Investigating the asymmetric effects of macroeconomic variables on opportunistic behavior of managers

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Abstract

In general, macro-monetary and financial variables are among the factors that can affect the performance of companies. Exchange rates are one of the factors that affect the business relations of economic enterprises with the outside world. Exchange rate risk arises from changes in stock returns as a result of foreign exchange fluctuations. On the other hand, earnings management has always been a challenge for managers and investors, and in the meantime, most studies have focused on internal factors of earnings management and less on external variables, especially the impact of an important variable such as exchange rate. In this study, the asymmetric effects of exchange rate passage on earnings management of 131 companies listed on the Tehran Stock Exchange during the period 2008-2019 have been investigated using the generalized torque approach. Based on the results, positive currency shocks on SEM1 and SEM2 have a negative and statistically significant positive effect on SEM4 and negative shocks have a positive and significant effect on SEM3. While the degree of positive exchange rate shock passed only on SEM4 and the rate of positive exchange rate shock passed on SEM3 is greater than one, but in relation to other cases, the degree of the passage of the exchange rate is incomplete. Based on the results, the degree of exchange rate passage has asymmetric effects on earnings management depending on the type of currency shock and earnings management variable.

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1. Introduction

Earning is a major factor influencing economic decisions so that users can make better decisions about profitability and analysis of financial statements by knowing the reliability of earning [5]. Also, the assumption of rationality in economics shows that everyone is trying to maximize their wealth, which is also true for managers. Based on this, managers seek to know how their free accounting practices affect wealth in order to increase their wealth. In fact, this increase in wealth can be accompanied by a decrease in the wealth of other Beneficiaries such as stockholders [10, 25]. This issue has also been considered by professionals. In this connection, Jensen et al [8] proposed the agency theory; They defined corporate executives as "employers" and shareholders as "brokers". In general, in the accounting literature, different definitions of earnings management have been expressed by researchers; However, providing an appropriate definition of earnings management requires understanding the goals and motivations of earnings management and its application.

Generally, Earnings consist of two parts: cash items and accruals. Of the two, what is most controlled by management is the accruals sector, which he uses to better represent the company's performance and increase its future earnings forecast. Therefore, the manager manipulates the accruals and in fact uses earning management. In other words, managers create predictable and consistent results by choosing authorized accounting methods, because most managers and investors believe that companies that have a good earning trend compared to similar companies have more predictability, comparability and value [24]. On the other hand, by considering agency theory, Managers can be motivated enough to increase their earning and manipulate earnings. On the other hand, one of the main purposes of setting accounting standards is for users to be able to make relatively relevant and accurate decisions using financial statements. Therefore, the accounting profession needs a reporting method that seeks to respect the interests of all users in a desirable way [27]. One of the tasks of auditors is to determine the appropriateness of financial statements by examining the compliance of financial statements with the framework set forth in accounting standards. Also, the flexibility of accounting standards in some cases to choose the accounting procedure has emphasized the professional judgment of accountants.

In fact, the problem stems from the fact that financial statements can be misleading in some cases due to the existence of earnings management, while financial statements are flawed in terms of compliance with accounting standards and auditors cannot objections to the financial statements [14].

The factors affecting earning management by managers are divided into external and company-specific. Studies on extra-corporate factors are those that relate to the economy as a whole and affect all companies; In contrast, studies of company-specific factors include those on managers change, company position, and the like. Studies have shown that most research is related to the impact of company-specific factors on earnings management and in fact, less attention has been paid to the impact of external factors. At present, there is a claim that macroeconomic factors can affect the performance of companies [8, 9]. Economic conditions and the environment have a significant impact on the financial position of companies and the importance of this issue has been mentioned many times in the financial economics literature. Existing statistics also indicate that advanced stock exchanges are located in countries that enjoy relatively good economic conditions, and this confirms the impact of the country's economic situation on companies [4]. So far, many studies have been conducted to investigate the reaction of stock prices and company value to macroeconomic

news [3, 17, 18]. Such studies argue that macroeconomic information affects stock prices through its effect on expected earnings. By accepting the close relationship between the capital market and the economic structure of the country, we can expect that macroeconomic information is useful in predicting the future earning of companies. But at present, there is no clear evidence as to whether macroeconomic information affects the forecast of the company's future earnings. For example, Kumala and Siregar [12] point out that macroeconomic information helps to predict the company's earning. Ming et al. [19] also showed that the variables of economic position have a heterogeneous but direct effect on the forecast of corporate earnings, in the sense that this effect occurs only in certain circumstances. Sometimes managers can use the subject of macroeconomic variables to earn management.

One of the most important macroeconomic variables is the exchange rate. In general, currency shocks directly affect companies that have revenue and expense items or assets and foreign currency liabilities in their structure [7, 15]. In addition, the exchange rate indirectly affects the financial position of companies by influencing the general level of prices, supply and demand of inputs and products of other companies. Therefore, managers may use this issue to manage to earn. It is likely that earnings management in the event of a positive currency shock will be different from earnings management in the event of a negative currency shock. Accordingly, in this study, the effect of asymmetric effects of exchange rate passage on earnings management of companies listed on the Tehran Stock Exchange has been investigated.

