ANALYSIS OF HOLLYWOOD MOVIE PROFITABILITY

Recommendations for the Hollywood Movie Studio on Film-making Policy over a 1- and 5-year period

Group members:

Ziyu Wang	3035777547
Fanju Xiao	3033092319
Yu Ka Chun	3035781275
Guanlin Chen	3035789954

Contents

1. Executive Summary

This report is about analyzing factors related to the profitability of Hollywood movies while addressing the concern of the Hollywood movie studio regarding its financial risks. We offered an appropriate movie-making policy for the Hollywood movie studio over a 1- and 5-year period. To achieve this objective, we studied the following questions:

1. What characteristics do Hollywood movies that have the highest and lowest return hold?
2. How does the COVID-19 pandemic affect the profitability of Hollywood movies?
3. What are the best predictors for the future success of Hollywood movies?

We approached these questions from a financial perspective regarding the ROI (returns on investment) and the gross revenue. There are two sets of data collected on Hollywood movies worldwide, continuous from 2008 to 2020 and from 2020 to 2022 respectively, which look at the Hollywood movie industry in both long terms and short terms. After studying relevant literature, we analyzed many vital factors influencing the profitability of Hollywood movies, including movie franchises, the COVID-19 epidemic, critic scores, genres, and runtime by using ranking tables, the line chart, correlation analyses, and multiple regression. Then, we found that horror and thriller franchised films brought higher returns than the others. The impact of the COVID-19 on the film revenue cap was positive but limited and weakened over time. The explanation is that the public gradually adapted to the COVID-19 situation and Hollywood movie studios have extended their streaming services. We then provided a prediction model for investment returns of the Hollywood movie studio with the best predictors possible. Our recommendation for the short-term film-making policy is that the Hollywood movie studio can be optimistic about the pandemic situation and keep its effort on providing streaming services during the coming year. Meanwhile, we recommend the Hollywood studio consider co-financing on a movie portfolio led by horror and thriller franchises, choosing peak season to launch the movies, attempting to achieve awards or nominations, and inviting stars in 10 years.

2. Introduction

The Hollywood movie industry constantly encounters high uncertainty. While many new products are released every year, the popularity of these movies is difficult to anticipate and is uneven. Only 30% to 40% can break even among all the films produced, and 10% generate revenues (Hennig-

Thurau et al., 2007). Among them, the most striking statistic is that only 6.3% of movies have made 80% of total profits in Hollywood during the last decade (De Vany & Walls, 2004). Given the above, Hollywood movie is a business of extremes; this circumstance should be analyzed considering factors affecting the financial risks.

The profitability of movies is subject to various financial risk factors and some of them have changed over time. One of the most prevalent changes is that Hollywood movie studios have incrementally valued movie franchises, with the most well-known productions like Star Wars and Harry Potter. In the past 30 years, film franchises have dominated the lists of the highest-grossing film portfolio (Pokorny et al., 2019). Allowing movie studios to extend the success of the parent film makes franchise movies more reliable in reducing the financial risk of film production compared to non-franchise movies. Therefore, we should include movie franchises as an indicator of movie success.

The COVID 19 epidemic is the most recent and ongoing event that greatly influences the Hollywood movie industry. Many theaters have closed due to concerns about public health. The Regal, the largest movie theater chain in the U.S, temporarily closed 663 cinemas (Johnson, 2021). The limitation on the movie's distribution channel might cause trouble for Hollywood movies. Not to mention that many movie studios have to delay or cancel their production plan, which cannot be done without cost. For example, the sudden cancellation of *A Quiet Place II* eight days before launch will cost Paramount about $30 million (Johnson, 2021). Considering the discussion above, we should quantify the effect of the COVID-19 epidemic with corresponding variables when advising the short-term film-making policy.

In addition to factors that have changed, we observe many factors like critic score, genres, and runtime that have relatively constant effects on the financial risks of movies. The critic score plays a critical role in raising the profit floor of movies. Compared to a successful film, a movie failure has limited information sources besides the website (Bae & Kim, 2013). This means that the critic score has a more significant influence on consumer choices when a movie is expected to be unsuccessful. The Hollywood movie studio might also want to focus on the movie genre since it is relevant to the movie franchises we discussed. According to Bozdogan (2013), the highest-grossing genres include adventure, action, and horror, while comedy is the most common genre

and drama has the least average gross. Besides, runtime also affects the movie's success. Chen (2018) suggests that runtime might slightly increase the total revenue of movies. As these factors impact the movie's success, the movie studio should think about the critic score, genres, and runtime for the movie production.

