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Analysis of the Correlation between the Price and Volume in Shanghai Stock Market

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Abstract: ***The article applied least-squares estimation and quantile regression to study the relationship between the volume and closing price in Shanghai stock market , turning to linear studies, which makes the correlation of stock trading volume and price for promotion, and conclusions are drawn that is different from predecessors' . The empirical results show that there is a stable positive correlation between the trading volume and the closing price of Shanghai stock market, that is, the higher the trading volume is, the higher the closing price is, and the equation is significant. At the 70%, 75% and 80% quantile level of volume, the correlation between the two is greatly Iimproved , and the performance is highly linear. The results show that when the stock is rising ,the high volume of the shares can be judged as the high point of the stock price, which determines the selling probability and the corresponding upper limit of risk value. This conclusion is helpful for investors to judge the trend of stock, reduce the losses caused by non-rational factors, and have the guiding significance in the stock selling operation.***

Keywords: The relation between volume and price; Linear regression; Volume; Stock price;

1. Introduction

The relationship between stock trading volume and stock price (abbreviated as volume price relationship) has always been the focus of investors when investigating stocks. In this article, the Granger causality test results show that the stock price of the Shanghai stock market is not subject to random walk, but can use the historical information to predict the future. Since the volume reflects all the factors that affect the stock price change, the volume directly affects the price of the stock. Finding the relationship between stock turnover and price helps investors to anticipate the future trend of the stock market.

Compared with previous literature, the innovation of this paper is:

1) Changed the dependent variable of the quantity and price relationship, making the stock price and trading volume show a significant positive linear relationship, replacing the previous non-linear relationship.
2) Using quantile regression, the coefficient of all the quantiles of trading volume maintains a stable positive correlation, which resolves the "left tail" correlation change of the seniors, that is, the negative correlation between volume and price turns into a positive correlation.
3) Under all trading volume points, the relationship between trading volume and stock price is significant at 1%, which optimizes the situation where volume and stock returns have nothing to do with certain points.

This article is devoted to the study of the correlation between stock prices and trading volume, and through the correlation, makes a corresponding judgment on the stock price corresponding to the volume at each point, and uses probabilistic thinking to predict its trend. To help investors rationally judge the stock price, the probability distribution of the stock price trend, and the corresponding maximum risk situation, and to guide the probability of selling stock operation, so that investors can obtain the best expected return and reduce investment risk, and can be highly efficient investment.

2. Literature Review

The research on the relationship between volume and price in foreign markets focuses on the relationship between volume and profitability. Saatcioglu K, Starks LT (1998) research shows that emerging markets that lead changes in stock prices have different institutional and information flows than developed markets, but do not show similar stock prices and research advantages using U.S. data gap. In a series of emerging markets, the differences in institutional and information flows are important enough to affect the valuation process of stocks[1]. Chen S H, Liao C C (1999) found that the agency-based approach is more fundamental to the interpretation of volume-price relations. The results show that the stock price relationship can be regarded as a general property of the financial market, and it believes that unless the feedback relationship between the individual behavior at the bottom and the agglomeration phenomenon at the top is well explained, the volume cannot be fully accepted. The relationship between yields [2]. Ciner C (2002) used structure and vector autoregressive models to study the information content of the trading volume of the Toronto Stock Exchange before and after a fully electronic transaction. The empirical results show that price discovery improved in electronic transactions will reduce the forecasting capacity of trading volume. After fully automated, the predictive power of price changes disappeared [3]. Badhani KN (2006) studied the causality between stock prices based on the total trading volume of the S&P CNX and the national stock exchange[4]. Mahajan S, Singh B (2008) used the daily data of the Bombay Stock Exchange Sensitivity Index to study the empirical relationship between the market structure hypothesis and the market structure. The study concluded that the volume provides information with precise and discrete information, rather than as information. The representative of the signal [5].

