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Research Paper

Applying the GARCH and COPULA Models to Examine the Relationship Between Trading Volume and the Value of Trading with the Bubble Pricing

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ABSTRACT

Given the importance of the securities market in each country's economy and the adverse effects of the price bubble on the irrational fluctuations of the stock market, it is clear that it must be prevented; therefore, with reference to the ambiguity of the factors causing the price bubble, research is underway. Investigating the relationship between the volume of transactions and the value of transactions with the price bubble in different industries of the Stock Exchange during the years 2006 to 2016 is a step towards recognizing this phenomenon. To investigate these communications, we used DCC-GJR-GARCH, diagonal BEKK and COPULA models. The results of the study of the relationship between the volume of exchanges and the value of exchanges with price bubbles suggest that there is a negative and complete correlation between them. In relation to the study of the relationship between price bubbles and research variables, we found that oil prices have a reverse and significant relationship with bubble prices. Other variables are not meaningful relationships with price bubbles. Also, in the study between variables of research with volume of transactions, it was determined that changes in tax volume and oil price variables have a reverse and significant relationship with the volume of transactions and the value of transactions with the volume of transactions has a direct and significant relationship.

1 Introduction

When investors look at share characteristics, the volume of transactions and the value of the share are usually not taken into account. In other words, most investors look at statistics such as return on shares, price-to-earnings ratio, market value of shares, or the date of the annual general meeting and dividend payout to shareholders after looking at the price of securities. Despite the disregard of most investors, the volume and value of the exchanges have close relationships with returns and the price bubble and have a large impact on securities. Most research on the relationships of volume and price transactions with returns and price bubbles lacks a proper mathematical model. In this research we attempt to solve this problem by applying the Coppola approach and the GARCH model in studying the relationship of these relationships in the market. The Stock Exchange has securities [1]. Coppola has many strengths in finding the amount and form of dependency, which is very useful for our project. These include the

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following reasons [2]:
In addition to expressing linear dependence, the COPULA also have the ability to express nonlinear dependence. COPULAs allow us to select any marginal distribution for each variable. What are the skewed distribution functions (and what are the fat-tailed distribution functions, which often have stock returns also have such distribution functions). COPULA's functions are constant against large and fast changes [3-7]. GARCH models are also commonly used in studies of financial economics such as the stock market - exchange rate fluctuations and inflation. The requirement to use such models is to assume that the variance assumption is homogeneous. The GARCH models are designed to model the conditional variance equation of the error term. The maximum likelihood method is used to estimate such models.
Generally speaking, the most important and essential of this research is to assist the stock exchange companies in explaining the relationship between the volume and value of trading with stock returns and the price bubble and to provide a model of these relationships based on COPULAs functions and GARCH models [10-15].
This research is aimed at developing literature related to trading volume, transaction value, equity bubble yield and financial system knowledge. The model presented in this study not only evaluates and monitors these relationships in the financial system but also charts the historical trend of creating a price bubble. Finally, the models presented in the second part of the study are studied. The main strengths of the proposed model, compared to the models presented in the research background, indicate the validity of this model, which benefits from the use of the COPULAs functions.

2 Theoretical Foundations and Research Background

2.1 Bubble Price

The word bubble in financial terms means that the price of an asset exceeds its existential value and has a lower dependence on its data price. characterizes the skepticism and lack of belief in the market share of the bubble of prices. It is usually difficult to detect bubbles when traders participate in the market at the growth stage of prices and profit margins. Bubbles are faded when they are detected. Usually, the asset price bubble also leads to a spectacular rise in asset stocks. The bubble is tied to the economic parameters. For example, the drop in the bubble in Japan in 1980 led to a recession. But because of speculation about the country, the recession did not go beyond the shores of the country. On the other hand, the abandonment of the US housing bubble caused the destruction of unprecedented wealth globally in 2008 [3].