To make a reasonable suggestion to our client, a Hollywood studio, on its movie-making principles, we have analyzed 1748 Hollywood movies from 2008 to 2022 launched worldwide and relevant pieces of literature. We have examined the role and value of movie franchises and the rise of streaming services. Then, we have conducted data analysis to evaluate the key factors determining the profitability of Hollywood movies in the world market. Our research has included many representative factors (movie franchises, the COVID-19 epidemic, critic scores, genres, and runtime). We have found suitable predictors for the financial success of movies based on the analysis results. Accordingly, we have given recommendations, mainly co-financing on a portfolio led by horror and thriller franchises, for our client to decide on an appropriate movie-making policy over a 1- and 5-year time span with the final section that concludes this report.

3. Data Analysis

In this section, we present a method for evaluating Hollywood movies by addressing the following questions:

1. What characteristics do Hollywood movies that have the highest and lowest return hold?
2. How does the COVID-19 pandemic affect the profitability of Hollywood movies?
3. What are the best predictors for the future success of Hollywood movies?

We collected data for factors including movie franchises, the COVID-19 epidemic, and critic scores from IMDB.com, Boxofficemojo.com, Rottentomatoes.com, and the-numbers.com to answer the above questions. The data for movie franchises and critic scores is from 2008 to 2020, while the data for analyzing the COVID-19 epidemic is the daily new confirmed cases from February 2020 to March 2022, intending to capture the timeliest effect on the Hollywood movie industry. The dependent variable would be the worldwide gross. The reason is that if we consider only the U.S. gross and use the overall costs to investigate the movie return, we will underestimate the investment return; we used the worldwide gross instead.

3.1. The Characteristics of Hollywood Movies with the Highest and Lowest Returns

In this section, we introduce the model for analyzing the characteristics related to the returns of Hollywood movies.

3.1.1. Mathematical Model

We calculated the return on investment (ROI) with the budget for a movie as an initial investment and its worldwide gross as a return. We choose ROI because it can objectively evaluate whether a film is profitable or not. The formula of ROI is:

$$ROI = \frac{(Worldwide\ Gross - Budget)}{Budget} \times 100\%$$

We calculated each movie in our data. A high positive ROI implies the movie's relatively higher profitability. A low positive ROI indicates that the movie is expensive relative to its earnings, while a negative ROI means that the financial return of a movie exceeds its budget, leading to financial risk. We put together the top 10 largest ROI movies to find what they have in common. We did the same for the ten films with the lowest negative ROI. The result of the movie with high and low ROI is examined in the next section.

3.1.2. Key Findings

Although we separated movie franchise and genre to conduct the analysis, some might argue that a movie franchise is a type of genre. However, the classification of the genre has no fixed boundaries. We separated them because the movie franchise has its specialty; it is more like a business model than traditional genres like horror and thrill. By distinguishing movie franchise and genre in the analysis, we believe that we could observe their effects on Hollywood movie success more explicitly in the following section.

From the below table, we figured out that none of the movies with the lowest negative ROI are franchise movies, and the negative ROI for these movies is around -86% to -97%. This result indicates that movies may undergo severe financial risk if they are not franchised. Meanwhile, 50% of movies here are dramas. This reflects that audiences are not keen on drama movies during the past decade. In short, a non-franchise movie, which is also categorized as a drama, is vulnerable to financial risks.

