

Research on Application of Multi-factor Stock Selection Model in Investment in the Context of Epidemic Prevention and Control

Taking Culture and Tourism Industry as an Example

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Abstract—With the rise of quantitative investment concept in the world, quantitative investment concept is gradually accepted by the market. Multi-factor model is one of the mainstream quantitative investment models in the world, and it is also a hot issue in the field of quantitative investment in China. This paper takes China's epidemic prevention, control policies, the industrial structure of culture and tourism, and the investment environment of the tourism sector into consideration. With the application of multi-factor stock selection model, 7 representative stocks are selected from culture and tourism industry to conduct a horizontal comparison of their gains and returns.

Keywords-Epidemic prevention and control; Multi-factor stock selection model; Culture and tourism industry

1 INTRODUCTION

Through practice and research, it is found that epidemic prevention and control policies are negatively correlated with culture and tourism industry development. When the epidemic prevention and control policies were tightened, the development of culture and tourism industry was restricted or even stopped. When the epidemic prevention and control policies are relaxed, the development of culture and tourism industry will show an apparent upward trend. Consumption demand and confidence in domestic tourism, locked down for a long time, rose sharply as the epidemic control was eased. Epidemic prevention and control policies are the main factors affecting China's culture and tourism industry, but not the genuine factor. Factor analysis is adopted for judgment to objectively and scientifically select stocks [1]. Factor analysis has the advantage of summarizing a large number of complicated variables into a few unrelated new comprehensive factors, which is of great benefit to our stock selection and investment [2].

2 SPECIAL MANIFESTATIONS OF THE DEVELOPMENT OF CULTURE AND TOURISM INDUSTRY DURING THE EPIDEMIC PERIOD

Culture and tourism industry complement each other, and the premise of culture and tourism industry is the diversity of various cultural exchanges and personnel mobility. With the continuous improvement of China's per capita disposable income, China's culture and tourism industry has also made great development in the decade from 2009 to 2019[3]. These developments are mainly reflected in:

1. Diversified development of culture and tourism industry

The integration of cultural publicity and physical tourism is deepening. For example, many museums and famous scenic spots have launched unique cultural and creative products, which not only enriches the types of tourist souvenirs, but also improves the cultural publicity force. This situation has also greatly improved the asset status of major cultural and entertainment enterprises. From a single service enterprise to a more optimized enterprise structure, supported by the special IP of each scenic spot, the formation of a culture or tourism IP is bound to be a new industrial chain, which in the financial market, it is a sharp rise in the stock price of cultural tourism enterprises [4].

2. The financing needs of culture and tourism industry have increased

With the continuous development of cultural tourism industry, the construction of large comprehensive tourism parks and the construction of online popular scenic spots are inseparable from the support of funds. Many financial institutions also support tourism projects as key financing projects. At the same time, the service equipment and traffic conditions associated with tourist attractions have also been effectively supported by finance. For example, the development of expressways near some scenic spots is a performance factor.

3. Depth exploration of culture and tourism industry

In the past, group tour was the main form of tourism, and tourism projects were casual. However, with the in-depth development of cultural tourism projects, many tourism projects with special purposes have been hatched, including medical and beauty industry, education industry, health care, quality development, etc., which reflects the diversity behind the cultural tourism industry.

Through the above situation, it can be found that the development of cultural tourism industry is more closely related to other industries at this stage, and the leverage from the financial industry is also greater than in the past. Therefore, with the popularity of COVID-19, the tourism industry has been greatly impacted because of its special development prerequisites. The development direction of the whole cultural tourism industry has also transformed. At the same time, under such conditions, the performance of leading enterprises in cultural tourism industry in the capital market is also unsatisfactory.