In the continuation of this article, first, the theoretical foundations and empirical studies are reviewed. In the third section, the research model is introduced and the estimation method is described. In the fourth section, the stationary of the variable is examined, currency shocks are specified, earnings management is measured and the study model is analyzed and the results are reported. Finally, in the fifth section, the conclusion is made.

2. Theoretical Foundations of Research

Earning management is one of the most popular topics among investors, legislators, analysts and the general public of financial statements. According to Fisher, earning management is the targeted involvement of managers in the external financial reporting process. G. Moradi Roodposhti, F. Rahnamay Roodposhty and Z. Hajiha [22] state that in general, earning consists of two parts: cash items and accrual items. Of the two, what is most controlled by management is the accruals sector, which he uses to better represent the company's performance and increase its future earnings forecast. Therefore, the manager manipulates the accruals and in fact benefits earning management. So far, six models of discretionary accruals have been proposed by researchers, among which the adjusted Jones model is more acceptable. Earnings management as a conscious management action to eliminate earnings fluctuations has been measured in different ways in different studies. According to Lin and Rong [17], earning management is a purposeful intervention in the company's external financial reporting process with the aim of gaining personal benefits. On the other hand, in order to increase current profits, managers may exercise their discretion over accruals or actual business decisions. Misuse of earnings-based accruals or real earnings management to increase earnings is a short-term horizon because two factors can be pointed out: (1) the reversal of the results of discretionary and actual liabilities of operational decisions and (2) the risk of managers' reputation. First, the use of accruals-based accounting options to increase earnings in the current period limits the ability to manage accruals in the same direction in future periods [14, 27]. In other words, accruals should be reversed at some point, unless managers use aggressive earnings management. Similarly, increasing earnings with real business actions is a short-term mechanism [20]. Earnings management by real

business activity, for example by manipulating in real activities, increases current cash flow by providing leading cash flows. Second, both earnings management mechanisms are likely to warn analysts and auditors. This increases the risk of losing reputation and discipline in the labor market and threatens the net interests of managers [16]. Given the expectations of managerial self-affirmation behaviors and revenue-increasing earnings management, a rational manager has more incentives in the short term (upward earnings management) when interest rates rise. Using the theoretical model of Gong et al [6] which invokes game theory and current value analysis, Sun and Al-Farooque [26] have argued that the choice between correct reporting and managed earnings depends on the present value of the expected net interests of the two options. The expected future interests of higher income from upward earnings management have a short period of time imposed by the reversal of accruals and the economic results of real earnings management. In contrast, expected future costs have a time horizon. Evidence of earning management or manipulation or even fraud may be discovered long after the CEO's resignation or retirement, that lawsuits and prosecutions will result in future financial and reputational damages.

The degree of exchange rate passage over a variable is defined as the percentage change in that variable per one percent change in the exchange rate. If at the same time as the exchange rate increases (the value of the domestic currency depreciates) by one percent, the variable in question also increases by one percent, then the exchange rate is said to be complete. If a change in the exchange rate of one percent leads to a change of less than one percent of the variable under consideration, then the exchange rate is said to be incomplete. Incomplete exchange rate passage can be due to factors such as market structure and the price elasticity of demand or due to macroeconomic factors and variables such as the intensity of exchange rate fluctuations, GDP, currency system and inflation environment and intra-company factors. The degree to which exchange rates affect corporate finances and earnings management are discussed in the literature on exchange rate risk. Various internal and external studies have been conducted in relation to earnings management and its determining factors, but in these studies, the degree of exchange rate passage has not been studied. These studies include the following:

Li et al. [16] used a sample of companies in China during the period 2007-2015 to examine how financial anxiety affects the choice of management methods and how to adjust the quality of internal control. The results showed that anxious firms tend to have more accruals earnings management and real earnings management as well. Internal control has an adjusting effect on the relationship between financial anxiety and earning management by inhibiting both accrual and real earnings management. Ozili and Outa [23] in a study examined the effect of bank earning management using commission revenue and bank fees with the role of investor protection and economic fluctuations. They found that banks use commission revenue and bank fees for income smoothing purposes, and this behavior is even stronger during periods of recession and in investor-backed environments. Eduardo et al. [5] in a descriptive study entitled earning Management and Macroeconomic Challenges: Evidence from the Capital Markets of the United States and Brazil, examining 7,932 company-chapter observations of Brazilian capital market member companies and 99,931 company-chapter observations of capital market member companies of the United States from 1998 to 2013, using panel data and multivariate linear regression, showed that in times of economic challenge, corporate executives in the United States and Brazil were more inclined to apply earnings management. In a study, Mohammad Rezaei and Ahmadi [21] tried to examine the possible differences in the management of the profits of listed and non-listed companies during the period 2011-2015. Their analysis has shown that there is no significant relationship between the type of company and earnings management using discretionary accruals and earnings management. These results indicate that since the financial statements of non-listed companies affiliated with listed companies are published on the Codal website, the motivations

of the auditors and managers of these companies are similar to those of listed companies. Baghumian et al [2] analyzed the effect of the economic downturn on the company's earnings management listed on the Tehran Stock Exchange during 2009-2014. Evidence has shown that as negative GDP growth increases, corporate executives use more earning management to better avoid bankruptcy by better reflecting the company's financial position. The results also showed that fluctuations in GDP can affect earnings management. In other words, in addition to earnings management incentives such as bound, a recession is also one of the factors affecting earnings management. Tehrani et al [27] have believed that with the increase of trade between countries, exchange rate fluctuations are considered as one of the most important risk factors of the company and with the increase of the exchange rate, export companies gain more earning and consequently more returns. The results showed a positive effect of simultaneous exchange rate fluctuations on the stock returns of these companies and no relationship between exchange rate fluctuations and stock returns was observed for a period of time.

