

Analysis Of the Future Development Trend of Marvel Superhero Movies: An Empirical Study Based on Time Series Method

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Abstract. With the expansion of the global entertainment market, Marvel superhero movies have had a significant impact on modern culture. Superhero movies have gained a wide audience with their unique themes, exciting plots, and visual effects. However, factors such as aesthetic fatigue and the pandemic have led to poor performance in recent years. This study aims to predict the future trend of superhero movies through time series analysis, providing decision-making basis for film and television companies. This article adopts a review study, ARIMA model time series analysis, and second-hand data analysis to predict using indicators such as historical box office, Tomatometer, and Audience Score. Research shows that superhero movies maintain a strong development trend, thanks to advances in digital technology and visual effects, as well as continuous exploration of new content. It's thrilling, humorous, and righteous themes continue to attract loyal fans. New elements such as superheroes with different identities also attract new audiences, indicating that superhero movies will continue to develop.

Keywords: Marvel; superhero movies; time series; trend analysis.

1. Introduction

With the continuous expansion and deepening of the global entertainment market, popular culture, especially superhero movies represented by Marvel, has had a significant impact on modern culture. Superhero movies have a wide audience base worldwide due to their unique themes, exciting plots, and rich visual effects. Especially the Marvel Universe, which is set as a fictional world centered around superheroes, coexisting parallel to the real world. The protagonists are a group of "human, fragile, easily uncontrollable, unfortunate, small but courageous superheroes", through its interconnected storylines and character settings, a diverse entertainment world has been successfully constructed [1]. The success of Marvel movies can be attributed to their profound character development, tense plot design, and incorporation of humorous elements, which together have attracted numerous fans. However, with the increasing aesthetic fatigue of audiences towards superhero movies, Marvel's superhero formula has gradually become ineffective, and coupled with external influences such as the pandemic, the performance of superhero movies in recent years has been somewhat unsatisfactory [2]. What is the future trend of superhero movies and how should it develop into a topic of discussion among people. By using time series as a method and analyze data from past superhero films, this study can predict the future development trend of superhero movies to a certain extent. Therefore, this study aims to explore the future development trends of Marvel superhero movies and their significance for the entire entertainment industry through time series analysis methods.

The main purpose of this study is to analyze historical box office data based on time series, as well as indicators such as Tomanometer and Audience Score on Rotten Tomatoes, to predict future market development and audience preferences, and to forecast the development trend of superhero movies in the future. Provide judgment basis for relevant decision-makers. This study can apply statistics to popular culture and entertainment industries. The research results can provide judgment basis for film and television companies, helping them plan their future development direction and fund allocation.

In order to analyze the development trend of superhero movies, this article adopts various research methods: 1. Review research: systematically review past research results and related theories and

analyze and summarize them. 2. Time series analysis: The main research method of this study is to establish an ARIMA model to analyze historical data and predict future trends. 3. Secondhand data analysis: Utilize existing historical box office data, Tomanometer, and Audience Score for research and analysis.

This article will first introduce the development and history of Marvel's, as well as how it grew from a small comic book publishing house to a global entertainment industry giant. And it will focus on describing the characteristics of superhero movies and the structural definition of the Marvel universe, as well as the current situation. Then collect box office data, budget data, Tomanometer, and Audience Score through the Box Office Mojo website and Rotten Tomatoes and conduct statistical analysis and research on them. Finally, these processed data are modeled and predicted using an Autoregressive Integrated Moving Average Model (ARIMA) in the time series to obtain the future development trend of Marvel superhero movies, and conclusions are drawn to provide recommendations.

2. Literature Review

2.1. The History and Development of Marvel

Marvel was founded in 1939, initially named TimelyComics. In 1961, it was officially renamed Marvel Comics. In the 1960s, creators such as Stanley Martin Lieber and Jack Kirby introduced a series of unique superheroes, such as Spider Man and Iron Man, which were widely popular. These characters are more complex and down-to-earth, greatly different from previous superhero images. The release of Fantastic Four marks the establishment of Marvel style. Entering the 21st century, with the innovation of film technology, Marvel Studios was established in 2008 and launched the Marvel Universe series, pushing Marvel to new heights. Through carefully constructed shared universes and cross-border films, each work is closely connected, forming a vast network of stories that attract and maintain the attention of global fans. The Marvel Universe is a vast superhero film series constructed by Marvel Studios, consisting of multiple interconnected movies, television series, and other media forms. Each superhero has their own storyline, but they are interconnected through cross-border movies to form a unified story world.