2.2 COPULA Functions

In the financial literature, an approach is proposed to model the dependency structure between the four-variable data without imposing any hypothesis on marginal cohesiveness based on Coppola functions, which includes defects such as linear correlation coefficient of asymmetry and sequential dependency between the distribution of returns Financial considerations. These functions are used to separate the margin and the dependency structure of the distributed distribution. Therefore, in order to define the cappole function, we can classify it into two random variables X1 and X2 with distribution functions Eq. (1), which assigns each corresponding value to univariate functions.

$$FX_1(X_1)\ ،P(X_1،X_2)\ ،FX_2(X_2)\ P(X_1\ .X_2) \quad (1)$$

For both real values of X2 and X1, we can consider three values of [FX1 (x1), FX2 (X2), F (X1, X2)], each of which has a point [FX1 (X1), FX2 (x2)] In a single square [0,1] × [0,1]. And this pair corresponds to the value of F (X2 and X1) in the interval [0,1]. This relationship, which assigns the value of the associated distribution function to single-variable functions, is called the copula function.
Copula 's functions are of interest for two reasons. Firstly, it can be used to study the dependence between variables as a non-parametric one, and secondly, they can be the starting point for constructing multivariate distribution functions. In general, Coppola can contain information about the common behavior of random variables at the end of the distribution, which is the basis of the initial studies of the basic market, is included. In addition to these collapses, they are able to detect and measure sequence behavior without the need to use the definition of the events of the Fern. These Copula features enable us to design and construct flexible, multivariate and rich patterns. A suitable copula with different sequence behaviors makes it possible to identify a powerful tool for testing the time increment of dependence on changes in one or two sequences of distributions [4].

2.3 COPULA Theory and Estimation Method

It is clear that the value of the asset portfolio risk is determined by the return on each of the assets in the asset basket. In other words, the correlation coefficient, which is one of the most common criteria for measuring the dependence on economic applications, is often not useful for describing and estimating the dependency structure in large losers, and therefore often results in a poorly estimated value of risk. Madelat [6] explains the actual form of stock structure during the years 1999 to 2000. Between 1995 and 1998, and also from the middle of 1998 to the year 2000, price bubbles were evident. In fact, significant changes in the market have exacerbated the price bubble. Although the boom may be attributed to managerial changes, but a large part is related to the existence of bubbles in this market. Babaei Semiromi[6] studied the existence of inflation bubbles during the years 1340 to 1380. In this research, two hypotheses of non-exonerated money supply have been investigated for the study of Granger's causality test. Mirshamsi [8] investigated the importance of capitalization and capital accumulation in economic growth and introduced the stock exchange for its implementation.
The existence of a rational bubble in the market reflects the two above mentioned. This study aims to study the realization of this issue in Tehran Stock Exchange and to explain the causes and ways of preventing it. Kiani [9] has studied the existence of price bubbles in Tehran Stock Exchange during the years 2002 to 2006 in his senior thesis and concluded that Tehran Stock Exchange faces a price bubble. Tehrani et al. [10], with their article on the study of the relationship between exchange rate fluctuations and stock returns of issuers of listed companies in Tehran Stock Exchange during the years 86-88, were accepted by 75 exporting companies. Using the GARCH model and the ICSS algorithm, it was found that, if we ignore the calculation of the structural failure in equations, the exchange rate changes do not affect the price of oil, but it has a significant effect on the gold price and the stock index. In this case, the change in oil prices does not affect any of the parameters studied. On the other hand, changes in the price of gold can affect the stock index, and changes in stock prices can affect the exchange rate. Santoi [11] used sequential samplers to test the existence of a bubble in the Dow Jones' stock market in the 1920 s and 1980s. Eventually, he did not see the bubble in the market. The Hamilton et al. [12] Rational Bubble Theory, used the Coppola approach to examine the relationship between volumes of return in critical situations for the Taiwanese Republic of Singapore, Malaysia, Thailand, Indonesia, and Japan. They used the Asian Financial Crisis in 117 to conduct their research. According to the results Estimates of both models exist in the Indonesian stock markets of Indonesia and the Philippines for exploding junk and in the stock markets of China, Brazil and Venezuela, Colombia, Chile, Indonesia, Korea and

the Philippines. Haston [13] also investigated the relationship between the three primary areas of market returns and volume of trade in the volume and downturn in international stock markets, and evidence of the effect of high trade volumes on negative deviations in market efficiency. And Zhou [16], in a study on the determinants of volume distribution, reviewed the importance of different market and company factors, which determines the distribution of trade volume and plays an important role in the ability of the host market to attract orders flow from rival markets.

Legitimate support and disclosure of better liquidity information In the advanced financial market, host markets are in the best position to capture orders from rival host markets. Also, host countries with more traditional rules of the United Kingdom are attracting more trading volumes than host countries under French civil law. The license for domestic trade will benefit people, because it creates fruitful contracts.

