Causality between Cash Flow and Earnings – Evidence from Tehran (Iran) Stock Exchange

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Abstract

This paper employs the data from 155 companies from 27 different industries listed on the Tehran Stock Exchange (TSE) for the period from 2000 to 2009 to examine the direction of causality between cash flow and earnings after taking consideration of stationarity and co-integration. The results indicate that there is a bidirectional causal relationship between cash flow and earnings at the level of all individual companies, so that cash flow variables caused earning variables and vice versa. However, at the level of industrial sectors, causality exists only between Profit before Interest and Taxation (EBIT) and Cash Flow from Operating Activities (CFOA).

Key Words:

Cash Flow, Earnings, Granger Causality, Stationarity, Co-integration, Tehran Stock Exchange, Iran

1. Introduction

Both earnings and cash flow are important to companies and shareholders. According to the Trueblood Committee, the objective of income statements and statements of financial activities (cash flow) is to provide useful information for predicting, comparing, and evaluating enterprises' earning power (Wolk *et al.*, 2004). Earnings are the net benefits of a corporation's operation (Eccles *et al.* 2001; Blanc and Setzer, 2015). According to the different purposes of accounting activities, several more specific earnings are used, such as EBIT – (earnings before interest and taxes) and EBITDA (earnings before interest, taxes, depreciation, and amortization). Cash flow can be defined as the movement of money into or out of the companies, businesses or projects.[1]

Different interested parties, such as shareholders, investors or analysts, focus on different aspects of earnings and cash flow. If there is a one-way relationship between cash flow and earnings, it is worthwhile to find out which one is a driver of the other. However, few studies have used econometric models to look into the causality between earnings and cash flow taking consideration of stationarity and co-integration.

The objective of this study is to explore the causal relationship between cash flows and earnings using the Iranian data, which has not been studied in this context earlier (see also Chowdhury, Uddin and Anderson, 2018 and Tang and Yaofor, 2018 for discussions on the emerging markets). To ensure that the results are reliable, we test the stationarity and co-integration in the first step. To contribute to the literature, this paper uses panel data to

[1]According to Iranian Accounting Standards, the statement of cash flows has five sections. This is shown in Table 1.

control for individual heterogeneity (Baltagi, 2005). This is the first study on such a topic in the Iranian market, which is the largest market in the Middle East in terms of the number of stakeholders, variation of industry and profitability.

The next section provides a review of previous research on cash flow and earnings. Section 3 describes the models and methodology. Section 4 explains the variables and data collection. Section 5 focuses on the empirical analysis and the results, discussion and conclusion are presented in Section 6.

2. Literature Review

So far, previous studies on determining the relationship between cash flow and earnings have not been conclusive. On one hand, some studies have concluded that "earnings" occupy a central position in accounting in predicting future cash flow for firms. FASB (1978) suggested that earnings provide a better indication than cash flow. However, FASB's statement did not have empirical support. Greenberg *et al.*, (1986) stated that earnings have a greater power of prediction than cash flow. Lorek and Willinger (1996) applied a multivariate, time-series prediction model and their conclusions were consistent with the viewpoint of FASB that earnings and accrual accounting data can enhance cash flow prediction. Dechow *et al.* (1998) investigated the ability of current cash flow and earnings to estimate future operating cash flow. They concluded that earnings are a superior predictor than current cash flow and also pointed out that the difference varies with the operating cash cycle. Barth *et al.* (2001) disaggregated earnings into cash flow and six major accrual parts and found that disaggregated earnings do a better job in predicting future cash flow than current cash flow. Kim and Kross (2005) found that the significance of the relationship between current earnings and future operating cash flow has increased over time. Their conclusion was applicable to different sized companies with or without paying out dividends.

On the other hand, some researchers have a different view. Bowen *et al.* (1986) used US data and found that net income plus depreciation and amortization and working capital from operations is the best predictor of cash flow from operation among other four variables. The evidence in the UK (Arnold *et al.*, 1991) did not support that earnings is a superior predictor than cash flow. Using a large sample, Burgstahler *et al.* (1998) concluded that cash flow is a better predictor than aggregated earnings. Krishnan and Largay (2000) found that the direct method of calculating cash flow has a great predictive ability. They concluded that cash flow is superior to earnings in forecasting future cash flow. Seng (2006) examined the predictive ability of earnings and different types of cash flow. The results showed that reported cash flow measures (i.e. CFFO, CFFIA and CFFFA) are better predictors than earnings.