Currently, Marvel superhero movies are still very popular worldwide, ranking among the top in terms of both fan base and box office. However, in recent years, the media and audiences have become increasingly aesthetically fatigued and critical of superhero movies, and the term 'superhero fatigue' has evolved from 'fan jargon' to an industry reality [3]. Marvel's superhero formula no longer works, where an ordinary person facing personal, or family troubles gains special abilities in special circumstances to become a superhero and fight against villains and adds humorous elements to it [2].

2.2. Superhero Movies

Superhero movies feature superheroes from comics as the main characters, typically based on existing comic book characters such as those from Marvel Universe and DC Comics. The protagonist is a group of "human, fragile, easily uncontrollable, unfortunate, small but courageous superheroes" [1]. Unlike the flawless and perfect image of early superheroes, superheroes in the Marvel Cinematic Universe have stepped down from the pedestal with an ordinary sense of "fragility". The eccentric and paranoid Iron Man, the stubborn and rigid Captain America, and the lonely Spider Man carrying heavy moral shackles have conquered audiences from different eras and countries. The deeply ingrained image has driven the global dissemination of Marvel superhero movies and received praise from audiences around the world [1].

2.3. Current Marvel Superhero Movie Viewing Data

Retrieve historical box office data and budget data for each movie from Box Office Mojo, and roughly calculate ROI by dividing box office by budget. Obtain the Tomanometer and Audience

Score of historical films from Rotten Tomatoes to assess their evaluation by professionals and audiences (Fig 1).

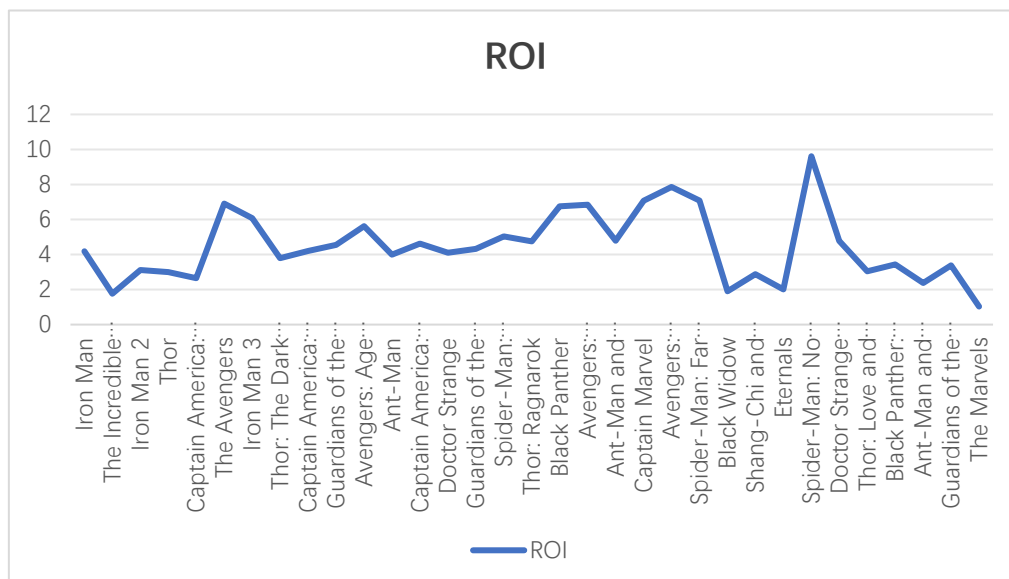


Fig. 1 ROI of historical movie box office

The fluctuation of ROI is significant, with a maximum value of 9.6 and a minimum value of 1.0, indicating a large gap. This suggests that the potential is high, but the bottom line is also relatively low. If high returns are expected, the risk is high, and both the maximum and minimum values occur in recently released superhero movies. Therefore, the ROI of superhero movies is in a very unstable state.