3 Methodology of Research

Research methods can be divided into three functional and developmental categories according to the nature of the project. Also, in classification based on research methodology, historical research is divided into scientific and experimental correlations. The method used to carry out this quasi-experimental project is a case study. In the research, the price bubble is the dependent variable, the volume of exchanges and the value of the exchanges of independent variables and the exchange rate, the price of gold, the price of oil and the volume of liquidity are the control variables. The variables are presented in the form of a conceptual model as follows:

$$Price - Bob_{it} = \alpha_0 + \beta_1 Tournver_{it} + \beta_1 Economic - Varibables_{it} + \varepsilon_{it} \quad (1)$$

$$Price - Bob_{it} = \alpha_0 + \beta_1 Value_{it} + \beta_1 Economic - Varibables_{it} + \varepsilon_{it} \quad (2)$$

In the above models, R_{it} is the return on equity, $Tournver_{it}$ trading volume, $Price - Bob_{it}$ _it price bubble, $Value_{it}$transaction value and $Economic - Varibables_{it}$are other control variables. Also, $\alpha_0$represents the width of the source in the model and ε_{it} specifies the remainders in the model. Also, the research hypotheses are as follows:

1. Explain the relationship between transaction value and price bubble using GARCH and COPULA models
2. Explain the relationship between volume of exchanges and price bubbles using Garch and copula models
3. Explain the relationship between the variables of research using Garch model

This research is based on the daily statistical data from the mentioned markets over a period of 11 consecutive years from 2006 to 2016 years. We have gathered information from the Tehran Stock Exchange, the global oil market and the exchange rate market as well as new software. The models presented by Eviwes9 software, Oxmetrics, SPSS Excel 2016 are reviewed and concluded. A sequence contains a series of consecutive observations of a variable that has the same symbol. For example, string (111) consists of only one sequence. While the string (101) creates a discrete sequence. Therefore, Santoni's research [11], shows that a series of observations, in comparison with what is expected from independent and random observations, shows lower dynamics. In this case, the data are positively correlated or selected from different

communities. The symmetry of changes in the bubble segment (ie, bubble changes) usually results in a series of positive returns longer than this expectation [11].

4 Research Models and Econometric Models

4.1 Reconnaissance Tests

In this test, we first create a series of returns from Hara Company. Then the average of the efficiency series is calculated. Then count the number of dynamics generated by positive and negative signatures. For example, if the returns of Iran's reporting company in the period under review are 0.0200 and the yield is less than 0.0023, then negative is considered. The number of expected dynamics in a random sequence is calculated as follows: Eq. (3)

$$E(R) = \frac{2(n_1)(n_2)}{n_1 + n_2} + 1 \quad (3)$$

Where E (R) is the expected number of dynamics of n1 is the number of positive outputs and n2 is the number of negative outputs. It should also be noted that the standard deviation of sigma is calculated using the following formula: Eq. (4)

$$\delta = \sqrt{\frac{2(n_1 n_2)[2(n_1 n_2) - n_1 - n_2}{(n_1 + n_2)^2 (n_1 + n_2 - 1)}} \quad (4)$$

By placing the z statistic between 1.96 + and 1.96, 95% confidence can be said that the hypothesis H0 based on the independence of the dynamics (the randomness of the returns) is confirmed. If the stock price changes correlate with each other, then in the case of a bubble on the stock exchange, it would be possible to expect longer sequences and, consequently, to a lesser number than independent observations. In the present research, in order to perform the regression test, the average of the return on time is calculated as the daily returns of the companies, and then the returns of each day, which is greater than the average, is a positive sign. Then, in order to make a meaningful difference, the difference between the number of dynasties counted with the number of dynamics is investigated (if the z test is expected for the random variable by the test, is, the difference between the number of dynastic counts and the studied dynamics is divided into The standard deviation of the dynasties (in the critical interval is 96.1 + 96.9). In this case, there is no significant difference between the number of dynastic counts and the number of expected dynamics, and it is deduced that the lengths of the dynasties do not differ from the lengths of the random and independent dynasties. But in the sense that the exam is not within the critical range. This will mean that the number of dynastic counts is significantly less than the expected number of dynamics, and it concludes that the length of the series of time series is so long that it does not correspond to random and independent data and there is a bubble.