3. Research Methodology

3.1. Introducing the research model

In this study, the following models have been used to investigate the asymmetric effects of negative and positive exchange rate shocks on corporate earnings management:

$$SEM_{i,t}^1 = \beta_0 + \beta_1 PSE_{i,t} + \beta_2 NSE_{i,t} + \beta_3 TTANG_{i,t} + \beta_4 AGE_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 LVG_{i,t} + \beta_7 SLGRW_{i,t} + \varepsilon_{i,t}$$

$$SEM_{i,t}^2 = \beta_0 + \beta_1 PSE_{i,t} + \beta_2 NSE_{i,t} + \beta_3 TTANG_{i,t} + \beta_4 AGE_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 LVG_{i,t} + \beta_7 SLGRW_{i,t} + v_{i,t}$$

$$SEM_{i,t}^3 = \beta_0 + \beta_1 PSE_{i,t} + \beta_2 NSE_{i,t} + \beta_3 TTANG_{i,t} + \beta_4 AGE_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 LVG_{i,t} + \beta_7 SLGRW_{i,t} + w_{i,t}$$

$$SEM_{i,t}^4 = \beta_0 + \beta_1 PSE_{i,t} + \beta_2 NSE_{i,t} + \beta_3 TTANG_{i,t} + \beta_4 AGE_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 LVG_{i,t} + \beta_7 SLGRW_{i,t} + \xi_{i,t}$$

Here,

$TTANG_{i,t}$: the ratio of the sum of tangible fixed assets to the total assets of ith company in year t.

$AGE_{i,t}$: the life of ith company (natural logarithm of the company's activity period) in the year t.

$SIZE_{i,t}$: the size of ith company (natural logarithm of assets) in year t.

$LVG_{i,t}$: ith financial leverage (total debt divided by total assets) in year t.

$SLGRW_{i,t}$: the sales growth rate of ith company in year t as equal to: sales in the previous year/(sales in the previous year minus sales in the current year).

$NSE_{i,t}$: Negative exchange rate shock is in year t, which is determined using the EGARCH approach and in terms of the environment in which shocks are formed.

$PSE_{i,t}$: Positive exchange rate shock is in year t, which is determined using the EGARCH approach and in terms of the environment in which shocks are formed.

$SEM_{i,t}^1$: The index of earnings management through income items of ith company in year t, which is used to measure earnings management through income items based on Keller model [16].

In Kouki model [11], earning management is calculated using accounts receivable and deferred income and in this model, expenses recognition is not used. In fact, he has shown that gross receivables are part of the sales of the current period and the operating cash flow of the next period because the accounts receivable are returned in the next period. This means that the change in gross receivables is due to changes in current sales and changes in future operating cash flow. Based on

what was stated, he presented the following model as the discretionary income model.

$$\frac{\Delta GrossA/R_{i,t}}{Assets_{i,t-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{Assets_{i,t-1}}\right) + \alpha_2 \left(\frac{\Delta S_{i,t}}{Assets_{i,t-1}}\right) + \alpha_3 \left(\frac{\Delta CFO_{i,t}}{Assets_{i,t-1}}\right) + \varepsilon_{i,t}$$

Where,

$\Delta GrossA/R_{i,t}$: Change in gross receivables per year t

$\Delta S_{i,t}$: Change in sales per year t

$\Delta CFO_{i,t}$: Change in operating cash flow per year $t+1$

$Assets_{i,t-1}$: Total assets are at the beginning of the fiscal year

$SEM_{i,t}^2$: The profit management index is through the accruals of ith company in year t.

In this model, the sum of accruals is a linear function of changes in income, property, machinery and equipment, return on assets and changes in sales, which are as follows:

$$\frac{ACC_{it}}{A_{it}} = \alpha_0 + \beta_1(\frac{1}{A_{it}}) + \beta_2(\frac{\Delta REV_{it}}{A_{it}}) + \beta_3(\frac{PPE_{it}}{A_{it}}) + \beta_4(\frac{ROA_{it}}{A_{it}}) + \beta_5(\frac{\Delta Sales_{it}}{A_{it}}) + \varepsilon_t$$

Where,

ACC_{it}: The sum of the total accruals of company i in year t

A_{it-1}: Total assets of company i at the end of year t

$\Delta Sales$: Change in the sales of company i between years $t-1$ and t

PPE_{it}: Property, plant and equipment (gross) of company i in year t

$SEM_{i,t}^3$ and $SEM_{i,t}^4$: Indicators of earnings management through real items of company i in year t

To measure real profit management inspired by Riahi-Belkaoui [24] model, earnings management through manipulation of real activities will be examined from two perspectives in this study: (1) abnormal discretionary operating cash flows, (2) abnormal discretionary charges.