Furthermore, some studies have showed mixed results on the predictive ability of cash flow and earnings. Finger (1994) concluded that earnings or earnings with cash flow are greater predictors of cash flow for most companies. However, cash flow is a better predictor than earnings in the short term. Basu *et al.* (1998) found that earnings calculated based on different accounting routines, when used for estimation, have different levels of significance in the prediction of cash flow. Nikkinen and Sahlstrom (2004) stated that the mixed results may be the result of neither cash flow nor aggregated earnings being a good predictor.

Although the econometrics model for causality is frequently used in economic studies (e.g., Payne, 2010; Chiou-Wei *et al.* 2008; Chontanawat *et al.*, 2008; Levine, Loaysa and Beck, 2000; Calderón, and Liu, 2002; Gross, 2011; Aktaş and Yilmaz, 2008; Aqeel *et al.* 2001; Hurlin and Venet, 2008; Magnus and Eric Fosu, 2008; Aydemir and Demirhan, 2009; Bowden and Payne, 2009; Chimobi, 2009; Athanasenas 2010; Chowdhury, Uddin and Anderson, 2018), only a few studies in accounting have examined the causality between cash flow and earnings. The empirical work by Bezuidenhout, Mlambo and Hamman (BMH) (2008, 2009) is an exception. Their study has investigated causal relationship between cash flow and earnings of stocks listed on the Johannesburg Stock Exchange using seventy companies from sixteen different sectors from 1981 to 2000. They included four types of earnings (earnings before interest and taxation (EBIT), profit before taxation (PBT), profit after taxation (PAT) and net earnings (EARN)) and compared them to three types of cash flow (cash generated from operations after adjustment for non-cash items (denoted by SUB1), cash generated from operations adjusted for investment income received and working capital (denoted by SUB2), and cash flow from operating activities after adjustments for interest and taxation paid (denoted by SUB3).In their studies, the variables were first tested for stationarity and/or co-integration. Regarding the causal relationship between earnings and cash flow, the authors found that in most cases, cash flow is found to cause earnings when the models are estimated in levels. However, when estimated in first differences, the causal relationship tended to be reversed as earnings cause cash flows. The authors claimed that the results in their study are likely to be affected by data limitations, since the tests used in their study are sensitive to sample sizes. They recommended a follow-up study, whereby panel data should be used.

3. Models and Methodology

3.1 Panel Data Regressions

In order to forecast by regression analysis, panel data need to be tested for stationarity and co-integration. Panel data is a pooling of time-series (t) and cross-section (i) data. According to Baltagi (2005), a panel data regression differs from a regular time-series or cross-section regression because it has a double subscript on its variables, i.e.

$$y_{it} = \alpha + \beta X'_{it} + u_{it} \quad i = 1, \ldots, N; \qquad t = 1, \ldots, T \tag{1}$$

With i denoting firms and t denoting time, the i subscript therefore denotes the cross-section dimension, whereas t denotes the time-series dimension. α is a scalar, β is $K \times 1$ and X_{it} is the itth observation on K explanatory variables. Most of the panel data applications utilize a one-way error component model for the disturbances, with

$$u_{it} = \mu_i + v_{it} \tag{2}$$

Where μ_i denotes the unobservable individual-specific effect and v_{it} denotes the remainder disturbance.

In order to determine causality using an econometric model, the data must be investigated for stationarity and then co-integration.

3.2 Stationarity

Most of the econometric models used for forecasting require the underlying time series to be stationary (Gujarati, 2003; Harris and Sollis, 2003), as non-stationary data can lead to spurious results.

The regression equation (1) can be used to illustrate the concept of "stationary". Based on this definition, panel data are called stationary if μ, σ , *cov* **and** ρ remain the same and are constant over time. These conditions guarantee that the behaviour of panel data will identical. In other words, y_{it} will be stationary if the coefficient of correlation (ρ) is smaller than 1, (0< ρ <1), and if ρ=1 it means that the equation has a unit root, and in this case, the stationarity provision is abrogated and it is non-stationary.

