



# Intellectual Capital, Tobin's Q Ratio and Stock Return

*Ali Ghasemi*<sup>1\*</sup>, *Vahab Rostami*<sup>2</sup>, *Mona Mahdavi*<sup>3</sup>, *Meghdad karkhane*<sup>4</sup>

<sup>1</sup>M.A of Accounting, Takestan Institution of Higher Education, Takestan, Iran.

<sup>2</sup>Department of Economics and Social Science, Payame Noor University, Tehran, Iran

<sup>3</sup>M.A Student of Management Accounting, Raja Institution of Higher Education, Qazvin, Iran

<sup>4</sup>M.A Student of Accounting, Takestan Institution of Higher Education, Takestan, Iran

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## ABSTRACT

**Objective:** The aim of this study was to investigate the effect of intellectual capital on the Tobin's Q rate and the efficiency of the companies' stock listed on the Tehran Stock Exchange. **Methodology:** To calculate the rate of value-added intellectual capital, Pulic model and to measure the financial performance, the Tobin's Q rate- one of the criteria based on the market value- have been used. The study sample consisted of the listed companies in Tehran Stock Exchange from which 90 companies were selected for a period of 5 years (2011 - 2014) by the systematic elimination and appropriate statistical tests were performed on them **Results:** The results of the study indicate that there isn't any significant and positive impact on the financial performance. **Conclusion:** Furthermore, they show a positive and significant relationship between the components of intellectual capital and return stock.

## 1. Introduction

Following extensive development in information technology in the 1990s, fundamental changes occurred in the pattern of economic growth and "knowledge" as the most important capital replaced the physical and financial capital in the global economy. In other words, the industrial economy with optimum combination of factors of production and economic wealth i.e., physical assets, gave way to a knowledge-based economy. In the knowledge-based economy, knowledge as a key factor plays a significant role in creating value and wealth (Chen et al., 2004). Today, despite the acceptance of the undeniable role of intangible assets and intellectual capital in financial performance, accounting systems based on traditional systems don't have the ability to measure intellectual capital and do not reflect the importance of these assets in the financial statements; while, the importance of these assets in increasing shareholders' wealth, obtaining a stable profitability trend, increasing the share of the global market, assessing the current performance and forecasting the future have always been in the spotlight. Due to the fact that companies do strategic planning to identify opportunities and threats to their environment they inevitably require comprehensive and adequate information about the capacity, competence and efficiency of their internal resources. Intangible and intellectual capitals as the main factors in the development of knowledge-based economy are capable of carrying out the strategic plans of the company (Marr, 2004).

### 1.1 A review of research literature

Recent developments in the global economy including the complexity, dynamics and competitive environment made the difference between the traditional approach and value creating method. The emergence of new global challenges in the economy has led to the foundation of knowledge based resources. These sources are considered as the main supportive supply and a competitive advantage in the business units (Ting and Lean, 2009). Intellectual capital can be considered as capital, knowledge-based entity that can be studied as a subject at university level something valuable and full of practical ideas that is increasingly accepted by the majority of organizations. Although the importance of intellectual capital is continuously increasing, however, many organizations are faced with issues related to its management, mainly due to measurement problems.

Growing gap between market value and book value of a lot of companies has led the attention towards the analyzing missing value in financial statements. According to the researchers, intellectual capital is a hidden secret that is not visible in the financial statements and leads organizations to gain

\* Corresponding author: [Alighasemi.acc@gmail.com](mailto:Alighasemi.acc@gmail.com)

