An Analysis of the Impact of Large-scale Performing Arts Events on the Stock Price of Macao Gaming Enterprises: A Case Study of Galaxy Entertainment Group

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Abstract. Based on the development strategy of "1+4" adequate diversification of the Macao Government, we present a case study using event study methodology to evaluate the internal relationship between large-scale performing arts events held by Galaxy Entertainment Group in the process of diversification and transformation and its stock price changes. The results reveals that the five selected large-scale performing arts events all show a positive impact on the stock price of Galaxy Entertainment Group, which verifies the effectiveness of large-scale performing arts events as a marketing strategy to increase the stock price of Galaxy Entertainment Group.

Keywords: Macao; Moderate Economic Diversification; Stock Price; Event Study Methodology.

1 Introduction

Globally, the COVID-19 pandemic has had a profound impact on socio-economic activities[1], especially for regions like Macao, which rely heavily on tourism and gaming as the lifeblood of the economy. The social distancing and lockdown measures triggered during the epidemic have greatly restricted cross-regional tourism, causing huge economic losses to Macao gaming enterprises, exposing Macao's problems such as a single industrial structure, over-reliance on the gaming industry, and lack of economic resilience. To address this challenge, the Macao Government has proposed the development strategy of "1+4" adequate diversification[2],wherein "1" is to promote the diversified development of tourism and leisure in accordance with the goal of building a world tourism and leisure center, and to make the comprehensive tourism and leisure industry excellent, refined and strong. Under the guidance of the "1+4" strategy, Macao gaming enterprises are closely aligning with the development policy of the government and actively exploring diversified transformation paths to adapt to market changes and

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future development needs. In order to further enhance the image of the city and attract more tourists, Macao gaming enterprises have not only increased their investment in the tourism, but also elaborately planned and held a variety of large-scale performances. Through these, Macao is striving to become a "City of Performing Arts", with a view to injecting new vitality into the prosperity and sustainable development of the economy and tourism.

In this paper, we took Galaxy Entertainment Group, one of the leading leisure and entertainment companies in Asia, as an example, using an event study framework to examine the intrinsic relationship between the large-scale performing arts events held by the group and the changes in its stock price. This research design is aiming to explore whether the marketing strategy represented by large-scale performing arts events in the process of diversification and transformation of Macao gaming enterprises can drive enterprises' stock prices up in the context of the "1+4" strategy proposed by Macao. Through this research, it is expected to provide scientific business decision support for relevant enterprises and provide valuable investment strategy reference for investors.

The results reveal that in our study, the large-scale performing arts events held by Galaxy Entertainment Group have a positive impact on its stock price, through this we can conclude that holding large-scale performing arts events as a marketing strategy have a certain positive effect on promoting the stock price of Galaxy Entertainment Group. Specifically, the study found that in the period before and after the large-scale performing arts events' event window, the stock price of Galaxy Entertainment Group generally showed an upward trend, and its actual income exceeded the expected level of the market model, which is not an accidental phenomenon, but presents a systematic pattern. This finding not only confirms the close link between large-scale performing arts events and stock prices, but also provides a new perspective for further understanding the relationship between corporate marketing strategies and market responses. Interestingly, this positive impact does not run through our per-ordained event window, and it can be affected by some unexpected factors, such as unexpected shocks from major external events. Therefore, it is recommended that relevant enterprises need to comprehensively consider these factors when formulating marketing strategies to achieve the best marketing results.

2 Literature Review

Since Fama et al. first proposed the event study methodology in 1969[3], it has been widely used in many fields, especially in finance and economics. By analyzing the impact of a specific event on a company's stock price, event study methodology helps investors, analysts, and researchers perceive the market dynamics, evaluate company value, and predict future trends. In the financial field, the event study methodology was initially focused on the impact of a company's financial events, such as dividend and bonus statements[4], stock splits[5], mergers and acquisitions[6], etc. on stock prices. However, with the passage of time, the application field of the event study methodology has gradually expanded, and it has been further expanded by scholars to study macroe-

