Contents lists available at Science-Gate

International Journal of Advanced and Applied Sciences

Journal homepage: http://www.science-gate.com/IJAAS.html

Investigating criteria to measure the value of intellectual capital and determining the effective factors

Gholamreza Mahfoozi [1], Maryam Hassas Khalasi [2,*]

[1]Department of Accounting, Rasht Branch, Islamic Azad University, Rasht, Iran
[2]Department of Management, University of Guilan, Rasht, Iran

ARTICLE INFO

Article history:
Received 5 October 2015
Received in revised form
10 December 2015
Accepted 17 December 2015

Keywords:
Long-run market value to book value
Market value to book value
Q Tobin
Net income growth Intellectual capital
Ownership concentration

ABSTRACT

The goal of this research is to analyze the effective factors on intellectual capital of companies. Due to this goal, we have used a sample of 93 companies from accepted companies at Tehran stock exchange and have analyzed these factors through data gathering of this research that are related to the years of study between 2008 and 2014. This research is made of two parts. In the first part of research, we have chosen top criteria through analysis of three effective factors on company's performance includes Q Tobin's ratio, ratio of market value and ratio of long-run market value to book value via comparison Adjusted R^2 and also coefficients related to each factor which in this research the variable of ratio of long-run market to book value has been chosen as a proper criteria. In second part we have tried to analyze the effective factors on selected top criteria in first part as intellectual capital. In this way, there was a positive and significant relation between the variable of growth percent of net profit, intangible assets and financial leverage. Likewise, there is an inverse and significant relation between the variable of board of director's reward and intellectual capital. Of course there is not a significant relation between the variables of ownership concentration and size of company and intellectual capital.

1. Introduction

Intangible assets that are supported by law and called intellectual property and includes royalties and copyright and franchises right and brands and commercial marks, some items of them are reflected at balance sheet but the other intangible assets which includes intellectual capital and perform under several economic principles, it means more use of them won't decrease their value, often will not be reflected in balance sheet (Chan, 2009). The great distance between book value and market value of companies has made more attention of companies towards findings the value of removed intangible assets of financial statement (Lev, 2001). Due to Bounties attitude most of several countries of world (such as industries of Iran) are using traditional methods of financial accounting which had been made for a business atmosphere based on manual works and tangible asset such as facilities and building many centuries ago while a business place which is based on knowledge needs a model that encompasses new organizational intangible assets like information and competency of labor (manpower), innovation, mutual relations, organizational culture, systems and processes, organizational structure and etc. It seems that the reports of traditional accounting reflects created real value incompletely, created gap between book value and market in most of companies such as incompetency of traditional accounting system on the calendar and reflection of intellectual capital which has made the mentioned disagreement (Chan, 2009; Avazzadeh, 2015).

In this regard, intellectual capital has gained increasing attention of academic researches and organizational and their staffs. All the managers and brokers and investors at accepted companies in stock exchange can approach to the innate value of company through evaluation of intellectual capital and by knowing the amount of having intellectual capital by companies, they can predict properly the financial returns due to this research.

2. Theoretical principles and literature of research

The term "intellectual capital" revealed for the first time by John Kenneth Galbraith in 1969. He believed in intelligent performance, not just havening intelligence and intellect. Although there is

* Corresponding Author.
Email Addresses: Gholamrezamahfoozi@yahoo.com (G Mahfoozi), Mary.Hassas@Gmail.com (MH Khalasi)

not a public accepted definition for intellectual capital, from the beginning of research around the onset of 1980s, there have been several definitions for that: Introduced intellectual capital as "intangible assets" which includes specific technology, customer information, trade name, fame and culture of company and are important for its competitive power. Chen (2009) considers intellectual capital as the intellect-knowledge materials, intellectual properties and experience. Edvinsson and Malone (1997) suggest intellectual capital as a knowledge which can convert into value. Marr (2004) considers intellectual capital as a stimulant for competitive profits of company and relates it to the company ability at managing and applying knowledge. Likewise, the community of management accountants of Canada believes that intellectual capital is a style of reserved knowledge by persons who share it with company for gaining the future profits (Iswati and Anshori, 2007). What is agreed is that intellectual capital indicates intangible value of an organization, something which is difficult to say. The definition of something which is considered as intellectual capital is difficult and likely it is better analyze the proposed categories about that, since categorizing is less difficult than definition. However, categorization will point to definition implicitly. Intellectual capital is a set of human capital, organizational capital and customer capital. Chen et al. (2005) believe that intellectual capital is made of these four categories and elements:

1. Human Capital
2. Customer Capital
3. Innovation Capital
4. Structural Capital

Chen et al. (2005) believe that these four capitals are meaningful together and in interaction with each other. Makki et al. (2008) and Brooking (1997) suggest that intellectual capital includes four types of property:

1. Market property
2. Intellectual property
3. Human-based property
4. Fundamental property

With a look to framework of suggestive model of Kaplan and Norton we can consider this point that customer aspect and relational capital, growth aspect and learning an human capital, aspect of internal processes and organizational capital, and financial aspect and financial capital (tangible) are related to each other. Beasley et al. (2006) believe that intellectual capital includes human capital, organizational capital, modernization and development capital and relational capital. Edvinsson and Malone (1997) in Skandia value scheme consider the value of company's market includes financial capital (comprised of all tangible assets) and intellectual capital (nonfinancial value). Then divide intellectual capital into two parts: organizational capital and human capital (Kok, 2007). Petty and Guthrie (2000) divide intellectual capital into external capital and human capital. Regarding different categorizations of intellectual capital and its elements, it seems that most of pundits accept its categorization in three parts:

1. Human capital: it is knowledge, skills and abilities of staff and indicates that ability or capability of human of an organization is for solving the problems of business and can't be owned by organization. Human capital can leave an organization when staff leaves that (Najibullah et al., 2006).

2. Organizational capital: structural capital includes all nonhuman resources of knowledge in organization that includes databases, organizational charts, processes guidance, strategies and guidelines. Organizational capital in an organization is everything which can support staff (human capital) and is a supportive infrastructure which enables human capital to do its own duties.

3. Customer capital: It is power and continuity of customer communication. The main background of customer capital is embedded knowledge at marketing channels and customer communication that develop in the way to lead business. Most of the recent definitions have promoted this category, so that it includes capital of relation which is embedded knowledge in all communications that an organization develops it (Bontis et al., 2000).

It was analyzed the impact of intellectual capital on current and future financial performance of accepted companies at Tehran stock exchange. The results of research show that there is a positive and significant relation between intellectual capital and current financial performance.

Hemmati et al. (2010) analyzed the relation between intellectual capital and market value and financial performance of nonfinancial companies. They measured the value of intellectual capital of companies by Public model and found that there is a positive and significant relation between intellectual capital with market value and financial performance of nonfinancial companies.

It was experimentally analyzed the elements of intellectual capital at evaluation of financial operations of accepted companies at Tehran stock exchange and I order to test the research hypothesis he used from data synthesis statistics method. Results showed that even after controlling the size and debt structure, there is a positive and significant relation between intellectual capital and financial performance of company and also there is a positive and significant relation between efficiency of human capital and profit of each stock.

Hassan pour and Yazdani (2012) analyzed the relation of value added of intellectual capital with financial and economic performance and market of company stock. The results of their research showed that there is a positive and significant relation between added valued of intellectual capital and economic and financial performance and value of stock market.

It was analyzed a new conception called intellectual liabilities (ILs) which is opposite of intellectual capitals. The results of their research showed that intellectual liabilities are potentials

inside intellectual capitals which help ruining the created value that has been made by intellectual capitals. Likewise, this kind of liability inside companies is followed by decrease of companies' value and increase of possibility of financial bankruptcy of companies.

Chen et al. (2005) analyzed the relation between intellectual capital with market value and financial performance of accepted companies at Taiwan stock exchange in the period between 1992 and 2002 in an experimental way. The results of hypothesis testing showed that intellectual capital has positive effect on market value and financial performance and it may be measured as criteria for future performance.

Juma and McGee (2006) analyzed in their research the effect of each part of intellectual capital on performance of companies with advanced technology in USA. The results showed that there is a positive and significant relation between intellectual capital and companies' performance.

Tan et al. (2007) analyzed the relation between intellectual capitals and financial performance in Singapore stock exchange based on three financial indexes (profit of each stock, rate of returns of stockholders' salary and annual rate of returns). The results of research showed that there is a positive relation between intellectual capital and indexes of financial performance and also a significant difference between the coefficients of intellectual capital at various industries.

Richieri et al. (2008) analyzed the impact of elements of intellectual capital of companies on criteria of financial performance of companies between 2000 and 2005 among thousands of great Brazilian companies in his research. Results showed that there is a positive and significant relation between parts of intellectual capital of companies and their financial performance at companies surveyed.

Lu et al. (2010) analyzed the effect of intellectual capital on performance of retail companies. The results showed that intellectual capital, in addition to the real value of these companies, have made competitive benefits between retail companies.

Abdullah & Sofian (2012) analyzed the relation between intellectual capital and performance of Malaysia companies. They showed that there is a positive correlation between intellectual capital and human capital has the most powerful correlation among the elements of intellectual capital.

It was analyzed the ownership structure on the efficiency of intellectual capital. The results showed that there is an inverse relation between ownership of board of directors of companies and efficiency of intellectual capital especially structural capital. Likewise, these results suggest that there is a negative relation between ownership of foreign investors and efficiency of employed capital.

It was analyzed the relation between disclose of intellectual capital with market value and financial performance of companies and suggests that the more the intellectual capital of company, the better its performance and higher its market value is.