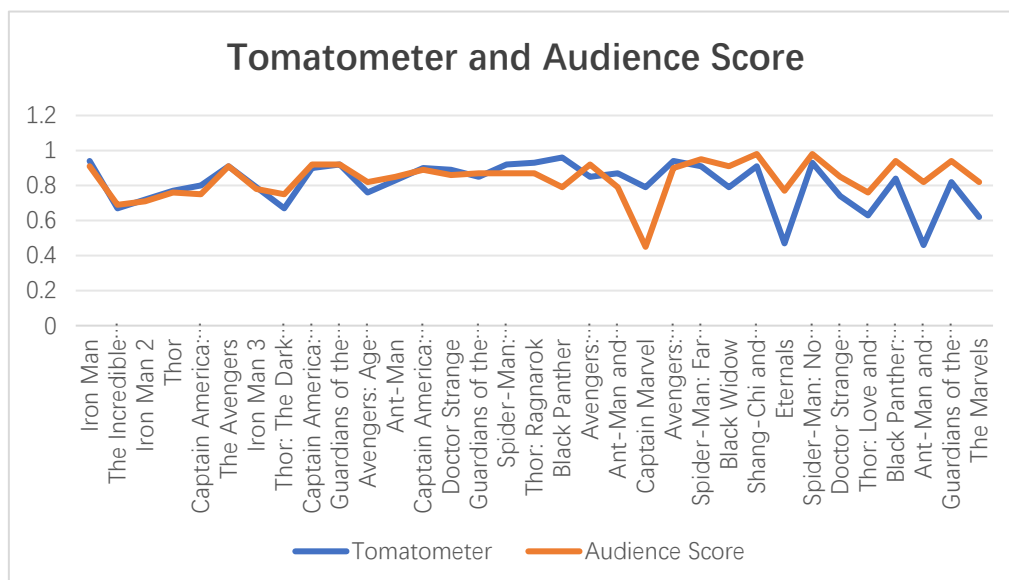


Fig. 2 Tomatometer and Audience Score

It can be seen that the Tomanomer obtained by more professional critics and the Audience Score obtained by the audience are roughly consistent in the early stages of the movie. As time goes by, the Audience Score first briefly averages lower than Tomanomer and then remains higher than Tomanomer (Fig 2).

3. Research Method

Time series analysis is a statistical technique used to analyze time series data, with the main purpose of making future predictions and trend analysis based on existing time series data. The time

series model used in this study is the ARIMA model, which stands for Autoregressive Moving Average Model. In ARIMA (p, d, q), AR is "autoregressive" and p is the number of autoregressive terms, MA is the "moving average", q is the number of moving average terms, and d is the number of differencing steps taken to make it a stationary sequence, so it is generally used to curve fit a differenced stationary sequence [4].

4. Research Result

4.1. Create a Timing Diagram of Key Indicators

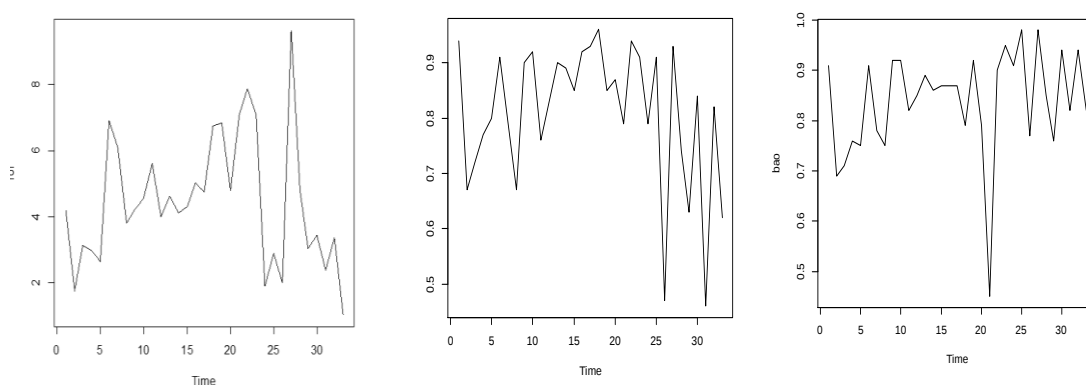


Fig. 3 Timing diagram of key indicators (1)

According to the timing diagram (Fig 3), it can be roughly judged that they are all non-stationary.