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a competitive advantage (Meditinos et al, 2010). DJamil et al (2013) investigated the effect of intellectual capital on stock returns of companies in Indonesia. Latif et al (2012) conducted a research on the efficiency of intellectual capital and firm performance in developing countries (comparison of Islamic banks and conventional) in Pakistan. The results of this study showed a significant relationship between human capital and almost all the functional efficiency of the Islamic banks and also a significant association between capital productivity and performance variables for conventional banks. Maditinos et al (2012) examined the relationship between intellectual capital, the value of the stock market and financial performance. The results of this study showed a significant positive correlation between intellectual capital, the value of the stock market and financial performance of the companies. Claudiu-Marian (2011) analyzed the effect of intellectual capital on the financial performance of companies in Romania. Study results showed a significant positive correlation between intellectual capital and financial performance of the companies investigated. Kiong Ting and Lean (2009) conducted a study to assess the financial performance of the company's intellectual capital and its relationship with their financial performance in Malaysia. The results showed a positive and significant effect of intellectual capital on companies' profitability. Ghosh & Amitava (2009) examined the relationship between intellectual capital and financial performance for the 80 companies of the software and pharmaceutical companies. The results of this study suggest that there was a significant relationship between intellectual capital and profitability, but there wasn't a significant positive correlation between the intellectual capital and market value (the ratio of market value to book value). Cascio (1989) in a study investigated the effect of intellectual capital on the Hong Kong stock companies. The results suggest that the effect of intellectual capital on the performance of companies in this study was not statistically significant (Latif et al., 2012). Kamath (2008) investigated the relationship between intellectual capital components and traditional measures of financial performance, including profitability, productivity and market value. The results didn't show a significant relationship between the components of intellectual capital and financial performance. Bramhandkar et al (2007) tested the impact of intellectual capital on the financial performance of 139 companies. The results of this study suggest a significant positive relationship between the components of intellectual capital and financial performance of the companies studied. Pew Tan et al (2007) studied the relationship between intellectual capital and financial performance in the Singapore stock exchange on the basis of financial indicators, Earnings per share, return on equity and return on their annual survey. Results indicated a significant positive relationship between intellectual capital and Indices and a significant difference between the value of intellectual capital in different industries.

## 2. Materials and methods

### 2.1 The hypothesis of the study and its Theoretical foundations

The first group of hypothesis: intellectual capital has a positive and significant impact on financial performance.

**H1:** structural capital has a positive and significant impact on financial performance

**H2:** Human capital has a positive and significant impact on financial performance

**H3:** Relational capital has a positive and significant impact on financial performance

The second group of hypotheses: intellectual capital has a significant positive impact on stock returns.

**H4:** structural capital has a positive and significant impact on stock returns

**H5:** Human capital has a positive and significant impact on stock returns

**H6:** Relational capital has a positive and significant impact on stock returns.

### 2.2 Analytical framework Model

In this study, financial performance and stock returns are considered as a function of intellectual capital.

The First group of hypotheses  
Model

$$Q_{i,t} = \beta_0 + \beta_1 IC_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 AGE_{i,t} + \beta_4 PROF_{i,t} + \beta_5 LEV_{i,t} + \varepsilon_0$$

$$Q_{i,t} = \beta_0 + \beta_1 HCE_{i,t} + \beta_2 CEE_{i,t} + \beta_3 SCE_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 AGE_{i,t} + \beta_6 PROF_{i,t} + \beta_7 LEV_{i,t} + \varepsilon_0$$

The second group of hypotheses  
Model

$$R_{i,t} = \beta_0 + \beta_1 IC_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 AGE_{i,t} + \beta_4 PROF_{i,t} + \beta_5 LEV_{i,t} + \varepsilon_0$$

$$R_{i,t} = \beta_0 + \beta_1 HCE_{i,t} + \beta_2 CEE_{i,t} + \beta_3 SCE_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 AGE_{i,t} + \beta_6 PROF_{i,t} + \beta_7 LEV_{i,t} + \varepsilon_0$$

### 2.3 Types of variables and how to evaluate them

#### 2.3.1 Intellectual Capital

According to Rose and Barrons (2005) Intellectual Capital, an asset to the organization's ability to create wealth is measured. Objective in nature and not physical assets and an intangible asset is considered that the use of assets associated with human resources, external relations and organizational performance is obtained. This feature makes the internal value creation. Some definitions of intellectual capital from the perspective of different researchers, briefly in table below:

**Table 1. Definitions of important intellectual capital from the perspective of various researchers**

Year	Researcher	Definition	Source
1997	Malone	Knowledge that has the potential to become valuable.	Makki & Lodhi, 2011
1998	Stewart	Students belonging to staff, equipment and networks involved in the process of production.	
1998	Olrish	Product competence and loyalty of employees.	
2007	Bontis	Working knowledge of individual and organizational knowledge as a competitive advantage helps.	

### 2.3.2 Elements of intellectual capital

Dezinkowski (2000) was the first person who classified intellectual capital into three broad areas as follows:

**Table 2. Areas of practice elements of intellectual capital**

Scope	Symbol	Elements of intellectual capital
Individual merits	HC	Human capital
The internal structure	SC	Structure Capital
The External structure	RC	Relational Capital

Source: (Bontis, 1998)

**Table 3. The concept of intellectual capital components**

	Intellectual Capital		
	Human capital	Structure Capital	Relational Capital
The nature and essence	Human intelligence	Organizational policies	Market relations
Area of operation	In the minds of employees	In Organizational Communication	External relations
Parameter measurement	Appropriate size	Access to Efficiency	Steady volume
Hard-coding	High	middle	Very High