3. Research hypothesis

The current research includes two parts. In first part we measure the impact of three effective factors of Tobin's Q, market value to book value and the value of long-run market to book value on dependent variable of returns right of stockholders in order to choose the variable which has the most explaining power for dependent variable as the top criteria of intellectual capital measurement. We use from two methods in order to choose top criteria. In first method we consider an individual model for each one of independent variables and through comparison of Adjusted R^2 choose the top independent variable which has the higher adjusted coefficient. In second method we make a combinational model for each three variable and after conducting the necessary tests for estimation of model, we will estimate the combinational regression model. The variable which has the highest coefficient of absolute magnitude will be chosen as top variable. We expect that the results of two methods be same. One of the reasons of paying to weaknesses of MTB is as a value criterion of IC accounting of historical cost; because market value is different from book value. In order to solve this problem, we have used of Tobin's Q in order to show the IC value. That it is possible that Tobin's Q be an approximation for IC value. Tobin's Q value tries to introduce the ratio of market values a replacement for book value of tangible assets based on assumptions. Due to current assumptions, Tobin's Q criteria will support weaknesses of MTB in order to measure accurately the value of intellectual capital. However, the adjustments of historical costs based on substitution value may not improve measurement criteria of intellectual capital value.

MTB criteria may be an insufficient and incomplete index as the measurement index of IC value. Based on primary idea of intellectual capital which is the same as creation of competitive profit, we may expect long-run available growth chances from intellectual capital. So in this research we present LRVTB criteria as the index of measurement of intellectual capital for the first time. And in first part of research we may choose top criteria among three mention criteria. We guess that LRVTB criteria based on mentioned reasons will be preferred criteria.

3.1. So the hypotheses of first part of research are defined as below

First Hypothesis: Explanation ability of long-run market value towards book value about company performance is higher than market value ratio to book value as a method of measurement for intellectual capital.

Second Hypothesis: Explanation ability towards long-run market value to book value about company performance is higher than Tobin's Q ratio as a measurement method for intellectual capital.

After analysis of two mentioned hypothesis among three criteria of Tobin's Q and MTB and LRVTB, every one which has the highest explanation power (Adjusted R^2) for company performance will be considered as top criteria for evaluation of intellectual capital value. And then these criteria will be used as dependent variable for hypothesis of second part of research and the effect of some items of financial statement on this benchmark of intellectual capital will be analyzed.

In second part of research, after choosing the top variable as benchmark index of intellectual capital, we will try to analyze the effective factors on this index. These factors are: growth percent of net profit- intangible assets- financial leverage of company- ownership concentration- size of company and reward of board of directors.

3.2. So this is the hypothesis of second part of research

The growth percent of net profit is a criterion which most of activists of business use it as an index of companies' performance evaluation and determine the price of stock market based on that. So we expect that this variable have direct and significant effect on the price of stock market at the time close to convention meeting (end of June). As we mentioned in the past, we consider the price of stock market by the end of June as the evaluation index of intellectual capital and divide it into book value in order to make it standard:

First Hypothesis: There is a significant relation between net profit growth and intellectual capital.

Some of potential factors of IC value can be found in available information at financial statements. In order to measure IC, using of intangible assets at balance sheet has been recognized. So second hypothesis is as follows:

Second Hypothesis: There is a significant relation between intangible assets and intellectual capital.

Lenders may be influential stockholders and may affect IC value through increasing the ratio of debts to salaries of stockholders (financial leverage). So it may be possible that companies manage their own IC. Therefore the IC value development may be accelerated and applying of it may be supported by influential creditors. The influence of creditors in companies and the value of intellectual capital related to that lead to planning the hypothesis below which has not been tested yet:

Third Hypothesis: There is a significant relation between financial leverage and intellectual capital.

Size of company may be having effect on the level of IC value the effect of company size on IC value has been analyzed in IC literature rarely. Company size may have positive effect on IC value of company as the result of access to resources and power of market. Based on this issue, this hypothesis has been designed:

Fourth Hypothesis: There is a significant relation between company size and intellectual capital.

The structure of ownership is another potential index of IC value. Throughout the history, the concentration of ownership was done by great stockholders. However, through theoretical principles, we can't consider easily the effect of ownership concentration on IC value.

In one hand, great stockholders may concentrate on stability instead of innovation which is in contrast with development of intellectual value. On the other hand the salaries development of stockholders may not have effective potential on the value of intellectual capital significantly, so that it may decrease the level of IC value. Without determination of expected direction of relation, the relation between ownership concentration and IC value is tested as follows:

Fifth Hypothesis: There is a significant relation between ownership concentration and intellectual capital.

Rewarding managers can significantly help to the IC value. The reason of rewarding may be considered as motivation for managers in order to prevent routine service. Motivational payments will increase efficiency at Labor force. Based on this fact the following hypothesis will analyze the relation between motivational payment (reward) to managers and IC value:

Sixth Hypothesis: There is a significant relation between rewards of board of directors and intellectual capital.