First of all, the epidemic has greatly reduced the flow of people, which is the basis for the survival of the tourism industry. Secondly, during the epidemic period, in addition to the substantial development of some special industries, the basic service-oriented industries has shrunk to varying degrees. Cross-border tourism has entered a period of overall stagnation. The transportation industry associated with the culture and tourism industry has also been greatly

impacted. For example, the aviation industry is at a loss due to insufficient attendance, some routes have reduced flight frequency and personnel, etc. Various airlines have launched package ticket discounts. Correspondingly, the company's assets has deteriorated and the stock price fluctuated and declined.

Therefore, in the face of COVID-19, the culture and tourism industry has undergone a huge change in a short period of time, and the business mode of the related enterprises has begun to change. Similarly, some culture and tourism industries have suffered a great impact during this period, the assets and liabilities of enterprises are not optimistic, and the financial institutions providing financing have also tightened their support for the culture and tourism industry. The superposition of multiple factors makes the performance of the culture and tourism industry in the capital market deteriorate, and the most intuitive performance is the decline of stock price. But with the improvement of the capacity of epidemic prevention and control and the encouragement policy at the government level, the number of outbound tourists is rising. At the same time, some culture and tourism enterprises have grasped the core of transformation, optimized the enterprise structure, and continuously expanded the proportion of capital light business, so as to improve the revenue. Therefore, at this stage, through multi-factor analysis of stock price and the establishment of relevant multi-factor stock selection model, we can better judge the future development direction of culture and tourism industry and related enterprises.

3 AN OVERVIEW OF MULTI-FACTOR STOCK SELECTION MODEL

Factors in the multi-factor model are variables and essential factors that affect the research results. This model can determine the main factors that affect the stock return rate and help us select stocks scientifically by analyzing these factors [5]. The multi-factor model has been through the development of CAPM model, arbitrage pricing theory, three-factor model, four-factor model and the five-factor model. It is the basis of the selection of the raw data, which only guarantees the quality of the information accurately and can make accurate research results. Thus, the original data needs to be dealt effectively before the multi-factor model was constructed.

3.1 Policy analysis

In 2020, The General Office of the State Council issued Several Opinions of the State Council on Promoting the Reform and Development of Tourism, which gave a series of favourable stimulus policies in response to the impact of the epidemic on the culture and tourism industry to promote the recovery of the industry, mainly including guiding residents to increase consumption, tax incentives, loans, etc.

3.2 Industrial structure analysis

The culture and tourism industry is characterized by diversity and multiple levels. Its industrial structure generally refers to the role and proportion of tourism landscape, transportation, catering, cultural development and other sectors in the tourism economic system. As the culture and tourism industry involves six aspects, including food, accommodation, travel, tourism, entertainment and shopping, it dramatically increases its industrial adhesion, and its correlation with other sectors is greatly enhanced. Therefore, the resilience of the culture and tourism

industry after the relaxation of epidemic prevention and control policies can not be compared with other sectors. In addition, the culture and tourism industry is the tertiary industry that accounts for the most significant proportion of China's economic aggregate, is in line with the leading direction of the national economy at the present stage, and is generally regarded as promising in the investment market [6].

3.3 Cultural and tourism sector investment advantages

First of all, cultural and travel consumption is expected to be significant. During the epidemic prevention and control period, major scenic spots were closed, street walking and home isolation were strictly prohibited, which increased the tourism demand of tourists from all over the country. After the epidemic prevention and control became regular, under the guidance of national policies, the cultural and tourism sector would show a sustained consumption trend.

Secondly, the adjustment of economic policies and the improvement of consumption level increase the proportion of consumption in the cultural and tourism sector. The fifth Plenary Session of the 19th CPC Central Committee proposed the major strategic deployment of accelerating the construction of a new development pattern with the domestic cycle as the main body and the domestic and international double processes promoting each other to further expand domestic consumption during the ravaging of the global epidemic and further increase the proportion of consumption in the cultural and tourism sector.

Finally, compared with foreign countries, domestic tourism consumption has apparent advantages. Before the outbreak of the novel coronavirus, our residents' demand for foreign culture and tourism consumption increased year by year. However, compared with the out-of-control situation of the epidemic abroad, the situation in China is much better. Therefore, China has gradually relaxed the restrictions on domestic tourism, so the vast demand of Chinese residents for foreign culture and tourism will be transformed into domestic consumption.