Many scholars began to study the relationship between trading volume and profitability in the Chinese stock market on the basis of Western research on quantity and price. Wang CW (2002) examined the linear and nonlinear Granger causality between the trading volume and price in the Shanghai and Shenzhen stock markets. The results show that there is a linear Granger causality and two-way non-reversion from stock returns to trading volume. Linear Granger causality, but after filtering the weekend and GARCH effects, the nonlinear Granger causality disappeared [6]. Wei Y U, Yin J (2006) found that there is a long-term equilibrium between price and volume, and price changes can explain changes in volume, but it is not entirely correct [7]. Qian Zhengming (2007) studied the quantile regression analysis of the relationship between volume and price in the Shanghai stock exchange market [8]. Zheng T T, Zhang C C, Xing W (2009) studied that price rules are not consistent in different stocks [9]. Lu Ying, Liu Xiaoyan (2015) discusses the correlation between stock returns and trading volume [10]. Ren Yanyan, Li Wei, RENYan-yan, et al (2017) compared the quantile regression (QR) model with the IVQR model and analyzed the relationship between the return rate and the volume under different quintiles [11].

The previous generation did not draw a stable and persuasive result on the relationship between the stock price and the stock price in terms of stock returns and trading volume. The conclusion only showed some basic characteristics between the quantity and price. The persuasive power was insufficient and it was necessary to The research of the relationship is improved and transformed. Among them, Ding D K, Lau S T (2001) studied the relationship between the absolute price of two kinds of crude oil and trading volume and the results showed a high degree of consistency [12]. Smirlock M, Starks L (2015) studied volume and absolute prices. The results show that at the company level, there is a significant causal relationship between volume and price, and this relationship is stronger in related earnings announcements [13]. Chen Langnan, Luo Jiawen, and Liu Xin (2015) illustrate the time-varying shock response to price structure and trading volume changes in market structure and the time-varying shock effect of short-selling trading mechanism[14]. However, the focus of this paper is that changes in stock prices change over time. There is no specific situation where the relationship between volume and price is positively related.

However, there are few researches on the relationship between the absolute stock price and the trading volume, and the specific situation of the quantity-price relationship is worth further studying and excavating the value of its practical application. Therefore, it can be considered to apply it to the Shanghai stock market, relying on the high significance of absolute prices and trading volume to study the correlation between absolute stock price and trading volume of the Shanghai stock market.

3. Basic ideas of the model

3.1 Least squares estimation

The problem of estimating certain parameters through one or more sets of observations is common in actual production. For example, the stock price of a stock that rises at a constant rate at time t is Y, which can be described by the following linear function (1):

$$y = \hat{a} + t\hat{\beta} \quad (1)$$

Where $\hat{a}$ is the initial price of the stock price at t =0, and $\hat{\beta}$ is the average growth rate of the stock price. Since observations in the actual process cannot be very accurate and the observations have accidental errors, we need to make redundant observations of the observations to exclude their randomness. At this time, in order to obtain the estimated values $\hat{a}$ and $\hat{\beta}$, it is necessary to separately measure the position at different time points t_1, t_2, t_3, ...t_n to obtain a set of observation values y_1, y_2, y_3, ...y_n. At this time, from the above formula (1) can be obtained (2)

$$v_i = \hat{\alpha} + t_i\hat{\beta} - y_i, (i = 1,2,\ldots,n) \quad (2)$$

If

$$\underset{n,1}{Y} = \begin{bmatrix} y_1 \\ y_2 \\ \cdots \\ y_n \end{bmatrix}, \underset{n,2}{B} = \begin{bmatrix} 1 & t_1 \\ 1 & t_2 \\ \cdots & \cdots \\ 1 & t_n \end{bmatrix}, \underset{2,1}{\hat{X}} = \begin{bmatrix} \hat{\alpha} \\ \hat{\beta} \end{bmatrix}, V = \underset{n,1}{\begin{bmatrix} v_1 \\ v_2 \\ \cdots \\ v_n \end{bmatrix}}$$

Then formula (2) is:

$$V = B\hat{X} - Y \quad (3)$$

Corresponding yi, ti (i =1, 2, ...n) is illustrated in Figure 1 below.

