

## **INTELLECTUAL CAPITAL AND PROFITABILITY TOWARDS FIRM VALUE: ANALYSIS USING QUANTILE REGRESSION APPROACH**

**Mohammad Herli**

Department of Accounting, Faculty of Economics and Business, Wiraraja University,  
Sumenep

Doctoral Program of Accounting Science, Airlangga University, Surabaya

*Email: mohammadherli@wiraraja.ac.id*

**Hafidhah**

Department of Accounting, Faculty of Economics and Business, Wiraraja University,  
Sumenep

### **ABSTRACT**

*This study aims to analyze the influence of intellectual capital and profitability towards firm value. This is caused by the inconsistency of research result of the variable influence. The research data are 26 companies incorporated in the LQ45 company, the companies selected are the companies owned large capitalization value, so that they are appropriate for this research topic. The research data is analyzed using quantile regression. The researcher believes that the inconsistency of the research result is due to the use of OLS regression model producing the biased estimate. Quantile regression method can overcome the weakness of regression model with OLS approach because it can produce estimation value on the different level. The result shows that intellectual capital and profitability have significant influence towards firm value on the different quantile (levels). Neither intellectual capital nor profitability has no influence on low quantile. This means that both independent variables have impact to the increasing of firm value on the quantile more than 0.2. It is different from profitability that continuously give impact on the high quantile, the intellectual capital will not give impact on firm value when it is on the high quantile (quintiles 0.8 to 0.95). Based on the result of this research, the company's management must continuously optimize the intellectual capital in order to be able to give a positive influence for the company development. This research uses a quantile regression approach to examine the influence of variables, up to now, especially in Indonesia is still rare the research in the field of accounting using this approach.*

*KeyWords: Quantile Regression, Intellectual Capital, Profitability, Firm Value*

### **1. INTRODUCTION**

The increasingly-complex of business competition force the company to innovate in order to create value that will increase competitiveness. Currently, business competition is not only in the local scope but also in the

global competition. The company management has to work smartly in order to be able to maintain the company existence (Ulum et al., 2008). Many companies as instance have stagnated even collapsed because they are unable to compete in the market.

According to some experts, there are several factors that can be utilized by companies to be able to compete. One of the factors is the capital of human resources. Human resources represented by the competent employee will produce innovation that will increase firm performance (Basuki, 2012; Brennan, 2001).

The study of the role of capital of human or employee in supporting the firm performance has been frequently done and proven to be able to improve the firm performance (Basuki and Kusumawardhani, 2012; Istanti, 2009; Santoso, 2012; Solikhah, 2010). The company is able to compete if they have competent employees that have qualified knowledge to develop the company. If this is realized, it may be able to create the capitalization and create the prosperity in the company (Sawarjuwono and Kadir, 2004).

Recently, the rapid economic growth foments a greater attention to the intellectual capital components. Companies do not only rely on the capital "money capital", but also focus on developing intellectual capital in increasing competitiveness and firm performance (Benevene and Cortini, 2010; Kong, 2010; Nahapiet and Ghoshal, 1998; Petty and Guthrie, 2000). The emergence of "new economy" has been encouraged the company to develop information technology and knowledge (Firer and Mitchell Williams, 2003; Kuryanto and Syafruddin, 2008).

The attention to intellectual capital in increasing the firm performance has been proven in companies based a developed country, for example, USA. The study of the intellectual capital in the developed country has been frequently done and many conclusions resulted that there is the influence of the intellectual capital in increasing the company's performance (Bontis, 2001; Marr et al., 2004; Wang and Chang,

2005). Intellectual capital has become a focus by managers and academics since the beginning of the 1980s and grown rapidly right now (Polo, 2007).

If the existence of intellectual capital has been realized by companies in the developed country, this is different from what happens in the developing country like Indonesia. In Indonesia, the intellectual capital phenomenon began to develop since 2009 especially after the emergence of PSAK No. 19 (revised 2009) on intangible assets. This indicates that companies in Indonesia have not realized about the role of intellectual capital in improving the firm performance. This corresponds to the research result conducted where there are several researchers stated the existence of the influence of intellectual capital on public companies in Indonesia (Basuki, 2012; Iswati, 2017; Sudibya, 2014; Ulum et al., 2008; Widarjo, 2011). However, there is also the finding that intellectual capital does not influence in increasing the firm performance (Kuryanto and Syafruddin, 2008).

