Relationship between Operating Cycle and Quality of Accounting Information in Tehran Stock Exchange Listed Companies

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Abstract   Earnings quality in financial reporting can influence confidence of investors in financial markets. Since the information and financial reporting environment of organizations is affected by the activity type of a business unit, quality of financial reporting is somehow influenced by these specifications and different activity types of organizations. So, this research aimed to study the relationship between operating cycle and quality of accounting information. The statistical population included the companies listed on Tehran Stock Exchange from 2008 to 2012, among which 110 companies were randomly selected based on Cochran's sample size formula. The research results showed no significant relationship between operating cycle and accruals quality. Also, it was found that increase in operating cycle would result in reduced earnings quality.

Key words   Operating cycle, quality of accounting information, earnings quality

1. Introduction

The major role of accounting information in financial markets is to provide the necessary ground for optimal allocation of resources. Following the recent financial scandals, investors have lost their complete trust in financial reporting system and earnings quality has emerged as an important factor in determining the validity and reliability of reported figures. As a result, investors, managers, law-makers, and standard developers are interested in determining quality of accounting information and its results. Also, since managers of business units need various kinds of information on the market, accounting, and operating cash flow and accruals, accounting system as the supplier of such information plays a very important role in this regard. More precise information is more important for managers' decision-making; in other words, decision-makers are more sensitive to such high-quality information. Accounting earnings and its components are also considered as the important source of information during decision-making. Many users of financial statements believe that accrual-based accounting earnings are a tool for assessing the performance of companies.

Considering the importance of accounting information in the decisions made by its users and the effect on the quality of financial reporting along with the influence of operating cycle on quality of financial reporting, studying the relationship between two variables of operating cycle and quality of accounting information is important for all the users of financial statements, investors, and creditors. Among the important factors influencing earnings quality are various accounting methods, inadequacy of estimation and prediction procedures, authority of managers, and effect of reporting basics and managers' discretions on earnings (Desai et al., 2009). Considering the importance of quality of accounting information and its role in

the decision-making of stake-holders, this research aimed to study the influence of operating cycle on quality of accounting information. Quality of accounting information was tested based on accruals and earnings quality; also, operating cycle was evaluated based on accruals. Thus, this research could be considered an innovation in terms of its main focus on accruals.

2. Literature review

In their article, Bayer *et al*. (2014) studied the influence of costing cycle during the life time of organizations and evaluated the effect of this cycle on products and production systems in terms of decision-making. The aim of this research was to introduce a viewpoint about the incorporation of costing cycle and its evaluation, which will help decision-makers in two areas of information and analysis. The research findings showed a model for sale integrity. Moreover, accounting flow of cost was the proposed method which could be widely applied depending on the life cycle of organizations and its analysis.

Rezaei and Mehrabani (2013) investigated the influence of operating cycles and ownership structure on level of accounting conservatism in the companies listed on Tehran Stock Exchange. The results demonstrated a significantly positive relationship between institutional ownership structure and conservatism level of companies and another significantly positive relationship between operating cycles and conservatism level of companies.

Hasan Abadi and Mashayekhi (2013) studied the value orientation of accounting information over time in Iranian companies. They sought to answer this question: How does value orientation of accounting information change over time in Tehran Stock Exchange? Thus, they applied two measurement and prediction approaches using regression to study the value orientation of accounting information in 95 companies during 11 years. The results showed that the research hypothesis indicating the reduced value orientation of accounting information over time cannot be rejected in the above-mentioned approaches.

Kalaei (2013), in his thesis entitled "Relationship between earnings levels and components and value of company in the life cycle of Tehran Stock Exchange Listed Companies", researcher examined 170 companies from 2006 to 2012. The results showed a significantly negative relationship between sale revenue and company value at all the three stages; also, there was no significant relationship between operating earnings and company value at growth and decline stages. Only at maturation stage, there was a significantly positive relationship. Relationship between net earnings and company value was significantly positive at all three stages; each of these variables was also evaluated along with the controlling variables of company size and financial lever. It should be also noted that variables of operating earnings and net earnings at maturation stage had more capability to explain and predict the company value. Also, sale revenue at maturation stage had a more significantly negative relationship than growth and decline stages.

Bayat (2013) studied the influence of life cycle on the relationship between financial characteristics and capital structure of the companies listed on Tehran Stock Exchange. The results showed that these companies preferred financing through liability at all three stages of their life cycle. In other words, they followed the hierarchical theory of financing for supplying the required financial resources.