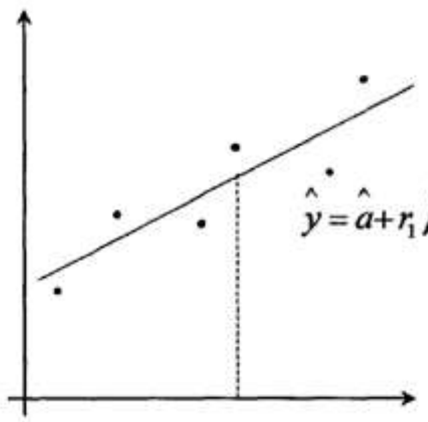

Figure 1 Determining Lines from Observation Points

From Fig 1, we can see that due to errors in the data observations, the data point-observation points depicted cannot get the theoretical straight line, and there are also some phenomena of random 'swing'. According to the requirements of the least-squares principle, The fitting model is optimal when the sum of squares of deviations from each observation point to the curve is the smallest.
The principle of least squares we describe is to make:

$$\sum_{i=1}^{n} v_i^2 = \sum_{i=1}^{n} (\hat{\alpha} + t_i\hat{\beta} - y_i)^2 = \min \tag{4}$$

It can also be expressed as:

$$V^T V = (B\hat{X} - Y)^T (B\hat{X} - Y) = \min \tag{5}$$

The estimation x that satisfies the above formula is called the least square estimate of x, and the corresponding method for finding the estimate according to this method is called the least squares method.

3.2 Quantile Regression

Koenker and Bassett (1978)[15] first explored the quantile regression model, and later Koenker and Hallock (2001)[16] extended their research further. Different from the least squares estimation method, the quantile regression method uses the weighted mean absolute error as an objective function to estimate the regression coefficients so that the dependent variables of different quantiles can be examined.

The main ideas are as follows:
Assuming that y is a random variable, its quantile $\theta(0<\theta<1)$ is defined as

$$qy(\theta) = \inf\{y : F(y) \geq 0\} \tag{6}$$

The quantile regression is solved by weighting the absolute deviation and minimization. For any fraction of the sample, we achieve the optimization goal by solving the following equation:

$$\min_{\zeta\in R} \sum_{i=1}^{N} \rho_\theta(y_i - \xi) \tag{7}$$

The weight $\rho_\theta(z) = z(\theta - I(Z<0))$, $I(Z<0)$ is an indicative function,as $I(Z<0)=\begin{cases}1, z<0\\ 0, z\geq 0\end{cases}$

Assume that the regression model is linear:

$$y_i = x_i'\beta + e_i \tag{8}$$

Then for arbitrary θ, the quantile regression objective function is:

$$V(\beta;\theta) = \frac{1}{N}\left[\theta\sum_{y\geq x'\beta}\left|y_i - x_i'\beta\right| + (1-\theta)\sum_{y\leq x'\beta}\left|y_i - x_i'\beta\right|\right] \tag{9}$$

The first-order condition for minimizing (9) is:

$$\frac{1}{N}\sum_{i=1}^{N} x_i(\theta - I(y_i - x_i'\beta < 0)) = 0 \tag{10}$$

According to the formula (10), $\bar{\beta}(\theta)$ is the regression coefficient of the θ-th quantile regression. Of course, the interpretation of the coefficients in the model is similar to the general linear model, except that it is not only limited to the conditional mean, but it is considered in various situations with different quantile positions. In practical applications, linear regression methods are generally used to estimate quantile regression coefficients.

Under large sample conditions, they have the following gradual distribution:

$$\sqrt{N}(\bar{\beta}(\theta) - \beta(\theta))N(0, G(\theta)^{-1}\sum(\theta)G(\theta)^{-1}) \tag{11}$$

Among them $G(\theta) = -E\left[x_i x_i' f_{e|x}(0)\right]$, $\sum(\theta) = \theta(1-\theta)E(x_i x_i')$, $f_{e(\theta|x)}$ is conditional probability density functionthe of error term $e(\theta)$.