4.2. Stationarity Test

According to the unit root test, determine the stationarity. If it is not stationarity, perform differencing until it stabilizes, and obtain the stationary time series diagram (Fig 4).

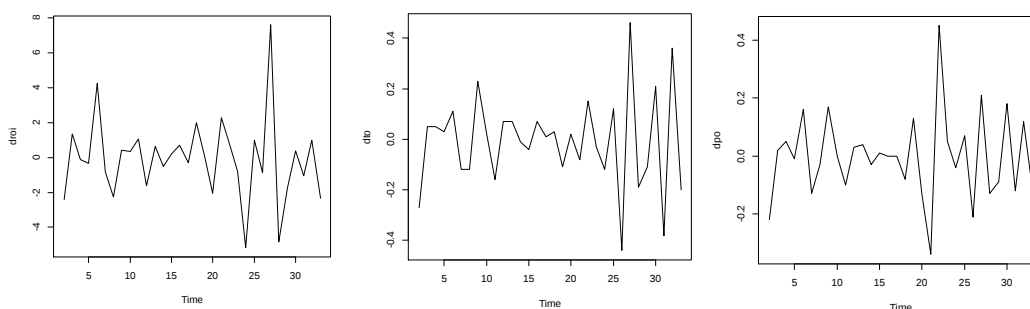


Fig. 4 Timing diagram of key indicators (2)

4.3. Model Order Determination and Fitting

Use stationary time series diagrams to create auto-correlation function and partial auto-correlation function diagrams, obtain the order based on the ACF and PACF diagrams, and determine the order according to the criterion that the smaller the AIC, the better.

4.4. Model Diagnosis and Adjustment

Perform normality and independence tests on the preliminary model and adjust the model order. The final ROI selected ARIMA (1,1,1) model, Tomanometer selected ARIMA (2,1,5) model, and Audience Score selected ARIMA (2,1,3) model (Fig 5).

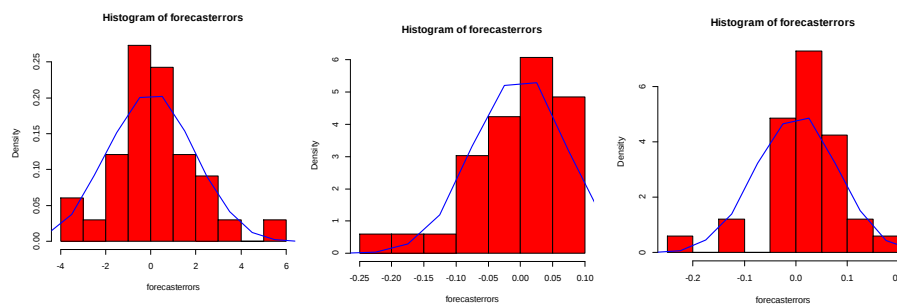


Fig. 5 Histogram of forecast errors

4.5. Model Prediction

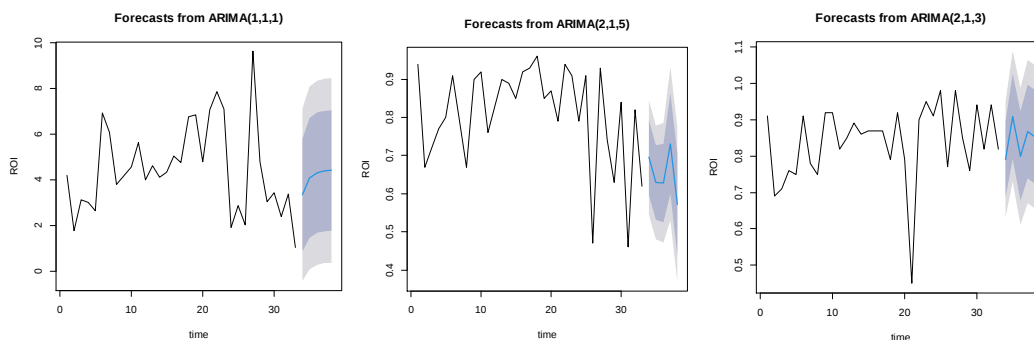


Fig. 6 Forecast from ARIMA

Based on the picture, we can predict that ROI will slightly increase in the next period, Tomanometer will continue to decline slightly after one or two periods, while Audience Score is relatively stable and will fluctuate within a small range in the future (Fig 6).