4. Method of research

The current research is practical due to categorization and based on its goal. The goal of practical research is to develop practical knowledge in a specific field. Likewise, the method and nature of research is correlational. The goal of this research is to determine the amount of relation between variables. For this reason and based on the measurement scales of variables, there will be chosen proper indices. The measurement scale of data is relative scale. Relative scale will present the highest and the most accurate level of measurement and have absolute zero. The method of research is inductive in which we have gathered theoretical principles and literature of research through library, articles and internet to reject or prove the research hypothesis through the application of proper statistical methods, it has been used of inductive reasoning in order to generalize the results. So conducting the research in terms of inductive-reductive reasoning has been done. It means that it is conducted in theoretical principles and research literature through library reading, other sites, articles in deductive framework and data gathering for reject or prove the hypothesis in inductive form.

4.1. Statistics population and sample

Statistics population is includes all companies listed on Tehran Stock Exchange and sampling is screening following conditions apply:

1. Financial Information companies tested are available in study period.
2. Companies are accepted the year 2008 to 2014 in the Tehran Stock Exchange.
3. Companies in the period of investigation haven't changes in the financial period and also financial year be ended 18 March.
4. These companies weren't among financial institutions, investment and banks.
5. The company's equity is negative.

Eventually, the final sample size according to the screening method was selected 93 Company.

4.2. Research models and operational definition of variables

4.2.1. Research Models and First Part Variables of the Study

Models Used in the First Method

$ROE = \beta0 + \beta1\ TQ + \beta2\ SIZE + \varepsilon$

$ROE = \beta0 + \beta1\ MTB + \beta2\ SIZE + \varepsilon$

$ROE = \beta0 + \beta1\ LRVTB + \beta2\ SIZE + \varepsilon$

Models Used in the Second Method

$ROE = \beta0 + \beta1\ TQ + \beta2\ MTB + \beta1\ LRVTB + \varepsilon$

Dependent Variable

Return on Equity: $ROE = \frac{\text{Income available to common shareholder}}{\text{Shareholder}'\text{Equity}}$

4.2.1.1. Independent variables

Ratio of Q Tobin: $TQ = \frac{MV+D}{A}$

MV = the market value of common stock

D = Net worth Liabilities

A = the value of net assets

Ratio of Market value to Book Value: $MTB = \frac{\text{The market value of equity}}{\text{Book value of equity}}$

Ratio of Long-run Market Value to Book Value: $lRVTB = \frac{\text{Long–Term Market Value to Book Value}}{\text{Book value of equity}}$

4.2.2. Research Models and Second Part Variables of the Study

1. Income growth: Profit margins every year over the previous year, divided by the absolute profit last y

2. Intangibles: Logarithm of intangible assets in the financial statements

3. Leverage: The ratio of debt to total capital

4. HHI: The sum of the square of the percentage of ownership Company

5. Size: The natural logarithm of total assets

6. Bonus: Logarithm of the total remuneration received by board

7. β0: Fixed amount, β1, β2, β3, β4, β5, β6: The regression coefficient and ε: The standard error

4.3. Statistical methods of hypothesis testing

It is used from statistical methods in two forms of descriptive and inferential in order to analyze the data of research and testing the hypothesis of research. At first we describe and explain the demographic features of data through descriptive statistics and then in order to calculate the parameters and analyze the hypothesis testing of research, we will analyze the classic assumptions of regression. Likewise, it has been used of EViews 8 software for descriptive analysis of data and hypothesis testing and extraction of regression model.

4.4. Descriptive statistics of measurement variables of intellectual capital and company performance

Table 1 shows descriptive statistics of primary variables for measuring the intellectual capital in the period under study. Descriptive statistics of variables of research had been measured through companies' data during the period of test (2008 to 2014) includes average, median, standard deviation, minimum, and maximum.

For example about the salary returns of stock holders, the amounts of average, median, standard deviation, minimum and maximum, skewness and kurtosis is respectively 0.27, 0.24, 0.18, -0.23, 0.67, 013 and 2.50. Due to this fact that the average is more than median of salary returns of stockholders, distribution of salary returns of stockholders among sample of skew is to the right.

Table 1: Descriptive statistics of the study variables

Variables	Means	Middle	SD	Minimum	Maximum	Skewness	Strain
ROE	0.27	0.24	0.18	-0.23	0.67	0.13	2.50
TQ	1.28	1.17	0.40	0.76	2.68	1.36	4.60
MTB	1.69	1.50	0.91	0.44	4.76	0.93	3.37
LRVTB	1.64	1.44	0.89	0.46	4.77	1.11	3.82

4.5. Inferential statistics of primary models of research for second testing of first part

4.5.1. First method: using of separate models for each one of variables and comparison of adjusted R2

In this research, at first we define a separate model for each one of independent variables in order to choose top criteria through comparison of Adjusted R^2 of each one of them. The mentioned model is described below:

Model 1: $ROE = \beta0 + \beta1\ TQ + \varepsilon$

Model 2: $ROE = \beta0 + \beta1\ MTB + \varepsilon$

Model 3: ROE = β0 + β1 LRVTB + ε

4.5.2. Results of regression models fitting

After analysis the stability of variables and Chaw test and making sure of the kind of estimated model, we try to estimate models through pooled model. The results of estimation have been shown in Table 2.