4. Basic Data Processing

4.1 Basic description of data

All of the data in this article is derived from wind information. The sampled sample is the data of the Shanghai Stock Exchange Index of the A-share market from December 19, 1990 to October 10, 2017, with a total of 6,555 trading days. The price value is obtained by taking the daily closing index logarithm (that is, LN(P)), and the trading volume (the daily transaction amount of the Shanghai stock market, in units of 100 million RMB) is directly taken from the raw data logarithm (ie LN (VOL)) Get.

Table 1: Shanghai Stock Market Trading Volume and Index Descriptor Statistics

		Trading Volume	Price
N	Statistics	6555	6555
Minimum	Statistics	2.7080	4.6049
Maximum	Statistics	20.5691	8.7147
Mean	Statistics	16.2330	7.3234
Standard deviation	Statistics	2.8526	0.7314
Variance	Statistics	8.1380	0.5349
Skewness	Statistics	-1.5340	-1.2419
Kurtosis	Statistics	2.7550	2.1525
Median value	Statistics	16.5549	7.4114
Mode	Statistics	5.8692	4.8996

From Table 1, we can see that the standard deviation and variance of the trading volume of the Shanghai Stock Exchange are very large, while the standard deviation and variance of the Shanghai Stock Exchange Index are small, which reflects the fluctuation of the trading volume, while the fluctuation of the Shanghai Stock Exchange Index is relatively small and relatively stable. Both the trading volume and the Shanghai Composite Index have a negative skewness, that is, the thick tail is on the left, and the distribution is left-biased. The kurtosis values of both quantity and price are all less than 3, and the kurtosis is flat and thin-tailed. Mean values are all greater than the median. There is less tail data and data is concentrated. Therefore, data regression has universal application. That is, most trading hours are in a normal state. The range of trading volume is very large, and the Shanghai index is very small. Therefore, using the volume as an independent variable can reflect the changes between volume and price.

In general, the volume and price of the Shanghai market are relatively stable, and the volume and price are relatively concentrated. The data reflects the phenomenon of the stock market in the general trading hours. However, when the bullish (bad) or bullish (bearish) market comes, that is, at the left tail and right tail of the trading volume, there will be large fluctuations in the trading volume, which is more significant in terms of volume.

4.2 Unit Root Test

Table 2: Shanghai Stock Market Unit Root Test

	1%level	ADF Statistics	Prob.*	Unit root test
Closing price	-3.431169	-3.609009	0.0056	No
Volume	-3.431171	-3.371552	0.012	No

Since this paper uses time series data, in order to avoid delays in regression, we first perform unit root tests on various variables before estimating the model. As a result, it was found that under the 1% significance level, the assumption that the yield of synthetic yields rejects the assumption that the unit root exists, and the data is stable. (Detailed results are shown in Table 2).

4.3 Granger causality test

From Table 3, Granger causality test, when the lag period is L = 1, the level of causality of the price-pair quantity is rejected at the 1% level, that is, the price of the received stock is the cause of the volume; meanwhile, the quantity The level of causality of the consideration is also the rejection of the original hypothesis at the level of 1%, that is, the acceptance of volume is the cause of the stock price. This shows that the stock price and trading volume influence each other, and the historical information of the trading volume can predict the stock price, that is, the trading volume helps to explain the future changes of the stock price.

This shows that the theory of stock price random walk is not established in the Shanghai stock market. Instead, it can explain and forecast the stock price through trading volume.

Table 3: Granger causality test

Null Hypothesis:	Obs	F-Statistic	Prob.
Price does not Granger Cause Volume	6554	99.2056	0.0000
Volume does not Granger Cause Price		8.2481	0.0041

5. Empirical Study on the Relationship between Quantity and Price of Shanghai Stock Index

In this paper, the method of least squares (OLS) and quantile regression (LAD) is applied to the model (12), that is, the stock trading volume and stock price (hereinafter referred to as volume-price relationship) are returned, and the stock trading volume and return are The comparison of the regression results of the rates (hereinafter referred to as volume-price relations*).

$$\ln P = \alpha + \beta \ln(\mathrm{VOL}) + \mu_t \quad (12)$$

(Among them: P means that the Shanghai Stock Exchange Index takes the logarithm, and VOL represents the logarithm of the trading volume of the Shanghai Stock Exchange.)