5. Research Discussion

According to the prediction results, it can be concluded that although the current ROI has not yet recovered to the best level, it will still show an upward trend in the coming period, indicating that superhero movies still have their value and investment potential. The slight decrease in Tomanometer represents a gradual tightening of attitudes towards superhero movies among industry professionals with certain professional abilities, and a decrease in expectations, indicating that the innovation of superhero movies may not be enough to impress professional industry professionals with enough highlights. However, the fluctuation of Audience Score within a certain range indicates that the audience's attitude towards it has not changed significantly, and the acceptance level is still good. Superhero movies still have a certain market and audience base.

This prediction seems to conflict with the viewpoints mentioned in the research background, such as audience aesthetic fatigue towards superhero movies and the discontinuation of Marvel's formula. This may indicate that although the current market for superhero movies is still relatively good, with ROI, Audience Score, and Tomanometer predicted to decline, there are still some issues. These issues may be due to the high homogenization of current superhero movies, with similar protagonists, plots, and outcomes, or they may be the direction of their gradual political correctness. In short, symbolic superheroes are losing people's love [5]. But the gradually improving special effects, sound effects, and audience's love and identification with superhero movies still allow them to maintain certain expectations for superhero movies.

In the future development of superhero movies, they should find their own highlights and advantages, avoid excessive politicization, and persist in continuous innovation. Here, innovation not only refers to technological innovation, but also to innovation from the perspectives of characters' background stories, the way superpowers are obtained, and even the ending. Self-imposed limitations

cannot bring any benefits to superhero movies. As long as superhero movies continue to develop and innovate, just like predicted results, they still have a good development trend.

6. Conclusion

According to the research in this article, the predicted results show that superhero movies, as a major industry in the film industry and an important product of Marvel, still maintain a strong development trend at present. This may be due to the rapid development and advancement of digital technology and visual effects technology at present. Superhero movies have their unique characteristics, including thrilling excitement, fantastic adventures, humorous humor, spectacular scenes, gorgeous combat effects, and themes of justice that cannot be replaced by other movies. Therefore, Marvel still has a considerable number of loyal fans. And Marvel and the directors of superhero movies have been exploring and developing superhero movies, constantly introducing new innovative content, which is constantly attracting fans. As long as fans are still there, there will always be people paying for superhero movies.

The unique charm and constantly improving audio-visual effects of superhero movies are also one of the reasons why audiences maintain a good acceptance and recognition of superhero movies. But there are also many problems, such as insufficient innovation, too many symbolic superheroes, and too much political color. Anti-hero is becoming a new trend. Of course, because there are extremely excellent superhero movies ahead, it will be difficult and stressful for superhero movies to continue to develop or even surpass in the future. But this is a challenge that creators of superhero movies such as Marvel will inevitably face, and it is also a challenge that Marvel superhero movies must overcome in order to continue to develop well.

However, this study also overlooked many influencing factors, such as the constant replacement of actors and the continuous development of the Marvel universe, which can create a burden on the audience, making them confused, unable to understand, unable to keep up, and even unable to distinguish each superhero, because they all have similar difficulties and acquire superpowers to defeat the villain. In addition, the rapid development of digital media is also a major influencing factor. With the rapid development of digital media, people in the post pandemic period are sometimes more willing to watch movies at home instead of going to the cinema. This is also a huge and undeniable trend for the development of superhero movies.

This study can further analyze historical data from aspects such as actor turnover, director turnover, and film release time, in order to clarify the impact of various factors on superhero movies and provide better predictive results for the development trend of superhero movies.

In summary, as a cultural phenomenon, superhero movies continue to have a positive development trend, with good acceptance and recognition, driven by both internal and external factors. In the future, with the development of technology and the emergence of creativity, superhero movies will continue to bring more exciting works to audiences.

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