Hang and Li (2012) considered the relationship between performance of companies and earnings quality and found that the company performance decreased with reducing earnings quality. Compared with previous studies, the performance of companies measured by two criteria of Tobin's q and stock return improved as soon as their earnings quality increased.

Pourheydari and Alipour (2011) studied the relationship between accounting data and business cycles in Tehran Stock Exchange. Also, they considered the behavior of accounting data based on business cycles and according to specific characteristics of companies. The results showed that, in Tehran Stock Exchange, there was a significant relationship between some accounting variables (sale growth and gross profit margin) and business cycles. However, no relationship was observed in some variables (such as change of total asset). Further, the findings demonstrated that the relationship between accounting data and business cycles was influenced by size of companies and their cycling or non-cycling nature (specific characteristics of companies).

Ogeneva (2010) studied the relationship between quality of accruals and share returns and believed that the realized returns could be influenced by three components: predicted expected return, unexpected cash flow, and unexpected risk news after controlling in terms of unexpected cash flow shocks. The results demonstrated a significantly negative relationship between accruals quality and future return of stock.

The relationship between accruals, cash flows, and stock return was considered by Hirshelefer *et al.* (2009), who found that, contrary to the previous findings, accruals could be strongly positive predictors for stock return; but, cash flows were negative predictors.

Dastgir and Rastegar (2011) investigated the relationship between earnings quality (earnings stability), size of accruals, and high-quality stock return of accruals. They selected 95 companies out of the companies listed on Tehran Stock Exchange from 2000 to 2007 and found that the earnings quality (stability) had a direct relationship with accruals quality. Besides, as the accruals quality decreased and size of accruals increased, stock return was increased.

3. Research Hypotheses

The main hypotheses were as follows:
Hypothesis 1: There is a significant relationship between operating cycle and accruals quality.
Hypothesis 2: There is a significant relationship between operating cycle and earnings quality.

4. Studied variables and measurement

4.1. Studied variables of operating cycle

Net sale
Total sale cost after the deduction of discounts, interest, or returned investment in a particular period

Average accounts receivable
Average accounts receivable = (Initial accounts receivable + Final accounts receivable)/2

Cost of goods sold
Initial inventory of goods + purchase of goods during the period + cost of produced goods during the period – final inventory of goods

Average inventory
Average inventory= (Initial inventory of goods + final inventory of goods)/2

Operating cycle:

$$OC = \left\{ \dfrac{360}{\dfrac{\text{Net sale}}{\text{Average accounts receivable}}} + \dfrac{360}{\dfrac{\text{Cost of goods sold}}{\text{Average inventory}}} \right\}$$

4.2. Studied variables of accruals quality

TCA: Total working capital accruals
OCF: Operating cash flow obtained from cash flow statements
ΔREV: Change in revenue
PPE: Property, plant, and equipment
ε: Residuals from regression

Considering the variables mentioned for quality of accruals (QA), Francis et al.'s model was applied in this research for QA measurement (2005):

$$TCA_{j,t} = \alpha_0 + \alpha_1 CFO_{j,t-1} + \alpha_2 CFO_{j,t} + \alpha_3 CFO_{j,t+1} + \alpha_4 \Delta REV_{j,t} + \alpha_5 PPE_{j,t} + \varepsilon \tag{1}$$

4.3. Measuring earnings quality

Residuals (ε) from regression of accruals indicate management or earnings quality.

4.4. Studied variables as a conceptual model

After measuring the variables of operating cycle, accruals quality, and earnings quality, the following model was used to test the research hypotheses based on the type of relationship between operating cycle and accruals quality as well as operating cycle and earnings quality:

$$AQ_{it}=\beta_0 +\beta_1 size_{it} +\beta_2 CFOVOL_{it} +\beta_3 SalesVol_{it}+ \beta_4 OperCycle_{it}+ \beta_5 NegEarn_{it} + \omega_i \qquad (2)$$

Size $_{it}$: Size of the company at the end of year t.

CFOVOL$_{it}$: Cash flow value for the operation of companies i for year t; in fact, it refers to those input and output cash flows which are caused by continuous and main activities generating operating revenue for the commercial unit and is obtained from cash flow statement. It is calculated as follows:

Cash flow = Operating earnings after the deduction of tax and interest + depreciation cost ± changes in assets and current liabilities (Dechow, 1994).

SalesVol$_{it}$: Sale of company i in year t.