Table 1

Top 10 Movies with the Smallest ROI Between 2008 and 2020, and the Corresponding Franchise and Genres

Year	Movie	Genre	Is Franchise	ROI
2019	The Kid	Comedy, Fantasy	No	-97.61%
2018	London Fields	Crime, Thrill	No	-94.58%
2013	Phantom	Action, Adventure	No	-93.34%
2015	The Letters	Drama	No	-91.76%
2010	Standing Ovation	Musical	No	-90.50%
2011	Creature	Horror, Fantasy, Sci-Fi	No	-88.97%
2017	The Promise	Action, Adventure, Drama	No	-88.28%
2017	LBJ	Drama	No	-87.46%
2016	I Saw the Light	Musical, Drama	No	-86.40%
2008	Nobel Son	Comedy, Drama	No	-86.38%

From Table 2, we observed that all movies between 2008 and 2020 that have the top 10 highest ROI are horror movies and 80% of them are thriller movies. This indicates that horror and thriller movies were popular during the past decades and might continue to achieve high returns. Thus, the Hollywood movie studio might want to produce horror and thriller movies to obtain a relatively higher return. Apart from the genre, the franchise is another notable factor. 70% of movies in this table have franchises, suggesting the similarities among these movies with high investment returns.

Table 2

Top 10 Movies with the Highest ROI between 2008 and 2020, and the Corresponding Franchise and Genres

Year	Movie	Genre	Is Franchise	ROI
2009	Paranormal Activity	Horror, Thriller	Yes	1294453.56%
2015	The Gallows	Horror, Sci-Fi, Thriller	No	41556.47%
2012	The Devil Inside	Horror	No	10075.95%
2011	Insidious	Horror, Thriller	Yes	6558.06%
2015	Unfriended	Horror, Thriller	Yes	6336.42%
2010	Paranormal Activity 2	Horror	Yes	5817.07%
2017	Get Out	Horror, Thriller	No	5511.96%
2011	Paranormal Activity 3	Horror, Thriller	Yes	4040.80%
2014	Annabelle	Horror, Thriller	Yes	3851.74%
2010	The Last Exorcism	Horror, Thriller	Yes	3798.11%

Based on the analysis of the tables above, non-franchised drama movies are more likely to gain a lower return, while franchised horror or thriller movies might be more popular and profitable. Moreover, we in fact have high expectations on franchised movies as box office is not their sole source of revenue. They can also generate profit from the peripheral products, which means their performance might be underestimated.

3.2. The Impact of the COVID-19 Pandemic on the Profitability of Hollywood Movies

In this section, we specifically examine the impact of the COVID-19 pandemic on Hollywood movies with the most updated data from February 2020 to March 2022. The number of daily confirmed cases is chosen as the dependent variable as it can represent the severity of the COVID-19 epidemic directly and shows the public awareness and measures from the side. At the same time, we selected ten movies with the highest daily world gross, which is meant to examine how the COVID-19 situation affects the film revenue cap on a daily basis in the below analysis.

Table 3: Correlation between Daily Top 10 Gross Revenue and Daily Confirmed Cases Worldwide

	Daily average of top 10 gross revenue	Daily confirmed cases
Daily average of top 10 gross revenue	1	
Daily confirmed cases	0.268269818	1

Refer to Table 3, the correlation analysis performed showcases the correlation coefficient between the daily new confirm cases and daily new top 10 gross is 0.268, which suggests a weak positive relationship between them. This phenomenon means that the COVID-19 situation has good but limited effects on the film revenue cap. The result is quite odd as we intuitively thought the pandemic might severely damage the Hollywood movie industry. We might need to validate further and explain this finding.

From Table 4 below, we found that the ten lowest-grossing days were all in March 2020. It was the early days of the pandemic, and many countries were implementing social distancing rules. Cinemas were a particular target. We then found that almost all the top 10 grossing movies were released in late 2021 and early 2022. A year and a half into the pandemic, improved vaccination, which may at least provide 50% protection rate coverage in many countries, significantly reduced COVID-19 symptoms (Kaplan & Milstein, 2021). The social distancing was slowly relaxed, and cinemas were in operation again. Even though new confirmed cases are much higher now, the box office increased because the public may have adapted to the Covid-19 epidemic.