conomic events, such as policy changes[7], trade disputes[8; 9], etc., and public emergencies, such as epidemics[10; 11], social movements[12], and other events. In addition, the event study methodology has also been applied by some scholars to measure the impact of news events on stock market[13; 14]. Capturing and analyzing the impact of specific news events on the stock market, it can also reveal the reaction mechanism of market participants to information and the dynamic process of stock price formation. Modern event study methodology has also introduced more complex statistical models, such as the GARCH-family Models[15]. To estimate the impact of events more accurately on stock prices, and the introduction of these models has made the event study methodology more accurate and in-depth, providing new perspectives and methods for research in various fields. It is worth mentioning that event study methodology is also widely used in marketing-related literature. Numerous prior studies have confirmed that marketing behavior for new products produces positive abnormal stock returns, such as the Akhigbe (2002) [16], Lee and Chen (2008) [17], Luo et al. (2022)[18].

3 Methodology

This paper uses the event study methodology to analyze the impact of large-scale performing arts events on the stock price of Galaxy Entertainment Group. The event study methodology is an empirical research methodology commonly used in economic research, which can be traced back to the research of Ball and Brown (1968)[19] and Fama et al. (1969)[3]. It is designed to select a specific event according to the research purpose, study the changes in the stock yield of the sample stock before and after the event, and then explain the impact of the specific event on the change of the price and stock yield of the sample stock, so as to reveal the economic effect of the event. In this paper, our goal is to filter out the normal performance of stocks using the event study methodology, so that we can independently analyze the abnormal returns triggered by large-scale performing arts events organized by Macao gaming enterprises. In this methodology, the core principle is to define an "Event Window", which is a specific period set around the event date to measure the impact of an event on a stock price. During this period, it is possible to calculate the daily Abnormal Return (AR), which is the difference between the real rate of return and the expected rate of return in the absence of a specific event. In addition, the Cumulative Abnormal Return (CAR) needs to be calculated to capture the overall impact of an event on the stock price more comprehensively, rather than just being limited to the abnormal volatility of a single trading-day.

4 The Model

4.1 Data

We selected the closing price of Galaxy Entertainment Group Limited (stock code: 00027.HK) from January 3, 2022 to March 22, 2024 from the Choice database, which is a mainstream database of Chinese finance developed and operated by East Money

Information Co.,Ltd. (Eastmoney.com). This database is mainly for financial professionals, investors, research institutions, etc., providing a full range of financial data services including stocks, bonds, funds, foreign exchange, futures, financial derivatives, etc.

4.2 Selected Events

According to the event study methodology, we used a search engine to retrieve and count the relevant information of 30 large-scale performing arts events held by Galaxy Entertainment in 2023.

According to the Efficient Markets Hypothesis (EMH) proposed by Fama (1970)[20], the stock market responds extremely quickly to market information, and all market information is immediately reflected in asset prices. So we can conclude market information is one of the factors affecting the volatility of the stock market. In view of the large number of events, it is necessary to quantitatively evaluate the impact of each activity in the preparatory period, and then select the events with greater influence as the representative events in this paper. With the help of the Baidu Index (index.baidu.com), we sorted out the search index data of these events from 30 days before the event to the day of the event by keywords. Baidu Index is a data analysis platform based on Baidu search data to reflect user search behavior. The searches for a specific search term in Baidu index can reflect the popularity and influence to a certain extent. As want of space, we selected the top 5 performing arts events in the search index for the study, and defines them as events 1 to 5, as shown in Table 1.

Table 1. Seclected Events

Number	Event Date	Event	Keywords	Source Location	Search Index
Event 1	2023-05-20	BLACKPINK WORLD TOUR [BORN PINK] MACAU	BLACKPINK	South Korea	10309
Event 2	2023-06-03	Cai Xukun KUN 2023 "Lost" World Tour Concert	Cai Xukun	Mainland China	16052
Event 3	2023-07-15	Jackson Wang "MAGIC MAN" World Tour Concert	Jackson Wang	Hong Kong, China	6603
Event 4	2023-08-12	2023 Wilber Pan "For·Ever" Birthday Theme Limited Concert	Wilber Pan	Taiwan, China	10324
Event 5	2023-11-18	Time Youth Group Triple Tower and Debut Fourth Anniversary Concert	Time Youth Group	Mainland China	7109