4.2 Model (1,1) GJR-GARCH

The main problem with Gearch's models is that they consider the process of variance symmetric. In this case, the dispersion is ignored. In addition, it is assumed that the positive and negative information gives the same effect in turbulence. But this condition is not like the real situation in the financial markets. Studies show that when it comes to shocking financial markets, prices are shrinking with more volatility. Compared to the time when financial markets tend to be positive, prices are fluctuating with less fluctuations. This phenomenon is attributed to leverage effects on financial returns. it is possible . The leverage effect of dynamic and asymmetric variance, due to the asymmetric effect in the conditional variance, shows the recurrence effect in the GARCH model. Garch's asymmetric models became more rigorous. Conditional marginal distribution is calculated according to the above mentioned documents

and the above issues. The value of γ depends on the value a_{t-i} above or below the threshold value a_{t-1}^2 has different effects on the condition variance σ_t^2, so that for $a_{t-i} > 0$the total effect The device $\sigma_t a_{t-1}^2$ is determined and when $a_{t-i} < 0$, the total effect of a shock on the output is measured by means of $(\alpha_i + \gamma_i) a_{t-1}^2$ So it can be expected that the estimated value for γ_i is positive for bad news. In addition, $\alpha_0 > 0. \alpha_1 \geq 0. \beta \geq 0. \beta + \gamma \geq 0$ and $\alpha_1 + \beta + \frac{1}{2}\gamma \leq 1$. The boundary distribution of $X_{t-1}$is approximately the same as GARCH(Haddad and Heirani 1393). Eq. (5)

$$P(X_{t+1} \leq X|\Omega_t) = P\left(\varepsilon_{t+1} \leq \frac{(X-\mu)}{\sqrt{\alpha_0 + \alpha_1 a_t^2 + \beta\sigma_t^2 + \gamma s_t \varepsilon_t^2}} \middle| \Omega_t\right)$$
$$= \begin{cases} N\left(\frac{(X-\mu)}{\sqrt{\alpha_0 + \alpha_1 a_t^2 + \beta\sigma_t^2 + \gamma s_t \varepsilon_t^2}} \middle| \Omega_t\right) & if\ \ \varepsilon \sim N(0.1) \\ t_d\left(\frac{(X-\mu)}{\sqrt{\alpha_0 + \alpha_1 a_t^2 + \beta\sigma_t^2 + \gamma s_t \varepsilon_t^2}} \middle| \Omega_t\right) & If\ \varepsilon \sim\ \ t_d \end{cases} \quad (5)$$

4.2 DCC GARCH Model

For the first time, Bollersleva [17], proposed the assumption of a constant conditional correlation between variables for a two-variable GARCH model. The assumption of the constancy of conditional correlation is a limiting assumption. Thus, Engle and Shepard [18], expanded the Bollersleva models and introduced dcc garch models. The conditional mean equations and family conditional variances of the G-Variable model are assumed to be the following equations:

$$\begin{aligned} &\varepsilon_t \left|\xi_{t-1} \sim N(O, H_t)\right. \quad , \quad K\left\lfloor \varepsilon_t \left|\xi_{t-1}\right.\right\rfloor = 0 \ , \quad K\left[\varepsilon_t \varepsilon_t\right] = D_t P_t D_t = H_t \\ &y_t = \mu_t + \varepsilon_t \\ &\varepsilon_t = D_{t-t} \end{aligned} \quad (6)$$

In which the vector y_t of dimension n * 1 is the observed values of the variables at time T. The conditional expectation condition y_t is conditional on the data set in the following parameters: formula 6 the conditional variance of h_{ti} follows the single-grained garch process:

$$h_{it} = a_i + \sum_{j=1}^{q} a_{ij}\, \varepsilon_{i,t-j}^2 + \sum_{j=1}^{p} \beta_{ij}\, h_{i,t-j}$$

Formula 7 the shock induced on the system at time t is the vector z_t the conditional mathematical expectation of z_t is conditional on the set of information on the following relationships:

$$E\left[z_t' z_t \left|\xi_{t-1}\right.\right] = P_t = \left[\rho_{ij,t}\right] \ , \ E\left[z_t \left|\xi_{t-1}\right.\right] = 0 \quad (7)$$

Formula 8 the manifold variance and covariance are as follows:

$$\rho_{ij,t} = E\left[z_t' z_t \left|\xi_{t-1}\right.\right] = \frac{E\left[z_{it} z_{jt} \left|\xi_{t-1}\right.\right]}{\sqrt{E\left[z_{it}^2 \left|\xi_{t-1}\right.\right] E\left[z_{jt}^2 \left|\xi_{t-1}\right.\right]}} = \frac{E\left[s_{it} s_{jt} \left|\xi_{t-1}\right.\right]}{\sqrt{E\left[s_{it}^2 \left|\xi_{t-1}\right.\right] E\left[s_{jt}^2 \left|\xi_{t-1}\right.\right]}} = Corr\left[\varepsilon_{it} \varepsilon_{jt} \left|\xi_{t-1}\right.\right] \quad (8)$$

Formula 9 the general form of Engle and Shepard [18], is also expressed in terms of the following equations:

$$P_t = \left[Q_t \otimes I_N\right]^{-1/2} Q_t \left[Q_t \otimes I_N\right]^{-1/2} \quad (9)$$

$$Q_t = (1-\alpha-\beta)\overline{Q} + az_{t-1}z'_{t-1} + \beta Q_{t-1} \quad (10)$$

Formula 10 limits imposed on parameters have a significant role in the convergence of qt manifest and Manifest P [19].