1. Estimation of the abnormal discretionary operating cash flow model (ACF) used to measure $SEM_{i,t}^3$

   In the first step, the normal level of operating cash flows is estimated using the following equation:

$$\frac{CFO_{i,t}}{Assets_{i,t-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{Assets_{i,t-1}}\right) + \alpha_2 \left(\frac{Sales_{i,t}}{Assets_{i,t-1}}\right) + \alpha_3 \left(\frac{\Delta Sales_{i,t}}{Assets_{i,t-1}}\right) + \varepsilon_{i,t}$$

   In this regard, $CFO_{i,t}$ is the flow of operational cash. The amount of cash flows (CFOs) is measured by calculating operating cash flows via dividing the net operating cash flow by the total assets [13]. Then, to estimate the anomalous optional operating cash flows, the actual operating cash flow of the company will be deducted from the normal level of operating cash flows calculated from the above model.

2. Estimation of the anomalous discretionary expenses model (ADE) used to measure $SEM_{i,t}^4$. In the first step, the normal level of anomalous discretionary expenses is estimated using following equation:

$$\frac{DISX_{i,t}}{Assets_{i,t-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{Assets_{i,t-1}}\right) + \alpha_2 \left(\frac{Sales_{i,t-1}}{Assets_{i,t-1}}\right) + \varepsilon_{i,t}$$

   In this regard, $DISX_{i,t}$ is operating discretionary expenses and $Sales_{i,t-1}$ indicates the sale of the previous period. In the second step, to estimate the anomalous operating expenses, the

real operating expenses of the company will be deducted from the normal level of operating expenses calculated from the above equation.

$\varepsilon_{i,t}, v_{i,t}, w_{i,t}$ and $\xi_{i,t}$ are the residues of company i in year t for research models. The present research models for 113 companies during the period 2008-2019 will be estimated using the GMM method. To specify the negative and positive price shocks of the foreign exchange market, exponential generalized autoregressive conditional heteroscedastic model (EGARCH) is used during the period 1973-2013.

4. Measuring Variables and Estimating The Research Model

4.1. Examining the stationariness of research variables

One of the assumptions made by traditional econometrics methods in estimating pattern coefficients using time series data and data panels is that the variables used are static. Therefore, to remove false regression and reach a reliable model, the static variables of the model are often examined in the time series data using Augmented Dickey-Fuller (ADF) unit root test. Despite that, several articles have suggested that panel unit root tests are more capable than time series unit root tests. In general, common single-root tests in the data panel include LLC, ADF, and IPS tests, from which the LLC test is selected as the most appropriate test in most studies. This choice is due to the suitability of this test for panels with a small period. In addition, Velte [28] show that LLC has more power than IPS, while ADF is also suitable for time series data characteristics not for the panel data. The results of this test for the variables used in the research model are shown in Table 1. Based on the results from Table 1, all research variables are based on the LLC unit root test at the stationary level. In other words, for all regressions in all tests, the null hypothesis that states the existence of a single root is rejected, and therefore it can be concluded that the residuals in all regressions are accumulated from zero and the possibility of false regression for table estimates is ruled out.

Now that the stationariness of the research variables has been ensured, the study patterns have been estimated using the GMM method. Using the GMM approach saves the number of control variables. In other words, in this model, there is no need for the presence of many control variables. Although helping to further explain the model, the presence of control variables in the classical panel, greatly reduced the degree of freedom of the model, mitigating the reliability and dependability of the model. This is not relevant in the GMM approach. In this study, the dynamic estimator of the GMM method proposed by Bhatti et al. [4] is employed. The GMM is one of the appropriate estimation methods in panel data and considers the effects of dynamic adjustment of the dependent variable. Using the GMM method of dynamic panel data has several advantages such as taking into account individual heterogeneity and irrelevant information and eliminating biases in cross-sectional regressions, which results in more accurate, more efficient and less linear estimates in GMM. In general, the dynamic GMM method is more appropriate than other methods for at least three reasons. In this method, endogenous variables can also be used. One way to control the end ingenuousness of variables is to use a tool variable. An instrument will have the necessary power when it is highly correlated with the variable under consideration, while it is not correlated with the error components. However, it is very difficult to find such a tool. An advantage of the GMM method is that it allows the interruption of these variables to be used as appropriate tools for endogenous control. The second advantage of this method is that the dynamics in the studied variable can be considered in the model, and the third is that this method can be used in all-time series as well as cross-sectional and panel data. In this research, a two-stage estimator of the GMM system is employed.

