



Proposing the optimal model to detect earnings management in firms listed by Tehran Securities and Exchange Organization using quantified audit quality tools and techniques

Gholam Abbas Mohammadkhani

Ph.D. Student, Accounting Department, South Tehran Branch, Islamic Azad University, Tehran, Iran
mohammadkhani_2009@yahoo.com

Mohsen Hamidian

Associate Professor, Accounting Department, South Tehran Branch, Islamic Azad University, Tehran, Iran
(Corresponding Author)
m_hamidian@azad.ac.ir

Fatemeh Sarraf

Associate Professor at Islamic Azad University, South Tehran Branch, Tehran, Iran

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ABSTRACT

The role of firm managers in improving earnings management reliability is essential considering the significance of audit quality in firm profits. A study was conducted on the role of related-parties transactions and corporate governance in reducing the manager's opportunistic behaviors as a result of accrued and real earnings. Related-parties transactions are quite prevalent among the firms and might pursue specific objectives; the important point is that minority shareholders' interests are held at a lower priority compared to the controlling (majority) shareholder's or the CEO's interests. The present study aims to propose an optimal model to identify earnings management in firms listed by Tehran Securities and Exchange Organization using quantified audit quality tools and techniques. The study is an empirical study in the field of positive accounting research and is based on real data obtained from the financial statements of firms listed by the Tehran Securities and Exchange Organization. The study is causal in terms of the relationship between the variables, applied in terms of the purpose, and a descriptive survey in terms of method, in which firms' record histories and statistical methods are employed to confirm or reject research hypotheses. The study's statistical population consists of the firms listed by Tehran Securities and Exchange Organization throughout 2009-2018, which includes 420 firms that were selected from the population through elimination. Besides, the research has used panel data for model estimation. Data were analyzed through both inferential and descriptive methods. The present research has used the appropriate statistical software to test the hypotheses. Results indicated that the model's explanatory power reaches 56% and 68% after adding the variables of related-parties transactions based on McConnell's accrual earnings management model and Richard Hoori's real earnings management

Keywords:

earnings management, tools, and techniques, auditing quality.

1. Introduction

Several studies conducted on earnings management have demonstrated that managers tend to act based on some discretion when preparing financial statements and use various auditing methods to impact earnings on different levels aiming to influence the results of their contract output, which is mainly reported based on earnings. Empirical evidence in this regard indicates that earning management measures are substantially taken to achieve smooth earnings, avoid debt contract terms violation in financial markets, and maximize the executive compensations (Nemati, 2019). Fascio et al. (2001), Laporta et al. (2000), and Johnson et al. (2000) have indicated that controlling (majority) shareholders have high incentives to use corporate resources for their gain rather than minority shareholders' interests, which is called tunneling. Tunneling is quite difficult to discern directly. Recent studies have tested the channels through which expropriation could be detected. Be Sure et al. (2002) demonstrated the expanse of tunneling through the examination of the investors' reactions in the face of acquisition events in the Korean stock market. Chong et al. (2006) tested a sample of related-parties transactions between the firms listed in Hong Kong securities and stock exchange organization and controlling shareholders, and concluded that firms that declare related-parties transactions earn considerable negative surplus returns, which is consistent with the tunneling hypothesis.

The main issue addressed by the present study is that whether the explanatory power of the existing earnings management models could be improved. To answer this question, the study attempts to examine whether adding the criterion of related-parties transactions could increase the efficiency of accounting (accrual) earnings and real earnings management.

According to Iran's Accounting Standard No. 12, related-parties transactions are defined as the transfer of services, resources, or liabilities between related parties, regardless of whether the price is claimed. Related-parties transactions could impact the financial status, performance, and flexibility of the business entity. Related parties might involve in transactions that non-related parties do not involve in. Besides, the monetary value of transactions between related parties might be different from similar amounts between non-related parties (Iran's Accounting Standards, 2007).

Acquisition of the firm through related-parties transactions are common in developed countries but are more prevalent in emerging economies given weak corporate governance and foreign markets. Related-parties transactions could be beneficial and inevitable in many cases and are recurrent in the operation system of the firm; however, such transactions allow majority shareholders or firm managers to gain the personal benefit at the expense of minority shareholders in some cases (Hamidi & She'ri, 2012).