The enhancement of company's attention to intellectual capital will improve the company's performance that will increase the firm value (Basuki; Sianipar, 2012; Riahi-Belkaoui, 2003; Sawarjuwono and Kadir, 2004; Wahdikorin and Prastiwi,

2010). This study will measure two independent variables (intellectual capital and profitability). Both of variables will be analyzed whether it has an impact in increasing the value of the firm. As mentioned above, research on the intellectual capital impact to the firm performance still become polemics because there are pros and cons to it. The author believes that the inconsistency of the research results due to the data analysis that the majority used regression approach. Usually, modeling with regression approach is

used to test the relation between the dependent variable (y) and independent variable (x). One of the most commonly used approaches is the ordinary least square (OLS). OLS requires assumptions that must be met. However, this method is known sensitive to assumption deviation of data. So, if the assumption is not met, the regression result of OLS is not favorable to be used. The assumption that is often violated on the regression with OLS is normality assumption (normality of data) so that researchers do the transformation to normalize the data that will produce in the biased allegation.

This research tries to reveal whether there is an impact of the intellectual capital and profitability to the firm value using the different approach that is quantile regression (QR). The QR method was first introduced by Koenker and Bassett in 1978 (Koenker and Bassett Jr, 1978). Quantile regression can overcome the weakness found in the regression with OLS of normality assumption and heteroskedasticity (Fitriah, 2009).

## **2. LITERATURE REVIEW**

### **2.1 Intellectual Capital, Profitability, and Firm Value**

Intellectual capital as intangible assets in an enterprise experiencing evolution from the identified as goodwill (Polo, 2007) develop to be intellectual capital that consists of several components that are quite complex. Generally, intellectual capital consists of three main components i.e. human capital, structural capital, and relational capital (Kaplan and Norton, 2004).

Human capital is closely related to the competence of the company's human resources. Certainly, Companies that have reliable human resources will give a positive impact on the company such as efficiency in the other resource

management of the company. In this case, the structural capital is closely related to the management knowledge that consists of vision, mission, and strategy owned by the company to be able to develop themselves. The third-components of intellectual capital is relational capital. This component is related to the relationship with consumers that will create consumer's loyalty. The synergy of the three components of intellectual capital will develop the firm performance, that will be able to increase the firm value (Basuki; Sianipar, 2012; Sawarjuwono and Kadir, 2004; Zeghal and Maaloul, 2010).

Profitability of company is a portrait of management performance in the company management. Therefore, the achievement of a manager can be seen from the profitability that can be achieved by the company (Analisa and Wahyudi, 2011; Selladurai, 2002). Profitability achieved by the company can be seen from several aspects i.e. profit, net income, the effectiveness of investment /asset, and rate of return on capital owners (Susilowati, 2011).

The profitability levels achieved by the company reflects favorable financial performance. Certainly, this is a reflection that the company is able to manage the capital to increase the profit maximally. Profitability will be able to increase firm performance and firmvalue (Delios and Beamish, 2001; Mardiyati et al., 2012; Plaz et al., 2004; Susilowati, 2011). Therefore, the firm value will be influenced by the profitability levels that can be achieved by the firm. This is relevant to the finding done by researchers specifically observing the profitability impact on the firm performance.

## **3. RESEARCH METODOLOGY**

This research was conducted on the company with large capitalization value incorporated on LQ45 since 2011- 2016.

from 45 companies listed, 26 companies were selected because they have the completed financial-data and fulfill the criteria as the sample. This research uses the secondary data that is annual report obtained by Indonesia Stock Exchange (IDX).