Table 1: Comparison of expectation time in proposed method and Multi-label classification with weighted classifier

Variable	Statistic LLC	Probability level	Results
A	-12.297	0.000	The variable is stationary
ACC/A	-13.228	0.000	The variable is stationary
AGE	-27.857	0.000	The variable is stationary
ASSET	-12.297	0.000	The variable is stationary
CFO/ASSET (-1)	-14.979	0.000	The variable is stationary
DCFO (+1)/ASSET (-1)	-6.950	0.000	The variable is stationary
DGROSSA/ASSET (-1)	-15.581	0.000	The variable is stationary
DISX/ASSET (-1)	-17.768	0.000	The variable is stationary
DREV/A	-15.465	0.000	The variable is stationary
DS/ASSET (-1)	-17.452	0.000	The variable is stationary
DSALE/A	-17.452	0.000	The variable is stationary
DSALE/ASSET (-1)	-17.452	0.000	The variable is stationary
LVG	-14.275	0.000	The variable is stationary
MTB	-78.596	0.000	The variable is stationary
PPE/A	-25.979	0.000	The variable is stationary
ROA/A	-18.625	0.000	The variable is stationary
SALE/ASSET (-1)	-17.749	0.000	The variable is stationary
SALEGRW	-15.465	0.000	The variable is stationary
SIZE	-8.289	0.000	The variable is stationary
TTANG	-466.23	0.000	The variable is stationary
NSE	-45.993	0.000	The variable is stationary
PSE	-4.190	0.000	The variable is stationary

5. Measuring Earnings Management Indicators and Specifying Crrency Shocks

In this study, real, accrual and income items have been used to measure earnings management. At first, based on empirical and theoretical studies, ordinary items were measured and then ordinary items were deducted from the total items and unusual items, also known as earning management index. The results of earning management modeling based on real items, accruals and income are further estimated by the GMM method.

As demonstrated in Table 2, the value of the Sargan test statistic (J) is significant for all four patterns. The level of significance of Sargan statistics in all four models indicates the confirmation of the null hypothesis based on the consistency of the estimated GMM. Accordingly, all the four estimated models are statistically valid and the results are not false. After estimating all four patterns, the described part of the pattern is deducted from the total dependent variable. The result is a residual of patterns known as earnings management indicators. Table 2 shows these indicators with the symbols SEM1, SEM2, SEM3 and SEM4.

6. Source: Research Findings

To specify currency shocks, it is necessary to calculate price volatility in foreign exchange markets and in terms of specifying price shocks in the foreign exchange market. In this regard, the study of Li et al. conducted on financial market shocks was identified in line with the objectives of this study. Accordingly, the EGARGH asymmetric model is used here to model the foreign exchange market

Table 2: Profit management modeling results based on real items, accruals and income using GMM method

Model	Manage profits through real items				Manage profits through real items				Earnings management through income items				Earnings management through accruals			
Dependent variable	DISX/ASSET(−1)				CFO/ASSET(−1)				DGROSSA/ASSET(−1)				ACC/A			
Independent variables	coefficient	SD	Statistic t	Probability level	coefficient	SD	Statistic t	Probability level	coefficient	SD	Statistic t	Probability level	coefficient	SD	Statistic t	Probability level
DISX(−1)/ASSET(−2)	0.315	0.083	3.803	0.000												
CFO(−1)/ASSET(−2)					0.188	0.060	3.112	0.002								
DGROSSA(−1)/ASSET(−2)									−0.074	0.033	−2.224	0.026				
ACC(−1)/A(−1)													−0.064	0.011	−5.889	0.0000
1/ASSET(−1)	11282	11290	0.999	0.318	29954	8236	3.637	0.000	−19359	7578	−2.555	0.011				
1/A													316127	167857	1.883	0.060
DREV/A													−10.009	1.237	−8.094	0.000
PPE/A													−3.456	1.460	−2.367	0.018
ROA/A													3.389	1.467	2.309	0.021
DS/ASSET(−1)									0.120	0.038	3.149	0.002				
DCFO(+1)/ASSET(−1)									−0.478	0.104	−4.585	0.000				
SALE(−1)/ASSET(−1)					0.092	0.030	3.028	0.003								
DSALE/A					0.127	0.034	3.786	0.000								
SALE/ASSET(−1)	−0.164	0.066	−2.482	0.013												
DSALE/ASSET(−1)															6.425	
Number of tools	37.000				36.000				36.000				36.000			
Sargan statistics	46.420				35.366				39.564				24.006			
Sargan statistic probability level	0.076				0.312				0.168				0.772			
Model waste	SEM4				SEM3				SEM1				SEM2			

volatility as follows:

$$ARIMA(p,d,q): a(L)\Delta^d y_t = a_0 + b(L)\varrho_t + \varepsilon_t$$

$L^t y_t = y_{t-i}$

$\beta(L) = (1 - \beta_1 L + ... + \beta_P L^p)$

$\gamma(L) = (1 + \gamma_1 L + ... + \gamma_q L^q)$

$\log\log(\sigma_t^2) = \omega + \sum_{j=1}^{q} \beta_j \log(\sigma_{t-j}^2) + \sum_{k=1}^{r} \gamma_j(\frac{\varepsilon_{t-1}}{\sigma_{t-1}}) + \sum_{i=1}^{p} \theta_j \left|\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right| + v_t$

where, a, b, α, γ and β are fixed parameters, L is the interrupt operator, d is the degree of stationariness (differentiation) of the y_t series, and ϱ_t is a random component. If γ is less than zero, then positive shocks propagate less fluctuations than negative shocks. To estimate the above model, informal exchange rate data during the period 1973-2018 has been used. Time series modeling is based on the assumption of the stationariness of variables. The most famous statistic for testing the null hypothesis is that the KPSS statistic series is stationary, which has been introduced by " Kouki, A, Mandatory " [11]. Based on the results of the KPSS unit root test, the null hypothesis of this test that there is no unit root of the informal market exchange rate logarithm during the period 1973-2013 is accepted (Table 3). EGARCH models are therefore an estimate of the problem of being free from falsehood.