Table 2: The results of regression models

Regression model	Independent variable	Coefficient	T	Sig.	Durbin-Watson	F	Adjusted coefficient of determination
Model 1	TQ	0.139	8.225	0.00	1.502	64.54021 0.000	0.107
Model 2	MTB	-0.108	-7.155	0.00	2.17	51.18796 0.000	0.072
Model 3	LRVTB	-0.157	-9.955	0.00	2.16	99.11339 0.000	0.131

As you can see in the last column of this table, the Adjusted R^2 of LRVTB variable is higher than other variables and we can consider these variables as top indices for measuring the intellectual capital.

4.5.3. Second method: using from Synthetic model and comparing their coefficients

In order to make sure of the accuracy of selected criteria among three mentioned criteria, we have made a synthetic model of three variables and through comparison of coefficient of each variable, tried to choose the preferred variable which has the highest amount.

The Hybrid Model: ROE = β0 + β1 TQ + β2 MTB + β1 LRVTB + ε

The stability test of variables has done before and it showed that variables were stable during the period of research. But in order to determine the proper model for regression model estimation, we should apply Chaw test for synthetic model again.

4.5.3.1. Results of fitting of hybrid model of research

After testing the assumptions of regression and ensuring that they are applicable, results of fitting of above regression equation has been presented in Table 3. The amount of t statistics (82.32152) also indicates the significance of regression model. As you can see in the lower part of Table 3, determination coefficient and Adjusted R^2 of above model are respectively 27.6 & and 27.3 &. So we can result that in the mentioned regression equation, only 27 & of changes of salary returns of stockholders of companies under this sturdy through independent variables are explained. In this table positive (negative) numbers in the column of coefficient amount indicates the amount of direct (inverse) effect of each variable on the salary returns of stockholders.

Table 3: The results of the fitted regression equation

Variables	Coefficient	The value of Coefficient	T	Sig.
Constant No.	β_0	-0.1525	-1.139	0.2551
TQ	β_1	0.5416	6.444	0.000
MTB	β_2	0.4547	8.835	0.000
LRVTB	β_3	-0.6786	-12.228	0.000
The coefficient of determination	0.276	F		82.32152
Adjusted coefficient of determination	0.273	Sig. (P-Value)		0.000
		Durbin-Watson statistic		2.2513

As you can see in Table 3, every three variables have significant relation with dependent variable (the significance level of each three variables is under 5 %). But since coefficient of LRVTB variable (the value of long-run market towards book value) in terms of absolute magnitude is higher than coefficient 2 of other variable, so we can result that LRVTB variable has higher explaining power for company performance and we can consider this variable as the preferred criteria for measurement of intellectual capital. In other word, either the first and second hypothesis of research regarding the highness of explaining power of LRVTB variable towards MTB and TQ variables are confirmed. The results of second method are consistent with the results of first method and we can consider LRVTB variable as the index of intellectual capital following the research and analyze the effective factors on it.

4.5.3.2. Second part: analysis of effective factors on measurement index of intellectual capital.

In this part of research, we analyze the effective factors on top criteria of measurement of intellectual capital and hereinafter we consider this variable as criteria of intellectual capital index (ICI). For this

reason we have chosen six variables which may be effective theoretically on this index and based on these factors we conduct the theoretical factors of assumptions of research. These factors are: growth percent of net profit of company, intangible assets, ownership concentration, size of company, reward of board of directors and financial leverage of company.

4.6. Descriptive statistics of data

In order to analyze the general and basic features of variables for model estimation, accurate analysis of them and recognition of population of research, understanding the descriptive statistics related to variables is necessary.

In Table 4, descriptive statistics of variables of research during the period under study have been shown. Descriptive statistics of variables of research which have been calculated through data of company during the test period (2009-2014) includes means, median, standard deviation; minimum, maximum, skewness and strain have been presented. The correlation coefficient between the variables was shown in Table 5.

Table 4: Descriptive statistics Variables

Variables	Means	Median	SD	Minimum	Maximum	Skewness	Strain
ICI	1.92	1.49	1.50	0.21	8.59	2.00	7.92
INCOME GROWTH	-0.23	0.10	5.64	-44.35	10.96	-6.17	47.95
INTA ASSETS	2.79	3.06	1.54	0.00	6.26	-0.49	2.75
LEV	3.76	1.60	22.48	0.10	564.28	23.93	569.04
SIZE	5.94	5.84	0.71	4.38	8.26	0.86	3.70
HHI	3.55	3.55	0.23	2.11	4.06	-0.46	4.73
BONUS	1.28	0.00	1.46	0.00	4.03	0.43	1.26

Table 5: Correlation between the main variables

	ICI	INCOME GROWTH	INTA ASSETS	LEV	SIZE	HHI	BONUS
ICI	1.00						
INCOME GROWTH	-0.15 -3.85 0.000	1.00					
INTA ASSETS	0.06 1.48 0.14	0.02 0.49 0.62	1.00				
LEV	0.23 5.90 0.00	-0.89 -49.97 0.000	-.0.01 -0.21 0.83	1.00			
SIZE	0.02 0.46 0.65	-0.02 -0.49 0.62	0.51 15.15 0.000	0.05 1.24 0.21	1.00		
HHI	0.02 0.48 0.63	-0.03 -0.62 0.49	-0.17 -4.38 0.00	0.01 0.26 0.80	-0.20 -5.11 0.000	1.00	
BONUS	-0.12 -3.00 0.00	0.02 0.57 0.57	0.05 1.29 0.20	-0.06 -1.49 0.14	0.01 0.24 0.81	-0.06 -1.50 0.13	1.00