OperCycle$_{it}$: Operating cycle of company i in year t, which is calculated as follows:

All the variables are divided by the average of total asset. The theoretical foundation of the above model is based on the point that accruals should explain operating cash flow (OCF) of previous, current, and future periods. Residuals (ε_i) of the regression of accruals show earnings quality or management. The less the standard deviation of the residual values, the higher the accruals quality and thus the quality of accounting information would be and vice versa. Accordingly, values of standard deviation are multiplied by -1. So, the standard deviation of the residuals of the above model (ε_i) for the last 4 years was considered the dependent variable in this research.

5. Data analysis

5.1. Descriptive statistics

Central indices such as mean and median and dispersion indices like standard deviation, kurtosis, and skewness were calculated for different variables and shown in the following table:

Table 1. Descriptive statistics for the research variables

Variables	Observations	Mean	Median	Standard deviation	Skewness	Kurtosis	Minimum	Maximum
Operating cycle	538	244.41	227.68	120.57	0.85	1.20	21.60	759.14
Company size	538	13.23	13.08	1.38	0.81	1.37	9.84	18.50
Liability ratio	538	0.64	0.65	0.19	0.17	0.87	0.09	1.54
Profitability ratio	538	0.13	0.11	0.13	0.75	3.19	-0.33	0.79
Accruals quality	537	-0.05	-0.04	0.04	-0.49	1.50	-0.22	0.00
Earnings quality	536	0.02	0.02	0.08	-0.10	1.01	-0.24	0.27

If mean and median values are close to each other, distribution of variables is symmetric; this is very important, because symmetry is one of the characteristics of normal distribution, which will be explained in the next section (kurtosis and skewness of normal distribution are zero). Skewness of the dependent variables of accruals quality and earnings quality was -0.49 and -0.1, respectively, indicating that these variables were relatively symmetrical and thus their distribution was similar to the normal distribution. Skewness of other variables was also symmetrical.

5.2. Inferential statistics
5.2.1. Kolmogorov–Smirnov test

Normality of regression model residuals is one of the regression assumptions, which shows the validity of regression tests. Below, Kolmogorov–Smirnov test is used to study the normal distribution of the dependent variables.

Probability of the dependent variables of accruals quality and earnings quality was more than 0.05 in the studied years; so, the zero hypotheses (normality of the variable) was not rejected for these variables; i.e. these variables were normal according to the prediction (skewness and kurtosis indices of close to zero).

Table 2. Kolmogorov–Smirnov test to study normality of the dependent variables

Variable	Year	Number	Normal parameters		Maximum difference			Z- K-S	Probability
			Mean	Standard deviation	Absolute value	Positive	Negative		
Accruals quality	2006	110	-0.04	0.04	0.16	0.13	-0.16	1.03	0.244
	2009	110	-0.05	0.03	0.14	0.11	-0.14	0.97	0.299
	2010	108	-0.05	0.04	0.15	0.11	-0.15	0.93	0.347
	2011	107	-0.06	0.03	0.13	0.07	-0.13	0.80	0.537
	2012	102	-0.06	0.04	0.14	0.10	-0.14	0.82	0.512
Earnings quality	2006	110	0.01	0.08	0.08	0.04	-0.08	0.88	0.419
	2009	110	0.01	0.07	0.07	0.06	-0.07	0.77	0.598
	2010	108	0.01	0.06	0.08	0.08	-0.05	0.83	0.503
	2011	107	0.02	0.08	0.09	0.09	-0.07	0.89	0.412
	2012	101	0.03	0.08	0.09	0.05	-0.09	0.90	0.387

5.2.2. Inferential statistics (panel analysis)

The results provided by Chaw and Hausman tests are shown in the following table in order to determine the appropriate model (integrated model, model with constant effects, or model with random effects):

Table 3. Chaw and Hausman tests for selecting the appropriate model

Model	Chaw (Limer) test				Hausman Test			Result
	Effects test	Value	Degree of freedom	Probability	X2	Degree of freedom	Probability	
Model 1	F	5.674	(109,418)	0.000	5.48	6	0.483	Model with random effects
	X2	484.893	109	0.000				
Model 2	F	2.775	(109,418)	0.000	10.55	6	0.102	Model with random effects
	x^2	290.692	109	0.000				

Probability values in Chaw test in the above models were less than 0.05; so, the applied models had multiple effects for the companies. Probability values of Hausman test in the first and second models were 0.48 and 0.1, respectively, both of which were more than 0.05.

Therefore, the applied models were the ones with random effects; below, this model is used to test the hypotheses.