4.3 Estimation Window

In order to estimate the normal rate of return, the event study methodology must select the estimation window. A too long or too short estimated window will affect the estimated normal rate of return. After referring to the research of many scholars, we defined the 200 trading-days before the event as the estimation window, that is, T=(-205, -6), which is used to estimate the normal rate of return before the event. In addition, we took the day of the performing arts event as the event day, and selected the 5 trading-days before and after the event date as the event window, that is, T=(-5,5), which is used to measure AR and CAR of the event. If the day of the performing arts event is not a stock trading-day, the next trading-day will be used instead. The timeline of the event study methodology is shown in Figure 1.

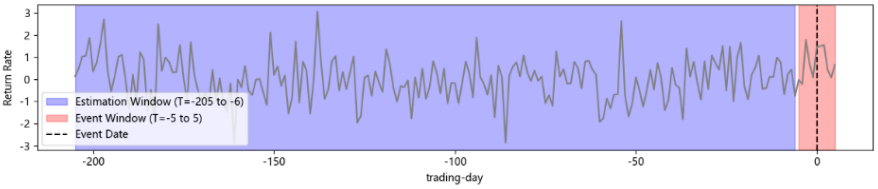

Fig. 1. The timeline of the event study methodology

4.4 Calculation of AR and CAR

In past studies, there have been several ways to calculate the normal rate of return on stocks. In this paper, we chose a market model based on the Capital Asset Pricing Model (CAPM) to calculate the normal rate of return, in which the return on an asset is assumed to be affected by only one factor.

Before building this model, we selected the Hang Seng Index as a proxy for market returns. The Hang Seng Index is one of the earliest stock market indices in Hong Kong, China, and has been widely cited since its launch on 24 November 1969 as an important indicator of the Hong Kong stock market. Therefore, the expected the normal rate of return on a stock can be estimated. The calculation is given by:

$$R_{it} = \hat{\alpha}_i + \hat{\beta}_i R_{mt} + \varepsilon_i \tag{1}$$

Where, R_{mt} denotes the return of the Hang Seng Index at time t, a_i signifies the estimated intercept term for stock i, β_i encapsulates the estimated beta coefficient, reflecting the sensitivity of stock i in relation to the market, and ε_{it}corresponds to the error term of the model, $E(\varepsilon_{it}) = 0$. Therefore, the calculation is given by:

$$E(R_{it}) = \alpha_i + \beta_i R_{mt} \tag{2}$$

For indices and individual stock daily returns, the calculation is given by:

$$R_{it} = [(P_{it} - P_{it-1})/P_{it-1}] \times 100\% \tag{3}$$

Where, P_{it} and P_{it-1} are the closing prices of stock i in the t and t-1 periods, respectively.

AR is the actual return of a stock during the event window minus the expected normal rate of return. The calculation is given by:

$$AR_{it} = R_{it} - E(R_{it}) \tag{4}$$

CAR refers to the sum of the AR for each day during the event window, and the calculation is given by:

$$CAR_{it} = \sum_{t=-5}^{t} A\,R_{it} \tag{5}$$

5 Analysis of Empirical Results

According to the market model, Table 2 reports the results of regression analysis of the estimation window using OLS least squares estimates. Based on this results, AR and CAR can be calculated. Table 3 reports AR and CAR during the event window. Figures 2 to 6 report the trend of AR and CAR during the event window.

Analysis of Event 1. During the event window, the AR showed a positive value for 8 trading-days, and showed an upward trend in the [-4, -1] trading-days, while the CAR reached 2.20% on the -1 trading-day. This shows that in the short period of time before the event, the market had anticipation of the upcoming event and had a positive reaction, according to which it can be judged that the event had a positive impact on the Galaxy Entertainment Group stock price.

Analysis of Event 2. During the event window, the AR remained positive on the [-5, -3] trading-days, and the CAR peaked at 3.44% on the -3 trading-day. It shows the market's positive reaction to the event. On the last trading-day of the event window, the CAR reached 1.02%, which can be judged to have a positive impact on the stock price of Galaxy Entertainment Group.