There is a global theory indicating that related-parties transactions could be used as a way to optimize internal resources, reduce transaction expenses, and improve the return on assets in group firms. On the other hand, such transactions could be used by managers and other shareholders opportunistically, which could manipulate operational results or leave an adverse effect on the minority shareholders' wealth. Cao (2003) and Huang (2003) have expressed their concerns about related-parties transactions being misused so that the controlling shareholders use firms as financial carriers and reallocate their assets to other investments. Another concern is that controlling shareholders might have more incentives to expropriate other shareholders and achieve personal gains through related-parties transactions. Hence, firms with more related-parties transactions are expected to pay fewer cash dividends (Khodamipour, Amini, & Houshmand, 2012).

According to the reasons mentioned above, awareness of the transactions, the accounts of the parties, and transactions with related parties is of great significance and might impact the evaluation of financial statements users' assessment of the business entity's operations including its opportunities and risks (Iran's Accounting Standards, 2007). Hence, identification of the factors impacted by related-parties transactions such as cash dividends is quite essential and appears to be necessary.

Building on the aforementioned, the present research seeks to answer the following questions:

- 1) Does the explanatory power of McNichol's accounting earnings management model increase after adding the variable of related-parties transactions?
- 2) Does the explanatory power of Richard Hoori's real earnings management model increase after adding the variable of related-parties transactions?

2. Research literature and background

According to the respective literature and analytical models, earnings management is a process performed by the firm's managing team to achieve benefits or goals. Therefore, managers manage reported earnings to impact the audience of accounting reports and accomplish their desired gains and objectives (Babajani & Tahriri, 2013).

There is no unified definition of earnings management; however, most scholars believe that earnings management means the manager's freedom to choose an accounting practice and intervene in the process of external financial reporting for their profit (Scott, 2009).

A major part of the earnings management literature is in search of an explanation for earnings management incentives using the agency theory. The agency theory indicates that related-parties transactions might result in the loss of shareholders' wealth because since it is separate from the management and there might be conflicts of interests between the two, and the manager might involve in earnings management to cover up this transfer of wealth. Standard developers point out that related-parties transactions indicate a potential expropriation of corporate resources (Gordon & Henry, 2005).

Accounting has always been considered a useful tool for the users of financial statements to make judgments and decisions. Financial statements are among the most significant products of the accounting system whose main purpose is providing the information required for the users of firm information aiming to assess its profitability and performance. The purpose of financial statements is to provide summarized and categorized information regarding the business entity's financial status, performance, and flexibility. Financial statements are used by a wide range of users to make financial decisions (the Technical Committee of the Auditing Organization, 2009). The information disclosed by the accounting system in the financial statement must be relevant and containing informative content to be useful for financial statement users (Najafi, 2009).

Relations with related parties could impact the business entity's financial status, performance, and flexibility. Related parties could make transactions that non-related parties do not involve in. for instance, a subsidiary business entity might sell its goods to the main business entity at a different price or with

different conditions from those offered to other customers. Also, the number of transactions between related parties might vary from the same amounts between non-related parties (Accounting Standards Development Committee, 2007).

Therefore, related-parties transactions could be considered one of the most prevalent opportunistic behaviors of managers that could leave a considerable impact on the business entity's performance while having the usual features of common business activities. All the few studies conducted in this regard indicate an inverse relationship between such transactions and management performance to create value for shareholders. Hence, empirical research on how related-party transactions influence various aspects of the firm is of great significance given the distinct nature of such transactions (Najafi, 2019).

Besides, the studies conducted on earnings management so far have been concentrated on the specific characteristics of the firm and sought to predict earnings management based on the firm's internal factors and parameters. The present research, on the other hand, aims to investigate the role of related-parties transactions and auditing quality in earnings management.

Heidarzadeh-Hanzaei & Barati (2019) examined the information environment and earnings management in firms with dual interests. The results of their study indicate that the information environments are weaker in firms with dual interests. Besides, the results of this study revealed that dual interests have no significant influence on the relationship between the information environment and earnings management.

In their study, Feizi et al. (2017) investigated the impact of voluntary non-financial information disclosure and sustainability performance on audit quality improvement. Their results indicated that voluntary disclosure of non-financial information and its aspects result in improved sustainability performance and auditing quality.

In another study, Barzgar & Haghghat (2019) investigated the moderating impact of related-parties transactions on the relationship between the firm's value and research and development costs disclosure, revealing a positive relationship between the firm's value and research and development costs disclosure as well as a negative and significant relationship between the firm's value and related-parties

transactions. Besides, related-parties transactions revealed to weaken the relationship between disclosure of research and development costs and the firm's value.

