

# Research on the Interaction of Metaverse Internet Public Opinion, Stock Price Volatility and Digital Economy

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## Abstract

The metaverse is a virtual space that is parallel to and independent of the real world, an online virtual world that mirrors the real world, and an increasingly real digital virtual world. Not only that, the Metaverse provides a new path for human society to achieve the ultimate digital transformation, showing a new era that can have the same historical significance as the era of great navigation, the era of the industrial revolution, and the era of spaceflight. Exploring and developing the metaverse will help promote the further acceleration of digital upgrading of my country's economy and society, and generate new development momentum through technological innovation. Therefore, it is of theoretical and practical significance to study the linkage between Metaverse Internet public opinion, stock price fluctuations and the development of the digital economy. The Metaverse Baidu Search Index is selected to measure the fluctuation of the Metaverse Internet public opinion, the daily opening price of the Metaverse Index depicts the fluctuation of stock prices, and the Digital Economy Total Return Index measures the development of the digital economy, and analyzes its correlation and trend linkage.

## Keywords

Metaverse; Baidu Index; Stock Price Volatility; Digital Economy.

## 1. Research Background

At present, the concept of metaverse has become a new concept in the capital market, and has attracted more and more attention from investors and scholars. First, because the epidemic has weakened the connection between people and the real world, and at the same time, the digital economy is also developing rapidly. The more time people spend communicating in virtual spaces, the more demand for the virtual world; With the development of technologies such as VR, AR, 5G, AI, etc., the scenes that once only appeared in science fiction and movies have become reality one by one. This is not only the initial form of the metaverse, but also lays the foundation for the development of the metaverse. ; In addition, as far as the current situation is concerned, the game is the prototype of the metaverse, but the metaverse brings a wider degree of freedom and user activity to the content creation of the game, which means that the majority of game manufacturers will have the opportunity to open up the game industry. new position. With the development of technology, the next stage of development of the Metaverse is to realize realistic social interaction, consumption and other aspects in the digital world. With the current development of the Internet industry encountering bottlenecks, the Metaverse may provide a new round of growth opportunities. Recently, due to the popularity of the "metaverse", giants such as Facebook, Tencent, and ByteDance have all involved in the field of the metaverse. The Metaverse may be the next generation of the Internet and the future digital economy. Whoever seizes the high ground of the Metaverse as soon as possible may lead the industry development for decades to come. Therefore, it is of great practical significance to

study the linkage between Metaverse network public opinion, stock price fluctuations, and the development of the digital economy.

## 2. Research Significance

With the application of network big data technologies such as Baidu Index, some scholars have confirmed the relationship between Baidu Index and investors' attention through research. Research shows that Baidu search volume can better reflect the online behavior and attention of investors. On the other hand, the metaverse is a virtual space that is parallel to the real world and independent of the real world. It is an online virtual world that mirrors the real world, and it is a digital virtual world that is becoming more and more real. Not only that, the Metaverse provides a new path for human society to achieve the ultimate digital transformation, and has an all-round intersection with the "post-human society", showing a world that can have the same historical significance as the era of great navigation, the era of the industrial revolution, and the era of spaceflight. new era.