5 Research Findings

In this research, information was collected and analyzed using daily data from the beginning of 2006 to the end of 2016. This information includes the price bubble of the companies active in the stock market and the value of transactions and the volume of equations. The volume of liquidity of the world price per barrel of oil. World exchange rate Gold and information on world oil price indices The exchange rate and the price of each ounce of gold have been extracted from the archives of repuTable foreign sites as well as the website of the Gold Union, as well as information about the stock exchange from the new software and the archives and the Stock Exchange database.

5.1 Descriptive Statistics

The descriptive statistics of the variables used in this study are presented in Table 1 below. In this Table, the mean of the maximum minimum standard deviation of the data is the elasticity of the skewness and the statistic and the probability of the jar, respectively, are shown.
According to the observation of the standard deviation Table for the variables in which the volatility is high in these markets and because the degree of skidding is more than 5%, so our variables have a broad tail distribution and their stretch is lower than normal.

Table 1: Descriptive Statistics of Research Variables

variables	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability
VL	1395708	1012650	31649331	64975.74	1501143	5.614	82.846	610326.2	0
TA	4.170	2.680	3.811	1.89	4.31	2.353	10.659	7583.754	0
TO	2051.63	1708.6	15570.72	64.36	1511.618	2.909	17.904	24021.014	0
pb	-38.75	-42.829	-3.447	-55.145	12.658	0.762	2.421	62.054	0
exchange	1145.510	1159.025	1895	546.5	374.471	0.124	2.01	97.777	0
gold	10298.28	10009	12260	89.47	1118.987	0.761	2.218	275.026	0
oil	82.601	83.330	143.590	0	29.443	-0.526	2.785	108.212	0

5.2 Shipro Wilk's Normality Test

The philosophy of the Shipro-Wilk test is similar to the multidimensional diagram. In this test, a regression relation between the static statistics of the data and the expected values of the sequential statistical distribution of the normal distribution is considered, and the test statistic is something like the coefficient of determination in the regression, which is higher, indicating the proximity of the distribution of data to The distribution is normal, and small values of the test statistic result in the rejection of the zero assumption (the normal distribution of data). ShiProVilk test is based on a regression relation or a correlation analysis between sequential statistics and their desired values. Usually if the level of significance in this test, which is in this Table with sig. The data displayed is

more than 0.05. Data can be assumed with high normal confidence. Otherwise, it cannot be said that the data distribution is normal.

Table 2: Shipro Wilk's Normality Test

variable	t- statistics	df	p-value
BP	0.621	1964	0
TV	0.897	1964	0
TA	0.796	1964	0
EXCHANGE	0.581	1964	0
GOLD	0.872	1964	0
OIL	0.947	1964	0

5.3 Unit root test

According to the results of the Dickey Fuller test, this test has been investigated in two ways: the width of the origin with the trend and width of the undrawn origin. As the results of the test show, in either case, the p-value in the surface test is greater than 0.05, therefore, it rejects the zero-tolerance hypothesis, but with a p-value difference to zero, to be.

5.4 Test the first hypothesis

The first hypothesis is to explain the relationship between the value of exchanges and the price bubble with the GARCH and COPULA models, which are further described in the estimation of these tests.