### 3.1 Theoretical Model

The OLS model consisted of  $(y_{it}, x_{it})$ ,  $i = 1, 2, \dots, N$  and  $t = 1, 2, \dots, i$  is a sample of the population of the selected company and  $i$  is a period. The dependent variable of  $y_{it}$  represents the firm value (Q), and  $x_{it}$  (K x 1) as the explanatory vector of  $y_{it}$ , represents the independent variable i.e. intellectual capital (IC) and profitability (ROA). With assuming the distribution of  $y_{it}$  is linear to  $x_{it}$ , so that the regression equation is expressed as:

$$y_{it} = x'_{it} \cdot \beta + u_{it} \quad (1)$$

Where  $\beta$  (K x 1 vector) is unknown estimate parameter.

Therefore, the model of equation 1 (non-quantile model) is potentially limited because it uses constant load on each determinant variable of firm value. By optimizing the OLS, we can obtain the estimator of  $\beta$  as:

$$\min \sum_t (u_{it})^2 = \sum_i (y_{it} - x'_{it})^2 \quad (2)$$

The estimation of  $\beta$  can be minimized of its absolute error quantity by following the model below:

$$\min \sum_t |u_{it}| = \sum_i |y_{it} - x'_{it} \cdot \beta| \quad (3)$$

The equations (2) and (3) represent the average value of errors with equal quality. Therefore,  $x_{it} \cdot \beta$  represents the mean and median of the OLS techniques. the main limitations of the OLS model are that the OLS provides only one measure of central-tendency distribution of the dependent variable i.e. firm value. In other words, OLS technique only takes the behavior of the firm value in the tail area.

The OLS model approach only provides one measure of central-tendency distribution of the dependent variable. However, this method fails to

overcome the behavior of the dependent variable in the tail area. To overcome this problem, various random model coefficients have emerged as the viable alternative in the statistic. QR model is one of the alternative models. Although the QR model has not received direct recognition yet of its statistical benefit, the author uses QR approach in this research because the explanatory parameter (independent) variable can be expressed as a monotonic function, scalar, random variable. Assume that  $\theta$  quantile to explain variable,  $y_{it}$  is linear with  $x_{it}$ . In the QR model can be expressed as:

$$y_{it} = x'_{it} \cdot \beta_{\theta} + u_{\theta it}$$

$$\text{Quant}_{\theta}(y_{it} | x_{it}) = \inf\{y: f_{it}(y|x)\theta\} = x'_{it} \cdot \beta_{\theta} \quad (4)$$

$$\text{Quant}_{\theta}(u_{\theta it} | x_{it}) = 0$$

Where  $\text{Quant}_{\theta}(y_{it} | x_{it})$  indicates that  $\theta^{th}$  is the conditional quantile of  $y_{it}$  in the vector regressor  $x_{it}$ ;  $\beta_{\theta}$  is unknown vector of variable that will be estimated to different value of  $\theta$  in  $(0,1)$ ; and  $U_{it}$  is error term derived from the function of differentiated distribution of  $F_{u\theta}(\cdot | x)$  and the density function of  $f_{u\theta}(\cdot | x)$ . The value of  $F_{u\theta}(\cdot | x)$ , shows the distribution of the dependent variable of  $x$ . The vvariation of values of  $\theta$  from 0 to 1 reveal the  $y$  distribution in  $x$  condition. The estimates of the  $\beta_{\theta}$  value are derived from:

$$\min \sum_{it: u_{\theta it} > 0} \theta x |u_{\theta it}| + \sum_{it: u_{\theta it} < 0} (1 - \theta) x |u_{\theta it}|$$

$$= \sum_{it: y_{it} - x'_{it} \cdot \beta_{\theta} > 0} \theta x |y_{it} - x'_{it} \cdot \beta_{\theta}| + \sum_{it: y_{it} - x'_{it} \cdot \beta_{\theta} < 0} (1 - \theta) |y_{it} - x'_{it} \cdot \beta_{\theta}|$$

Even though the estimator has not have an explicit form, however, the

minimization resulted can be overcome the problem using linear programming technique (Koenker and Bassett Jr, 1978). The QR approach allows the researcher to track all distribution of the conditional dependent variable in the

independent variable. In this research, we used the bootstrap method to estimate the standard error coefficients of the QR model. This is because the sample used is relatively small (Buchinsky, 1995).