Table 4

Top 10 Highest-grossing and Lowest-grossing Movies during 2020-2021, and Their Corresponding Daily Number of New Confirmed Cases

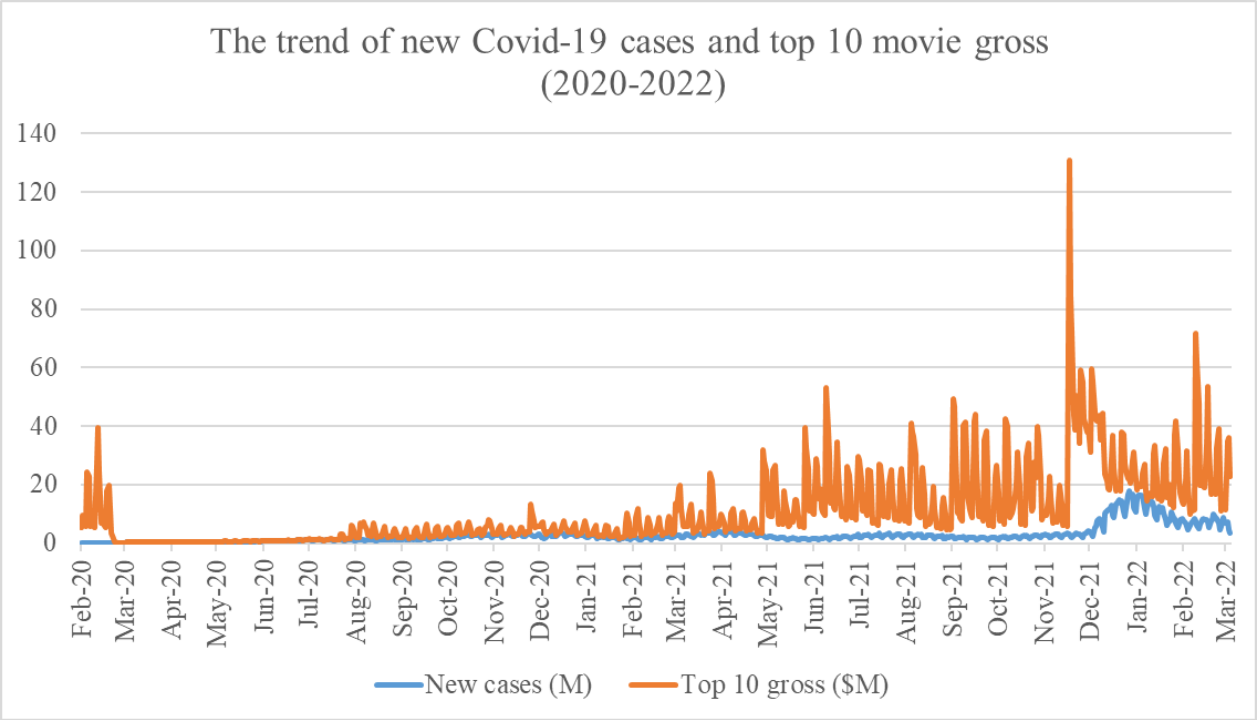
Date	New Cases	Top 10 Gross	Date	New Cases	Top 10 Gross
2021-12-10	3015083	128026878	2020-03-23	194615	4
2021-12-11	2203900	82033791	2020-03-22	158057	12
2021-12-12	1918792	70605790	2020-03-21	146938	24
2022-03-04	7434928	64316203	2020-03-25	232034	24
2021-12-18	2570564	56478703	2020-03-20	142098	106
2021-12-25	3070614	5,6478703	2020-03-19	126189	110
2022-03-05	5986700	56299314	2020-03-30	287365	126
2021-12-19	2074497	52943454	2020-03-29	251959	141
2021-12-26	2430030	52943454	2020-03-24	185433	173
2021-07-02	1794264	51368440	2020-03-31	339311	174

Above, we analyzed the performance of 20 extreme box office days concerning the new confirmed case. In the rest of this section, we looked at the overall impact pattern by analyzing the monthly trend of the COVID-19 cases and the top 10 movie gross from 2020 to 2022.

Figure 1 below shows that the box office of the top 10 highest-grossing movies was dramatically reduced at the beginning of March 2020. Also, there was almost no gross in the second quarter and third quarter of 2020. In late 2020 and the first half of 2021, the box office slowly grew. It was not until late 2021 and early 2022 that box-office growth accelerated. We further discovered that the new confirmed cases line rose after the top 10 gross lines increased in November 2021. As the number of new cases surged, the movie's box office declined rapidly in January 2022.