Aref-Manesh & Amouzadi-Rizi (2019) examined the moderating influence of public ownership on the relationship between the mechanisms of corporate governance and earnings management (accrual and real) in firms listed in the Tehran Securities and Exchange Organization. Their results indicate that among the corporate governance mechanisms, only the size of the board has a significant and negative impact on accrual earnings management while the percentage of non-executive members has a significant and positive impact on real earnings management and no significant influence on accrual earnings management. Besides, public ownership is revealed to have a significant and positive impact on the relationship between the size of the board and real earnings management. The board's size and independence in public firms and ownership centralization have a significant and positive relationship with accrual earnings management while the percentage of institutional investors has a significant and negative relationship with accrual earnings management.

Vaghfi, Salmanian, Manian, and Fayyaz (2016) published an article under the name of "a Study of the relationship between related-parties transactions and the quality of the disclosure of earnings management and profitability in firms listed by Tehran Securities and Exchange Organization". The study used related-parties transactions as the independent variable and discretionary accruals as the dependent variable. This research investigated 112 firms listed by Tehran Securities and Exchange Organization over 2011-2015. Results indicated that "related-parties transaction" had a significant and negative relationship with "disclosure rank", and a significant and positive relationship with "earnings management". Results of the study did not confirm a significant relationship between related-parties transactions and profitability.

In their study, Mohed & Kamran (2020) examined whether related-parties transactions impact income quality in East Asia. The study aimed to investigate the impact of Related-Parties Transactions (RPTs) and the types of RPTs (simple, complex, and loans) on income quality in four countries including Malaysia, Hong Kong, Singapore, and Thailand. Their results supported the justification that the presence of

controlling shareholders in East Asia is likely to result in related-parties transactions which increases the probability of firm revenue manipulation through DAC.

In another study, Mohammad Mostafa et al. (2020) examined the relationship between firm performance and real and accrual earnings management. Their results indicated that abnormal cash flow and accruals had a severely negative relationship with Tobin's Q. This study demonstrated that firms operating in accruals and cash flow resulting from operations that report higher earnings have lower future performances. Hence, this indicates income manipulation which will lead to future complications. Still, the study provides helpful evidence for managers and shareholders in the field of decision-making.

Al-Haleh, Giorgio, and Alan Lowe (2018) published an article entitled "the interaction between related-parties transactions and earnings management: the role of auditing quality". This study concentrated on the firms listed in Athens Securities and Exchange Organization over 2009-2014. Our results confirm that real earnings management and related-parties transactions are generally used interchangeably. However, further tests indicate that this interchange would not be significant if the firm is audited by one of the Big Four accounting firms. All in all, no significant relationship was observed between related-parties transactions and accrual earnings management.

Wong et al. (2015) investigated the increase or decrease of sales value in related-parties transactions between similar business groups. They discovered that such transactions increase the firms' value, except for firms with public ownership, tax evasion incentives, or a large number of top executives. They also figured out that some individuals use information rents to limit the share value of minority shareholders. They also suggested that tax evasions and ownership structure have a mutual relationship with related-parties transactions.

In a study named "the relationship between the related-parties transaction and controlling ownership", Minjong et al. concluded that related-parties transactions have generally reduced the firm's value in Korean firms, but this reduction is only visible when ownership control was high.

3. Research hypotheses

The following are research hypotheses:

- 1) The explanatory power of McNichol's accounting earnings management model increases after adding the variable of related-parties transactions
- 2) The explanatory power of Richard Hoori's real earnings management model increases after adding the variable of related-parties transactions.

4. Research methodology

The present research is an applied study and falls into the category of correlation studies. The study has a quasi-empirical design and adopts a retrospective approach (through past information). Besides, research data and information were collected through desk research. Persian and English journals were mainly used to collect theoretical information and other data were mainly collected from Tehran Securities and Exchange Organization databases, explanatory notes, audited financial statements, and Tadbir Pardaz and Rahavard-e Novin software.