Source: (Bontis, 1998)

#### 2.3.2.1 Human Capital

Human capital is the most important part of intellectual capital. However, the cooperation of human capital, structural capital and customer capital could lead to the creation of stronger intellectual capital and thus achieve competitive advantage (Dragomir and Fatur, 2009). Human capital as the most important asset of an organization's is the source of creativity and innovation. The asset of tacit knowledge of employees is the most critical elements in an organization affecting the performance of the organization. However, only the tacit knowledge in an organization is not enough for good performance. Human capital can be the sum of professional knowledge, leadership, of employees. Problem-solving and risk taking abilities (Buzbora, 2004). Human capital is the capacity, the knowledge, skills and experience of the staff of a company as well as the dynamic management of activities that lead to the company's competitive environment is (Sundac and Krmpotic, 2009).

#### 2.3.2.2 Structure Capital

Structural capital consists of all non-human knowledge resources in organizations that contain databases, organizational charts, strategies, action plans and in broader dimensions what is it worth to an organization than its material values (Roos and Roos, 1997). Capital structure includes organizational culture, organizational learning and structure, practice and information systems in an organization. Intellectual capital authorities believe that the structural capital is the backbone of the development of learning organizations. In their view, if an organization has employees with high potential but weak systems and procedures, this will hinder the achievement of a desired level of performance. In contrast, a strong structure reduces costs and increases profits and productivity of the organization (Bontis, 2003).

#### 2.3.2.3 Relational Capital

Relational Capital is the company's intangible assets, which consists of communication and interaction with the customers and knowing them (Chen, 2004). Relational Capital is defined as a set of assets that clarifies the company's relationship with its environment and the management of these funds, including the company's relationships with customers, shareholders, suppliers, competitors, government and, ultimately, society (Sanchez and Scobar, 2000).

#### 2.3.3 Stock Return

In the analysis of the fundamental variables, in the first stage, stock returns and then, investment risk and stock price and finally the value created for shareholders are investigated. Evaluation of the equity value is the ultimate purpose of financial analysis. (Eldomiaty, 2006). Fundamental financial variables are known in the financial literature, and are based on assumptions that include events affecting the companies that are transparent in the disclosure of information.. Financial ratios are the most common type of basic Information that has been used in the analysis of the fundamental variables. Organizational performance is the result of operational processes and goals of the organization. In other definition, organizational performance is delivering the functions that the organization has assigned for human resources. Organizational performance includes almost all the goals of production and cost competitiveness and is related to excellence, flexibility, speed, reliability, and quality. In addition, organizational performance can be defined as an umbrella concept that covers all activities related to the organization's success. Organizations with superior performance own certain characteristics in terms of the vision, goals of the institution's mission, strategic thinking, leadership, organization, technology and organizational processes (Hardesty, 2003).

### 2.3.4 Financial Performance

Investing methods have lot of diversity. Regardless of the type of investment, the investor predictions on renewable investment income and real benefits from the investment are the most important aspects of the financial decision making. In any investment, investors are looking for investment returns. The investor is trying to know the amount of future stock returns of companies. On the other hand, one of the most common methods of analysis of financial information is providing financial ratios. Financial ratios are a summary of financial reports of companies that provide information about company's internal condition (Maditinos et al, 2012).

### 2.4 Research Methodology

This research is a descriptive study that examines the impact of intellectual capital on the financial performance and stock returns in the Tehran Stock Exchange's listed companies using an experimental design. To test the hypothesis of the study a multivariate linear regression based on panel data and a combination of cross-sectional and time-series has been used which uses statistical methods and econometrics to examine the relationships between variables.

#### 2.4.1 Data Collection Method

The library method was used to gather information. The required data has been collected by studying the financial statements of companies included in the statistical community to support the research hypothesis. The financial Statements were taken from the database and Tehran Stock Exchange's website.

#### 2.4.2 The Statistic population, sampling method and sample size

The study sample regarding the objectives and conditions for its implementation includes all companies listed on the stock exchange, and with the goal of generalization of the results to all companies of the stock market. To remove the effects of confounding industrial variables, previous researches also tried to take the sample from industries with enough population and with activities similar to those done by stock exchanges companies.

The research sample for the period of 2010-2014 includes companies that have set the following conditions:

The companies must be present before 2010 on the Stock Exchange, and their shares traded on stock exchanges.

These companies should be periodically reviewed with intervals Trading

The company's fiscal year should be ended on Esfand 29 (in terms of increased comparability).