Figure 1

The Monthly Trend of the New COVID-19 Cases and Top 10 Movie Gross from 2020 to 2022



Based on the data analysis of this section, we concluded that there was a correlation between the number of new cases and the box office. Movies' box office was meager in the early days of the pandemic. Later on, the box office has since recovered as people adjusted to the pandemic but would still decline as the number of new confirmed cases rose.

3.3. Best Predictors of Hollywood Movies' Financial Success

This section is dedicated to identifying the factors for predicting the financial success of Hollywood movies.

3.3.1. Methodology

We performed several simple correlation analyses to find out the interactions between our independent variables, including runtime, critic scores, franchise, and genres (It is split into 11 different genres, which are comedy, horror, action, adventure, romance, fantasy, sci-fi, thriller, crime, musical and drama. It is important to point out that some movies can have more than one genre) and the dependent variable ROI. We also performed multiple linear regression using the

most significant independent variables. We calculated the standardized coefficients from the results and compared them with the correlation coefficients. Throughout the process, we eliminated some variables that contribute very little to the regression model until we obtained a set of predictors, which produces a reasonable R-squared statistic. The correlations and the multiple linear regression results are listed in Tables 5 to 8 in Section 3.3.3 below. Before presenting the result, it is essential to point out some limitations concerning the data used for the regression analysis.

3.3.2. Limitations

We identified some limitations with our analysis, among which the budget is not necessarily the actual costs of movies. The specific costs are often beyond disclosure. However, the budget is the closest number we can get to calculate the ROI and generally does not deviate from its actual costs too much.

Other than calculating ROI, we might have problems categorizing movie genres. We only consider 11 genres here, while the total categories are more than this. It can be possible that we miss the effect of some other genres without knowing it. However, the 11 genres already occupy a large proportion of the existing categorization and should be comprehensive enough to study.

3.3.3. Key Findings

After discussing the limitation of our analysis, we carried out several multiple regressions between the ROI and the independent variables, with each regression model having different sets of independent variables. Their adjusted R-squared values are shown below in Table 5.

Table 5

Adjusted R-squared Values from Different Multiple Regression Models

Variables used in regression	Adjusted R-squared values
Genres + Runtime + Critic Scores + Franchise	0.0306234
Genres + Runtime + Critic Scores	0.0311116
Runtime + Critic Scores + Franchise	0.0065145
Runtime + Critic Scores	0.0070492

From Table 5 above, we found out that the adjusted R-squared values of the model containing genres, runtime, and critic score as variables is 0.0311116, which is the highest among all models. Therefore, we decided to use this model as our final multiple regression model. Furthermore, the adjusted R-squared values slightly increased after removing the franchise variable. We can conclude that this variable has very little effect on the ROI.

From the model we have chosen, we analyzed the multiple regression results, which are shown in Table 6 below.

Table 6

Results of Multiple Linear Regression for Genres, Runtime, and Critic Score on ROI

	Variance Explained				
	R	*R* Squared	Adjusted *R* Squared	Std. Error of the Estimate	Observations
	0.195758	0.038321	0.031111	22.888569	1748
	ANOVA RESULTS				
	df	Sum of Squares	Mean Square	*F Value*	*p* Value
Regression	13	36199.08561	2784.545047	5.315167536	1.89E-9
Residual	1734	908419.3639	523.8865997		
Total	1747	944618.4495			

In Table 6, the linear model is statically significant since $p<0.05$. The adjusted R-squared statistic is about 4%, indicating that these three predictors explain about 4% of the variance in worldwide gross.

We now consider the unstandardized coefficients, standardized coefficients, and p-values for all three predictors. The results are presented in Table 7 below.