### (1) Theoretical significance

Research on the popularity of online public opinion, the fluctuation of the metaverse sector, and the linkage between the development of the digital economy is of great significance for academic researchers and individual investment decisions, especially for government departments to formulate policies, listed companies and investors to avoid risks, etc. It has important reference value. By analyzing the existing relevant literature research results, many domestic literatures have studied the correlation between investor attention and stock returns, but there are few concepts and hotspots to measure the relationship between stocks and search popularity. Scholars' research on the metaverse mostly stays on the definition, nature, technology, and practical application of the metaverse. There is little research on its capital market and little research on the relationship between the development of the digital economy and the development of the metaverse. Based on the current popular field metaverse, this paper has a certain novelty to study the relationship between it and the development of the digital economy. It has certain reference value for scholars to study the development of the metaverse. At present, the concept of metaverse has become a new concept in the capital market, and has attracted more and more attention from investors and scholars. First, because the epidemic has weakened the connection between people and the real world, and at the same time, the digital economy is also developing rapidly. The more time people spend communicating in virtual spaces, the more demand for the virtual world; With the development of technologies such as VR, AR, 5G, AI, etc., the scenes that once only appeared in science fiction and movies have become reality one by one. This is not only the initial form of the metaverse, but also lays the foundation for the development of the metaverse. ; In addition, as far as the current situation is concerned, the game is the prototype of the metaverse, but the metaverse brings a wider degree of freedom and user activity to the content creation of the game, which means that the majority of game manufacturers will have the opportunity to open up the game industry. new position. With the development of technology, the next stage of development of the Metaverse is to realize realistic social interaction, consumption and other aspects in the digital world. With the current development of the Internet industry encountering bottlenecks, the Metaverse may provide a new round of growth opportunities. Recently, due to the popularity of the "metaverse", giants such as Facebook, Tencent, and ByteDance have all involved in the field of the metaverse. The Metaverse may be the next generation of the Internet and the future digital economy. Whoever seizes the high ground of the Metaverse as soon as possible may lead the industry development for decades to come. Therefore, it is of great practical significance to study the linkage between Metaverse network public opinion, stock price fluctuations, and the development of the digital economy.

On the other hand, financial researchers have always attached great importance to "investor attention", which affects investment decisions by affecting investors' psychological activities and emotional tendencies, and then has a corresponding impact on stock prices. With the widespread use of Internet technology, when people face the explosive growth of data, they may lack the ability and energy to process information, and usually cannot focus on efficiency and obtain effective information, so it is necessary to use Internet search engines. Investors' search records on the Internet are directly related to their attention.

Since the concept of the Metaverse was proposed in the second half of the year, it has been hailed by a lot of capital. According to Oriental Fortune.com, the stock prices of many "Metaverse" concept stocks have risen one after another. As of November 17, the shareholding of this sector has reached 1.247 billion yuan, showing a high growth potential. But at present, because the concept of the metaverse has just become popular, the research on the metaverse is still stuck in its future direction. As well as the impact on society, it did not analyze the impact of the development of the metaverse on the future development of the digital economy. Therefore, this paper conducts a linkage study on the popularity of online public opinion, the fluctuation of the metaverse sector, and the digital economy, which has certain reference value for investors and the development of related industries.

In the era of booming emerging technologies such as cloud computing and 5G, the concept of the Metaverse is likely to become a reality, which brings new opportunities to my country's capital market, entity enterprises and many investors, but as an emerging field, the Metaverse's Research is not rich enough. At the same time, according to the research of scholars, the popularity of the Internet will have a certain impact on enterprises, stock prices, and emerging industries. Therefore, it has become an urgent and important research topic to investigate the "investor attention", the linkage between the fluctuation of the Metaverse sector and the development of the digital economy. certain reference value.

## (2) Practical significance

From the perspective of enterprises, Metaverse is still in the initial stage of industry development, which also means that there is huge room for expansion of Metaverse-related industries. Therefore, if digital technology giants with multiple advantages want to hold on to the market, they must deploy in advance and involve the field of the Metaverse; from the perspective of the government, the Metaverse is not only an important emerging industry, but also a field of social governance that needs attention. The formation and development of the Metaverse in order to consider and resolve the issues associated with its development. The Metaverse is a new height for the development of the digital economy. Therefore, studying the linkage between the development of the Metaverse and the development of the digital economy has not only reference value for investors' future investment planning, but also a certain significance for government governance.

## 3. Research Status and Development Trend at Home and Abroad

### (1) Research on the Metaverse and Digital Economy

#### ① study abroad

Since the metaverse is the latest concept, less research has been done on all aspects of it. Foreign scholars have explored the metaverse in terms of its properties, mainly discussing the application research of the metaverse, and analyzing the relationship between the fields that the metaverse can cover and reality. Siyaev Aziz et al. (2021) used test-evaluated data to demonstrate that the metaverse domain can be applied to voice interaction modules in aircraft maintenance. Ben falchuk (2018) and others used the event study method to illustrate the contradiction between the development of the metaverse and our privacy protection, and provided some suggestions for the development of the metaverse. As for the development of