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5.1 Least Squares Estimation

First, the least squares method is applied to the regression of the model (12) and compared with the predecessor's quantity-price relationship*. From Table 4 and Figure 2, comparing the two models available, the volume-price relationship is significant at the 1% level, the volume-price relationship* is significant at the 5% significance level, and the R2 value or the adjusted R2 is the quantity-price relationship. The values are all greater than 80%, indicating that the linear regression between the volume and the stock price is very significant. The two have a strong positive correlation and a good degree of fit. That is, the stock price can be represented by the volume and the quantity and price are linearly related. If the trading volume increases, the stock price will rise, and vice versa; but the R2 value of the price/price relationship* and the adjusted R2 value are less than 0.001, and the overall wireless relationship of the equation. In summary, the correlation levels of the two variables obtained by the regression of trading volume and stock prices, as well as the significant level of the linear equation are higher. Therefore, this article chooses to use the volume and the stock price as the main two variables of the volume-price relationship. the study. Figure 1 shows that the volume and price concentration trend of the Shanghai Composite Index is obvious, and the linear equation reflects the market average, ie, the volume and price concentration in most trading hours. Therefore, the results of this study have universal applicability, that is, they are effective at most trading hours. .

OLS regression results show that the stock price is explained by the volume of the level reached 82.4% or more, a higher degree of interpretation, volume and price are positively correlated, so in the case of large probability can be used to explain the changes in the stock price changes, that is, stocks The higher the volume, the higher the corresponding stock price. Returning to the focus of this study, when the stock price is in a rising stage, the highest volume in this phase corresponds to the highest stock price, so when the volume reaches the maximum level of the rising range, it is the highest point of the stock price. The probability is 82.4%, that is, the theory that determines the selling point of the stock by judging the stock trading volume is established at a probability of 82.4%.

Table 4: OLS regression results under the two models

OLS regression	B Value	P Value	Significant level	R^2 Value	R^2 Value (adjusted)
Volume/Price	0.232756	0.0000	1%	0.824122	0.824095
Volume/Return	-0.020579	0.0335	5%	0.000689	0.000537

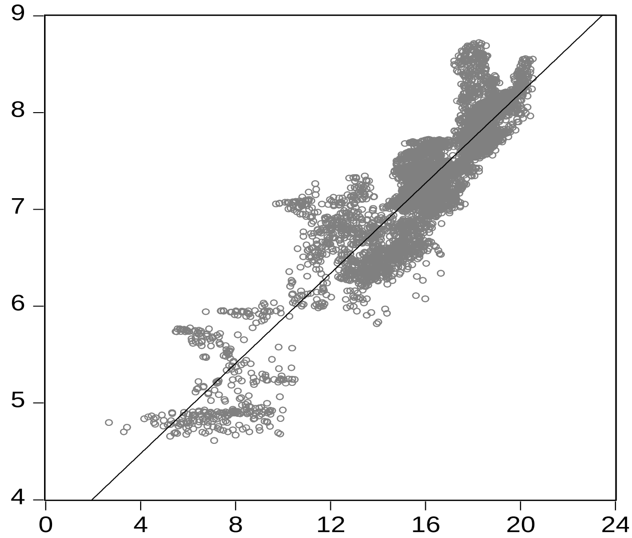

Figure 2: Scatter plot of volume of OLS return and price of Shanghai index

5.2 Quantile Regression

Based on the OLS study, the quantile regression model was used to study the specific changes in the volume-price relationship at each quantile of the volume, and at the same time comparing the volume and the stock price (volume-price relationship) with the volume and the rate of return. The value of each quantile point (volume-price relationship*).

The choice of quantiles is θ = 0.O5, 0.1, 0.15, ..., 0.85, 0.9, 0.95. In addition, in order to study the effect of extreme values on the stock market, the regression coefficients of 0. O1 at the left tail and 0.99 points at the right tail were simultaneously estimated. There are 21 quantile points for each group of data, as shown in Table 5 below.