4 EMPIRICAL ANALYSIS OF THREE-FACTOR STOCK SELECTION MODEL

4.1 Model construction

The multi-factor stock selection model takes a series of influencing factors (factors) as the basis for stock selection, verifies the influence of factors on stock fluctuations through analysis, and then selects stocks that meet the conditions of selected influential factors. This model can synthesize a large amount of data to obtain a fair and objective stock selection result. The multi-factor stock selection model interprets the linear relationship between stock expected return rate and the exposure degree of factors affecting stock volatility through quantitative analysis. Its general expression is:

$$r_{i,t} - r_{f,t} = \alpha_i(t) + \beta_{1i}(t)(r_{M,t} - r_{f,t}) + \beta_{2i}(t) \cdot SMB_t + \beta_{3i}(t) \cdot HML_t + \varepsilon_{i,x}(1)$$

$r_{i,t}$ represents the yield of stock I at time t; $r_{f,t}$ is the risk-free rate of return; $r_{M,t}$ is the market portfolio yield at time T; $r_{i,t} - r_{f,t}$ is the excess return rate of stock I at time T;

$r_{i,t} - r_{f,t}$ is the excess return rate of the stock at time T; $r_{M,t} - r_{f,t}$, SMB_t , HML_t respectively represent the market premium factor, size factor and book-to-market

factor at time T; $\alpha_i(t)$, $\beta_{1i}(t)$, $\beta_{2i}(t)$, $\beta_{3i}(t)$ and $c_i(t)$ are the quantile regression coefficients.

4.2 Stock evaluation method

The excess return of stock is composed of selection return and risk return. Selection return is the result of stock selection, which reflects the growth ability of stock in different periods. In

the model, the stock can be judged according to the constant term $\alpha_i(t)$ only. When $\alpha_i(t) > 0$, the excess return of the stock is greater than the risk return, indicating that the stock is selected

by more people at the r loci. When $\alpha_i(t) \leq 0$, the excess return of the fund does not exceed the risk return, indicating that the stock ability is in a weak position at the T-locus.

To achieve the research purpose and eliminate the interference of epidemic prevention and control factors to the maximum, stocks with trading records in two periods (April 1, 2019--June 1, 2019, and April 1, 2021--June 1, 2021) were taken as research objects, and 7 representative stocks were selected as follows: Mount Huangshan tourism, Xi 'an Tourism, Yunnan Tourism, Guilin tourism, Zhongxin tourism, Tibet tourism, Jiuhua Mountain Tourism.

The main indicators include stock net value, risk-free interest rate and factor data, and the sample data are all from the database. In the empirical study, the risk-free rate is the daily risk-free rate based on the bank's annual fixed interest rate and the calculation method of compound interest. The fund rate of return adopts logarithmic rate of return, which is calculated as follows:

$$r_{i,t} = [\ln(NAV_t - NAV_{t-1})] \times 100\% \quad (2)$$

Here, NAV_t represents the cumulative net value of the stock on day T.

4.3 Operation analysis

The multi-factor stock selection model takes a series of influencing factors (factors) as the basis for stock selection, verifies the influence of factors on stock fluctuations through analysis, and then selects stocks that meet the conditions of selected influential factors. This model can synthesize a large amount of data to obtain a fair and objective stock selection result. The multi-factor stock selection model interprets the linear relationship between stock expected return rate and the exposure degree of factors affecting stock volatility through quantitative analysis. The descriptive statistics can be seen in Table 1:

TABLE 1. DESCRIPTIVE STATISTICS OF EXCESS STOCK RETURNS

Event day stocks	The maximum	The minimum value	The median	The standard deviation	J-B	
Xi 'an tourism	129.232	-143.46	0.021	1.415	0	***
Guilin tourism	150.438	-75.9	0.027	1.235	0	***
Yunnan tourism	158.343	-154.34	0.045	1.53	0	***
Zhongxin tourism	79.674	-99.89	0.036	1.945	0	***