the digital economy, foreign scholars have studied the impact of the digital economy on society and the economy. Mikhaylova Anna (2021) et al. consider digital supply management from the perspective of participation in international trade. Conducted a SWOT analysis of concepts to study the correlation of external traffic and SCM software investment. Soluk jonas (2021) et al found that the positive relationship between family influence and dynamic ability was attenuated rather than strengthened by environmental dynamism. The findings have important implications for family business innovation and digital BMI research, providing valuable insights into the role of dynamic capabilities and environmental dynamism in the digital economy. Jiang Xiuxiu et al (2021) used panel econometric model, mediation effect model and instrumental variable method to evaluate the annual data of 30 provinces in China from 2011 to 2018. The results show that the development of digital finance has greatly boosted economic growth, which is quantitatively robust after selecting historical data as instrumental variables and other robustness tests. Li Xiaoyan et al. (2021) introduced the digital economy into the Solow growth model as a technological advance, and performed a fixed-effects regression based on global panel data of 190 countries from 2005 to 2016. An inverted U-shaped nonlinear relationship was found between carbon dioxide emissions and the digital economy, which supports the Environmental Kuznets Curve (EKC) hypothesis.

## ② domestic research

At present, domestic scholars mainly conduct research on the characteristics, applications, and social and economic impacts of the Metaverse. Wu Tong et al. (2021) used MakerDAO Dai to carry out the lending process, the price stabilization method of the MakerDAO Dai economic system, and the Roblox P2E economic incentive model, etc. to illustrate that the metaverse with a generalized token economy needs to rely on the immutability and interaction provided by the blockchain. The operability and the tools to link the two worlds in the value dimension: the global stablecoin and the central bank digital currency realize the development, and can promote the establishment of the digital labor paradigm and the development of related industries, and deepen the development of the virtual economy. Jiang Yuhui (2021) used a philosophical perspective to describe the metaverse as an opportunity for change. On the one hand, it greatly overcomes various defects of gamification platforms, and on the other hand, it shows that the metaverse is not perfect. A challenge for philosophy educators. In order to improve the ability of multiverse optimization algorithm to solve practical problems, Lili Ren (2021) and others proposed a multiverse optimization algorithm for slime mold foraging. The algorithm utilizes slime mold foraging behavior to further seek the optimal solution between the local optimum and the global optimum. By comparing with other 10 similar algorithms on 12 functions, the results show that this algorithm can be used as an effective tool for problem optimization.

As for the digital economy, domestic researchers have also studied the impact of the digital economy on society and the economy. Gu Weizhong (2021) built TVP-VAR, PSTR and other models to focus on the comparison of the development characteristics of new and old kinetic energy from multiple dimensions and conduct empirical analysis, and concluded that using new digital infrastructure as a starting point to break through the implementation of digital applications and make full use of traditional economic foundations to achieve economic development Sustainable development is the top priority of current economic development. Dong Zhao (2021) based on the dynamic capability theory, entrepreneurial opportunity theory and innovation theory, studied the role of digital capability in promoting business model innovation, and took the relationship between the two as the main line of the model to explore the impact of digital capability on business model innovation. influence mechanism. Wang Yongcang (2021) comprehensively uses instrumental variable method, quantile regression method, mediation effect model, threshold estimation method, panel semi-parametric estimation, spatial measurement, least squares method, propensity score matching method, Iv-

probit and other methods to empirically test digital finance The effect and mechanism of farmers' income growth, and finally, based on the conclusions, policy recommendations for the development of digital finance to promote farmers' income increase are put forward. Lin Jing (2021) used OLS and Logit models to empirically measure the impact of Internet use on employment quality, and obtained the following conclusions through robustness tests: In the dimension of labor income, digital infrastructure and Internet use play a significant role in promoting income. ;In the dimension of working hours, digital infrastructure and Internet usage have a significant negative correlation with working hours, which is conducive to reducing working hours; in the dimension of job stability, the improvement of workers' job stability is closely related to the level of digital infrastructure development. , The popularity of the Internet is not synchronized; in the dimension of social security, digital infrastructure and social security are negatively correlated, but with the increase in the popularity of Internet use, the degree of social security for workers is constantly improving.