Table 3: Results of KPSS unit root test for natural logarithm of free market exchange rate and gold price

Variable	KPSS statistic	Critical values at the significance level			Results
		1%	5%	10%	
LEXCH	0.1272	0.2160	0. 1460	0. 1190	The variable is stationary

For estimating the EGARCH model, we initially determined the conditional mean equation. The ARMA [1, 2] equation is superior to the competing modes according to the correlation diagram of the exchange rate series as well as the AIC and Schwartz Bayesian (SBC) information criteria.

Table 4: Modeling exchange rate shocks in Iran

Equation	Dependent variable	LEXCH			
	Independent variable	Coefficient	SD	Statistic Z	Probability level
Conditional average	Width of origin	7.3062	0.5563	13.1337	0.0000
	Time trend				0.0000
	AR(1)	0.6494	0.0387	16.7672	0.0000
	AR(2)	0.3324	0.0413	8.0509	0.0000
	MA(1)	0.8520	0.0331	25.7542	0.0000
Conditional variance	Width of origin	−0.3529	0.2636	−1.3387	0.1807
	$\lvert e_{t-1}/\sigma_{t-1}\rvert$	−3.0565	0.3383	−9.0342	0.0000
	e_{t-1}/σ_{t-1}	1.8182	0.5290	3.4370	0.0006
	σ_{t-1}	0.5784	0.0558	10.3615	0.0000

Based on the correlation diagram of the logarithm squared of the residuals obtained from the ARMA [1, 3] model estimation, the EGARCH [1] model has been selected as the most suitable for the conditional variance equation. The results are presented in Table 4, where the role of positive and negative shocks in the formation of currency fluctuations is not the same. Based on this table, foreign exchange market volatility (H_{it}) and negative (NS_{it}) and positive (PS_{it}) shocks can be measured as follows:

$$H_t = \sigma_t$$
$$NSE_t = (o, \varepsilon_t)$$
$$PSE_t = \max(o, \varepsilon_t)$$

6.1. Estimating the research model

In the previous sections, all variables of the research were measured. In this section, the four main study patterns are estimated by the GMM method and the results are analyzed. The results of the four research models are presented based on the GMM method in Table 5.

The value of the Sargan test (J) in relation to all four estimated patterns is significant and their level of probability is greater than 10%. Hence, the estimated models have sufficient validity. Table 5 shows that all the four indicators related to earnings management are significantly affected by their recent period values. This effect is negative. This shows that if earning management is conducted in the recent period, it will decrease in the current period. The results show that the effect of positive currency shocks on earnings management through income items (SEM1) and earnings management through accruals (SEM2) is negative and statistically significant. Also, the impact of these shocks on earnings management through real items based on abnormal discretionary expenses (SEM4) is positive and statistically significant. But the impact of negative currency shocks on earnings management through income items (SEM1), earnings management through accruals (SEM2) and earnings management through real items based on unusual discretionary expenses (SEM4) is not statistically significant.

The variables TTANG, AGE, SIZE and SLEGRW on earnings management through income items (SEM1) are statistically significant. In relation to earnings management through accruals (SEM2), the effect of AGE, SIZE, LVG and SALEGRW variables is statistically significant. Also, the variables TTANG, LVG and SLGRW on earnings management through real items based on anomalous discretionary operating cash flows (SEM3) and the variables TTANG, AGE and SLGRW