Figure 3 compares the changes in the equation coefficients of the two methods - volume and stock prices (volume-price relations), volume and yield (volume-price relations *). It can be seen that the coefficient of both decreases with the increase of the locator point, showing that the effect of a larger volume on the price/return rate gradually decreases. With the increase in trading volume, the price/return rate should have increased accordingly, but due to the Chinese market's limit-up and down-limit system, the huge volume cannot reach the corresponding price/yield rate and the equation coefficient β decreases. Affected by the price rise and fall limit system, it is more pronounced in the coefficient of the equation of volume and yield (volume-price relationship*) because the rate of change in stock returns is daily (-10%, 10%) when the volume increases. The coefficient β of the equation rapidly declines and has a negative correlation; while the stock price (the Shanghai index) does not have a prescribed range, it is still affected by the price rise and fall blocking system, which leads to an increase in the volume of transactions, and the coefficient β decreases slowly, but keeps Above 0.2 (positive correlation).

Figure 4 shows the trend of R2 at the selected locator for volume and stock prices, trading volume and yield, and it can be seen that the volume and stock price (volume-price relationship) generally exhibit a higher linear relationship. At the left side of the 50% divergence point (median), that is, during most of the trading time, the R2 value of the stock market's linear equation and stock price's linear equation fluctuates around 0.6. It can be inferred that the stock trading volume is positively correlated with the stock price. In most trading hours, at least 60% of the probability can be determined that when the stock is in the rising phase, the higher trading volume corresponds to the higher stock price (the Shanghai stock index). That is, the conclusion that the trading volume reached the maximum degree of the time period is the selling point of the stock is correct at the probability of 60%.

In real market conditions, this probability will increase. In Figure 4, the R2 value of the OLS method reaches 0.82, and the linear regression fit is better than the quantile regression goodness R2 value, that is, there are more points in the quantile regression than fitting the linear equation. The problem is explained as follows. In the actual situation, the transaction volume will not be arranged neatly from small to large according to the quantile, but the combination of low volume and high volume, but the overall is in line with the positive linear relationship between volume and price. Therefore, when the high and low trading volumes are aligned, the goodness of fit at each locator will converge to 82.4% of the overall goodness of fit, ie, the goodness of fit increases. Its significance is that, in real trading, the trading volume in different periods is at different points, regardless of which point is the trading volume of the current trading period, the current trading volume can be determined according to the R2 value corresponding to its dividing point. The minimum value of the stock price correlation, that is, at the X quantile, the probability that the stock price is the relative highest point when the trading volume in the rising stage reaches the highest is greater than the RX2 value corresponding to the X divergence point, and different periods correspond to different judgment probabilities. The minimum value, which determines the upper limit of the risk of selling stocks (= 1 - RX2), that is, the maximum risk value, can help investors analyze the probability of stock movement and obtain a stable and higher expected return.

In addition, there was an increase in R2 at the 1%-5% quartile and a maximum of about 0.75 at the 5% subsite. The reason why the R2 value does not decrease at the 1%-5% divergence point is that when the bear market, the stock market is sluggish, the trading volume is too low, and as the volume increases, the degree of price change increases. The degree increases and the R2 value increases in a small range.

The R2 value of the volume and yield (volume-price relationship*) studied by the predecessors was less than 0.01, the overall equation was insignificant, and the wireless correlation was not studied.

In summary, the existence of the daily limit system will reduce the influence of the increase in trading volume on the stock price, optimize the twists and turns of previous research, and show a stable positive correlation; in most stock trading hours, ie, In most trading hours, stock trading volume and stock prices are always positively correlated, and at least 60% of the probability can be determined that the highest trading volume of stocks in the upward trend corresponds to the relatively highest stock price, that is, the selling point. This conclusion can better guide investors to sell stocks at the same time, can determine the maximum risk value under different trading volume points, and use the probabilistic thinking to carry out graded investment, and sell an equal probability share of stocks at different probability selling points, making Yield-to-risk levels are at their lowest, and optimal levels of expected returns are obtained.