4.7. Inferential statistics

4.7.1. Stability testing of variables

In this part we analyze the stability of variables of research. In order to analyze the stability, we have use from Levin, Lin and Chu test. The results of this research have been shown in Table 4-9. Due to the results of LLC test (Table 6), since P-value variable (significance level) is lower than 0.05 for all the variables, so these variables of research during the period of research were at stable level.

The results of LLC test showed that average and variance of variables during time and covariance of variables has been stable between these years. So that using of these variables in this model would not make a virtual regression. Test Linear Independent Variables was shown in Table 7.

4.8. Determine the proper model to estimate regression model

Table 6: Test Levin, Lin and Chu (LLC)

Variables	Statistic	P-Value
ICI	-25.0417	0.000
INCOME GROWTH	-211.518	0.000
INTA ASSETS	-25115.0	0.000
LEV	-153.426	0.000
SIZE	-36.1584	0.000
HHI	-8931.63	0.000
BONUS	-49.3397	0.000

Table 7: linear coefficient between independent variables research model

Variables	Tolerances	VIF
INCOME GROWTH	0.000	4.89
INTA ASSETS	0.002	1.36
LEV	0.000	4.91
SIZE	0.009	1.38
HHI	0.065	1.05
BONUS	0.001	1.01

Due to the literature of research and nature of hypothesis of research we have used of synthetic data in this research. In order to determine the proper model (pooled or panel with stable or random impacts) for hypothesis testing it has been used of Chaw and Hausman tests. In order to hypothesis testing we have used of following regression model in this research. Results of fitting of regression model of research were shown in Table 8.

$$ICI = \beta 0 + \beta 1 \text{ Intangibles} + \beta 2 \text{ income growth} + \beta 3 \text{ bonus} + \beta 4 \text{ HHI} + \beta 5 \text{ Leverage} + \beta 6 \text{ Size} + \varepsilon$$

Table 8: Results of the fitted regression equation research

Variables	Coefficient	The value of Coefficient	T	Sig.
Constant No.	β_0	1.847	1.480	0.14
INCOME GROWTH	β_1	0.014	3.474	0.000
INTA ASSETS	β_2	0.103	2.096	0.03
LEV	β_3	0.030	6.863	0.00
SIZE	B_4	-0.202	-1.787	0.07
HHI	β_5	0.269	0.962	0.33
BONUS	β_6	-0.092	-2.239	0.01
The coefficient of determination	0.14	F		17.449
Adjusted coefficient of determination	0.13	Sig. (P-Value)		0.000
		Durbin-Watson statistic		1.9817

The amount of t-statistics (17.44902) indicates the total significance of regression model (because the total significance level is lower than 0.05). As you can see in the lower part of table, determination coefficient and Adjusted R^2 of above model are 14 % and 13 % respectively. So we can result that in mentioned regression equation, only 13 % of changes of index criteria of intellectual capital of companies under study through mentioned independent variables were explained. In this table, positive (negative) numbers in column of coefficient amount indicates the amount of direct (inverse) effect on the each variables index of intellectual capital.

4.9. The test of the first part hypotheses

First Hypothesis: Explanation ability of long-run market value towards book value about company performance is higher than market value ratio to book value as a method of measurement for intellectual capital.

Second Hypothesis: Explanation ability towards long-run market value to book value about company performance is higher than Tobin's Q ratio as a measurement method for intellectual capital.

4.9.1. Result and interpretation

Regarding Tables 2 and 3, every three variables of value of long-run market towards book value, market value towards book value and Tobin's Q ratio at confidence level of 95 % at regression model of research is significant. We found through comparison of Adjusted R^2 of each models in Table 4 and comparison of coefficient of each variables in synthetic model of Table 3 variable of value of long-run market towards book value has higher explaining power in comparison with two other dependent variables of salary returns of stockholders. So both two hypothesis of research in first part are confirmed based on these two facts: the ability of explanation of market value towards book value is a kind of measurement method for intellectual capital and the ability of explanation of long-run market value towards book value about company performance is higher than the Tobin's Q ratio as a measurement method for intellectual capital. In analysis of above results it should be said that because the date of General Assembly of stockholders and growth determination of dividend payment, the price of stock by the end of June will have stronger relation in comparison with the value of stock market to company performance at the end of the year the (index of market value to book value and Tobin's Q ratio). We consider these criteria as the index of intellectual capital.

4.10. Hypothesis testing of second part

After choosing the top criteria as the preferred criteria of index of intellectual capital, we analyzed the effective factors on these criteria in second part. The results of hypothesis and their analysis have been shown below:

First Hypothesis: There is a significant relation between net profit growth and intellectual capital.