Table 5: Results of estimating research models by GMM method

Dependent variable	Earnings Management through Income Items (SEM1)				Earnings management through accruals (SEM)			
Independent variables	Coefficient	SD	Statistic t	Probability level	Coefficient	SD	Statistic t	Probability level
Dependent variable with one interval	−0.4517	0.0288	−15.6800	0.0000	−0.4699	0.0135	−34.8828	0.0000 .0
PSE	−0.0263	0.0148	−1.7699	0.0772	−1.5096	0.7882	−1.9152	0.0559
NSE	−0.0090	0.9162	−0.0098	0.9922	41.5460	36.2103	1.1474	0.2516
TTANG	−1.1313	0.6164	−1.8353	0.0669	11.8555	14.7417	0.8042	0.4216
AGE	−1.8747	0.7766	−2.4139	0.0161	136.8062	36.0578	3.7941	0.0002
SIZE	0.2869	0.0978	2.9339	0.0035	−19.4023	5.4140	−3.5837	0.0004
LVG	0.0278	0.1282	0.2171	0.8282	−11.1825	3.2906	−3.3983	0.0007
SLGRW	0.0475	0.0223	2.1329	0.0333	5.7924	1.8498	3.1314	0.0018
Tools rating	25				23			
Sargan Statistics (J)	21.8003				16.44347			
Probability level J	0.118177				0.353206			
Dependent variable	Earnings management through real items based on anomalous operating cash flows (SEM3)				Earnings management through real items based on anomalous option costs (SEM4)			
Independent variables	Coefficient	SD	Statistic t	Probability level	Coefficient	SD	Statistic t	Probability level
Dependent variable with one interval	−0.3310	0.0493	−6.7199	0.0000	−0.4390	0.0176	−24.9798	0.0000
PSE	0.0183	0.0245	0.7476	0.4550	0.0775	0.0250	3.0963	0.0020
NSE	3.6125	1.6616	2.1741	0.0300	0.1374	1.3189	0.1042	0.9170
TTANG	−1.3055	0.6388	−2.0438	0.0414	−3.0266	1.2990	−2.3300	0.0201
AGE	−0.1311	0.7558	−0.1735	0.8623	4.8928	2.8355	1.7255	0.0849
SIZE	−0.0271	0.0986	−0.2753	0.7832	−0.8493	0.5888	−1.4423	0.1497
LVG	−0.4390	0.1151	−3.8150	0.0001	0.1743	0.2673	0.6521	0.5146
SLGRW	−0.0834	0.0265	−3.1507	0.0017	0.4150	0.0594	6.9817	0.0000
Tools rating	24				25			
Sargan Statistics (J)	20.45676				21.09655			
Probability level J	0.200349				0.222001			

on earnings management through real items based on anomalous discretionary expenses (SEM4) have a statistically significant effect.

7. Discussion and Conclusion

Earnings management is always a challenge in companies listed on the stock exchange. earning management is influenced by internal and external factors. Most macroeconomic variables play a role in external factors, one of the keys of which is the exchange rate, which has a state of instability in the Iranian economy and is always faced with various negative and positive shocks. In other words,

the results of currency shocks can be reflected in the earnings management behavior of managers, which is known as the degree of exchange rate passage over earnings management and has not been considered in internal studies. Therefore, in this study, the asymmetric effects of exchange rate passage on earnings management of 131 companies listed on the Tehran Stock Exchange during the period 2008-2019 were investigated using the Generalized Torque (GMM) approach.

In this study, to specify the negative and positive shocks of the foreign exchange market, the EGARCH approach and annual data during the period 1973-2019 were used. The results showed that in the market, negative and positive shocks have an asymmetric role in the formation of exchange rate volatility. In the next step, in terms of the environment of shock formation, the magnitude of the impact of shocks, negative and positive shocks were specified in a normalized way. In this connection, non-standard negative and positive shocks obtained based on the residual EGARCH conditional mean equations are divided by the conditional standard deviation obtained from these models. This type of specification ensured that in a turbulent foreign exchange market environment, the impact of negative and positive shocks on the variables under study was reduced. This principle is consistent with economic-financial facts and theories such as the theory of rational expectations. After specifying the negative and positive shocks of the normalized foreign exchange market, the impact of these shocks on earnings management was investigated.

Four indicators were used for earning management. These 4 indicators were measured through income items, accruals, real items based on unusual discretionary operating cash flows and real items based on unusual discretionary expenses. This measurement was based on GMM modeling and 4 separate models were estimated. Then, the effect of negative and positive currency shocks on the 4 earnings management indices was examined by the GMM method. The results showed that the recent period values of all four earnings management indices on their current values are negative and statistically significant. Therefore, on this basis, managers periodically strengthen or weaken earnings management policy. The results also showed that the effect of positive currency shocks on earnings management through income items and earnings management through negative accruals and on earnings management through real items based on abnormal positive expenses is statistically significant. However, insufficient evidence on the effectiveness of earnings management through real items based on abnormal discretionary operating cash flows is not statistically significant. The impact of negative shocks on earnings management through income items, accruals and real items based on unusual discretionary expenses is also not significant. Negative currency shocks also mean managing earnings through real items based on abnormally discretionary operating cash flows. Based on the size of the impact, only the impact of positive currency shocks on earnings management through accruals and the impact of negative shocks on earnings management through real items based on abnormal discretionary operating cash flows in terms of absolute value is greater than one. Therefore, it can be stated that the degree of passage of positive exchange rate shocks on earnings management through accruals and negative exchange rate shocks on earnings management through real items based on abnormal discretionary cash flows is greater than one. In all 4 indicators related to earnings management, the absolute magnitude of the degree of the passage of negative and positive currency shocks is different. Therefore, it can be said that the degree of the passage of negative and positive exchange rate shocks is asymmetric on earnings management. Based on the above results, it is suggested that investors and auditors pay attention to the foreign exchange market and the type of foreign exchange shocks in assessing the financial condition of companies and earnings management because these shocks significantly affect the behavior of managers in managing earnings.

References

[1] R. Alkebsee, A.A. Alhebry and G. Tian, *Whose cash compensation has more influence on real earnings management, CEOs or CFOs?*, J. Account. Emerg. Econ. 2021 (2021).

[2] R. Baghumian, H. Mohammadi and M. Taheri, *Economic downturn and earnings management*, Manag. Account. 10 (2017) 29–42.

[3] O. Ben Salah and A. Jarboui, Dividend policy, *earnings management and the moderating effect of corporate governance in the French context*, J. Financ. Econ. Policy 2021 (2021).