Table 7

Coefficients of Multiple Linear Regression

	Unstandardized Coefficients		Standardized Coefficients			
	β	Std. Error	Beta	Std. Error	*t* Value	*p* Value
Intercept	7.8618	4.1852			1.8784	0.0605
Comedy	-1.4561	1.4411	-0.0302	0.0299	-1.0104	0.3124
Horror	8.4544	1.9819	0.1160	0.0272	4.2659	2.10×10^{-5}
Action	-2.8559	1.5141	-0.0571	0.0303	-1.8862	0.0567
Adventure	-0.0211	1.5255	-0.0004	0.0293	-0.0139	0.9889
Romance	1.2691	1.7532	0.0184	0.0254	0.7239	0.4693
Fantasy	-1.2059	1.7997	-0.0165	0.0247	-0.6701	0.5029
Sci-Fi	1.0637	1.8172	0.0154	0.0262	0.5854	0.5584
Thriller	3.9847	1.6188	0.0698	0.0284	2.4615	0.0139
Crime	-1.5339	1.8686	-0.0214	0.0261	-0.8209	0.4118
Musical	0.5669	4.2582	0.0032	0.0238	0.1331	0.8941
Drama	-1.9930	1.3592	-0.0426	0.0290	-1.4663	0.1427
Runtime	-0.0636	0.0373	-0.0466	0.0274	-1.7017	0.0890
Critic Score	0.0664	0.0213	0.0785	0.0251	3.1214	0.0018

In the table above, only the p-values for "Horror", "Thriller", and "Critic Score" are below 0.05, which are 2.10×10^{-5}, 0.0139, and 0.0018, respectively. This indicates these three predictors are statistically significant. The p-values for the rest of the predictors are higher than 0.05, indicating

that they are not statistically significant. The model equation corresponding to this multiple regression model is:

ROI = 7.8618 - 1.4561 * Comedy + 8.4544 * Horror -2.8559 * Action - 0.0211 * Adventure + 1.2691 * Romance - 1.2059 * Fantasy + 1.0637 * Sci-fi + 3.9847 * Thriller - 1.5339 * Crime + 0.5669 * Musical - 1.9930 * Drama - 0.0636 * Runtime + 0.0664 * Critic Score

Furthermore, from the standardized coefficients, we can conclude that "Horror", "Thriller", and "Critic Score" have stronger relationships with the ROI than other predictors, indicating that they are the best predictors of Hollywood movies' financial success. This matches the findings in Section 3.1.2, where horror and thriller movies may generate a higher ROI. Nonetheless, all the standardized coefficients are below 0.15, which means they are weakly correlated with the ROI. To check if the findings are correct, we compared the standardized coefficients with the results of the simple correlation, which are presented in Table 8 below.

Table 8: Correlation Between Chosen Variables

	ROI	Comedy	Horror	Action	Adventure	Romance	Fantasy	Sci-Fi	Thriller	Crime	Musical	Drama	Critic Score	Run time
ROI	1													
Comedy	-0.044	1												
Horror	0.155	-0.215	1											
Action	-0.056	-0.210	-0.123	1										
Adventure	-0.039	-0.031	-0.151	0.438	1									
Romance	-0.013	0.0201	-0.124	-0.205	-0.186	1								
Fantasy	-0.028	-0.056	0.033	0.075	0.194	-0.001	1							
Sci-Fi	0.014	-0.213	0.032	0.328	0.252	-0.114	0.064	1						
Thriller	0.091	-0.347	0.255	0.208	-0.146	-0.150	-0.137	0.111	1					
Crime	-0.029	-0.032	-0.094	0.166	-0.129	-0.101	-0.127	-0.116	0.273	1				
Musical	0.001	0.036	-0.048	-0.090	-0.072	0.028	-0.006	-0.051	-0.068	-0.049	1			
Drama	0.040	-0.257	-0.149	-0.236	-0.295	0.153	-0.113	-0.156	-0.048	0.065	0.033	1		
Critic Score	0.050	-0.043	-0.096	-0.049	0.053	-0.087	-0.088	0.017	-0.037	0.007	0.044	0.162	1	
Runtime	-0.060	-0.290	-0.200	0.176	0.060	-0.005	0.052	0.171	0.020	0.068	0.020	0.263	0.265	1

In the first column, we found that horror and thriller films have higher correlations with the ROI compared to other movie genres. On the other hand, these two movie genres and the critic scores are moderately correlated with the ROI, indicating that they have bigger effects on future financial success than other predictors. Furthermore, the correlations between all the predictor variables are only small to moderate, meaning that they have no multicollinearity. The findings match the above results in Table 6.

3.3.4. Discussion

We used the result obtained from Section 3.3.3 for further discussion.

