A study on the Weekly Calendar Effect of Chinese Stock Market – Taking Guizhou Maotai as an Example

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Abstract: Based on the basic theory of AR model, a reasonable AR model was established. The above guizhoumaotai index was taken as an example to conduct fitting prediction and empirical analysis of stock prices. First, using Eviews software, unit root test is conducted on the original data sequence to determine whether the original data sequence is stable. If it is not stable, the original sequence needs to be treated with weekly rate of return differential. Secondly, the identified AR model is estimated by using the model form of recognition sequence of autocorrelation graph and partial autocorrelation graph, including the coefficient of estimation model and the order of discriminant model. Finally, the model is used to predict the weekly closing price of guizhoumaotai index with high precision, so as to predict the weekly calendar effect of the stock market. The results show that the fitting effect is good, indicating that the established AR model has certain accuracy. Conclusion the AR model is more suitable for short-term data fitting. At the same time, combined with Eviews software, the calculation process can become simple and accurate. Study changes in the short-term in our weekly calendar effect on stock prices in the future trend and formulate investment strategies have practical significance, can provide reliable information service for investors and policy makers and decision.

Key words: AR model; Week calendar effect; The time series

I.   Preface

The weekly calendar effect is that the average return or average volatility of financial markets on one trading day of the week is significantly different from that of the rest of the week. The research on the effect of the weekly calendar began with the studies of Osborne(1962) and Cross(1973). Since the 1980s, the weekly calendar effect of financial markets has been widely studied. Although the calendar effect of research on financial market in China began in the 1990 s, but so far not many use the research methods, from the domestic research in China calendar effect in the literature, such as Li-chengFeng(2003)[1], Guo-dongXu(2004),Hui Xu(2005),Xiao-guangHe(2006),Hua Cai(2006) method is adopted by the dummy variable regression. The weekly calendar effect on the stock market analysis has important role for investors, so this article is in China's guizhoumaotai, for example by using the ARCH of test analysis and AR model is established to study.

This article mainly aims at guizhoumaotai index closing price every week during the period of the 2008, forecast problems, establish guizhoumaotai index weekly closing price forecast model, by using the AR model in guizhoumaotai index closing price every week for high precision fitting prediction. The research results show that the weekly closing price of guizhoumaotai index will maintain a steady rise in a short period of time, and there will be no sharp rise or fall. Study changes in the short-term in guizhoumaotai index closing price every week to understand the stock market week calendar effect change has practical significance and investment decisions can provide reliable information service for investors and policy makers and decision.

The efficiency of the stock market has been greatly improved. In countries such as the us and Australia,

calendar effects have reversed, suggesting that financial markets are becoming more efficient. In China, financial markets already have some weak efficient market characteristics, but not enough to show that the market has really reached the weak efficient stage.

The weekly calendar effect has some regional characteristics. Research shows that among mature stock markets in the us, UK and Germany, the weekend effect is the lowest on Monday and the highest on Friday. Stocks in the asia-pacific region, such as Australia, Malaysia and Hong Kong, had the lowest yields on Tuesday and the highest on Friday. A test of the weekly effect of the Shanghai stock market is consistent with that of most asia-pacific markets, with yields generally trading at their lowest on Tuesday and highest on Friday.

The range of data used to study the calendar effect is expanding and the method is updating. Calendar effect research pay more and more attention to the model and theory support and statistical significance test, considering the calendar effect on yield and the impact of market risk, the research methods are from the original simple analysis to the random walk model, the average of the ARCH model, GARCH model, and the rolling sample testing method, etc.

The focus of further research. Future research should strengthen the analysis of yield risk. At the same time, along with many controls, Chinese stock market is more and more specifications, but still have some with Chinese characteristics, so the characteristics of the stock market in China should be more detailed and in-depth analysis. In addition, many scholars abroad have found that smaller companies have a significant calendar effect, at present our country about the study of the relationship between company size and calendar effect is less, in the future should make full use of the data of listed companies to strengthen the research in this field.

II. The development Course of Weekly Calendar Effect

2.1. Foreign Development

The study on calendar effect began in the 1930s. But the main findings focus on the post-1970s.Cross(1973)[2]and French(1980) studied the yield of S&P500 index, and found that on average, the average yield of Friday was higher than that of Monday.French(1980)[3]found a different week trading day after the stock yields there is significant difference between, many studies have confirmed that the different time interval and different stock index have weekly calendar effect.Gibbons(1981)[4]and Keim(1984)[5]discovered that the Dow Jones index had a negative yield on Monday.Rogalski(1984) found that the average negative return between Friday's close and Monday's close occurred during non-trading hours, and the average trading day return (from opening to closing) was consistent all days.Jaffe(1985)[6]studied four developed markets in Australia, Canada, Japan and the UK, and the results showed that there was weekend effect in the countries studied. However, David J.Kim (1998) found no weekly effect in the study of Korean and Thai markets.Jaffe (1989) confirmed Monday's abnormal yield not only exists in the securities market, but also exist in many different securities, Flannery and Protopapadakis (1988) confirmed also exist in many different varieties of securities calendar effect.