The unit root test is considered as a more powerful method to test for stationarity (BMH, 2008; Dickey and Fuller, 1979) and of great assistance in selecting a correct forecasting model (Diebold and Kilian, 1999). According to Baltagi (2005) and Im, Pesaran and Shin (2003), the Im, Pesaran and Shin (IPS) unit root test allows for a heterogeneous coefficient of y_{it-1} and proposes an alternative testing procedure based on averaging individual unit root test statistics. IPS suggests an average of the ADF tests when u_{it} is serially correlated with different serial correlation properties across cross-sectional units. Im, Pesaran and Shin (2003), in particular, proposed a test based on the average of (augmented) Dickey–

Fuller (Dickey and Fuller, 1970) statistics computed for each group in the panel, which they referred to as the t-bar test.

The panel unit root tests by Im, Pesaran and Shin (2003) for the panel version of the Augmented Dicky-Fuller (ADF) test are based on the following regression:

$$\Delta \mathbf{y_{it}} = \alpha_i + \rho_i y_{i,t-1} + \eta_i t + \theta_t + \varepsilon_{it} \qquad \textbf{(3)}$$

Where $\alpha_\mathbf{i}$ are individual constants, $\eta_i t$ are individual time trends, and $\theta_\mathbf{t}$ are the common time effects. The tests rely on the assumption that $E\left[\varepsilon_{it}\varepsilon_{js}\right] = 0 \;\forall\; t$, s and $i \neq j$ which is required for calculating common time effects. Thus, if the different series are correlated, the last assumption is violated.

The null hypothesis is that each series in the panel contains a unit root, i.e.,

$\boldsymbol{H_0}$: ρi=0 for all i

and the alternative hypothesis is that some (but not all) of the individual series have unit roots, i.e.,

$\boldsymbol{H_1}$:

$\rho i<0$ for $i= 1, 2, \ldots, N_1$

$\rho i= 0$ for $i= N_1+ 1, \ldots, N$

Formally, it requires the fraction of the individual time series that are stationary to be nonzero, i.e., $\lim N \rightarrow \infty (N_1/N) = \delta$ where $0 < \delta \leq 1$. This condition is necessary for the consistency of the panel unit root test. The IPS *t*-bar statistic is defined as the average of the individual ADF statistics (see also Baltagi, 2005.p:242):

$$\bar{t} = \frac{1}{N}\sum_{i=1}^{N} t_{\rho i}$$

Where $t_{\rho i}$ is the individual *t*-statistic for testing H_0: $\rho i = 0$ for all *i*. In cases where the lag order is always zero ($pi = 0$ for all i), IPS provide simulated critical values for $\bar{t}$ for different numbers of cross-sections *N*, series length *T* and Dickey–Fuller regressions containing intercepts only or intercepts and linear trends. In the general case where the lag order *pi* may be nonzero for some cross-sections, IPS show that a properly standardized $\bar{t}$ has an asymptotic N(0,1) distribution.

According to BMH (2008), differencing is often used to make the data stationary. Baltagi (2005) recommended that regression models involving non-stationary time series should be estimated in difference form.

3.3 Co-Integration

Although many time series are non-stationary (having so-called random walk or stochastic trends), it is possible that in the long term, linear combinations of these variables have been stationary during the time (without random walk or stochastic trends). When variables are co-integrated, the regression results may not be spurious and the t- and F-tests are valid (Gujarati, 2003).

The methods for testing for co-integration in panel data have developed very rapidly (see Pedroni, 1999, 2000, 2001, 2004). One of the most commonly used co-integration testing methods is the residual based panel co-integration test by Pedroni (2004) (Malinen, 2011).

To ensure broad applicability of any panel co-integration test, it will be important to allow as much heterogeneity as possible among the individual members of the panel (Pedroni, 2004).