*Table 3.1. Variable and Variable Proxy*

<b>Variable</b>	<b>Representation</b>	<b>Variable Proxy</b>
Dependent Variable		
Firm Value		$Q = \frac{(EMV+D)}{(EBV+D)}$
Independent Variable	VAIC <sup>TM</sup>	= Value Added Capital Employed + Value Added Human Capital + Structural Capital Value Added
Profitability		Net Income After Tax/Total asset

#### **4. RESULT AND DISCUSSION**

##### **4.1 Descriptive Statistics**

The statistic data above is minimum, maximum, average, and standard deviation of the variable observed i.e. intellectual capital, profitability, and firm value (tabel 2).

Intellectual capital is knowledge resources in form of employees, customers, processes or technologies that the company can use them in the value-creating process for the company. The result of statistical calculation of this variable obtainn the average value of 5.61, the minimum value of, 1.09, the maximum value of 18.53, and standard deviation value of 3.54.

Profitability in this research is proxied through Return on Assets (ROA) that is one of the profitability ratios that measure the firm effectiveness of profit-making by

utilizing asset owned. ROA reflects business profit and firm efficiency in utilizing of total asset. Based on the result of the statistical calculation is obtained the average value of 10.43, the minimum value of 0.09, the maximum value of 40.38, and standard deviation value of 8.59.

This ratio is valuable concept because it indicates the estimation of the financial market nowadays about the return value of each dollar of incremental investment. If the Q ratio above is one, this indicates that the investment in company's asset makes profit offered higher value instead of the investment expenditure. Based on the result of the statistical calculation is obtained the average value of 2.33, the minimum value of 0.14, the maximum value of 18. 64, and standard deviation value of 2.87.

*Table 4.1. Descriptive statistics*

<b>Information</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Standard Deviation</b>
IC	1,09	18,53	5,61	3,54
ROA	0,09	40,38	10,43	8,59
Q	0,14	18,64	2,33	2,87

*Source: data processed by researcher*

## 4.2 Result

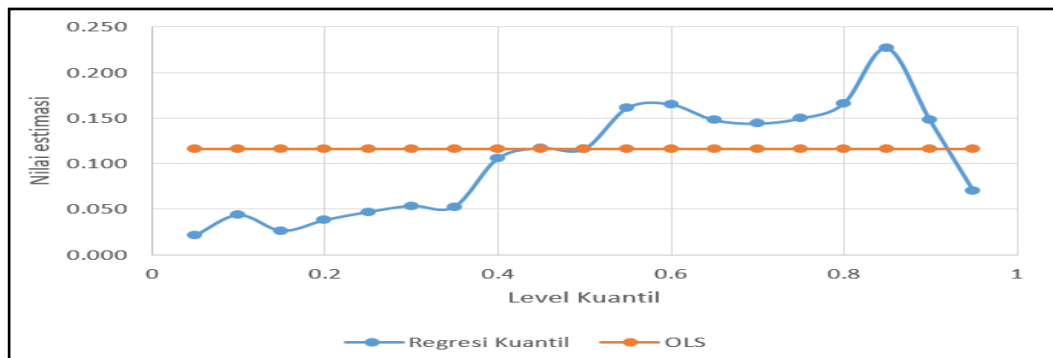
### 4.2.1 Intellectual Capital and Firm Value

In determining of influence between intellectual capital and firm value, the researcher compares the output of regression resulted by OLS method and quantile method. The OLS regression model is in quantile 50. Table 3 shows the regression result using the OLS method where the intellectual capital variable is significantly positive, it has an effect on

the firm value of the error level of 5%. However, this method cannot identify begin to what level the intellectual capital has an impact on the firm value. To overcome the problem, so that the QR approach can be applied. The table 3 shows that the influence of intellectual capital begins to affect the firm's value on the quantile of 0.20 to 0.85. The effect becomes absolute to the quantile of 0.40 to 0.075 that is significantly positive to the error level of 5%.