Companies did not change the fiscal year during the study period and the data should be available in order to extract the required information

Companies should not be included in banks and other financial institutions, investment companies and intermediary and are not holding and leasing ones

Due to limitations in the choice of population, 90 companies were purposefully selected based on systematic random sampling during the period of 2010 to 2014.

#### 2.4.3 Research Model

In the present study Pulic model (2000) has been used to calculate the rate of value-added intellectual capital. According to this model, the development of the market value is due to capital and intellectual capital. A five-step description table is essential to calculate the value of intellectual capital (see table The elements of intellectual capital are calculated using the information contained in Table 4.

**Table 4. Intellectual capital components Calculate methods**

Step1	Value Added Determining	VA = Total value added
Step2	Human Capital Efficacy Determining	HC = Total wage and salaries expenses HCE = VA / HC
Step3	Structure Capital Efficacy Determining	SC = VA – HC CEE=VA / CE
Step4	Relational Capital Efficacy Determining	SCE = SC / VA
Step5	Intellectual Capital Efficacy Determining	VAIC = HCE + CEE + SCE

Source: (Djamil et al, 2013)

The variables used in the study are shown in Table 5.

**Table 5. variables calculation methods**

variable	type	calculation method	Source
IC	Independence	Pulic (2000) Model	Pulic ,2000
Q	Depended	The total market value of shareholders 'equity and book value of assets minus the book value of shareholders' equity divided by the book value of assets	Almeida et al, 2004
R	Depended	The sum of dividends and value difference before and after the end of the period divided by the share price at the end of the year	Jones, 1943
SIZE	Control	The natural logarithm of total assets, end of period	Ibikunle et al, 2013

LEV	Control	Ratio of total debt to total assets at end of year	Almeida et al, 2004
AGE	Control	Participate in the exchange difference admission to the study.	Ibikunle et al, 2013
PROF	Control	The ratio of market value to book value of equity	Ibikunle et al, 2013

### 3. Discussion and results

#### 3.1 Normality and colinearity test

One of the assumptions necessary to obtain accurate results in tests is that the data are normal. Also, co-linearity should exist between the independent variables and control variables. Normal & co linearity test results are shown in Table 6 and. Furthermore, tolerance test is one of the indicators to check for linear dependence between the independent variables. The more tolerance is close to zero, the less information about data variables and the more problems occur in regression. If it is less than /01 it indicates that there is a serious problem among the variables included in the regression model. However, another index called the variance inflation factor (VIF) can also be used to detect the multi-co linearity. The least amount of variance inflation factor is 1 and this is a situation in which no multi-co linearity exists between independent variables. (See table 6).

**Table 6. Normality and co linearity test**

variable	J- B statistic	J- B statistic (Prob)	Colinearity statistics	
			Tolerance	VIF
IC	23.251	0.324	0.632	1.377
SIZE	6.325	0.219	0.452	1.548
LEV	2.875	0.100	0.685	1.315
AGE	3.652	0.721	0.932	1.075
PROF	12.801	0.354	0.452	1.558
Q	9.325	0.521		
R	6.214	0.641		

Given that the level of significance in all variables of the study is more than 5%, so we can accept the normality of the data. Also in terms of the value of tolerance and variance inflation factors for all independent and control variables is greater than 2.0 and less than 5, so the assumption of co-linearity is rejected.

#### 3.2 Detection test model (Chow test) and Hausman test

To determine the significance of fixed effects, Chow test method was used. It is based on the determination coefficient of estimation methods of panel data. Statistical data in this study combines time-series and cross-sectional ones. Therefore, due to the combination of research data Chow test was chosen to estimate the appropriate model between two alternative methods of integrated and panel. . If the results of this test showed the use of panel data, in order to select the appropriate model between the fixed effects model and the random effects model Housman test will be used. Table 7 shows diagnostic test results and selection of an appropriate model.

**Table 7. Test Results and selecting the appropriate model using the Chow test to determine the distribution of research data**

Test Name	$Q_{i,t} = \beta_0 + \beta_1 HCE_{i,t} + \beta_2 CEE_{i,t} + \beta_3 SCE_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 AGE_{i,t} + \beta_6 PROF_{i,t} + \beta_7 LEV_{i,t} + \varepsilon_0$			
	Statistic	d.f.	Statistic (Prob)	conclusion
Chow ( F cross section)	51.362	(89,189)	0.0000	Panel Data
	$R_{i,t} = \beta_0 + \beta_1 HCE_{i,t} + \beta_2 CEE_{i,t} + \beta_3 SCE_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 AGE_{i,t} + \beta_6 PROF_{i,t} + \beta_7 LEV_{i,t} + \varepsilon_0$			
	Statistic	d.f.	Statistic (Prob)	conclusion
	61.521	(89,213)	0.0001	Panel Data

The results of the detection of the model for the first and the second group hypothesis suggests the possibility of 0.000 and the error level of less than the 0/05 for the Chow test. Thus, according to the results of the table 8 it can be concluded that the Distribution of research data is of the Panel type. Given that the Chow test results showed the using of panel data, the determination of the estimation method (using fixed effects or random effects) is done with the help of Housman test. See results in Table 8 below.