Pedroni (2000, 2004) proposed several tests for the null hypothesis of co-integration in a panel data model, which allows for considerable heterogeneity. Pedroni (2004) suggested two different test statistics for the models with heterogeneous co-integration vectors (Breitung and Pesaran, 2005). Let $\hat{u}_{it} = y_{it} - \hat{\delta}_i' d_{it} - \widehat{\beta'}_i x_{it}$ denote the OLS residual of the cointegration regression. Pedroni considers two different classes of test statistics: (i) the "panel statistic" that is equivalent to the unit root statistic against homogeneous alternatives, and (ii) the "Group Mean statistic" that is analogous to the panel unit root tests against heterogeneous alternatives. The two versions of the *t statistic* are defined as (see also, Breitung and Pesaran, 2005):

Panel $$z_{pt} = \left(\tilde{\sigma}^2{}_{NT} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{u}^2{}_{i,t-1}\right)^{-1/2} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{u}_{i,t-1}\, \hat{u}_{i,t} - T \sum_{i=1}^{N} \hat{\lambda}_i\right) \qquad \textbf{(4)}$$

Group-mean $\tilde{Z}_{pt} = \sum_{i=1}^{N} \left(\hat{\sigma}_{ie}^{2} \sum_{t=1}^{T} \hat{u}^{2}{}_{i,t-1} \right)^{-1/2} \left(\sum_{t=1}^{T} \hat{u}_{i,t-1} \hat{u}_{i,t} - T\hat{\lambda}_{i} \right)$ **(5)**

where $\hat{\lambda}_{\mathbf{i}}$ is a consistent estimator of the one-sided long run variance $\lambda_{\mathbf{i}} = \sum_{\mathbf{j=1}}^{\infty} \mathbf{E}\left(\mathbf{e_{it}} \mathbf{e_{i,t-j}}\right)$, $\mathbf{e_{it}} = \mathbf{u_{it}} - \boldsymbol{\delta}_{\mathbf{i}} \mathbf{u_{i,t-1}}$, $\delta_{\mathbf{i}} = \mathbf{E}\left(\mathbf{u_{it}} \mathbf{u_{i,t-1}}\right) / \mathbf{E}\left(\mathbf{u_{i,t-1}^{2}}\right)$. $\hat{\boldsymbol{\sigma}}_{\mathbf{ie}}^{2}$ denotes the estimated variance of $\mathbf{e_{it}}$ and $\tilde{\sigma}^{2}{}_{NT} = N^{-1} \sum_{i=1}^{N} \hat{\sigma}_{ie}^{2}$. Pedroni presents values of μ_{p}, σ_{p}^{2}, $\mathbf{and}\,\tilde{\mu}_{p}$, $\tilde{\sigma}_{p}^{2}$ such that $\left(z_{pt} - \mu_{p}\sqrt{N}\right) / \sigma_{\mathbf{p}}$ and $\left(\tilde{Z}_{pt} - \tilde{\mu}_{p}\sqrt{N}\right) / \tilde{\sigma}_{\mathbf{p}}$ have standard normal limiting distributions under the null hypothesis. The hypotheses to test for co-integration are as follows:

H_0: The variables are not co-integrated.

H_1: The variables are co-integrated.

If H_0 can be rejected in favour of H_1, then it can be concluded that the variables are co-integrated. Otherwise they are not.

3.4 Granger Causality

The Granger Causality test is used in this study to determine whether causality exists between earnings and cash flows. Within a bivariate context, the Granger-type test states that if a variable x Granger causes variable y, the mean square error (MSE) of a forecast of y based on the past values of both variables is lower than that of a forecast that uses only past values of y (Magnus and Fosu, 2008).

Based on definition: one variable is "Granger-causes" (or "*G*-causes") if a forecast of the second variable based only on its past values is made significantly more accurate by using past values of the first variable. More generally, since the future cannot predict the past, if variable x causes variable y, then changes in x should precede changes in y (BMH, 2008). In other words, a relationship is causal if an intervention on A can be used to alter B. It can be expressed in this slogan: "no cause in, no cause out" (Hoover, 2006).

According to the econometric model, tests for Granger causality require the variables to be stationary and co-integrated. At each time point, we observe two variables, x_{it} and y_{it}, which may have a reciprocal causal relationship.