Table 3: Unit Root Test

variable	Test for unit root	Intercept					Trend and intercept				
		t Statistic	critical values			Prob	t Statistic	critical values			Prob
			1%	5%	10%			1%	5%	10%	
TA	level	-5.2317	-3.435	-2.863	-2.567	0.0000	-6.2030	-3.965	-3.413	-3.128	0.000
TO	level	-5.5114	-3.435	-2.863	-2.567	0.0000	-8.1204	-3.965	-3.413	-3.128	0.000
VL	level	-6.5393	-3.435	-2.863	-2.567	0.000	-6.5292	-3.965	-3.413	-3.128	0.000
SR	level	-5.0610	-3.435	-2.863	-2.567	0.000	-5.1102	-3.965	-3.413	-3.128	0.0001
ASR	level	-1.2817	-3.435	-2.863	-2.567	0.6202	-1.3496	-3.965	-3.413	-3.128	0.8749
	1 st diffrence	-48.5721	-3.435	-2.863	-2.567	0.0001					
EXCHANGE	level	-1.8062	-3.435	-2.863	-2.567	0.3778	-1.3335	-3.965	-3.413	-3.128	0.8791
	1 st diffrence	-52.6045	-3.435	-2.863	-2.567	0.0001	-52.6242	-3.965	-3.413	-3.128	0.000
GOLD	level	0.6150	-3.435	-2.863	-2.567	0.9902	-0.6516	-3.965	-3.413	-3.128	0.9754
	1 st diffrence	-13.5269	-3.435	-2.863	-2.567	0.000	-13.6430	-3.965	-3.413	-3.128	0.000
OIL	level	-1.3429	-3.435	-2.863	-2.567	0.6114	-1.4885	-3.965	-3.413	-3.128	0.8336
	1 st diffrence	-47.8022	-3.435	-2.863	-2.567	0.0001	-47.8066	-3.965	-3.413	-3.128	0.000

Table 4: GARCH DCC-GJR Model Estimates for the Value of Total Industrial Exchanges

	PB	TA	VL	EXCHANGE	GOLD	OIL	DCC-GARCH
ARCH	*1.434 **[14.999] ***(0.127)	0.237 [8.214] (0.000)	0.263 [4.658] (0.000)	1.444 [2.349] (0.127)	3.860 [3.964] (0.034)	1.291 [1.829] (0.033)	α =0.158 [4.568] (0.000)
GARCH	0.151 [1.652] (0.098)	0.7186 [19.19] (0.000)	0.722 [12.45] (0.000)	-0.873 [-14.84] (0.000)	-0.874 [-14.84] (0.000)	-0.141 [-2.200] (0.027)	β =0.804 [17.97] (0.000)

Table 5: Estimation of Copula Model

VARIABLE	**TA**	**VL**	**PB**	**EXCHANGE**	**GOLD**	**OIL**
TA	1	-0.7001	-0.149	0.3744	0.521	**0.1523**
VL	-0.7001	1	-0.137	-0.1039	-0.037	**-0.0915**
PB	-0.149	-0.137	1	-0.0002	-0.107	**-0.361**
EXCHANGE	0.3744	-0.1039	-0.0002	1	0.3054	**0.4728**
GOLD	0.521	-0.037	-0.107	0.3054	1	**0.0006**
OIL	0.1523	-0.0915	-0.361	0.4728	0.0006	**1**

In Table 4, the coefficient of t equation and significance level are used. Irish. Given that the results of DccGJR GARCH estimation are Jakay's, the alpha and beta parameters are equal to (0, 158) and (0.804) respectively, and the p value is less than that with the probability of the mode and 5% of the total condition Alpha and Beta are smaller than 1. This set specifies the parameters for which the matrix of the correlation condition in the previous period affects the current period. And as the beta value is larger and closer to one, it is expected that for each pair of calculated correlations, the conditional correlations of the current period are close to the correlation of the previous period.

5.5 Results of estimation of COPULA model

For the value of total industrial exchanges to estimate the Coppola model, first we estimate the GARCH on each of the variables, then we fit the Coppola model on the GARCH model to show the marginal correlation on the model and among the different variables of the model. According to Table 5, the results of the t copula model indicate that there is a complete and inverse relation between the bubble pb and the transaction value ta with -0.149. However, there is a negative and very weak relationship between the price bubble and the exchange rate with respect to its value (-0,000,000). The second hypothesis is to explain the relationship between the volume of transactions and the price bubble with the GARCH and COPULA models, which are further described in the estimates of the tests.

Table 6: of DCC-GJR-GARCH Model for Transaction Volume

	PB	**TO**	**VL**	**EXCHANGE**	**GOLD**	**OIL**	**DCC-GARCH**
ARCH	*1.434 **[2.310] ***(0.000)	0.198 [6.900] (0.000)	0.263 [4.658] (0.000)	-0.023 [-0.655] (0.512)	-0.023 [-0.659] (0.509)	-0.100 [-1.104] (0.269)	$\alpha = 0.141$ [4.717] (0.000)
GARCH	-0.000 [-0.496] (0.127)	0.758 [21.98] (0.000)	0.722 [12.45] (0.000)	0.795 [2.408] (0.031)	0.175 [4.872] (0.034)	-0.011 [-2.089] (0.033)	$\beta = 0.822$ [19.99] (0.000)

In the Table above: * means the coefficient of equation, ** t statistic and *** is a significant level.