The study's statistical population consists of the companies listed by Tehran Securities and Exchange Organization and OTC Iran. The study's temporal domain includes 2009-2018. The sample is made up of all the firms in the statistical population that meet the following criteria:

- 1) No change in the financial period during the research period
- 2) No trading interruption longer than three months
- 3) Not being among the firms operating in the field of investments. Such firms are different from others since they vary in nature and their main income is the result of investments, so such cases were eliminated from the statistical population.
- 4) Available data required for research variables over 2009-2018
- 5) Financial periods ending on the 29th day of the last month of the year so that data could be used together and in panels, if need be

4.1. Criteria for regression model comparisons

All earnings management models are based on accruals and real items are multi-variate regression models. Regression model evaluation criteria could be used to test research hypotheses.

a. Modified determination coefficient

Modified coefficients are used in many studies as indicators for determining the model's good fit. Unlike the determination coefficient, this scale considers the number of explanatory variables concerning the number of observations. In other words, this criterion implements a fine for the reduced degree of freedom.

b. The F statistic

Contrary to the t-statistic, this statistic tests the significance of estimated coefficients simultaneously, and its higher values naturally indicate the model's higher explanatory power.

c. Durbin-Watson statistic

Autocorrelation of errors is an issue in time series data regression analysis. Autocorrelation rejects the ordinary least squares (OLS) assumption that error elements are uncorrelated. The Durbin-Watson test is among the best-known tests to detect such autocorrelations. Values between 1.5 and 2.5 for this statistic indicate a correlation between the regression model's error components. In other words, errors are distributed normally and the model is a good fit.

5. Research models and variables

a. The models and variables of the first hypothesis

To test the first hypothesis, McNichol's accrual earnings management model (2002) was tested as follows:

$$\Delta WC_{i,t} = \beta_0 + \beta_1 CF_{i,t-1} + \beta_2 CF_{i,t} + \beta_3 CF_{i,t+1} + \beta_4 \Delta Sales_{i,t} + \beta_5 PPE_{i,t} + \varepsilon_{i,t} \quad (1)$$

In which

$\Delta WC_{i,t}$ (the change in the firm's capital accruals in year t compared to year t-1) is the dependent variable, and $CF_{i,t-1}$ (the operating cash flow of firm i over year t-1), $CF_{i,t}$ (the operating cash flow of firm i over year t), $CF_{i,t+1}$ (the operating cash flow of firm I over year t+1), $\Delta Sales_{i,t}$ (the changes in firm i's sales income in year t compared to year t-1, and $PPE_{i,t}$ (the firm's

machinery, properties, and equipment account in year t) are independent variables.

All of the variables above were divided by total assets in the beginning of the year. After the model above is estimated across all firms and the values of model coefficients are calculated, model residuals are calculated. The absolute value of model residual is used as a criterion for accounting earnings management.

In the second step, an approach similar to Collins' et al. (2017) is adopted and the variable of related-parties transactions based on McNichols accrual earnings management model (2002) is added as follows:

$$\Delta WC_{i,t} = \beta_0 + \beta_1 CF_{i,t-1} + \beta_2 CF_{i,t} + \beta_3 CF_{i,t+1} + \beta_4 \Delta Sales_{i,t} + \beta_5 PPE_{i,t} + \beta_6 RPT_{i,t} + \varepsilon_{i,t} \quad (2)$$

Where $RPT_{i,t}$ is related-parties transactions in firm i and year t. the present research has used the monetary value of related-parties transactions as a criterion for assessing transactions with related parties. This variable is calculated by dividing the total monetary value of related-parties transactions by total assets.

b. The models and variables of the second hypothesis

To test the second hypothesis, we will first estimate Richard Hoori's real earning management model (2006). The present study has used abnormal operating cash flow as a factor for increasing sales, and abnormal discretionary expenses as a factor for reducing discretionary expenses, and as a criterion for real income operation earnings management as follows:

$$\frac{CFO_{it}}{AvAsstes_{it}} = \beta_0 + \beta_1 \left(\frac{1}{AvAsstes_{it}}\right) + \beta_2 \left(\frac{Sales_{it}}{AvAsstes_{it}}\right) + \beta_3 \left(\frac{\Delta Sales_{it}}{AvAsstes_{it}}\right) + \varepsilon_{it} \quad (3)$$

In the second step, the variable of related-parties transactions based on Richard Hoori's real earning management model (2006) are added to estimate the model as follows:

$$\frac{CFO_{it}}{AvAsstes_{it}} = \beta_0 + \beta_1 \left(\frac{1}{AvAsstes_{it}}\right) + \beta_2 \left(\frac{Sales_{it}}{AvAsstes_{it}}\right) + \beta_3 \left(\frac{\Delta Sales_{it}}{AvAsstes_{it}}\right) + RPT_{it} + \varepsilon_{it} \quad (4)$$

Where CFO_{it} indicates abnormal cash flow of firm i in year t, which is obtained by dividing the cash flows from operation by total assets at the beginning of the period;

$Sales_{it}$ Indicates firm i's sales in year t, which is obtained by dividing net sales of the current period by total assets at the beginning of the period;

RPT_{it} Indicates related-parties transaction in firm i and year t, which is obtained by dividing the annual changes in current year sales compared to the previous year by total assets at the beginning of the period.