The regression equation in Section 3.3.3 can estimate the ROI of the movie according to its genre, runtime, and critic score. However, from Table 5 above, we found that the adjusted R Square is very low, being less than 4%, indicating the actual ROI in real life has a high chance of differing from the ROI calculated using the equation. One of the major reasons is that the equation involves using dummy variables for the genre variable. With different combinations of genres for different, they will each have a different equation used to estimate their corresponding ROI. As a result, the overall plot is scattered all over the graph. Ultimately, there is a high possibility that there will be a lot of extreme values, which will heavily variate the overall result, making it difficult to estimate using one specific model.

Furthermore, from the result in Table 7 above, we concluded that "Horror", "Thriller", and "Critic Score" are the best predictors of the profitability of Hollywood movies. However, all the variables have small to moderate correlations with the ROI. This indicates that none of the variables are suitable for predicting the ROI.

4. Recommendations

We now give recommendations to the Hollywood movie studio on movie-making policy over a 1- and 5-year period.

4.1 Short-term Recommendations for the Hollywood Movie Studio

As introduced in Section 3.2, it is known from the data on the correlation analysis that the number of new cases has a positive relationship with the box office. The box office will still drop as new confirmed cases rise. Since 2012, 25 million households have canceled their cable subscriptions and switched to streaming services, which have become especially prevalent during the COVID-19 era as Americans must quarantine themselves at home (Johnson, 2021). Considering that consumers during the quarantine have more exposure to streaming services and Hollywood movie studios have begun a gradual transition to pure streaming, it seems reasonable for the Hollywood movie studio to recover and even increase their gross profit from the streaming services. Therefore, we suggest that the Hollywood movie studio should compensate for the impact of the epidemic on the box office by providing streaming services and other distribution modes.

The franchise movies we discussed above are generally big-budget movies, which a small movie studio might not be able to afford. However, there are many supplement pieces of literature suggesting methods for small movie studios to participate in a big-budget production project. One of them is co-financing. Co-financing is a term in the film industry used to describe a film in which production costs and revenue are shared among multiple companies. Cofinancing is an effective risk management tool, allowing studios to reduce exposure to risky films and invest in more big-budget films (Goettler & Leslie, 2005). The recent pandemic risks that movie studios have faced also make it reasonable for them to seek co-financing to mitigate their risks. Therefore, we suggest that the Hollywood movie studio can take co-financing to reduce financial risks when making films.

4.2 Long-term Recommendations for the Hollywood Movie Studio

As discussed in Section 3.1, franchising is a notable factor, and franchise movies have a higher return on investment. Furthermore, in Section 3.1.2, we also found that horror and thriller films have been popular over the past few decades. Therefore, when the Hollywood movie studio makes movies in the future, it is recommended to consider making more horror and thriller franchised movies.

Also, we noted that big-budget films gain from higher release intensities in peak season than independent films. For example, an average big-budget movie with a pre-release advertising budget of $18 million can generate approximately an additional $2.4 million in revenue (i.e., 2.5% of the median total revenue for the movie studio) during the peak season (Ma et al., 2018). Moreover, the budget strongly correlates to the movie's box office gross (Stephen, 2019). Investing a higher budget in making a movie will result in higher box office gross because the budget of the movie includes costs on special effects and salaries, etc., which will improve the quality of the movie and give the audience a better viewing experience. Therefore, we recommend that the Hollywood movie studio should invest more budget in peak season when making movies.

Furthermore, events long after the screening of a movie can affect earnings. The most apparent event is when a film wins an award or nomination like an Oscar. For films released in more than ten theaters, the gross might increase by about 30% with each Oscar nomination (Simonoff & Sparrow, 2000). Therefore, we recommend that the Hollywood movie studio invest more budget in peak season when making movies and improve the quality of the movies to win an award or nomination.

In addition, star power can also affect the financial return of movies. Stars nowadays play a critical role when dealing with the caprice of the movie industry. Stars can use their influence to attract fans to watch movies, increasing viewership and box office. Movies without stars have a higher chance of extreme disasters, such as losing more than 95 million dollars (De Vany & Walls, 2004; Karniouchina, 2011). Therefore, we suggest the Hollywood movie studio invites stars to appear in the movie.