4.10.1. Results and interpretation

Regarding Table 8, the variable of growth percent of net profit at confidence level of 95% at regression model of research was significant, so that the hypothesis of research is confirmed based on this fact: there is a significant relation between growth percent of net profit and the value of intellectual capital. On the other hand due to the positive sign of coefficient percent of growth of net profit (0.014) we can result that the variable of growth of net profit has direct effect on value of intellectual capital (the value of long-run market towards book value) of companies. In analysis of above results it should be mentioned that the price of stock market at the end of June is more affected by the percent of profit growth of companies caused by the direct relation of profit and the price of stock market.

Second Hypothesis: There is a significant relation between intangible assets and intellectual capital.

Regarding Table 8, the variable of intangible assets at confidence level of 95% at regression model of research was significant, so that the hypothesis of research is confirmed based on this fact: there is a significant relation between intangible assets and the value of intellectual capital. On the other hand due to the positive sign of variable coefficient of intangible assets (0.103) we can result that the variable of intangible assets has direct effect on value of intellectual capital (the value of long-run market towards book value) of companies. In analysis of above results it should be mentioned that the intangible assets which indicates the human capital and spiritual capital of companies has direct effect on intellectual capital of companies and this effect will appear in price of stock market by the end of June.

Third Hypothesis: There is a significant relation between financial leverage and intellectual capital.

Regarding Table 8, the variable of financial leverage at confidence level of 95% at regression model of research was significant, so that the hypothesis of research is confirmed based on this fact: there is a significant relation between financial leverage and the value of intellectual capital. On the other hand due to the positive sign of variable coefficient of financial leverage (0.030) we can result that the variable of growth of net profit has direct effect on value of intellectual capital (the value of long-run market towards book value) of companies. In analysis of above results it should be mentioned that the companies which have high financial leverage (in order to finance its projects will use more of loans) gains higher returns towards loan cost and for this reason their price of stock market will increase by the end of June. In other word the amount of leverage among Iran companies is the sign of intellectual capital of that company.

Fourth Hypothesis: There is a significant relation between company size and intellectual capital.

Regarding Table 8, the variable of company size at confidence level of 95% at regression model of research was not significant, so that the hypothesis of research is not confirmed based on this fact: there is a significant relation between company size and the value of intellectual capital. In other hand, the variable of company size has no effect on intellectual capital of companies (the value of long-run market towards book value). In analysis of above results it should be mentioned that the price of stock market is not affected by the end of June, although intangible assets has effect on market value, total assets which indicates the size of company has no effect on market value of companies.

Fifth Hypothesis: There is a significant relation between ownership concentration and intellectual capital.

Regarding Table 8, the variable of ownership concentration at confidence level of 95% at regression model of research was not significant, so that the hypothesis of research is not confirmed based on this fact: there is a significant relation between ownership concentration and the value of intellectual capital. So it can be resulted that the variable of ownership concentration has no effect on the value of intellectual capital of companies the value of long-run market towards book value). In analysis of above results it should be mentioned that the price of stock market is affected by decisions of investors and has no relation with the amount of concentration or ownership distribution among the owners of companies; it means stockholders don't pay attention to concentration or the lack of ownership in companies for the price of stock.

Sixth Hypothesis: There is a significant relation between rewards of board of directors and intellectual capital.

Regarding Table 8, the variable of growth percent of net profit at confidence level of 95% at regression model of research is significant, so that the hypothesis of research is confirmed based on this fact: there is a significant relation between rewards of board of directors and the value of intellectual capital. On the other hand, due to the negative sign of variable coefficient of reward of board of director (-0.092) we can result that the variable of reward of board of director has inverse effect on intellectual capital of companies (the value of long-run market towards book value). In above analysis it should be mentioned that if the reward of board of directors increase, the value of stock market of June which is an index of intellectual capital will decrease. In other word, stockholder and active investors in market don't show a positive reflection in relation with reward of board of director.

5. Results

In this research, we analyzed the effective factors on intellectual capital of accepted companies in Tehran stock exchange between 2009 and 2014. The current research is divided into two parts: in first part of research we chose the ratio of value of long-run market towards book value as a proper criteria through analysis of these three effective factors on company performance: Tobin's Q ratio, the ratio of

market value towards book value and the ratio of long-run market value towards book value and comparison of Adjusted R^2 and also coefficients related to each factor.

Table 9: Summary of assumptions first to sixth part II

Hypotheses	Coefficient	P-Value	Results
There is a significant relation between net profit growth and intellectual capital.	0.013	0.000	Direct and significant
There is a significant relation between intangible assets and intellectual capital.	0.103	0.03	Direct and significant
There is a significant relation between financial leverage and intellectual capital.	0.030	0.000	Direct and significant
There is a significant relation between company size and intellectual capital.	-0.201	0.07	Lack of relationship
There is a significant relation between ownership concentration and intellectual capital.	0.268	0.33	Lack of relationship
There is a significant relation between rewards of board of directors and intellectual capital.	-0.092	0.01	Reverse and significant

In second part of research we analyzed the effective factors on top selected criteria of first part as intellectual capital. The findings of research showed that the variable of growth percent of net profit, intangible assets and financial leverage have direct and significant relation with intellectual capital. Likewise, there is an inverse significant relation between the variable of reward of board of directors and intellectual capital. Of course there is not a significant relation between ownership concentration and size of company.