Mount Huangshan tourism	120.454	-58.5	0.026	0.356	0	***
Tibet tourism	140.745	-60.34	0.056	1.267	0	***
Jiuhua Mountain Tourism	130.276	-52.56	0.021	0.783	0	***

Note: *** indicates significant at 0.1% level; The detection J-B test is proposed by Jarque -- Ben and is used for detection

Test whether random variables are normally distributed.

Among the tourism companies, five listed companies were significantly negatively affected. The listed companies with religion as their core tourism resources, such as Jiuhua Mountain Tourism and Tibet tourism, have suffered the most negative impact. The cumulative abnormal income in the window period decreased significantly, but it has been negatively affected for the longest time after the event. Although the cumulative abnormal income of listed companies with natural resources as their core tourism resources, such as Huangshan Tourism and Guilin tourism, decreased within 5% in the event window period, they soon adjusted it back, which shows that the impact cycle of the event on Huangshan Tourism and Guilin tourism is relatively short. The T- test results of specific 7 companies in Table 2.

TABLE 2. T-TEST RESULTS OF SAMPLE COMPANIES

Individual stock	tStat
Xi 'an tourism	4.24***
Guilin tourism	3.28***
Yunnan tourism	-17.54***
Zhongxin tourism	4.21***
Mount Huangshan tourism	40.50***
Tibet tourism	-43.12***
Jiuhua Mountain Tourism	11.33***

Extraordinary earnings (AR) in the event window period of 7 listed companies related to the tourism chain and cumulative abnormal return (CAR).

We determine the buying and selling timing of the selected stocks through SAR indicators. Buying time is when the stock price began to break through the price curve upward from the Kline. When the stock price falls from the K-line direction and breaks the price curve, mindgo programming can be used to operate. This can eliminate human subjective factors and further ensure the factual accuracy of buying and selling timing.

4.4 Research results

By analyzing eight representative brigade plate stocks and comparing their data with the Shanghai composite index and Shenzhen index, we find that the text brigade plate yield is much higher than the Shanghai and Shenzhen index. Thus, we can see that the tourism industry will have significant development after the lifting of the epidemic prevention and control, which is consistent with our expectations. This shows that the elasticity of culture and tourism industry is stronger than the average value of each industry, and it has stronger adaptability to emergencies. Similarly, this performance will affect enterprises related to the culture and tourism industries, which means that investors need to closely understand the progress and

layout of the epidemic in advance. These enterprises should also optimize their product and business structure and maintain the asset liability ratio in a reasonable range.

5 CONCLUSIONS

In the post-epidemic era, the culture and tourism industry has strong vitality and great development potential, so it has great investment value. Through the study of the transaction, if the investment choice is as follows:

For one thing, investment in culture and tourism industry should concentrate on short-term investment, avoid long-term investment. According to relevant researches in the industry, short-term tourism vacation products in China are very popular [7]. At present, although China has made great achievements in epidemic prevention and control, it does not mean that the war against the epidemic has won an overall victory. Local outbreaks of the epidemic still occur from time to time, and the development of culture and tourism industry is closely related to epidemic prevention and control policies. Therefore, in the post-epidemic era, investment in culture and tourism industry should focus on the short-term operations and avoid long-term operations as much as possible.

For the other thing, investment in culture and tourism industry should closely follow the national policy trend and grasp the market trend. According to relevant statistics, the domestic tourism market of all provinces in China shows different regional fluctuations under the influence of the epidemic, among which the impact degree is the largest in the central region and the smallest in the northeast region [8]. Under the influence of national policy regulation and regional differences in domestic market, the development status of culture and tourism industry in different regions will be greatly different. Therefore, it is necessary to comprehensively analyze the influencing factors and grasp the key factors.

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