[4] K.I. Bhatti, M.I.U. Husnain, A. Saeed, I. Naz and S.D. Hashmi, *Are top executives important for earning management and firm risk? Empirical evidence from selected Chinese firms*, Int. J. Emerg. Markets 2021 (2021).

[5] E. Flores, E.F.J. Weffort, A.F. da Silva, L.N.G. Carvalho, *Earnings management and macroeconomic crises: Evidences from Brazil and USA capital markets*, J. Account. Emerg. Econ. 6(2) (2016) 179–202.

[6] G. Gong, Y. Li and L. Zhou, *Do management earnings forecasts fully reflect information in past earnings changes?*, Int. J. Account. Inf. Manag. 27 (2019) 373–406.

[7] H.R. Ismael and H. Kamel, *Internal audit quality and earnings management: evidence from the UK*, Manag. Audit. J. 36 (2021) 951–978.

[8] G. Jensen, D. Solberg and T. Zorn, *Simultaneous determination of insider ownership, debt, and dividend policies*, J. Financ. Quant. Anal. 27 (1992) 247–263.

[9] S. Khajavi, G. Rezaei and M. Bagheri, *Investigating the mediating role of managers' capabilities on the relationship between tax avoidance and the risk of falling stock prices of companies listed on the Tehran Stock Exchange*, Financ. Manag. Strategy 6 (2018) 34–11.

[10] K.S. Kim, J.H. Lee and Y.W. Park, *Acquiring firms' earnings management in stock-for-stock mergers within Korean business groups*, Manag. Finance 48(1) (2021) 27–48.

[11] A. Kouki, *Mandatory, IFRS adoption, investor protection and earnings management: A data analysis of Germany, France and Belgium listed companies*, Int. J. Account. Inf. Manag. 26 (2018) 187–204.

[12] R. Kumala and S.V. Siregar, *Corporate social responsibility, family ownership and earnings management: the case of Indonesia*, Soc. Respons. J. 17 (2021) 69–86.

[13] N. Lassoued, *Capital structure and earnings quality in microfinance institutions*, Int. J. Manag. Finance 2021 (2021).

[14] J.J. Lee, Y. Lim and H.I. Oh, *Does customer satisfaction matter to managers' earnings forecasts and stock returns?*, Eur. J. Market. 52 (2018) 2026–2051.

[15] K. Lee, S. Ni and R.A. Ratti, *Oil shocks and the macroeconomy: The role of price volatility*, Energy J. 16 (1995) 39–56.

[16] Y. Li, X. Li, E. Xiang and H.G. Djajadikerta, *Financial distress, internal control, and earnings management: Evidence from China*, J. Contemp. Account. Econ.16(3) (2020) 100210.

[17] W. Lin and M. Rong, *Impacts of other comprehensive income disclosure on earnings management*, Nankai Bus. Rev. Int. 3(1) (2012) 93–101.

[18] D. Mangala and N. Singla, *Do corporate governance practices restrain earnings management in banking industry? Lessons from India*, J. Financ. Report. Account. (2021).

[19] T. Ming, W. Teng and S. Jodaki, *A model to investigate the effect of information technology and information systems on the ease of managers' decision-making*, Kybernetes 50 (2021) 100–117.

[20] S.A. Mir Arab Baigi, H. Makari and M. Nazarizadeh, *Investigating the theory of popularity in the Iranian financial market and its relationship with fluctuations in stock returns and stock returns in the Tehran Stock Exchange*, Financ. Knowledge Secur. Anal. 13 (2020) 135–121.

[21] F. Mohammad Rezaei and S.L. Ahmadi, *Profit management in listed companies and non-listed companies*, Empirical Account. Res. 9 (2019) 282–256.

[22] G. Moradi Roodposhti, F. Rahnamay Roodposhty and Z. Hajiha, *Provide a comprehensive profit management model based on critical thinking using fuzzy ANP method*, Manag. Account. Audit. Knowledge 10(40) (2021) 121–134.

[23] P.K. Ozili and E. Outa, *Bank earnings management using commission and fee income: The role of investor protection and economic fluctuation*, J. Appl. Account. Res. 20 (2019) 172–189.

[24] A. Riahi-Belkaoui, *Is earnings management affected by human development and economic freedom?*, Rev. Account. Finance 3 (2004) 115–127.

[25] A.J. Simamora, *Crime rate, real earnings management and managerial ability*, Corp. Govern. Int. J. Bus. Soc. 2021 (2021).

[26] L. Sun and O. Al-Farooque, *An exploratory analysis of earnings management practices in Australia and New Zealand*, Int. J. Account. Info. Manag. 26 (2018) 81–114.

[27] R. Tehrani, A. Drikandeh, K. Navabizand, A. Arian and S.H. Hosseini, *Investigating the relationship between exchange rate fluctuations and stock returns of exporting companies listed on the Tehran Stock Exchange*, Financ. Knowledge Secur. Anal. 6 (2013) 87–101.

[28] P. Velte, *The bidirectional relationship between ESG performance and earnings management–empirical evidence from Germany*, J. Global Respons. 10 (2019) 322–338.