The initial goal is to formulate a linear model that embodies a reciprocal relationship between *x* and *y*. Consider the following set of equations (Bezuidenhout *et al.* 2008):

$$Y_{it} = \alpha_0 + \alpha_1 y_{1(t-1)} + \cdots + \alpha_l y_{i(t-\ell)} + \beta_1 X_{1(t-1)} + \beta_2 X_{2(t-2)} + \cdots + \beta_l x_{i(t-\ell)} + \varepsilon_{it} \tag{6}$$

$$x_{it} = \alpha_0 + \alpha_1 x_{1(t-1)} + \cdots + \alpha_l x_{i(t-\ell)} + \beta_1 y_{1(t-1)} + \beta_2 y_{2(t-2)} + \cdots + \beta_l y_{i(t-\ell)} + v_{it} \tag{7}$$

The reported F-statistics are the Wald statistics for the following null and alternative hypotheses:

$$\mathbf{H_0}: \beta_1 = \beta_1 = \cdots = \beta_l = 0$$

$$\mathbf{H_1}: \textit{at least one} \beta_i \textit{ is} \neq 0$$

The null hypothesis is that x does not Granger cause y in the first regression and that y does not Granger cause x in the second regression against the alternative that one variable Granger causes the other.

4. Data and Variables

The Tehran Stock Exchange (TSE) opened in February 1967, with only six companies listed during its first year of trading. Then Government bonds and certain State-backed certificates were traded in the market. The TSE has come a long way since then: today it has evolved into an exciting and growing marketplace where individual and institutional investors trade securities of over 420 companies (www.tse.ir, September 2012). The TSE is now the largest market in the Middle East in terms of the number of stakeholders, variation of industry and profitability.

From the year 2000, the Accounting Standards of Iran (ASI) were officially published and became compulsory for listed companies in Stock Exchanges in Iran. In addition, it is necessary to comply with International Financial Reporting Standards (IFRS), simultaneously. The initial sample includes all listed and delisted common corporations in the TSE.

The period of study is the years 2000 to 2009 (a nine-year period, as the statement of cash flow based on accounting standards of Iran (ASI) is provided on the basis of five parts from year 2000 (see Panel B in Table 1). The final sample is decided by applying the following two conditions: 1) corporations whose financial statements have been presented to the TSE for the period of the test, 2) because in pooled financial statements, negative items are neutralized by positive items, data have been selected for non-pooled statements. To meet these two conditions, 155 firms from 27 industries qualified for testing in the final sample.

A sample of income and cash flow statements in compliance to ASI and IFRS can be seen in Table 1. While the statement of cash flow for IFRS has three parts, it has five part based on ASI (see panel B in Table 1).

Following BMH (2008), three variables from income statements (EBIT, PBT and EARN) and three variables from statements of cash flow (CFOA, CFII and CFT) (Panel A and B, respectively) are selected for the test, as shown in Table 1.

<Insert Table 1 about here>

5. Data Analysis

Results for data analysis are presented in the following three sections, including test results for stationarity, co-integration and causality, respectively.

5.1 Results for Stationarity

To test for causal relationships, the variables need to test for stationarity first. The Im, Pesaran and Shin unit root test results for stationary is shown in Table 2.The results show that Profit Before Interest and Taxation (EBIT), denoted by X_1, Profit Before Taxation(PBT) denoted by X_2, and Earnings (EARN), denoted by X_3, are non-stationary.

<Insert Table 2 about here>

In the statement of cash flow (denoted by Y), with the exception of cash flow from Operating Activities (CFOA) denoted by Y_1, the other two variables - Cash Flow after Investment Income Received and Interest Paid (CFII), denoted by Y_2, and Cash Flow after Taxation (CFT) denoted by Y_3 – are stationary.

Because the variables X_1, X_2, X_3 and Y_1 have unit roots (are non-stationary), we must test for the existence of long-term relationships among the variables by using a co-integration test.

5.2 Results for co-integration

The results for testing co-integration are presented in Table 3. Pedroni's co-integration test with intercept shows the existence of long-term relationships between six models. Because of the existence of long-term relationships, it is not necessary to use differencing (see Hendry and Juselius, 2001; Yini, 2009; Baltagi, 2005; Gujarati, 2003). It means that panel data are co-integrated (i.e., they have no random walk or stochastic trends).

<Insert Table 3 about here>

The null hypothesis, in this test, is a lack of long-term relationships between variables. As presented in Table 3, the P-Value is zero, which means that the null hypothesis is rejected. In other words, long-term relationships exist between variables of the model. This makes it possible to investigate for causality between variables.