Table 5: Empirical results of the two models under quantile regression quartiles

	Volume and Price			Volume and Return		
Quantile (%)	α	β	R^2	α	β	R^2
1	1.6520 (0.0000)	0.3127 (0.0000)	0.727232	-0.2098 (0.0000)	0.0388 (0.0000)	0.096392
5	2.1940 (0.0000)	0.2885 (0.0000)	0.747047	-0.0310 (0.2468)	0.0389 (0.0000)	0.049502
10	2.414 (0.0000)	0.2797 (0.0000)	0.702776	0.0582 (0.0452)	0.0421 (0.0000)	0.029536
15	2.5584 (0.0000)	0.2742 (0.0000)	0.675131	0.1129 (0.0014)	0.0449 (0.0000)	0.019829
20	2.7133 (0.0000)	0.2680 (0.0000)	0.653166	0.1407 (0.0011)	0.0487 (0.0000)	0.013105
25	2.8529 (0.0000)	0.2626 (0.0000)	0.63083	0.2800 (0.0000)	0.0466 (0.0000)	0.010974
30	2.9886 (0.0000)	0.2572 (0.0000)	0.613569	0.4327 (0.0000)	0.0430 (0.0000)	0.010774
35	3.1358 (0.0000)	0.2509 (0.0000)	0.601347	0.5839 (0.0000)	0.0397 (0.0000)	0.010347
40	3.2543 (0.0000)	0.2463 (0.0000)	0.592132	0.6463 (0.0000)	0.0420 (0.0000)	0.008957
45	3.3485 (0.0000)	0.2427 (0.0000)	0.584574	0.6226 (0.0000)	0.0504 (0.0000)	0.00693
50	3.4472 (0.0000)	0.2386 (0.0000)	0.577286	0.6703 (0.0000)	0.0548 (0.0000)	0.005112
55	3.5457 (0.0000)	0.2346 (0.0000)	0.569624	0.8674 (0.0000)	0.0509 (0.0000)	0.003727
60	3.6484 (0.0000)	0.2304 (0.0000)	0.556847	1.1260 (0.0000)	0.0447 (0.0000)	0.002835
65	3.7851 (0.0000)	0.2241 (0.0000)	0.544349	1.4717 (0.0000)	0.0339 (0.0109)	0.001182

70	3.9388 (0.0000)	0.2169 (0.0000)	0.531847	1.9627 (0.0000)	0.0174 (0.2863)	0.000229
75	4.1484 (0.0000)	0.2067 (0.0000)	0.51756	2.4604 (0.0000)	0.0027 (0.8842)	0.000007
80	4.3269 (0.0000)	0.1984 (0.0000)	0.493935	3.2186 (0.0000)	-0.0235 (0.2916)	0.000285
85	4.5062 (0.0000)	0.1902 (0.0000)	0.459659	4.5178 (0.0000)	-0.0736 (0.0011)	0.00269
90	4.6198 (0.0000)	0.1868 (0.0000)	0.41153	5.8513 (0.0000)	-0.1140 (0.0001)	0.006843
95	4.6503 (0.0000)	0.1944 (0.0000)	0.337563	9.1111 (0.0000)	-0.2286 (0.0001)	0.014499
99	4.9277 (0.0000)	0.2018 (0.0000)	0.263331	23.2193 (0.0000)	-0.8248 (0.0000)	0.063518