*Table 4.2. The Influence of Intellectual Capital toward Firm Value to the quantile levels*

Quantile	Estimation	(p-value)	Quantile	Estimation	(p-value)
<b>0.05</b>	0.021090	0.638	0.95	0.070363	0.953
<b>0.10</b>	0.043478	0.119	0.90	0.147727	0.620
<b>0.15</b>	0.026087	0.246	0.85	0.226933	0.073
<b>0.20</b>	0.037944	0.021	0.80	0.165761	0.078
<b>0.25</b>	0.046765	0.003	0.75	0.149502	0.014
<b>0.30</b>	0.053559	0.032	0.70	0.143870	0.000
<b>0.35</b>	0.052632	0.115	0.65	0.147860	0.000
<b>0.40</b>	0.105605	0.012	0.60	0.165111	0.000
<b>0.45</b>	0.116973	0.008	0.55	0.161215	0.000
<b>0.50</b>	0.115888	0.004	OLS	0.115888	0.004



*Figure 4.1 the influence of intellectual capital toward firm value. The comparison of QR estimation with OLS estimation to the confidence level of 95%.*

Figure 4.1 shows the comparison of the figure of QR value estimation from the intellectual capital variable with the confidence level of 95% by the estimation using OLS approach. As previously stated that the OLS indicates

an only relationship between the intellectual capital variable and firm value variable. OLS is unable to present the different of the estimation value at

various levels. In the case above, OLS is unable to present impact of intellectual capital (IC) on the level of different firm-value (Q). This cause the OLS approach sometimes producing biased estimation.

If we observe the figure 1 and table 4.2 above, then it will appear that intellectual capital makes the different impact on the level of firm value. Intellectual capital begins to make the

impact on the firm value on the quantile of 0.2 and the value increased up to reach anticlimactic at the quintile of 0.8. it means that a company that less attention to the existence of the intellectual capital does not have an impact on the firm value. The enhancement of company attention toward intellectual capital will make a greater impact on firm value. However, the uniqueness of this study, the intellectual capital will no longer affect the company when the firm value has been maximal or the company has reached the peak of the utilization of intellectual capital.

The finding of this research can be a reference for company management to pay more attention and to optimize the intellectual capital owned in order to give impact to the company. These findings are relevant with the research result (Basuki; Sianipar, 2012; Riahi-Belkaoui, 2003; Wahdikorin and Prastiwi, 2010; Wang and Chang, 2005) that intellectual capital give the impact to company's performance. Optimization of the components of intellectual capital in the company will certainly give a positive impact on the development of the company. (Kaplan and Norton, 2004) states that the attention to the intellectual capital

components (human capital, structural capital, and relational capital) will increase the value of internal and external companies in order to be able to increase the firm value.

#### **4.2.2 The Influence of Profitability with Firm Value**

Profitability is the measure of the company in making the profit. This research uses Return on Assets (ROA) to proxies the profitability. Table 4 shows the influence of profitability on firm value to the confidence level of 95%. The estimation with OLS approach represents that profitability has the positive impact and significant to firm value with the error level of 5%. It means that the firm value will increase as increasing of profitability value. On table 4 also provides the estimation result of the influence of profitability to firm value with using quantile approach, showing that the profitability ratio begins to have an influence to firm value on the higher quantile (0.20 to 0.95). The table 4 shows that the profitability ratio does not have an influence on the firm value on the bottom quantile (0.05 to 0.15). it means that the low level of firm value, the company profitability does not give an impact to the company value.

*Table 4.3 The influence of profitability toward firm value on the various levels of quantile*

<b>Quantile</b>	<b>Estimation</b>	<b>(p-value)</b>	<b>Quantile</b>	<b>Estimation</b>	<b>(p-value)</b>
<b>0.05</b>	-0.010293	0.573	0.95	0.433841	0.000
<b>0.10</b>	-0.016667	0.588	0.90	0.348219	0.000
<b>0.15</b>	0.032328	0.389	0.85	0.334629	0.000
<b>0.20</b>	0.063187	0.026	0.80	0.259294	0.000
<b>0.25</b>	0.074830	0.001	0.75	0.205298	0.000
<b>0.30</b>	0.101017	0.000	0.70	0.164410	0.001
<b>0.35</b>	0.101576	0.000	0.65	0.142777	0.000
<b>0.40</b>	0.109621	0.000	0.60	0.136697	0.000
<b>0.45</b>	0.107211	0.000	0.55	0.119111	0.000
<b>0.50</b>	0.109656	0.000	OLS	0.109656	0.000