The direct and significant relation between financial leverage and intellectual capital is corresponding with the results of Viktoria Goebel research. Likewise the significant relation between reward of board of directors and intellectual capital is corresponds with the results of him, of course the direction of relation is different from his research.

The relation between ownership concentration and intellectual capital as a variable based on assumptions has not been tested before, and we have not seen a relation between this variable and intellectual capital.

6. Conclusion

Conducted researches in our country about intellectual capital is mainly qualitative and held be questionnaire, so using of quantitative model has been the main distinction between this research and other similar internal researches. Totally the most important distinctions of current research with other similar items are as follows:

1. Lack of relationship introduction of long-run market value index to book value (LRVTB) to measure the value of intellectual capital
2. The time territory of until 7 years (2008-2014)
3. Using 93 tested continuously for all the samples years
4. Evaluate the relationship between ownership concentration and leverage with intellectual capital as previously untested variables.
5. Lack of consider companies that have negative equity

7. Suggestions

1. The survey of impact of managers' psychological biases on the value of intellectual capital
2. The survey of impact of Smoothing and earnings management on the value of intellectual capital
3. The survey of impact of factors such as the type of industry, economic conditions during the forecast period on the value of intellectual capital
4. The survey of impact of management's conservative behavior on the value of intellectual capital

References

Avazzadeh E (2015). Investigation the effect of customer relationship management on customer's loyalty and satisfaction (case study: Shiraz city Refah chain stores). International Journal of Advanced and Applied Sciences, 2(2): 11-15.

Beasley, M., Chen, A., Nunez, K., & Wright, L. (2006). Working Hand in Hand: Balanced Scorecards and Enterprise Risk Management. Strategic Finance, 87(9): 49-55.

Bontis N, Keow W and Richardson S (2000). Intellectual capital and business performance in Malaysian industries. Journal of Intellectual Capital, 1 (1): 85-100.

Brooking A (1997). Management of intellectual capital. Long Range Planning, 30 (3): 364-365.

Chen MC, Cheng SJ and Hwang Y (2005). An empirical investigation of the relationship between intellectual capital and firms' market value and financial performance. Journal of Intellectual Capital, 6(2): 159-176.

Dewi FA and Saudah S (2012). The relationship between Intellectual capital and corporate performance. The 2012 International Conference on Asia Pacific Business Innovation and Technology Management, 40: 537- 541

Edvinsson L, Malone MS, (1997). Intellectual capital: Realizing your company's true value by finding its hidden brainpower, Harper Business, New York.

Chan HK (2009). Impact of intellectual capital on organisational performance: An empirical study of companies in the Hang Seng Index (Part 1). The Learning Organization, 16(1): 4 – 21.

Hemmati H, Mehrabi A and Rahimiyan N (2010). The relationship between intellectual capital and financial performance of listed companies in Tehran Stock Exchange. M.A. Thesis, Faculty of Humanities, Institute Raja, Qazvin.

Iswati S and Anshori M (2007). The influence of intellectual capital to financial performance at insurance companies in Jakarta Stock Exchange (JSE). Proceedings of the 13th Asia Pacific Management Conference, Melbourne, Australia, 1393 – 1399.

Juma N and McGee J (2006). The relationship between intellectual capital and new venture performance: An empirical investigation of the moderating role of the environment. International Journal of Innovation and Technology Management, 3(4): 379-405.

Kok A (2007). Intellectual capital management as part of knowledge management initiatives at institutions of higher learning. The Electronic Journal of Knowledge Management, 5 (2): 181-192.

Lev B (2001). Intangibles, Management, Measurement, and Reporting, Brookings Institution Press, Washington D.C.

Lu WM, Wang WK, Tung WT and Lin F (2010). Capability and efficiency of intellectual capital: the case of fabless companies in Taiwan. Expert systems with applications, 37(1): 546-555.

Makki M, Lodhi SA and Rahman R (2008). Intellectual capital performance of Pakistani listed corporate sector. International Journal of Business and Management, 3(10): 45-51.

Marr B (2004). Measuring and benchmarking intellectual capital. Benchmarking: An International Journal, 11 (6): 559-570.

Najibullah S, Mohiuddin M and Shahid AI (2006). An exploratory study on intellectual capital performance of the commercial banks in Bangladesh. The Cost and Management, 34 (6): 40-54

Petty R and Guthrie J (2000). Intellectual capital literature review: measurement, reporting and management. Journal of Intellectual Capital, 1 (2): 155-176

Pew TH, Plowman D and Hancock P (2007). Intellectual capital and financial returns of companies. Journal of Intellectual Capital, 8 (1): 76 – 95.