Given that operational cash flows include the discretionary and non-discretionary flows, ε_{it} is the discretionary part of the operational cash flow and represents real earnings management.

6. Research findings

6.1. Variables' descriptive statistics

Table 1 indicates the descriptive statistics of research models' variables. Results indicate that all variables have a favorable condition. The mean is the main central indicator that demonstrates the distribution's center of gravity and equilibrium point and is a suitable indicator for demonstrating data centrality. The mean value of the variable is 0.138, which indicates most of the data are concentrated around this point. Standard deviation is among the most significant scattering parameters that measure the scattering of the observations from average.

Table 1: descriptive statistics of research models' variables

Variable	Symbol	Mean	Maximum	Minimum	Standard deviation
Accrual earnings management	Δwc_{it}	0.138	5.875	0.0001	0.247
Real earnings management	CFO_{it}	0.128	-5.65	3.99	0.3182
Changes in sales	$\Delta Sales_{it}$	0.1671	9.49	-2.07	0.527
Firm sales	$Sales_{it}$	1.004	39.61	0	1.887
Assets and equipment accounts	PPE_{it}	0.3444	8.32	0	0.649
Related-parties transactions	RPT_{it}	0.153	24.78	-1.81	0.996

Variable	Symbol	Mean	Maximum	Minimum	Standard deviation
Firm i's operational cash flow in year t-1	CF_{it-1}	0.172	0.279	0	0.065
Firm i's operational cash flow in year t	CF_{it}	0.101	0.311	0.007	0.086
Firm i's operational cash flow in year t+1	CF_{it+1}	0.629	0.928	0.261	0.205

Resource: research findings

6.2. Inferential statistics and testing research hypotheses

The present study has used multivariate regression to test research hypotheses. Eviews v.9 software was used to analyze data. There are many approaches to determine the suitable method for the analysis of compound data. The prevalent approach is to use Chow's test. If the result of this test indicates that panel data must be used, either Fixed Effect Model (FEM) or Random Effect Model (REM) must be used to estimate the research model. Hausman's test must be conducted to choose between the two models.

6.2.1. Testing regression model assumptions

There are a series of assumptions called classic assumptions regarding the residual term (or model's error). The assumptions of the linear regression model must be tested and examined to ensure that for regression coefficient estimators to be the best estimates with no linear bias. Therefore, the testing of these assumptions and the results of the estimations will be explained as follows.

Error component fixed variance test

The present study investigates the hypothesis of residuals' variance homogeneity using the White test. The following table demonstrates the results of this test, indicating that the null hypothesis of variance homogeneity is rejected in all four models. Hence, Generalized Least Squares (GLS) were used to eliminate variance heterogeneity.

Non-correlation test of error component (residuals)

This classic linear regression assumption indicates that there is no correlation regression residual terms. Bruch-Godfrey serial autocorrelation test was used to test residuals' independence. The null hypothesis of this test indicates the lack of autocorrelation and the alternative hypothesis indicates a serial correlation between errors. Results of the test confirmed the null hypothesis in all four models given that the probability of the F-statistic was higher than 5% at the confidence level of 95% in both models. Hence, there is no reason for rejecting the lack of autocorrelation between residual terms in both research models. In other words, the assumption of error component non-correlation is confirmed in both research models.

Table 2: results of error component fixed variance test

Model	F-statistic	Probability	Result
First	8.2534	0.000	Error component variance heterogeneity
Second	4.1248	0.000	Error component variance heterogeneity
Third	2.3241	0.000	Error component variance heterogeneity
Fourth	4.1245	0.000	Error component variance heterogeneity

Resource: research findings

Table 3: results of Non-correlation test of the error component

Model	F-statistic	Probability	Result
First	1.415	0.145	Lack of error term autocorrelation
Second	1.956	0.214	Lack of error term autocorrelation
Third	2.214	0.217	Lack of error term autocorrelation
Fourth	2.874	0.351	Lack of error term autocorrelation

Resource: research findings

6.2.2. Panel unit root test for variables' stationarity

A panel-data-based unit root test for variable stationarity is necessary to increase the power of the

tests. Therefore, the stationarity of all variables used in estimations must be used before the research model is estimated given that variable stationarity could result

in false regression in terms of both time series and panel data.