## (2) Research on Internet Search Volume

### ① study abroad

Regarding Internet search volume, some foreign scholars have used Internet search volume to conduct related research, involving market characteristics such as stock price, excess return, and liquidity. Da et al. (2011) used the relevant search volume of the Google index to measure investor attention, and studied the impact of investor attention on stock prices. The study found that the level of the Google search index has a great correlation with the rise and fall of stock prices. Google search The index can be a good reflection of investor attention. Bank et al. (2011) studied the stock market with Google search volume as an indicator, and found that with the increase of Google search volume, the trading activity and stock liquidity in the stock market usually changed to a certain level. Chae-joon et al. (2020) study investors' focus on Korean Internet search volume and underreaction to earnings announcements, evidence that companies with higher search intensity trade more, especially individual investors, and imply that investors can rely on Internet search volume and Investing in the stock market with public information is a sustainable development. Campos et al. (2017) used a heterogeneous auto-decreasing (HAR) model to show that (including traditional macro-financial variables as well as Google (ASVI) abnormal search volume has a significant and positive relationship with oil volatility, and that ASVI has a high economic value , enabling traders with volatility-exposed portfolios to significantly improve returns.

### ② domestic research

In terms of network popularity, domestic scholars have studied its correlation with events, industries, and stock markets. Wang Chao (2020) discussed the correlation between public opinion and stock market returns through Granger causality analysis, and concluded that there is a positive correlation between the two, and public opinion heat greatly affects stock market returns. Ren Runlei (2020) used Hausman test and model setting to empirically analyze the impact of online attention on regional tourism development. The regression results show that online attention to scenic spots will have a positive impact on regional tourism development. (2020) used the VAR model and impulse response function to study the relationship between the daily rate of change of the Baidu index and the excess returns of the underlying stocks in the Guangdong-Hong Kong-Macao Greater Bay Area. The empirical analysis proves that the influence of Internet popularity is limited, so investors need to invest rationally , don't blindly follow suit. Wang Xiaoyan et al. (2017) used the vector autoregressive model and the event research method to study the artificial intelligence network popularity and the performance of its concept stocks, reflecting that when the concept is popular, the network popularity has a certain impact on its performance, and also proposed from another aspect. Investors should invest with caution. At the same time, domestic scholars have also carried out empirical research on the popularity of online public opinion. (2019) used the projection pursuit model

to show that the popularity of we-media network public opinion is affected by key factors, which provides a theoretical basis for the guidance, early warning and governance of we-media network public opinion.

#### **4. The Necessity of Studying the Interaction of Internet Public Opinion, Metaverse, and Digital Economy**

(1) Metaverse is closely linked to the digital economy and develops

The Metaverse is the result of a digital civilization formed in the digital age. It is a digital engine fueled by the digital economy and an integration of cutting-edge digital technologies. In the metaverse era, digital technology will be integrated and applied to various operating scenarios of the whole society to achieve high-quality development of the digital economy. This is a node that changes human civilization, giving birth to a new resource allocation, a new business format combining reality and virtuality, and a new way of life in the virtual world. Therefore, it is a product of this great transformation of the world's digital economy. .

The 2016 G20 Hangzhou Summit released the definition of digital economy: the use of digital knowledge and information as the key production factor, the modern information network as an important carrier, and the effective use of information and communication technology as an important driving force for efficiency improvement and economic structure optimization a series of economic activities. That is, the goal of the transformation and upgrading of the traditional economy is the digital economy. The metaverse economy is a subset of the digital economy, the most cutting-edge and revolutionary part. Some of the ideas and tools contained in it have an important inspiring effect on the development of the digital economy. Metaverse economics gets rid of some of the natural constraints of traditional economics, such as limited natural resources, complex systems to ensure order, and the huge cost of market establishment. Analyze human economic behavior in a purely digital world, set simple rules, and build an economic system from scratch. Some conclusions and viewpoints that can be obtained from the innovative research and practice of Metaverse Economics can be used for reference by the traditional economy, thus contributing to the development of the digital economy. Therefore, studying the correlation between the fluctuation of its metaverse stock price and the fluctuation of the digital economy total income index has certain significance for the future development of the economy.