2.2. Domestic Development

The research on the calendar effect of financial market in China is relatively late compared with that in foreign countries.

Qin Fan and Ming-shanZhang (2002)[7]based on the random walk model, use nearly 10 years of data on China's securities market empirically test the existence of the weekend effect, its conclusion is that China's stock market exists the weekend effect, and Shanghai effect more apparent over the weekend, China's securities

market is still not reach the weak form efficient.

Tong Liu(2003)[8] to study the recent Shanghai stock market, he USES the basic statistical analysis and Kolmogorov Smirnov has inspection (1) (K - S found that Shanghai stock market index distribution does not obey normal distribution, then Levne test analyzes the variance of the returns series, the Shanghai stock market exists on Tuesday and Friday effect conclusions.Shao-fuZhouand Qi-anliChen(2004)[9] the unconditional volatility of correcting Levene test and GARCH model of the fluctuation of the Shanghai stock market week effect of empirical research, the results show that the Shanghai stock market is significantly high fluctuations on Monday, they are using the mixed distribution model, further research that weekend the accumulation of information may be one reason for the high fluctuations on Monday.Guo-dongXu ,Xiang-linTian,Bing-gongL in (2004)[10] the use of the standard K S nonparametric test and virtual variable regression method, using 1993 to 2003, the stock index fromthree levels (month/quarter/semi-annual) on the calendar effect of the Shanghai and shenzhen stock market in China has carried on the comprehensive analysis and test. The results show that there is a significant seasonal effect in Shanghai market, but not in shenzhen market. The study also found that both Shanghai and shenzhen have significant December effects, which are inseparable from the special policy and market background of the Chinese stock market. They think that the existence of seasonal effect reflects the inefficiency of China's stock market from one perspective, which is more obvious in Shanghai stock market.

Xuan Zhang and Mei Cai(2004) using l3l6 a-share index of Shanghai and shenzhen stock market trading day the yield on the calendar effect of Shanghai and shenzhen stock market are studied, results show in Shanghai and shenzhen stock market have significant positive excess yields on Friday, there were significant effect of week, but the effect is not obvious in Shanghai and shenzhen two city, only show the weak January effect.Xiu-juanZhao,Qi-fangWuand Shou-yangWang(2004)[11]conducted an empirical test on the calendar effect of open-ended funds and closed-end funds in China's securities market and compared it with the index benchmark. The results show that the Chinese fund market has a certain degree of calendar effect. What's more, the Shanghai index and most of the open-end funds had relatively higher yields on Monday. The average daily return for the first half was lower than the average for the second half. Closed-end funds had higher returns in March and lower returns in August.

III. Empirical Analysis of Weekly Closing Price of Guizhou Maotai Index

AR model refers to the use of previous observation value and current interference value and a certain linear combination to predict and analyze.

The mathematical formula of AR model is:

$$y_t = \Phi_1 y_{t-1} + \Phi_2 y_{t-2} + \cdots + \Phi_p y_{t-p} + \varepsilon_t \quad (1)$$

Type: y_t is a stationary time series, Φ_i (i =1，2，…，p) represents the undetermined coefficient of AR model,

p represents the order of AR model, ε_t for the error.

Find the historical data of the weekly closing price of guizhoumaotai index on netease financial website, from 2008-9-12 to 2018-6-8. Based on the modeling theory of AR model, the weekly closing price prediction model of guizhoumaotai index was established to study the short-term changes of weekly closing price of guizhoumaotai index.

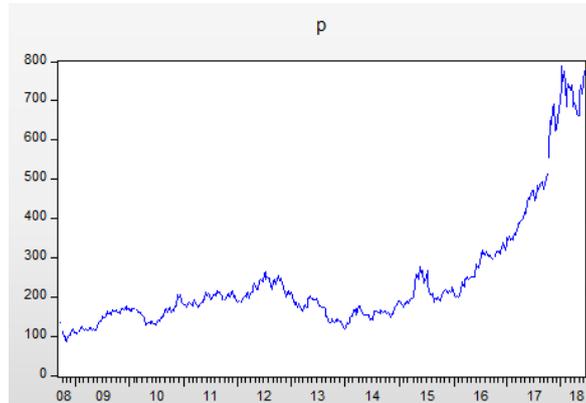**3.1. Stability processing of raw data**

Fig 1. The weekly closing price of guizhoumaotai

Can be seen from the figure 1, guizhoumaotai index closing price every week period beginning in the 2008-9-12, has been a steady fluctuations, prices have risen sharply since 2015, suggests that this time the company has a larger adjustment, and promote the rapid rise of the economy, therefore can roughly determine the sequence of non-stationary time series.