Note: Precise P value in parentheses

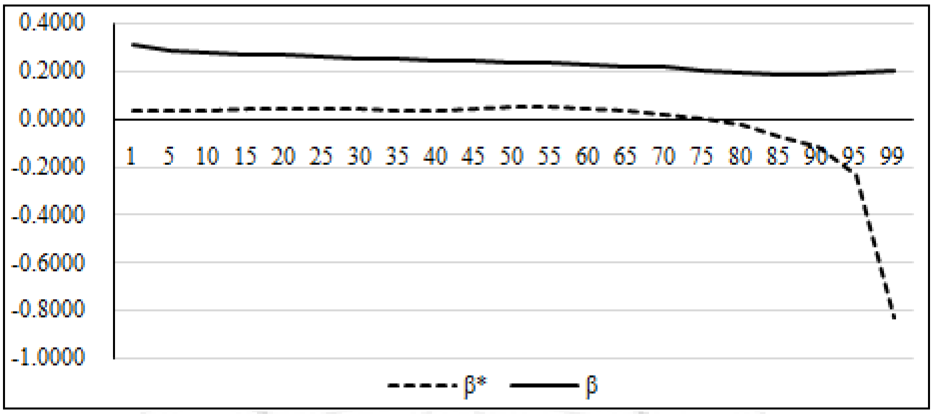

Figure 3: The change of equation coefficient of volume and stock price, volume and yield

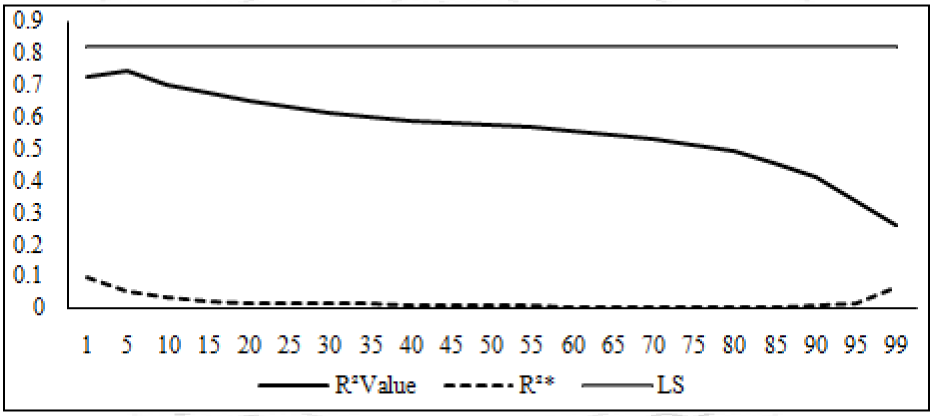

Figure 4: The trend of R2 changes in volume and stock prices, volume and yield, and OLS

6. Conclusion

The article uses the Granger causality test to prove that the stock price of the Shanghai stock market is not a random walk, but can use the historical information of price and price to predict the future. At the same time, it has changed the dependent variable of traditional research on quantity and price relations, and has drawn different conclusions from previous ones when converting from yield to stock price. On the one hand, when the relationship between quantity and price was improved from the curve relationship studied by the former to the linear relationship, the significance of the equation was increased to 82.47%, and the volume-price relationship on all trading volume points was significant at the 1% level. On the other hand, when the former researched the relationship between quantity and price, it was distorted after 75% of the trading volume, and the correlation between the two was negatively correlated. The general practical conclusion could not be obtained, and the p value was very large. Not obvious. However, after changing the dependent variable, the β and p values of the correlation coefficients in the quantile regression result after 75% of volume have been greatly improved. The two are positively related and show significant performance after the 75% quantile.

The results show that a positive correlation between volume and price means that the larger the volume, the higher the stock price, and the overall significance is 82.4%. At different points of trading volume, when judging that the stock price is in the rising stage, the relative highest point of the trading volume corresponds to the relative highest point of the stock price, and the lowest probability of selling the stock under the trading volume point can be determined, and The biggest risk of selling stocks. That is to say, investors can find the selling point of the theoretical value at the level of the sub-site where the current trading volume is located, and can determine the minimum selling probability and the upper limit of the risk value of the sub-position where it is located. This empirical conclusion helps investors to use theories to guide stock sales, rationally analyze stock prices, reduce blind confidence and blind optimism, and increase investment efficiency. Although this article studies the linear relationship between the Shanghai Stock Exchange Index and the trading volume, the individual stocks in the Shanghai Stock Exchange still have an overall volume and price characteristic. The above-mentioned theoretical methods can be applied.

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