5.3 Results for Causality

The results of the Granger causality test for all individual companies are given in Table 4. All nine pairs were tested for causality, using the AR models as represented by equations 6 and 7 in Section 3. In all of these nine pairs of variables, cash flow variables were found to cause earnings variables and this relationship was two-way (earning $\leftrightarrow$ cash flow). In other words, the results for causality indicate that all nine pairs of variables (for the companies) were causally related and that the causality was bidirectional (two-way).

<Insert Table 4 about here>

Because causality exists between cash flow and earnings, we can estimate the following equations:

$$Y_{1it} = \alpha + \beta X_{1it} + \gamma X_{2it} + \delta X_{3it} + \varepsilon_{it} \quad (8)$$

$$Y_{2it} = \alpha + \beta X_{1it} + \gamma X_{2it} + \delta X_{3it} + \varepsilon_{it} \quad (9)$$

$$Y_{3it} = \alpha + \beta X_{1it} + \gamma X_{2it} + \delta X_{3it} + \varepsilon_{it} \quad (10)$$

$$X_{1it} = \alpha + \beta Y_{1it} + \gamma Y_{2it} + \delta Y_{3it} + \varepsilon_{it} \quad (11)$$

$$X_{2it} = \alpha + \beta Y_{1it} + \gamma Y_{2it} + \delta Y_{3it} + \varepsilon_{it} \quad (12)$$

$$X_{3it} = \alpha + \beta Y_{1it} + \gamma Y_{2it} + \delta Y_{3it} + \varepsilon_{it} \quad (13)$$

Where Y_1, Y_2, Y_3 denote CFOA, CFII, CFT and X_1, X_2, X_3 denote EBIT, PBT and EARN respectively.

These equations can be used for forecasting, as we can estimate Y_1 by X_1, X_2 and X_3. Also, conversely, we can estimate X_1 by Y_1, Y_2 and Y_3. This applies to all variables in this test.

We also test causality for the level of industry sectors. Results from the Granger test are presented in Table 5 for 27 industry sectors. According to the results, causality was only found between variables X_1 and Y_1. In other words, Profit Before Interest and Taxation (EBIT), denoted by X_1, was caused by Cash Flow from Operating Activities (CFOA), denoted by Y_1, and vice versa. In other variables, causality was not found.

<Insert Table 5 about here>

6. Discussion and Conclusions

To test for causality between earnings and cash flow, we have investigated stationarity and co-integration. The Im, Pesaran and Shin test is used to investigate stationarity. The Pedroni test is used to investigate co-integration or long-term relationships.

In determining causality for all individual companies, the results show that there are bidirectional relations in all six variables. In other words, all income statement variables have Granger cause (G-cause) on all statements of cash flow and vice versa. For example, EBIT (denoted by X_1) is a Granger cause of CFOA (denoted by Y_1) and vice versa. This means that EBIT can forecast CFOA, and that CFOA can forecast EBIT. This bidirectional relationship exists between all pairs of variables X and Y ($X \leftrightarrow Y$).

As noted in literature review, BMH (2008) selected four variables from income statements and three variables from statements of cash flow, using time series analysis. In some conditions, they found bidirectional relations between earnings variables and cash flow variables.

In comparison, we use panel data to investigate causality between variables. Panel data give unbiased and compatible estimations in comparison to time series data. As noted by Baltagi (2005), panel data give more informative data, more variability, less collinearity among the variables, more degrees of freedom, greater efficiency and so on. Our panel data includes 155 companies, while the BMH study has 70. According to BMH (2008) because of sensitivity to sample sizes, large sample sizes are required if conclusive results are to be reached. As noted by BMH, the size of the sample has an effect on the result of research. We conclude that for individual companies, causality exists between variables of earnings and variables from cash flow, but at the industry level this bidirectional relationship exists only between Profit Before Interest and Taxation (EBIT=X_1) and Cash Flow from Operating Activities (CFOA= Y_1).

In this study, panel data have more explanatory power and we find that it is better to include more companies. Therefore, we propose that researchers test causal relations in future by using panel data and by increasing the sample size.