Fig. 2 ADF test results of weekly closing price of guizhoumaotai

Furthermore, ADF test was performed on the original data sequence, and the test results were shown in figure 2. As can be seen from figure 2, under the condition that the significance level is 0.01, the unit root exists, so the original assumption is accepted, that is, the original data sequence is non-stationary.
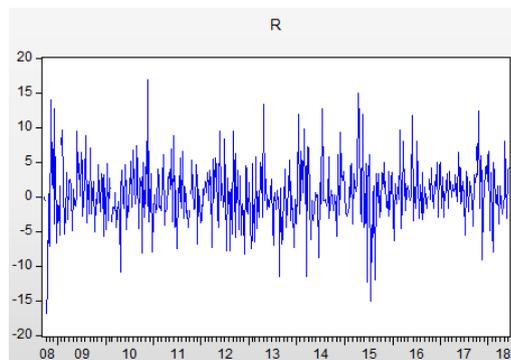
3.2. Convert of the original data

Fig 3. Linear graph of weekly yield ofguizhoumaotai

We can see from figure 3, guizhoumaotai weekly return series R has obvious aggregation, a high yield after getting higher yields, a low yield after gettinglower yields.

Fig. 4 ADF test results of weekly returns of guizhoumaotai

As can be seen from figure 3, the difference of weekly rate of return on the original data may be stable. Is further ADF test, as shown in figure 4, ADF test statistics is 23.06749, the absolute value of more than 1% under the significant level of the absolute value of the critical value to 3.443281, therefore does not accept the null hypothesis, weeks after the yield difference sequence is smooth.

3.3. Autocorrelation graph and partial autocorrelation graph

Fig5. Autocorrelation and partial autocorrelation of guizhoumaotai weekly rate of return

As can be seen from FIG. 5: since both the autocorrelation coefficient and the partial autocorrelation coefficient are 6 order trailing, the AR (6) modelis established[12].

As shown in figure 6, the P value is less than 0.05, indicating that the coefficient of the model is significant. The following is the expression corresponding to the model:

$$\overline{X}_t = -0.107131 X_{t-6} \quad （2）$$

3.4. Heteroscedasticity test
3.4.1 ARCH test[13] is there any heteroscedasticity

Fig. 6 heteroscedasticity test of guizhoumoutai weekly rate series

As shown in figure 6, the P value is greater than the significance level of 0.05, and the original hypothesis is accepted. There is no conditional heteroscedasticity in the original sequence.
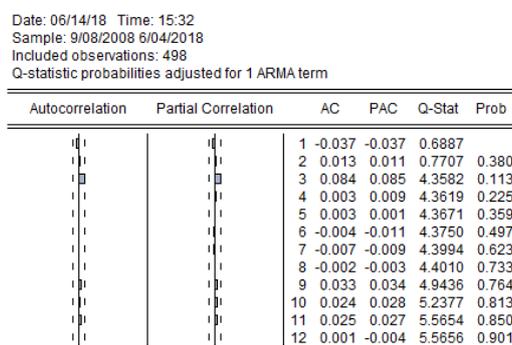
3.4.2. Residual test of sequence model

Fig7 residual correlation diagram of guizhoumaotai weekly return rate series AR (6)

The figure 7 shows: as the P value is greater than 0.05, shows all the Q value is less than 0.05 card square distribution under the test level of the critical value, the model of theremnants of difference as white noise, there is no serial correlation residuals. Therefore, it can be determined that thefitting effect of this model is very good.

From formula 1-2, it can be seen that: the average weekly return decreased by 0.107131 units in the period when the weekly rate of return was increased by 1 unit in the period with a lag. We know that guizhoumoutai week closing price is rising gradually, but its weekly return with lag, there is a weekly calendar effect, because of its shares[14] on Tuesday and Friday are generally have varying degrees of decline. This model fully highlights this point, indicating that the weekly calendar effect of China's stock market is quite significant.

IV. Conclusion

Modeling theory, this article is based on AR model by using the AR model in guizhoumaotai week index closing price for high precision fitting and empirical analysis, the study of guizhoumaotai week index closing price short-term fluctuations, to meet, to verify the weekly calendar effect of the stock market in China. Based on AR model (6) and established in this paper in guizhoumaotai index week close fitting prediction and analysis, combining our country stock market volatility weeks weekly calendar effect principle, in ignoring the enterprise the management policy and government policy unchanged under the premise of can get guizhoumaotai index in weeks despite the ups and downs, but the overall trend is still present continuous rose slightly. Therefore, in the study of China's stock market investment decisions, we must not ignore the weekly calendar effect of China's stock market, sometimes it can play a decisive role.

In a word, the AR model to predict non-stationary time series data has the very good effect, at the same time combined with Eviews software for the establishment of the AR model and solving, can provide reliable information service for investors and policy makers and decision.

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