The present study has used Levene, Li, and Chow's tests as well as Im, Pesaran, and Shin test. The following table indicates the results of both tests. As demonstrated, the null hypothesis of Levene, Li, and Chow's test indicating the non-stationarity of all variables has been rejected at the 95% probability level. So all variables are stationary at level.

Table 4: research variables unit root test

Variable	Levene, Li, and Chow's statistic	Probability value	Stationary at level
Δwc_{it}	-16.09	0.000	Stationary at level
CF_{0it}	-19.56	0.000	Stationary at level
$\Delta Sales_{it}$	-20.12	0.000	Stationary at level
$Sales_{it}$	-18.06	0.000	Stationary at level
PPE_{it}	-30.45	0.000	Stationary at level
RPT_{it}	-30.78	0.000	Stationary at level
CF_{it-1}	-40.48	0.000	Stationary at level
CF_{it}	-39.62	0.000	Stationary at level
CF_{it+1}	-49.52	0.000	Stationary at level

Resource: research findings

6.2.3. Testing research hypotheses

Hypothesis 1: The explanatory power of McNichol's accounting earnings management model increases after adding the variable of related-parties transactions. To test the first hypothesis, McNichol's accounting earnings management model (2002) was first estimated. We encounter two general cases in panel data estimation. The first case is that all cross-sections have the same intercept, in which case we are faced with pool data. The second case is that all cross-sections have different intercepts, which is called panel data. Hausman's explanation is used to choose between fixed effect and random effect methods for model estimation. If the test statistic is calculated to be greater than the value mentioned in the table, the H_0 hypothesis is rejected which means there is correlation and a fixed effect method must be used. To perform Chow's test, the F-Limer statistic must be calculated after estimating the model with fixed effects so that we can choose between the fixed effects method and ordinary least squares. Table 5 indicates the results of the Hausman and Chow tests, which confirms the

fixed effects methods rather than the sum of the least-squares method (in other words, panel data are confirmed vs. pool data) since the probability is lower than the standard value of 0.05%. Besides, results of the Hausman's test for the research model reject the null hypothesis. In other words, results indicate that the fixed effects method is confirmed over the random effects method since the probability value is smaller than the standard value of 0.05%. Hence, the research model must be estimated using the fixed effects method.

Table 5: Results of Chow's test for the first model

Chow's test	Statistic	Probability
Cross-section F	1.63	0.002
Cross-section Chi-square	122.42	0.000
Hausman test	Statistic	Probability
Cross-section random	12.03	0.017

Resource: research findings

Considering the results obtained from F and Hausman tests, we estimate the model using the generalized least squares (GLS) method within the framework of cross-sectional weighted regressions and considering random effects. Generalized least squares mainly control the collinearity between residual terms. Therefore, it can be considered for all t, s, j , and i given that $s \neq t$ and $i \neq j$:

$$E(\varepsilon_{it}, \varepsilon_{jt} | X_i^*) = \delta_i^2$$

$$E(\varepsilon_{is}, \varepsilon_{jt} | X_i^*) = \delta_i^2$$

Table 6 indicates the results of model estimation using the random-effects model.

Table 6: Results of the first model's panel test

Variable	Coefficient	t value	significance level
CF_{it-1}	0.78	5.02	0.000
CF_{it}	0.24	3.23	0.015
CF_{it+1}	0.21	2.46	0.014
$\Delta Sales_{it}$	0.19	3.32	0.000
PPE_{it}	0.32	4.59	0.035
$D.W = 1/54 \quad probF = 0/000 \quad R^2 = 0/42$			

Resource: research findings

As the first model's determination coefficient indicates, independent variables have been able to

predict 42% of the changes in the dependent variable. In other words, the model has an explanatory power of 42%. The F-statistic and respective significance level, as well as its comparison with the 0.000 error level, indicate the significance of the model at the 99% confidence level. The Durbin-Watson statistic also equals 1.54, which rejects the assumption of serial (first-order) autocorrelation between the disruptive components of regression. Rejection of the serial (first-order) autocorrelation between the disruptive components of regression indicates that the determination coefficient and model regression coefficients are not false.