(2) Internet public opinion has an impact on financial asset prices

With the emergence of various forms of new media such as the Internet and mobile phones, the scope and speed of information generation and dissemination are increasing day by day. The dissemination of public opinion is developing from traditional professional media channels to the parallel direction of public media and self-media, and the social and economic impact of public opinion is also expanding. At the same time, the rapid development and application of emerging technologies in the mobile Internet environment has given birth to new financial management and operation modes. These new management and operation modes make capital circulation and capital integration, payment, information exchange and other business processes completely different from traditional ones. financial model. These new management and operation models originate from emerging technologies, but their effects are reflected in the rapid dissemination of financial information, thereby forming agglomerated financial public opinion. Under the influence of online public opinion, it has a great impact on investors' attention, confidence and emotions, and there is a greater difference, which in turn has a great impact on the price fluctuations of financial assets. Therefore, studying the trend between the Metaverse Baidu Search Index and stock price fluctuations is of reference value for investors and managers, and has reference value for the development of the digital economy and national policies.



## 5. Correlation Analysis of Network Public Opinion, Metaverse Stock Price Fluctuations, and Digital Economy Trends

### (1) Correlation Analysis of Metaverse Baidu Search Index and Metaverse Stock Price Trend

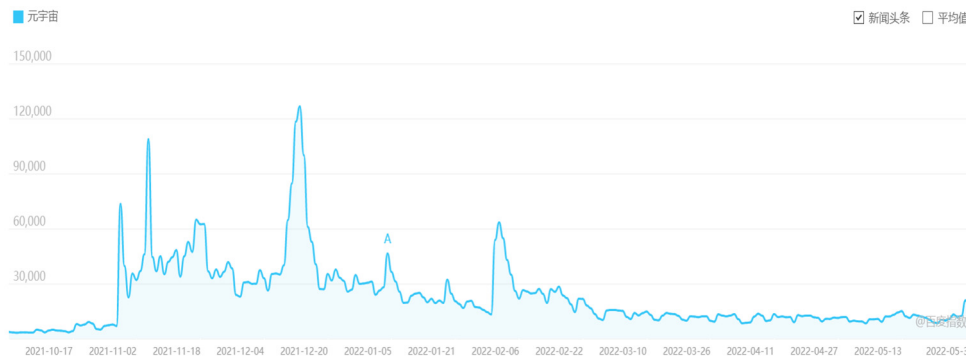


Figure 1. Metaverse Baidu Search Index Trend Chart

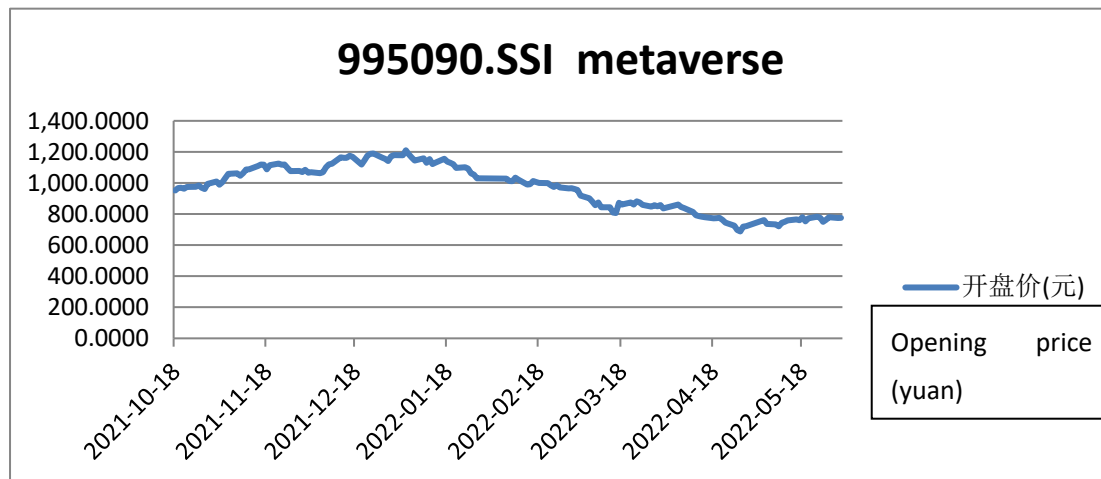


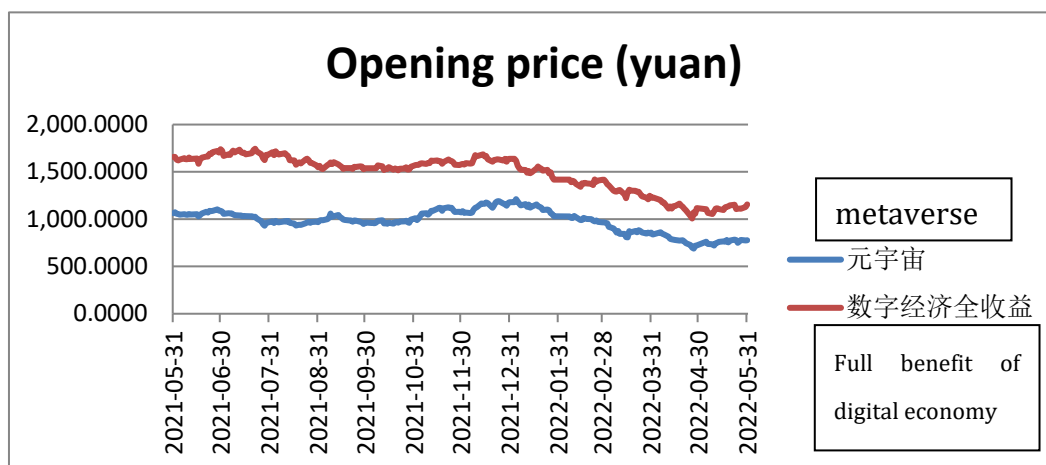
Figure 2. Metaverse Concept Stock Index Trend Chart

The data in Figure 1 selects the data from the Baidu Search Index from 2021.10.17 to 2022.5.31. It can be seen from Figure 1 that the Metaverse Search Index increases during the period from 2021.11.02 to 2021.12.31, which reflects the The concept of going out of the metaverse has taken China by storm. At the same time, the Metaverse Concept Stock Index selects the daily opening price from 2021.10.17 to 2022.5.31 to form a discount trend chart. The Baidu Search Index corresponding to the Metaverse exploded, and the stock price also increased, showing a trend of resonance and co-direction. When the Search Index fell, the Metaverse Concept Stock Index also reflected the downward trend. From this analysis, it can be concluded that the Metaverse Baidu Search Index and the stock price index have the same trend of change. This has certain reference value for the country to formulate relevant public opinion policies and for the future development of the Metaverse.