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Table 1: Adjusted income statement and statement of cash flow

PANEL A: Income Statement (denoted by X)	
Sales	
Less: Cost of sales	
Gross profit	
Administration and selling expenses	
Profit before interest and taxation	**X_1=EBIT**
Less: Interest expense	
Plus: Investment income received	
Profit before taxation	**X_2=PBT**
Less: Taxation	
Earnings	**X_3=EARN**
PANEL B: Statement of Cash Flow (denoted by Y)	
Cash Flow from Operating Activities:	
EBIT	
±Adjusted for non-cash items	
Cash Flow from Operating Activities:	**Y_1=CFOA**
±Investment income received and Interest paid	
Cash Flow after Investment Income Received and Interest Paid:	**Y_2=CFII**
Taxation paid	
Cash Flow after Taxation:	**Y_3=CFT**
Cash Flow from Investment Activities	
Cash Flow from Financing Activities	
Net cash	

Note: this table provides a sample of income statement in Panel A and cash flow statement in Panel B.

Source: Appendix of Accounting Standards of Iran (ASI) number 2 (translated) and International Accounting Standards (IAS) 7, as adjusted.

Table 2: Unit root test for stationary: IM, Pesaran and Shin model

	p-value	Results
X_1=EBIT	0.9870	non-stationary
X_2=PBT	0.9947	non-stationary
X_3=EARN	0.9884	non-stationary
Y_1=CFOA	0.1915	non-stationary
Y_2=CFII	0.0003	stationary
Y_3=CFT	0.0000	stationary

Notes: this table provides Im, Pesaran and Shin unit root test results for stationarity. Profit Before Interest and Taxation (EBIT) is denoted by X_1; Profit Before Taxation (PBT) is denoted by X_2; Earnings (EARN) is denoted by $X_{3;}$ Operating Activities (CFOA) is denoted by Y_1, Cash Flow after Investment Income Received and Interest Paid (CFII) is denoted by Y_2; Cash Flow after Taxation (CFT) is denoted by $Y_{3.}$

Table 3: Results of Pedroni Cointegration Test

Model	P-Value (Panel PP-Statistic)	Results of Test
$Y_1 \Rightarrow X_1X_2X_3$	0.00	Long term relation exists
$Y_2 \Rightarrow X_1X_2X_3$	0.00	Long term relation exists
$Y_3 \Rightarrow X_1X_2X_3$	0.00	Long term relation exists
$X_1 \Rightarrow Y_1Y_2Y_3$	0.00	Long term relation exists
$X_2 \Rightarrow Y_1Y_2Y_3$	0.00	Long term relation exists
$X_3 \Rightarrow Y_1Y_2Y_3$	0.00	Long term relation exists

Notes: this table provides the results from the Pedroni co-integration test with intercept. Profit Before Interest and Taxation (EBIT) is denoted by X_1; Profit Before Taxation (PBT) is denoted by X_2; Earnings (EARN) is denoted by $X_{3;}$ Operating Activities (CFOA) is denoted by Y_1, Cash Flow after Investment Income Received and Interest Paid (CFII) is denoted by Y_2; Cash Flow after Taxation (CFT) is denoted by $Y_{3.}$