**Table 8. Housman test results to determine the estimation method (using fixed effects or random effects)**

Test Name	$Q_{i,t} = \beta_0 + \beta_1 HCE_{i,t} + \beta_2 CEE_{i,t} + \beta_3 SCE_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 AGE_{i,t} + \beta_6 PROF_{i,t} + \beta_7 LEV_{i,t} + \varepsilon_0$			
	Statistic	d.f.	Statistic (Prob)	conclusion

Hausman (Cross-section random)	31.253	6	0.0000	Fixed Effects
	$R_{i,t} = \beta_0 + \beta_1 HCE_{i,t} + \beta_2 CEE_{i,t} + \beta_3 SCE_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 AGE_{i,t} + \beta_6 PROF_{i,t} + \beta_7 LEV_{i,t} + \varepsilon_0$			
	Statistic	d.f.	Statistic (Prob)	conclusion
	29.652	5	0.0036	Fixed Effects

Given that the probability of the test statistic is less than 0.05, the fixed effects method is confirmed.

### 3.3 The results of the study hypothesis

After analyzing and determining of optimal model and selecting the estimation of the first and second regression models using panel data, results of the estimation and linear regression tests for the first and second hypothesis were provided in table 9 & 10.

**Table 9. Estimated coefficients assumptions of hypnosis's regression model**

Dependent variable: Q					Dependent variable: R			
Variable	Coefficient	t statistic	t (Prob)	VIF	Coefficient	t statistic	t (Prob)	VIF
C	4.985365	2.652133	0.0000	-	23.254222	9.652144	0.0000	-
Human Capital	10.362854	4.128541	0.0079	2.21	8.251222	7.215521	0.0063	2.21
Structure Capital	5.954263	5.821632	0.0006	2.98	4.635214	4.633325	0.0006	2.97
Relational Capital	7.952145	7.254169	0.0032	2.63	7.549921	7.003652	0.0124	2.63
Size	9.652143	7.965213	0.0074	1.99	7.998754	7.123521	0.0195	2.66
Lev	-5.985401	-6.987512	0.0412	1.93	-4.632111	-8.523365	0.017	1.54
Age	9.973511	4.939354	0.0123	2.87	7.0125440	9.712333	0.0000	1.92
Prof	4.652712	2.845261	0.0000	2.12	9.652214	7.125932	0.0003	2.01
Adj R	D - W	F statistic	F (Prob)		Adj R	D- W	F statistic	F (Prob)
0.42	1.99	120.36	0.0000		0.62	2.01	412.12	0.0001

Based on the above figures, intellectual capital has a significant positive impact on financial performance and stock returns. Both hypothesis tests showed that significant negative impact on the financial leverage variable impact of the independent variable on the dependent variables were. Other control variables and a significant positive impact on the independent variable on the dependent variables have an impact. According to the results of the two hypotheses were confirmed.

## 4. Conclusion

In this study, in first step, the information needed to calculate the elements of intellectual capital, Tobin's Q ratio and return on equity of 90 companies listed on the stock exchange selected by systematic sampling were gathered for the 5-year period (2011- 2014) of the audited financial statements relating to the these companies. Then, research variables were assessed and evaluated using SPSS, Excel and Eviews7. And finally, by using 2 models, the effect of intellectual capital on financial performance (Tobin's Q ratio) and stock return of companies surveyed were tested. The overall results obtained were as follow: The effect of intellectual capital on financial performance is not significant that is compliance with the findings of Makki (2008) and Ghosh and Amitava (2009).

The effect of intellectual capital on the stock return is significant that is in compliance with the findings of Djamil et al. (2013) and Maditinos (2012). Considering the results, it can be concluded that in the human capital, indicators such as satisfaction, competence and skills; in the relational capital, the relationships with customers and people outside the organization; and in the structural capital, indicators such as organization policy to the extent that they can significantly affect the performance of the business unit have not developed and neglected. However, it should be stated that the current development of the indicators mentioned was sufficient for the desired effect on stock returns.

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