216	-.341[*]	1	.086	-.163	.050
	Sig. (2-tailed)	.212	.045		.622	.349	.775
	N	35	35	35	35	35	35
ITAGASSit	Pearson Correlation	.084	-.183	.086	1	-.036	-.147
	Sig. (2-tailed)	.632	.293	.622		.839	.401
	N	35	35	35	35	35	35
HASSIT	Pearson Correlation	-.041	.321	-.163	-.036	1	.140
	Sig. (2-tailed)	.813	.060	.349	.839		.423
	N	35	35	35	35	35	35
SREVit	Pearson Correlation	-.349[*]	.221	.050	-.147	.140	1
	Sig. (2-tailed)	.040	.202	.775	.401	.423	
	N	35	35	35	35	35	35
*. Correlation is significant at the 0.05 level (2-tailed).							

In order to verify this hypothesis, we used Pearson Correlation to identify whether there is significant relations between the abovementioned variables and the results were in accordance with the following chart.

Based on Table 7, value of level of significance between value added of intellectual capital and investment return of intellectual capital in the bank is lower than 5%. Thus, hypothesis H_1 is accepted at 95% confidence level. In addition, the level of significance between ratio of fixed assets to total assets of bank *i* at year *t* and bank profitability was lower than 5%. Therefore, hypothesis H_1 is accepted at 95% confidence level. Hence, the

correlation between ratio of value added of intellectual capital and efficiency of investment in intellectual capital of the bank is negative and inverse. Similarly, the correlation between the ratios of fixed assets to total assets of bank i at year t and bank profitability is negative and inverse.

Table 8: coefficients of regression model of pool least squares (pls) by fixed effects

Components of the Model	Coefficient (β)	(Std. error)	t statistics	Level of significance (Sig)
C	9.15	0.32	28.76	0.00
Profitability of bank i at year t	1.20	0.38	3.17	0.006
Barriers to entry of bank i at year t	-2.29	0.44	-5.16	0.0001
Risk in bank i at year t	2.13	0.77	2.78	0.01
Efficiency (return) of bank i at year t	-1.77	1.22	-1.45	0.17
Return on investment in intellectual capital in bank i at year t	-0.10	0.03	3.31	0.0047
0.17	-1.43	0.23	-0.33	AR(1)

Table 9: General test of significance of the model

Modified coefficient	Coefficient of determination (R)^2	Statistics F	Level of significance (Sig)	HARDI Test (probability)	f Limer test (probability)	Hausman test	Durbin-Watson statistics
0.30	0.28	1.99	0.00	0.000	0.0937	0.04	2.21

In order to investigate the simultaneous effect of all the financial variables described in the 5 hypotheses, we used multiple regression model by method of pool least squares (pls). Based on Tables 4-8, confidence level of variables such as ratios of intangible assets to total assets of bank i at year t, ratio of assets of bank i at year t to total value of bank assets, value of intercept, bank profitability, ratio of fixed assets to total assets of bank i at year t, is significant at 95% confidence level. And based on value of t statistics, this verify the coefficients and their effects' orientation, i.e. the relation of ratios of intangible assets to total assets of bank i at year t, ratio of assets of bank i at year t to total value of assets of bank plus value added of intellectual capital and bank profitability is positive. In contrast, the relation between ratio of fixed assets to total assets of bank i at year t and value added of intellectual capital is negative (inverse). Results given in Tables 4-9 account for roughly 0.31 of changes of value added of intellectual capital in 5 abovementioned financial variables. Durbin-Watson statistics also suggests non-correlation of unexplained variance. Tables 4-9 contain the values of statistics calculated at all levels of variables, which is lower than 5%. So the data are static. F Limer test is used to identify Pool and Panel. Data are introduced as Pool. In this test, null hypothesis indicates that model has used pool data, whereas alternative hypothesis indicates that model has used panel data. Since the probability level is less than 10%, this test show that data are pool. In Hausman test, null hypothesis indicates that model has used Fixed Effect method, whereas alternative hypothesis indicates that model has used Random Effect. Since prob is less than 0.1, test shows that fixed effects are preferably more efficient.

6. Findings of the study:

Summary of findings of the study has been given in Table 10:

Table 10: summary of study hypotheses

Hypotheses	Results from test of hypotheses
There is a negative relation between barriers to entry in industry of a sector and intellectual capital performance in companies active in banking industry, which are accepted in TSE	There is a negative and inverse relation between barriers to entry in industry of a sector and intellectual capital performance in companies active in banking industry, which are accepted in TSE
There is a positive relation between ratio of staff costs and intellectual capital performance in companies active in banking industry, which are accepted in TSE	There is a negative and inverse relation between staff costs and intellectual capital performance in companies active in banking industry, which are accepted in TSE
There is a positive relation relative return of bank and intellectual capital performance in companies active in banking industry, which are accepted in TSE	There was not a significant relation to be observed between relative return of bank and intellectual capital performance in companies active in banking industry, which are accepted in TSE
There is a positive relation between bank profitability and intellectual capital performance in companies active in banking industry, which are accepted in TSE	Positive and direct relation was found between bank profitability and intellectual capital performance in companies active in banking industry, which are accepted in TSE.
There is a positive relation between bank risk and performance of human capital in companies active in banking industry, which are accepted in TSE	Positive and direct relation was found between bank risk and performance of human capital in companies active in banking industry, which are accepted in TSE.

Results from regression indicate that barriers to entry and return on investment in intellectual capital, which were not accounted for in other sectors during previous studies, are variables that dramatically influence the performance of intellectual capital. Furthermore, coefficient of bank_profit and bank risk was statistically

significant. In contrast, both barriers to entry and return on investment in intellectual capital have a negative effect on performance of human capital and according to managers of the banks are potentially capable of reflecting undesirable performance. Moreover, bank profitability and bank risk have positive effect on performance of human capital and according to managers of the bank are potentially capable of reflecting a desirable performance.

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