5.2.3. Testing the first hypothesis

First hypothesis: There is a significant relationship between operating cycle and accruals quality.
Panel analysis was applied to estimate the general model. The assumed model was as follows:

$$Y_{1it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \varepsilon_{it}$$

(3)

Results of the panel analysis are given in the following table:

Table 4. Model fitting for the first hypothesis

Parameters	Coefficients	t	Result	Result
Constant value	-0.088	-3.44	0.001	Significantly negative
Operating cycle	0.00001	0.46	0.646	Non-significant
Company size	0.0025	1.40	0.161	Non-significant
Liability ratio	0.0048	0.49	0.621	Non-significant
Profitability ratio	-0.0004	-0.03	0.975	Non-significant
Loss report	-0.019	-3.27	0.001	Significantly negative
Change of management	0.0002	0.06	0.949	Non-significant
F	2.27	F probability	0.036	
Coefficient of determination	0.03	Durbin - Watson	1.60	

In Table 4, significance probability of F was equal to 0.36, which was less than 0.05. So, the zero hypotheses were rejected at 95%; i.e. at confidence level of 95%, there was no significant model. Value of coefficient of determination was equal to 0.03, which means that about 3% of changes in the dependent variables could be explained by control and independent variables. Durbin-Watson statistics was 1.60; values close to 2 indicate lack of auto-correlation of the residuals which is another assumption of regression (so, there was no auto-correlation between the residuals). t values for operating cycle, company size, liability ratio, profitability ratio, loss report, and management change were 0.64 (non-significant), 1.40 (non-significant), 0.49 (non-significant), -0.03 (non-significant), -3.27 (significantly negative), and 0.06 (non-significant), respectively. t value for the intercept was -3.44, which rejected the zero hypothesis at confidence level of 95%; i.e. the intercept was significant.

5.2.4. Investigating the second hypothesis

Second hypothesis: There is a significant relationship between operating cycle and earnings quality. The assumed model was as follows:

$$Y_{1it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \varepsilon_{it} \tag{4}$$

The following table shows the results of panel analysis:

Table 5. Model fitting for the second hypothesis

Parameters	Coefficients	t	Result	Result
Constant value	0.114	2.64	0.008	Significantly positive
Operating cycle	-0.00006	-1.99	0.049	Significantly negative
Company size	-0.002	-0.83	0.405	Non-significant
Liability ratio	-0.031	-1.53	0.127	Non-significant
Profitability ratio	-0.273	-9.14	0.000	Significantly negative
Loss report	0.047	3.66	0.000	Significantly positive
Change of management	-0.003	-0.52	0.603	Non-significant
F	23.98	F probability	0.000	
Coefficient of determination	0.21	Durbin - Watson	1.59	

In Table 5, the model with random effects was estimated. Significance probability of F was equal to 0.000, which was less than 0.05; so, the zero hypotheses was rejected at 95%; i.e. at the confidence level of 95%, there was a significant model. Value of coefficient of determination was 0.21, which means that about 21% of changes in the dependent variables could be explained by control and independent variables. Durbin-Watson statistics was 1.59. t values for operating cycle, company size, liability ratio, profitability ratio, loss report, and management change were -1.99 (significantly negative), -0.83 (non-significant), -1.53 (non-significant), -9.14 (significantly negative), 3.66 (significantly positive), and 0.6 (non-significant), respectively. t value of intercept was 2.64, which rejected the zero hypothesis at the confidence level of 95%; i.e. the intercept was significant.

6. Conclusions

Considering the results, it can be observed that there was no significant relationship between operating cycle and accruals quality. But, there was a significantly negative relationship between operating cycle and earnings quality. In other words, more increase in operating cycle would lead to reduced earnings quality.

Considering the results obtained from the hypothesis stating that there was a significantly negative relationship between earnings quality and operating cycle, it can be concluded that in the companies with complicated operating cycle and high operation level, change of earnings and subsequently decreased earnings quality are expected and users of the information of financial statements including financial analysts, managers and shareholders, and other beneficiaries are recommended to consider operating cycle as an index for measuring earnings quality in their decision-making models while analyzing the information. However, considering the results of the second hypothesis, showing that there was no significant relationship between operating cycle and accruals quality, it can be concluded that the existence of operating cycles in various industries and complexity of these industries have no significant influence on accounting information, because managers present their reports necessarily based on available standards. Thus, users of financial statements are recommended to avoid applying operating cycle for measuring accruals quality, since it does not have any influence in this regard.

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