Given that the results of the GARCH DCC-GJR estimation indicate that the α and β parameters are (0.141) and (0.822) respectively and that their P-value is less than 0.05, with a probability of 95% The condition 1> α + β is provided. These conditions for the expressed parameters α and β indicate that the conditional correlation matrix in the previous period has an effect on the current period, meaning that it can be expected that according to the changes in the parameters in the previous period will affect the current period.

Table 7: GARCH COPULA Model Estimation for Exchanges Volume

VARIABLE	TO	VL	PB	EXCHANGE	GOLD	OIL
TO	1	-0.593	-0.196	0.317	0.545	0.055
VL	-0.593	1	-0.137	-0.103	-0.037	-0.091
PB	-0.196	-0.137	1	0	-0.107	-0.361
EXCHANGE	0.317	-0.103	0	1	0.305	0.472
GOLD	0.545	-0.037	-0.107	0.305	1	0
OIL	0.055	-0.091	-0.361	0.472	0	1

Table 8: Test Results of Diagonal BEKK Model

VARIABLE	**TO**	**TA**	**VL**	**PB**	**EXCHANGE**	**GOLD**	OIL
TO		0.354*	-0.667	-2.102	1.246	0.4	-0.055
		[0.858]**	[-1.561]	[-0.080]	[0.841]	[717.468]	[-0.296]
		0.390***	-0.118	-0.935	-0.4	0	0.766)
TA	0.975		0.009	172593	-0.187	-0.568	0.018
	[50.475]		[0.502]	[0.930]	[-3.430]	[-0.387]	[0.617]
	0		-0.615	-0.351	0	-0.698	-0.537
VL	-0.958	-0.046		7.457	0.691	3.548	-0.023
	[-138.669]	[-7.449]		[0.107]	[1.770]	[269.173]	[-0.572]
	0	0		-0.914	-0.076	0	-0.567
PB	3.931	-8.391	-2.291		3.331	-4.781	-1.291
	[0.560]	[-0.942]	[-0.7591]		[1.105]	[-0.729]	[-1.100]
	(0.575)	(-0.346)	(0.448)		(0.269)	(0.466)	(0.271)
EXCHANGE	-0.031	0.006	-0.022	-0.019		25.321	0.032
	[-1.793]	[0.529]	[-7.055]	[-0.267]		[138921.6]	[0.630]
	-0.072	-0.596	0	-0.789		0	-0.528
GOLD	0	0	0	-0.006	0.027		-6.27
	[-0.089]	[0.227]	[0.374]	[-1.762]	[14.473]		[-0.047]
	-0.928	-0.28	-0.707	-0.078	0		0
OIL	-0.132	0.019	-0.124	-0.129	1.197	13.961	
	[-3.143]	[0.650]	[-4.667]	[-2.902]	[5.508]	[6150.953]	
	-0.001	-0.515	0	-0.003	0	0	

In the Table above: * means the coefficient of equation, ** t statistic and *** is a significant level.

Also, with regard to the positive parameters of alpha and beta, it can be stated that, after creating a shock in the series of outputs, it can be expected that conditional correlation for the next period will increase. The beta parameter also indicates the effect of the conditional correlation of the previous period on the conditional correlation of the current period. And as the beta value is larger and closer to 1, it is expected that for each pair of calculated correlations, the conditional correlations of the current period are expected to be close to the conditional correlation of the previous period. According to the DCC-GJR-GARCH model, one can conclude that there is a correlation between the price bubble and the volume of trading. According to the above Table, the results of the t-Copula model indicate that there is a complete and inverse relationship between the price bubble (PB) and transaction value (TA) with values (0.19). In the study of the relationship between price bubbles and other research variables,

similar results were obtained because of negative values. But in the connection between the price bubble with the exchange rate, according to its value (0.0002), there is a negative and very weak relationship between them.