Analysis of Event 3. During the event window, the AR showed positive values for a total of 7 trading-days, and the CAR showed positive values on [-5,5] trading-days. It is worth noting that on the date of the event, the CAR has been as high as 4.31%, indicating that the market is highly concerned and positive expectations for the event. This significant alpha is further evidence of the positive impact of the event on the Galaxy Entertainment Group stock price.

Analysis of Event 4. During the event window, the AR showed greater volatility on the [-5,0] trading-days, and the CAR was 1.48% on event day. However, in the trading-days after the event, the CAR showed a downward trend until the last trading-day of the event window, when the CAR fell to -1.46%. After our analysis, it can be attributed to the negative impact of an unexpected major external event. Since August 10, 2023, the 10-year U.S. Treasury rate has continued to rise sharply, hitting a new high since 2008 on August 21, 2023, which has had a broad impact on global capital markets. As for the impact on the stock price of Galaxy Entertainment, it can be speculated that due to the turmoil in the global financial market, especially the rise in U.S. Treasury interest

rates, investors' appetite for risky assets has decreased, breaking previous market expectations, which in turn has affected stock prices and AR. However, despite the impact of external factors in the later period, the stock price has fallen to a certain extent, but on the whole, the activity still has a certain positive impact on the stock price of Galaxy Entertainment Group.

Analysis of Event 5. During the event window, the AR was positive on [-4,1] trading-days, and the CAR also showed a positive trend, especially on the event day, when the CAR reached 3.87%, indicating the market's high expectations for the event. This result also confirms the positive impact of the event on Galaxy Entertainment Group's stock price.

Table 2. OLS Regression Results

Number	Estimation Window	α	β
Event 1	2022-07-21 - 2023-05-12	0.0986	0.9448
Event 2	2022-08-02 - 2023-05-24	-0.0772	0.9436
Event 3	2022-09-14 - 2023-07-07	0.1099	0.9545
Event 4	2022-10-12 - 2023-08-04	0.0462	0.9386
Event 5	2023-01-17 - 2023-11-10	-0.0322	0.7756

Table 3. Statistics of AR and CAR during the event window

DATE	Event 1		Event 2		Event 3		Event 4		Event 5	
	AR	CAR	AR	CAR	AR	CAR	AR	CAR	AR	CAR
-5	0.0090	0.0090	0.7965	0.7965	0.2048	0.2048	0.9594	0.9594	-0.7305	-0.7305
-4	-0.0360	-0.0271	0.6575	1.4540	3.2555	3.4603	0.4852	1.4446	0.6465	-0.0840
-3	0.0498	0.0227	1.9863	3.4403	-0.0850	3.3753	-0.9852	0.4594	0.9622	0.8781
-2	0.7613	0.7840	-1.3753	2.0651	-1.0714	2.3039	1.6813	2.1406	0.3939	1.2720
-1	1.4192	2.2032	-1.3777	0.6873	1.2592	3.5631	-1.0907	1.0499	2.1452	3.4172
0	**-1.0119**	**1.1914**	**0.4644**	**1.1517**	**0.7453**	**4.3084**	**0.4298**	**1.4797**	**0.4491**	**3.8663**
1	1.1829	2.3743	0.1913	1.3429	0.1155	4.4239	-0.1952	1.2845	0.9083	4.7746
2	-2.8799	-0.5056	-0.7728	0.5701	-0.4522	3.9716	-0.0851	1.1994	-0.8759	3.8988
3	0.6230	0.1174	1.9331	2.5033	-0.4789	3.4927	-0.4120	0.7874	-0.8527	3.0460
4	0.4830	0.6004	-1.8174	0.6858	0.6249	4.1176	-1.4550	-0.6676	0.6397	3.6857
5	**1.8102**	**2.4106**	**0.3299**	**1.0157**	**-3.3680**	**0.7497**	**-0.7965**	**-1.4642**	**-0.6234**	**3.0623**