To determine whether the first hypothesis is confirmed or rejected, the variable of related-parties transactions must be added to the model above to see how its explanatory power changes. Before examining the model, Chow and Hausman tests must be conducted on the second model as well. Table 7 indicates the results of the Chow and Hausman tests. Results of the Chow test confirm the use of the fixed effects method over the sum of least squares. Besides, the result of the Hausman test for the research model rejects the null hypothesis. In other words, the results confirm the use of the fixed effects method over the sum of least squares.

Table 7: Results of the Chow test on the second model

Chow test	Statistic	Probability
Cross-section F	2.97	0.000
Cross-section Chi-square	214.84	0.000
Hausman test	Statistic	Probability
Cross-section random	18.14	0.001

Resource: research findings

Table 8 indicates the results of the panel data test obtained from the second model estimation. As results demonstrate, adding the variable of related-parties transactions increases the model's explanatory power, so that it increases to 56% compared to the first model. Besides, the F statistic and the respective significance level, and its comparison with the 0.000 error level indicate that the model is significant at a confidence level of 99%. The Durbin-Watson statistic also equals 1.64, which rejects the existence of serial (first-order) autocorrelation between the disturbance components of the regression. The first research hypothesis is confirmed according to the results.

Table 8: Results of the second model's panel test

Variable	Coefficient	t value	Significance level
CF _{it-1}	0.68	6.54	0.000
CF _{it}	0.38	4.54	0.002
CF _{it+1}	0.32	6.98	0.231
ΔSales _{it}	0.65	5.68	0.000
PPE _{it}	0.32	6.19	0.005
RPT _{it}	0.019	2.121	0.034
<i>D.W</i> = 1.64 <i>probF</i> = 0.000 <i>R</i> ² = 0.56			

Resource: research findings

Hypothesis 2: The explanatory power of Richard Hoori's real earnings management model increases after adding the variable of related-parties transactions. To test the second hypothesis, Richard Hoori's real earnings management model (2006) was first estimated. As mentioned earlier, Chow and Hausman tests must be conducted before Richard Hoori's real earnings management model is estimated. Table 9 indicates the results of Chow and Hausman tests and reveals that the use of the fixed effects method is selected over the sum of least squares since the probability is smaller than the standard value of 0.05%. Besides, the Hausman test for the research model rejects the null hypothesis, so the model must be estimated using the fixed effects method.

Table 9: results of Chow test on the third model

Chow test	Statistic	Probability
Cross-section F	4.68	0.000
Cross-section Chi-square	102.41	0.000
Hausman test	Statistic	Probability
Cross-section random	12.25	0.023

Resource: research findings

Table 10 indicates the results of the panel data test obtained from the first model estimation. As the results demonstrate, the model's explanatory power is 32%. Besides, the F statistic and the respective significance level, and its comparison with the 0.000 error level indicate that the model is significant at a confidence level of 99%. The Durbin-Watson statistic also equals 1.5, which rejects the existence of serial (first-order) autocorrelation between the disturbance components of the regression. The first research hypothesis is confirmed according to the results.

Table 10: Results of the third model's panel test

Variable	Coefficient	t value	Significance level
$\left(\frac{1}{AvAsstes_{it}}\right)$	3	1.918	0.251
$\left(\frac{Sales_{it}}{AvAsstes_{it}}\right)$	0.248	4.15	0.000
$\left(\frac{\Delta Sales_{it}}{AvAsstes_{it}}\right)$	0.345	5.458	0.000
<i>D.W</i> = 1.5 <i>probF</i> = 0.000 <i>R</i> ² = 0.32			

Resource: research findings

To determine whether the second hypothesis is confirmed or rejected, the variable of related-parties transactions must be added to the model above to see how its explanatory power changes. Before examining the model, Chow and Hausman tests must be conducted on the second model as well. Table 11 indicates the results of the Chow and Hausman tests. Results of the Chow test confirm the use of the fixed effects method over the sum of least squares. Besides, the result of the Hausman test for the research model rejects the null hypothesis. In other words, the results confirm the use of the fixed effects method over the sum of least squares.