Table 4: *Results for Granger Causality Test from level of all companies*

Null Hypothesis	***Pairs***	***F- Statistic***	***Prob.***
X_1 does not Granger Cause Y_1	$X_1 \rightarrow Y_1$	277.452	6.E-98
Y_1 does not Granger Cause X_1	$X_1 \leftarrow Y_1$	3.50879	0.0303
X_2 does not Granger Cause Y_1	$X_2 \rightarrow Y_1$	252.605	1.E-90
Y_1 does not Granger Cause X_2	$X_2 \leftarrow Y_1$	3.94954	0.0195
X_3 does not Granger Cause Y_1	$X_3 \rightarrow Y_1$	229.191	1.E-83
Y_1 does not Granger Cause X_3	$X_3 \leftarrow Y_1$	0.50030	0.6065
X_1 does not Granger Cause Y_2	$X_1 \rightarrow Y_2$	174.475	2.E-66
Y_2 does not Granger Cause X_1	$X_1 \leftarrow Y_2$	9.86137	6.E-05
X_2 does not Granger Cause Y_2	$X_2 \rightarrow Y_2$	195.345	4.E-73
Y_2 does not Granger Cause X_2	$X_2 \leftarrow Y_2$	11.7672	9.E-06
X_3 does not Granger Cause Y_2	$X_3 \rightarrow Y_2$	185.114	7.E-70
Y_2 does not Granger Cause X_3	$X_3 \leftarrow Y_2$	8.58160	0.0002
X_1 does not Granger Cause Y_3	$X_1 \rightarrow Y_3$	150.795	2.E-58
Y_3 does not Granger Cause X_1	$X_1 \leftarrow Y_3$	11.4638	1.E-05
X_2 does not Granger Cause Y_3	$X_2 \rightarrow Y_3$	168.385	2.E-64
Y_3 does not Granger Cause X_2	$X_2 \leftarrow Y_3$	12.6228	4.E-06
X_3 does not Granger Cause Y_3	$X_3 \rightarrow Y_3$	159.277	2.E-61
Y_3 does not Granger Cause X_3	$X_3 \leftarrow Y_3$	7.79464	0.0004

Notes: this table provides the results of the Granger causality test for all individual companies. Profit Before Interest and Taxation (EBIT) is denoted by X_1; Profit Before Taxation (PBT) is denoted by X_2; Earnings (EARN) is denoted by $X_{3;}$ Operating Activities (CFOA) is denoted by Y_1, Cash Flow after Investment Income Received and Interest Paid (CFII) is denoted by Y_2; Cash Flow after Taxation (CFT) is denoted by $Y_{3.}$

Table 5: *Results for Granger Causality Test from level of industry sectors*

Null Hypothesis	***Pairs***	***F- Statistic***	***Prob.***
X_1 does not Granger Cause Y_1 Y_1 does not Granger Cause X_1	$X_1 \rightarrow Y_1$ $X_1 \leftarrow Y_1$	5.61036 6.15772	0.0122 0.0087
X_2 does not Granger Cause Y_1 Y_1 does not Granger Cause X_2	$X_2 \rightarrow Y_1$ $X_2 \leftarrow Y_1$	1.80208 1.93071	0.1920 0.1725
X_3 does not Granger Cause Y_1 Y_1 does not Granger Cause X_3	$X_3 \rightarrow Y_1$ $X_3 \leftarrow Y_1$	2.40266 2.50517	0. 1174 0. 1082
X_1 does not Granger Cause Y_2 Y_2 does not Granger Cause X_1	$X_1 \rightarrow Y_2$ $X_1 \leftarrow Y_2$	1.25101 1.18497	0.3087 0.3274
X_2 does not Granger Cause Y_2 Y_2 does not Granger Cause X_2	$X_2 \rightarrow Y_2$ $X_2 \leftarrow Y_2$	0.85153 1.00478	0. 4424 0. 3848
X_3 does not Granger Cause Y_2 Y_2 does not Granger Cause X_3	$X_3 \rightarrow Y_2$ $X_3 \leftarrow Y_2$	1. 23045 1. 46277	0. 3144 0. 2565
X_1 does not Granger Cause Y_3 Y_3 does not Granger Cause X_1	$X_1 \rightarrow Y_3$ $X_1 \leftarrow Y_3$	0.91482 0.85918	0.4175 0.4393
X_2 does not Granger Cause Y_3 Y_3 does not Granger Cause X_2	$X_2 \rightarrow Y_3$ $X_2 \leftarrow Y_3$	0. 64848 0. 72467	0. 5340 0. 4974
X_3 does not Granger Cause Y_3 Y_3 does not Granger Cause X_3	$X_3 \rightarrow Y_3$ $X_3 \leftarrow Y_3$	0. 95233 1. 07921	0. 4035 0. 3598

Notes: this table provides the results for level of industry sectors of the Granger causality test. Profit Before Interest and Taxation (EBIT) is denoted by X_1; Profit Before Taxation (PBT) is denoted by X_2; Earnings (EARN) is denoted by $X_{3;}$ Operating Activities (CFOA) is denoted by Y_1, Cash Flow after Investment Income Received and Interest Paid (CFII) is denoted by Y_2; Cash Flow after Taxation (CFT) is denoted by $Y_{3.}$