### (2) Correlation analysis between Metaverse stock price and digital economy total income index trend

The data of the metaverse concept stocks in Figure 3 are selected from 2021.05.31 to 2022.05.31, and the data of the digital economy total income index is selected from 2021.05.31 to 2022.05.31 (the CSI Digital Economy Theme Index is selected from the Shanghai and Shenzhen markets involving digital economy infrastructure and The securities of listed companies in application fields with a high degree of digitization are used as index samples to

reflect the overall performance of securities of listed companies with the theme of digital economy in Shanghai and Shenzhen markets). From Figure 3, it can be seen that the Metaverse Concept Stock Index and the Digital Economy Total Return Index show a common fluctuation trend, the two resonate in the same direction. From this, it can be reflected that the development of the Metaverse and the digital economy complement each other, promote each other and develop together. As for the future of the metaverse, according to the trend, it will penetrate into many fields like the digital economy, and it will become a new round of driving force for the development of the country.



**Figure 3.** Metaverse Concept Stocks and Digital Economy Total Income Index Volatility Trend Discount Chart

At the same time, through the connection between the previous round of analysis and this round of analysis, it can be known that the trends of network public opinion, the fluctuation of the stock price of the Metaverse, and the fluctuation of the digital economy are the same. This result can fully reflect the future situation of the Metaverse and the national Through network public opinion, policies suitable for the development of the metaverse and the digital economy can be made for the development of the country. At the same time, for investors, they can also learn from the fluctuations of the same trends among the three to formulate more rational investment strategies.

## 6. Epilogue

Through 2 rounds of analysis, it can be known that the trends of network public opinion, Metaverse stock price fluctuations, and digital economy fluctuations are the same. This result can fully reflect the future of Metaverse The development of the digital economy makes policies suitable for national development. At the same time, for investors, they can also learn from the fluctuations of the same trends among the three to formulate more rational investment strategies. The Metaverse is the future development direction, and the digital economy is the country's established strategy. Under the appropriate network public opinion policy, the two will act in the same direction to provide a more explosive driving force for the development of the national economy.