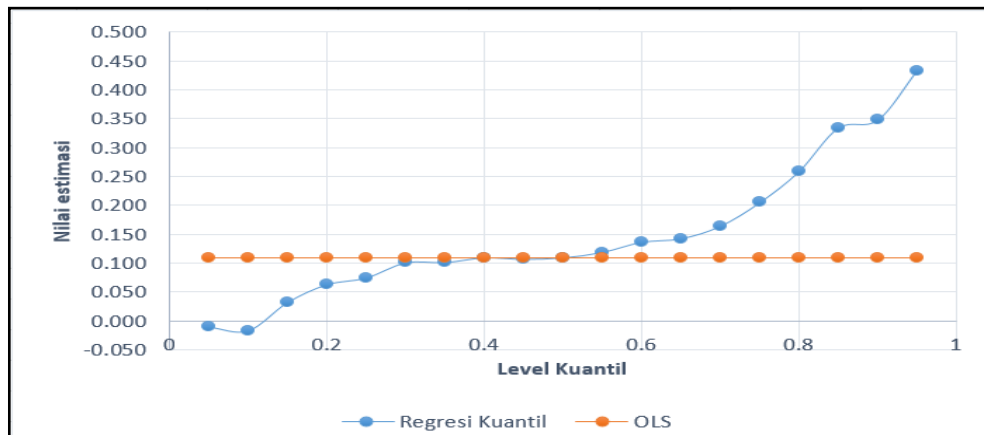


Figure 4.2. The influence of profitability toward firm value. The comparison of QR estimation of profitability variable with the confidence level of 95%

Table 4.2 shows the comparison of the figure of QR estimation value of the profitability variable with 95% confidence levels by estimation using the OLS approach. It is visible in figure 4 above, OLS is unable to provide the impact of profitability (ROA) on the level of different firm-value (Q).

If we observed the Figure 2 and 4 above, it will be visible that profitability provides the different influence on each level of firm value. Profitability does not provide the influence in increasing the firm value on the low quantile. In this study is found that the profitability affects the firm value on the quantile more than or equal to 0.2. The important thing is that the quantile enhancement of the firm value is directly proportional to the firm profitability. It is clearly seen in Figure 4 that the increasing ROA will increase the firm value.

This research supports that the research conducted by (Cruz et al., 2010; Dunning and Pearce, 1975; Idris, 2017; Molyneux and Thornton, 1992; Selladurai, 2002) stated that profitability has influence toward the firm performance and firm value.

## 5. CONCLUSION

Firm management is required to improve firm performance so that the firm management must be able to optimize the firm resources. The study

towards the intellectual capital in contributing to the firm development continuously increase. Several findings have concluded that there is influence between intellectual capital in the company towards firm performance. However, the problem is the inconsistent result of one researcher with another researcher on the impact of intellectual capital towards firm value. There is a researcher who stated that there is a positive influence between intellectual capital and firm value (Cruz et al., 2010; Sudibya, 2014), however, several researchers frequently stated that both of them have the negative relationship (Kuryanto and Syafruddin, 2008).

The inconsistency of the result is caused by the analysis used in estimating the impact. This commonly uses regression with the OLS approach. As we know, the regression model with the OLS equation tends to focus on the central point only, so that sometimes it produces biased estimation results.

This study uses the different approach to examine the influence of intellectual capital and profitability towards firm value. The approach used is quantile regression. The use of quantile regression aims to know the influence of independent variable to the dependent variable on the different levels.



The result shows that the intellectual capital and profitability have the different influence on the various levels of quantile. The intellectual capital variable and profitability variable have no influence towards firm value on the low quantile. The interesting thing in the finding of this research that on the quantile of the high firm value, evidently, the intellectual capital no longer influences the company. This is different from the profitability variable where the variable still has the significant influence on the quantile of high firm value.

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