Table 11: Results of the Chow test on the fourth model

Chow test	Statistic	Probability
Cross-section F	1.32	0.005
Cross-section Chi-square	159.49	0.000
Hausman test	Statistic	Probability
Cross-section random	13.21	0.000

Resource: research findings

Table 12 indicates the results of the panel data test obtained from the first model estimation. As results demonstrate, adding the variable of related-parties transaction increases the model's explanatory power; in other words, the model's explanatory power increases to 68% compared to the first model. Besides, the F statistic and the respective significance level, and its comparison with the 0.000 error level indicate that the model is significant at a confidence level of 99%. The Durbin-Watson statistic also equals 1.54, which rejects the existence of serial (first-order) autocorrelation between the disturbance components of the regression. The second research hypothesis is confirmed according to the results.

Table 12: Results of the fourth model's panel test

Variable	Coefficient	t value	Significance level
$\left(\frac{1}{AvAsstes_{it}}\right)$	3	2.795	0.368
$\left(\frac{Sales_{it}}{AvAsstes_{it}}\right)$	0.478	4.879	0.013
$\left(\frac{\Delta Sales_{it}}{AvAsstes_{it}}\right)$	0.745	5.125	0.000
<i>D.W</i> = 1.5 <i>probF</i> = 0.000 <i>R</i> ² = 0.32			

Resource: research findings

7. Discussion and conclusion

Given the role of earnings in investors' decision-making in firms, legislative bodies such as the Iranian Auditing Organization need to adopt tools to reduce the manipulation of earnings by managers. In this regard, the Iranian Auditing Organization approved new requirements of related-parties transactions in 2007. Given the importance of earnings management, the present study proposed the optimal model to estimate and explain real and accrual earnings management in firms listed by Tehran Securities and Exchange Organization. Therefore, the present research is an applied study and falls into the category of correlation studies.

Study results indicated that adding the variable of related-parties transactions to the research models increases their explanatory power. Therefore, research hypotheses are confirmed. Given that the results of testing research hypotheses indicate a significant relationship between real and accrual earnings management and related-parties transactions, one could conclude that transactions with related parties are likely to be conducted based on the assumption of conflict of interests and might result in the loss of shareholder's wealth. Therefore, the assets of the firm might leave the ownership of the firm in favor of the related parties, and the manager might involve in earnings management to cover it up. Results and findings of this hypothesis are consistent with results obtained by Ming, J. J & T. J. Wong, T. J. (2014), Gordon, E. A., & E. Henry and D. Palia (2017), and Kuan et al. (2010).

In other words, the results of the present study indicate that earnings management occurs when firms get involved in transactions with related parties. Given the substantial nature of economic interactions with related parties might not be completely revealed and such transactions might not be in the best interest of

shareholders, shareholders who invest in firms involved in related-parties transactions might suffer from losses. Hence, the shareholders had better look for other ways to stand against managers' opportunistic behaviors so that their financial interests are protected. Regarding the positive impact of related-parties transaction and earnings management, one could say that transactions with related parties might result in the loss of shareholders' wealth given the separation of management from ownership and conflict of interest hypotheses. According to this viewpoint, the motivation for transactions with related parties is sometimes to take the firm's assets out of its ownership, and the manager gets involved in earnings management to cover such transactions up. Our results confirm and complete the results of previous studies. Our findings indicate that related-parties transactions could be a separate tool for earnings management and could be directly used to manipulate the reported earnings. These results are consistent with results obtained by Najafi (2009), Cheng et al. (2011), Jiang et al. (2010), and Cohlbeck & Miho (2017).

8. Research limitations and suggestions for further research

The present study's limitation is that the manipulation and change in the actual activities of a firm do not necessarily equal conscious real earnings management. The aforementioned must be kept in mind when interpreting and using results of studies such as the present research

- Each of the real earnings management criteria (abnormal discretionary expenses, changing the time of asset sales, abnormal operational cash flow, etc.) could be investigated in relation to accrual earnings management in firms suspected of fraud. Besides, studies with qualitative approaches such as the grounded theory could be used to investigate the reasons for motivation to involve in such transactions and the time when executives manage accrual and real earnings through literature study and interview with the managers of firms listed in Tehran Securities and Exchange Organization.
- Investigation of the relationship between earnings management and related-parties transactions in firms before, during, and after

the initial public offering of shares and comparing them to one another.

- Using various scales such as the number of parties involved as well as the type and monetary value of the transactions to measure related-parties transaction
- Investigation of whether the transaction with related parties is an opportunistic behavior, and whether the firms with more related-parties transactions are lower compared to other firms. In other words, do investors know about the opportunistic nature of these transactions?

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