5. Conclusions

In our analysis above, we analyzed many Hollywood movies and related literature launched in the world market to help the Hollywood movie studio decide their film-making policy. Then, we conducted data analysis to assess the key factors that determine the profitability of Hollywood movies in the world market. We evaluated the profitability of different Hollywood movies by calculating ROI. We discovered that horror and thriller franchised films have a high return on investment. Moreover, through correlation analysis, the impact of the COVID-19 situation on the

film revenue cap is positive but limited. Using multiple linear regression, we eventually found that "Horror", "Thriller", and "Critic Score" are the best predictors of the profitability of Hollywood movies. Meanwhile, all the variables have small to moderate correlations with the ROI, which indicated that none of the variables are suitable for predicting the ROI. Based on our analysis, in the short term, we recommend that the Hollywood movie studio responds to the impact of the pandemic by offering streaming services. Meanwhile, the Hollywood movie studio can seek co-financing to mitigate its financial risks. In the long term, we recommend that the Hollywood movie studio should consider producing more horror and thriller franchises, increase their budgets during peak seasons, strive to win awards or nominations, and invite stars to appear in the movie.

6. References

Bae, J., & Kim, B. D. (2013). Is the electronic word of mouth effect always positive on the movie?. Academy of Marketing Studies Journal, 17(1), 61.

Bozdogan, Y. (2013). The determinants of box office revenue: a case based study: thirty, low budget, highest ROI films vs. thirty, big budget, highest grossing Hollywood films (No. dumas-00909948).

Chen, A. W. (2018). A statistical analysis of gross revenue in movie industry. International Journal of Business Management and Economic Research (IJBMER), 9(3), 1276-1280.

De Vany, A. S., & Walls, W. D. (2004). Motion picture profit, the stable Paretian hypothesis, and the curse of the superstar. *Journal of Economic Dynamics & Control*, *28*(6), 1035–1057. https://doi.org/10.1016/s0165-1889(03)00065-4

Goettler, R.L. and Leslie, P. (2005), Cofinancing to Manage Risk in the Motion Picture Industry. Journal of Economics & Management Strategy, 14: 231-261. https://doi.org/10.1111/j.1530-9134.2005.00041.x

Hennig-Thurau, T., Houston, M. B., & Walsh, G. (2007). Determinants of motion picture box office and profitability: an interrelationship approach. *Review of Managerial Science*, *1*(1), 65–92. https://doi.org/10.1007/s11846-007-0003-9v

Johnson, M., Jr. (2021). Hollywood survival strategies in the post-COVID 19 era. *Humanities and Social Sciences Communications*, *8*(1). https://doi.org/10.1057/s41599-021-00776-z

Karniouchina, E. V. (2011). Impact of star and movie buzz on motion picture distribution and box office revenue. *International Journal of Research in Marketing*, *28*(1), 62–74. https://doi.org/10.1016/j.ijresmar.2010.10.001

Kaplan, R. M., & Milstein, A. (2021). Influence of a COVID-19 vaccine's effectiveness and safety profile on vaccination acceptance. Proceedings of the National Academy of Sciences, 118(10).

Ma, J., Huang, D., Markovitch, D. G., & Ratchford, B. (2018). High or low season?: Contrasting launch timing considerations for big-budget and low-budget entertainment products. *European Journal of Marketing*, *52*(9/10), 1956–1980. https://doi.org/10.1108/ejm-08-2017-0513

Pokorny, M., Miskell, P., & Sedgwick, J. (2019). Managing uncertainty in creative industries: Film sequels and Hollywood's profitability, 1988–2015. *Competition & Change*, *23*(1), 23–46. https://doi.org/10.1177/1024529418797302

Simonoff, J. S., & Sparrow, I. R. (2000). Predicting movie grosses: Winners and losers, blockbusters and sleepers. *Chance (New York, N.Y.)*, *13*(3), 15–24. https://doi.org/10.1080/09332480.2000.10542216

Stephen, F. (2019, July 22). Is a movie's box office gross connected to its budget? https://stephenfollows.com/is-a-movies-box-office-gross-connected-to-its-budget/