5.6 Test the Third Hypothesis

The third hypothesis is about explaining the relationship between research variables with GARCH model. This model has been estimated by the diagonal BEKK model. In this model, we examine the relationship between the individual variables of the research and describe the results as shown in Table 8. In the study of the relationship between research variables and the volume of transactions, the results indicate that the price bubble, the gold price, having a P-value of 0.05, does not have a meaningful relationship with the volume of trading. Also, liquidity and oil prices with coefficients of 0.958 and 0.132 and P-value of 0.05, which are respectively 0.000 and 0.001, have a reverse and significant relationship with the volume of transactions. Regarding the valuation of undrawn relationships with the research variables, one can see that the only variable that can affect the value of transactions is the volume of liquidity. The liquidity volume with a coefficient of 0.046 and 0.000 = P-Value has a reverse and significant relationship with transaction value.

In the study of the relationship between research variables with liquidity, exchange rate variables with a coefficient of 0.022 and a significant level of 0.000 and oil prices with a coefficient of 0.124 and a significant level of 0.000, due to having smaller coefficients and smaller P-value from 0.05 have a reverse and significant relationship with the volume of liquidity. In relation to the study of the relationship between price bubbles with research variables, it is seen that the price of oil with a coefficient of 129 and -0.003 and P-Value has a reverse and significant relationship with the price bubble. Other variables do not have meaningful relationships with price bubbles because their significance level is less than 0.05. That is, their changes do not cause a change in the price bubble. Regarding the relationship between exchange rate and other research variables, it is observed that the value of the transactions having a coefficient of 0.187 and 0.05> P-value with a 95% probability has a reverse and significant relationship with the exchange rate. The gold price and the price of oil each with positive coefficients and P <0.05> 95% have a direct and meaningful relationship with the exchange rate. Also, by examining the relationship between volume of transactions, liquidity volume and price bubble with the exchange rate having a P-Value greater than 0.05, we find that there is no significant relationship between these variables and the exchange rate.

In the study of the relationship between research variables with gold prices, it is observed that the values of transactions and price bubbles are not significantly related to the price of gold because of the fact that the P-value is greater than 0.05. But the volume of transactions, the volume of liquidity, the exchange rate, and the price of oil with positive coefficients and P-Value greater than 0.05 with a 95% probability have a direct and significant relationship with the price of gold. Also, regarding the relationship between oil price and other research variables, as shown in the Table above, the volume of transactions, the value of transactions, the volume of liquidity, the price bubble and the exchange rate with a P-Value greater than 0.05 have a significant relationship with the price Have no oil.

6 Discussion and Conclusion

The results of the DCC GJR GARCH estimate in Table 10 indicate that the alpha and beta parameters are (0.158) and (0.804) respectively and the p value is less than 0.05. With a probability of 95% a total beta condition of alpha and beta of less than 1. According to the estimation of the DCC GJR GARCH model, one can conclude that there is a correlation between the price bubble and the value of the

transaction. According to Table 11, the results of the T COPULA model indicate that there is a complete and inverse relationship between the price bubble (PB) and the value of transactions (TA) with values (-149). In Table 12, the results of estimating the MGJR GARCH model are used to explain the relationship between transaction value and price bubble. As it is seen, gamma in all industries except print and paper products of equipment and machinery for industrial contracting and industry of gypsum and lime cement. The effect of shocks on the variability of variables has asymmetric effects, but in the printing and paper industries of the cement and gypsum industry and Due to the fact that gamma is not meaningful and the p value in these industries is more than 0.05, it is equal to 0.435 0.47 0.039 0.03428 0.335. In the study of the relationship between the variables of research with the volume of transactions, the results of Table (4-16) show that the volume of liquidity and oil prices with the coefficients of 958-0 and -0.21 and the value of 0.05> p value, respectively, 000 and 0/001 have a significant reverse relationship with the volume of equations.

Regarding the evaluation of the value of transactions with the research variables, one can see that the only variable that can affect the value of transactions is the volume of liquidity. The liquidity volume with a coefficient of 0.046 and p value 0 has a reverse and significant relationship with the value of transactions Is. In the context of the study of the relationship between the value of transactions with the variables of research, no research has been done so far. Such relationship with the exchange rate with coefficients and significant levels has a reverse and significant relationship with the volume of liquidity, but no relation has been made between the volume of liquidity and the variables of research so far. According to Table (11) and (14), there has been no research on the relationship between price bubbles and other variables in the research. Regarding the relationship between the exchange rate and other currencies, the value of transactions with a coefficient of -0.186 and p <0.05 with a probability of 95% have a direct and significant relationship with the exchange rate. Also, by examining the relationship between the volume of liquidity transactions and the price bubble with the exchange rate having a P value of more than 0.05, we find that there is a significant relationship between these variables and the exchange rate.

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