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and Digital Economy--Analysis based on DCC-GARCH and Copula dual model”(Project Approval Number: ACYC2021314).

## References

- [1] Siyaev Aziz, Jo GeunSik. Towards Aircraft Maintenance Metaverse Using Speech Interactions with Virtual Objects in Mixed Reality[J]. *Sensors*,2021,21(6).
- [2] Ben Falchuk, Shoshana Loeb, Ralph Neff. The Social Metaverse[J]. *IEEE Technology and Society Magazine*, 2018,37(2).
- [3] Chae Joon, Kim Ryumi,Han Jaehee. Investor Attention from Internet Search Volume and Underreaction to Earnings Announcements in Korea[J]. *Sustainability*,2020,12(22).
- [4] Wang Gaoshan, Yu Guangjin, Shen Xiaohong. The effect of online environmental news on green industry stocks: The mediating role of investor sentiment[J]. *Physical A: Statistical Mechanics and its Applications*, 2021,573.
- [5] Ji Ki Hwan, Kang Mi Ri. Trends of Public Interest in Sleep Disorders: Looking by Internet Searching Volume [J]. *Sleep Medicine Research*,2017,8(2).
- [6] Campos I., Cortazar G., Reyes T.. Modeling and predicting oil VIX: Internet search volume versus traditional variables[J]. *Energy Economics*,2017,66.
- [7] Ben Falchuk, Shoshana Loeb, Ralph Neff. The Social Metaverse: Battle for Privacy. [J]. *IEEE Technol. Soc. Mag.*,2018,37(2).
- [8] Asaf Manela, Alan Moreira. News implied volatility and disaster concerns[J]. *Journal of Financial Economics*, 2017,123(1).
- [9] Williams Alisa Habeeb. Data Makes a Difference. [J]. *JEMS: a journal of emergency medical services*, 2016, 41(5).
- [10] Sasai Kazuto, Tanimura Yusuke, Takahashi Hideyuki, Kitagata Gen, Kinoshita Tetsuo. An Agent-based Data Analytics Support Tool for Network Management Intelligence[J]. *International Journal of Energy, Information and Communications*,2017,8(1).
- [11] Ruggless, Ron. Ruby Tuesday challenges raise investor concern[J]. *Nation's Restaurant News*,2013.
- [12] Zhao Yulin, Li Junke, Wang Jiang E. Analysis and Prediction of “AI + Education” Attention Based on Baidu Index--Taking Guizhou Province as an Example[J]. *Future Internet*,2021,13(5).
- [13] Li Wenli, Yang Guangfei, Li Xianneng. Correlation between PM2.5 pollution and its public concern in China: Evidence from Baidu Index[J]. *Journal of Cleaner Production*,2021,293.
- [14] Zhang Wei, Yan Kai, Shen Dehua. Can the Baidu Index predict realized volatility in the Chinese stock market? [J]. *Financial Innovation*,2021,7(1).
- [15] Mikhaylova Anna, Sakulyeva Tatyana, Shcherbina Tamara, Levoshich Natalia,Truntsevsky Yuri. Impact of Digitalization on the Efficiency of Supply Chain Management in the Digital Economy[J]. *International Journal of Enterprise Information Systems (IJEIS)*,2021,17(3).
- [16] Soluk Jonas, Miroshnychenko Ivan, Kammerlander Nadine, De Massis Alfredo. Family Influence and Digital Business Model Innovation: The Enabling Role of Dynamic Capabilities[J]. *Entrepreneurship Theory and Practice*,2021,45(4).
- [17] Jiang Xiuxiu, Wang Xia, Ren Jia, Xie Zhimin. The Nexus between Digital Finance and Economic Development: Evidence from China[J]. *Sustainability*,2021,13(13).
- [18] Li Xiaoyan, Liu Jia, Ni Peijie. The Impact of the Digital Economy on CO2 Emissions: A Theoretical and Empirical Analysis[J]. *Sustainability*,2021,13(13).
- [19] Jiang Yuhui. "Orphans" in the Metaverse?--Why video games serve as an educational platform for the next generation of children's philosophy[J]. *Journal of Guizhou University(Social Science Edition)*, 2021,39(05).