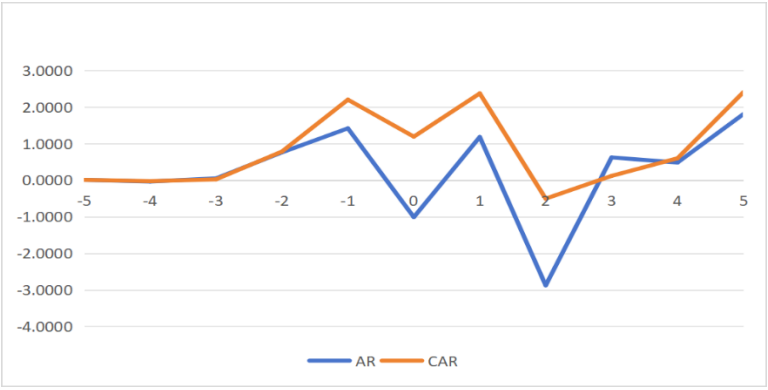

Fig. 2. Trend chart of AR and CAR During the Event Window of Event 1

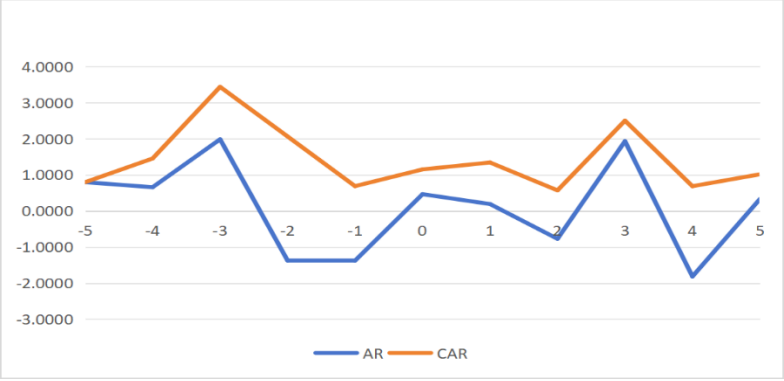

Fig. 3. Trend chart of AR and CAR During the Event Window of Event 2

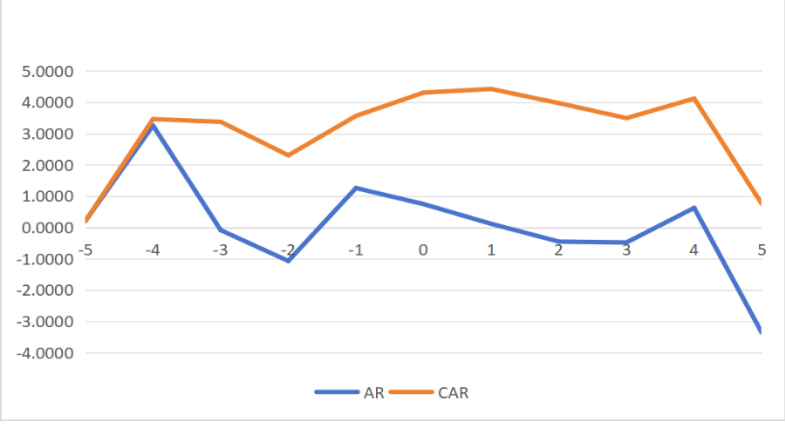

Fig. 4. Trend chart of AR and CAR During the Event Window of Event 3

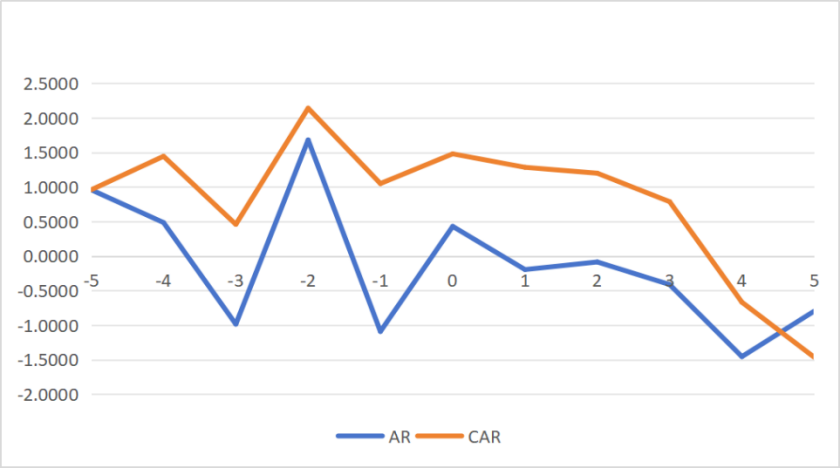

Fig. 5. Trend chart of AR and CAR During the Event Window of Event 4

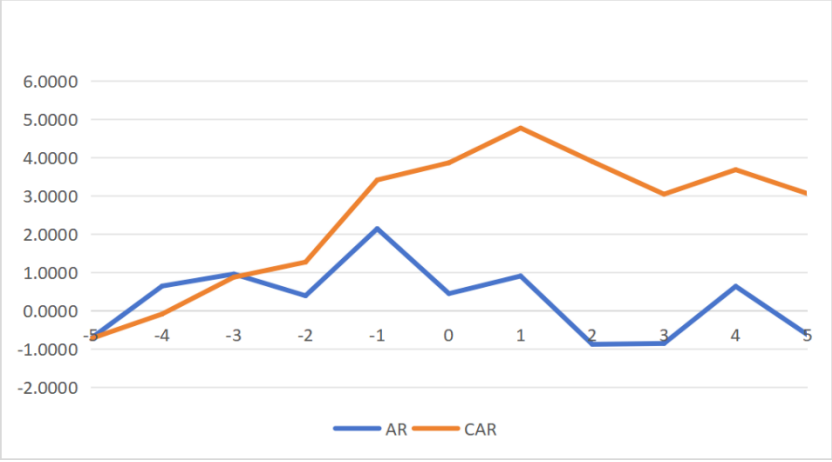

Fig. 6. Trend chart of AR and CAR During the Event Window of Event 5

6 Conclusion

In this study, we have explored the intrinsic relationship between the marketing strategies represented by large-scale performing arts events and the changes in stock prices of Macao gaming enterprises in the process of diversification and transformation. To this purpose, we have developed an analysis based on the development strategy of "1+4" adequate diversification of the Macao Government, taking Galaxy Entertainment Group, a leading enterprise in Asia's leisure and entertainment industry, as a case study, use the the event study methodology.

Based on the analysis of the five events, this paper draws the following conclusions: (1) The holding of large-scale performing arts events has a significant positive impact on the stock price of Galaxy Entertainment Group, which provides empirical support for further in-depth research on the relationship between marketing strategy and market response. (2) As a window for Macao to attract tourists, large-scale performing arts events have successfully attracted the attention of the public and investors, and have had a significant positive impact on the sustainable development of the local economy. A series of positive measures to promote the development strategy of "1+4" have yielded initial results.

Based on the conclusions of the study, we puts forward the following suggestions: (1) Continue to promote diversified marketing strategies. Macao gaming industry is the core force to promote economic development. Meanwhile, keeping on promoting the diversified transformation of enterprises through large-scale performing arts events and other forms can not only enrich tourism resources to Macao and further enhance the attractiveness of the city, but also reduce the excessive dependence on the gaming industry to a certain extent and achieve balanced economic development. (2) Explore cooperation and innovation. Macao gaming enterprises should actively seek cooperation opportunities with government departments and cultural and arts institutions. In the future market layout and brand building, more attention should be paid on how to better arouse the interest and trust of investors, so as to enhance the brand value and jointly promote the prosperity and sustainable development of Macao tourism industry. (3) Improve the efficiency of market communication. Macao gaming enterprises should improve an efficient and transparent market communication mechanism, timely convey information to investors and the public, and ensure the market's right to know, so as to enhance investors' confidence and win wider market recognition and support for enterprises. (4) Strengthen risk prevention. While the empirical results are generally positive, the analysis of Event 4 also suggests that major external event shocks may have an impact on market expectations and stock prices. Therefore, when planning such events, companies need to fully assess the potential changes in the macroeconomic environment and develop targeted risk management strategies.

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