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EE489: Seminar in Industrial Economics

The Determinants of Box Office Revenue

: The Case of Thailand

Presents

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This paper contributes to the study on the determinant of Thailand's box office revenue. Most of the previous researches were conducted on the USA film's environment due to the availability of sample and information. This research duplicates the model of previous studies and applied to Thailand's case to examine whether the same condition lies within the different market environment. The study is projected to give the results that could be explained by the movie's genre, franchise, nationality, and others. Providing the information for both Thailand's data and World's data, the result can show and compare the effect on both markets and offer the current insights.

Introduction

Movie industry is one of important industries that drives the economy in the current world. The great players in the industry get recognized worldwide, like Hollywood for the production, or Oscar for awards. Many countries have been trying to promote their industry to improve both the economy and standard of living in the aspect of entertainment.

Thailand is also one of the country that tries to promote the industry with the support of government and internal entrepreneurs. Despite having the duopoly structure with only two major movie theatre owners, Major Cineplex and SF Cinema, owning over 80% of the market share, the country still has decent variety of movies screened and cheaper average ticket price comparing to other countries. During 2017, with only 3 main theatre owners including the other independent owners, Thailand has screened the total of 204 movies with an average of \$5.2 ticket price (BoxOfficeMojo). Meanwhile, Japan and Singapore have screened the total of 185 and 99 movies with 3 and 6 owners with average of \$12.7 and \$7.5 ticket price respectively.

In spite of all the supports for the industry to grow, there are only small amount of the studies on the industry applied in Thailand's environment. Even though there were studies on the industry, most of them were conducted in the US environment where the data can be collected easily. Most of the studies that conducted in Thailand were also in the consumer side. Only few chose to study on the product side. This is an interesting issue and makes the author decides to conduct the study on the product side based on the model from previous research papers. Since the data from worldwide box office are also available, the model emphasize on the determinants of worldwide box office will also be conducted for comparison to the Thailand's determinant.

The study based on numbers of hypotheses. The fact that there are several studies on the international market but not in Thailand built up these hypotheses. Based on the previous

literature, the study is conducted to test whether the factors determined box office internationally are significant in Thailand case or not, like genre, franchise, budget, actor and director factor, and online rating score. Moreover, previous studies suggested that the industry has its own peak period where there will be increase in demand for certain time like Christmas or 4th of April. To adapt the theory to Thailand's case, the study is to find that whether the market has peak period on the school break period, during April, May, and October, where there are supposed to be the increase in demand in certain period.

The article is structured as follows. Section 1 introduced the idea and scope of the study while stating the main questions and hypotheses. Section 2 consists of a literature review that will synthesize and analyze the existing researches examining the variables that could determine the box office revenue. Section 3 sets out the research methodology by defining the sample, the collection method, the dependent and independent variables, and the specification models. Section 4 contains a discussion on the key research findings according to the data and method that applied. Lastly, section 5 concludes with a summary of the main findings conclusions, and limitations.

Literature Review

Across the globe, there are numbers of researches on the determinations of box office, however it was not popular until the modern day. It begins with Litman and his research against the conventional wisdom of the world. As he was inspired on his researched in 1983 from the quote "No one, absolutely no one can tell you what a film is going to do in the marketplace", said by Jack Joseph Valenti, Former MPAA President. The quote ignited the study in determinants of the box office to proves that the statement is wrong. From Litman's initial study,

many of researchers developed the paper into their own specific interest that would improve the explanation of the movie industry.

Litman's 1983 study was the first study on a multiple regression model in an attempt to predict the financial success of films in US environment. He included movie genre, MPAA rating, superstar in the cast, production costs, release company, Academy Awards, and release date as the independent variables in his study. The results show that production costs, reviews from critics, genre, holiday release, and Academy Award are all significant determinants of the success of a theatrical movie. His model was then use as a guideline to come up with determinant of the box office revenue for further researches, including this paper.

Apart from Litman, many has contributed research on specific variables in order to emphasize the effect on the micro level. Terry N. and others' research on 2016 emphasize the effect of movie sequel to the box office revenue in USA. The research found that the movie sequel has positively correlated significant results to the dependent variable. In his support, he also strengthened the argument with the rationale of the movie sequel. He explained that the role of movie sequel is to capitalize the success of the parent films. Not only the effect on the films, movies with sequel also frequently found to have effect on people's lifestyle since there will be merchandises and related products released to capitalize the franchise. The bond between the franchise and the people then creates the loyal audience, that the franchise has and will ensure a level of sales in the next sequel. Moreover, the franchise would create a reputation, so that the sequel would spend less marketing cost in order to introduces itself into the market. Consequently, there are more of franchise movies coming out nowadays than in the past since it is safer and more profitable to the movie producers. The explanation is well explained that it could also potentially applied to the Thailand case.

Einav L. also developed and found the results on his 2007 study about the seasonality in US environment. The author observes by estimating weekly demand for movies, using movie fixed effects, a long panel of movies' weekly revenues, and restrictions on their decay pattern, using the dataset from all released movies in USA between 1985 - 1999. Results showed that there was peak period in the movie industry in certain period of time like the national holidays, Fourth of July, Christmas, and Thanksgiving. This is due to the increase in overall demand from an amplification effect and dampening effect. With the same characteristic, the effects could also occur in Thailand's market. This suggest that from the yearly period, there might be certain peak period for the film industry to observe even though it might not be the same period as the US market.

Even a small detail like film rating by MPAA could also be controversial in the issue of determining the box office revenue. Sawhney and Eliashberg studied on the issue and developed a model that could break customer's decision into time-to-decide and time-to-act in their 1996 work. The result showed that the movie with restricted rating (R) by MPAA performed the worst among all due to higher time-to-act but have longer time-to-decide comparing to others. However, Litman's study in 1986 found no significant correlation between the MPAA rating and the determinant in box office revenue. Nevertheless, both of the studies are based on the US samples and environment. Adapting the model into Thailand's environment could give the different results.

Methodology

This study aims to cover the factors that affect the box office revenue in Thailand. The fact that Thailand has no central officials for the data makes the data collection process harder to be done. Since the author tries to emphasize on the current trend of the movie industry, the data that is analyzed would be the latest possible data. With the time limitation, the author could only collect the data for movies that was filmed in Thailand in 2017 offered by www.boxofficemojo.com.

The main sources of data for this study are the website boxofficemojo.com, IMDB, and the-numbers.com. The boxofficemojo.com contains the data for gross Thailand and worldwide box office revenue for year 2017 in the total of 204 movies, the release date, MPAA rating, actor, director, number of franchise, budget, and runtime. Since over 40% of movies in Thailand are non-US movies and the boxofficemojo.com site's data are US oriented, there would be some missing data that are needed to be filled. IMDB is a globally reliable site and could provide some of the missing data, including the IMDB online rating. The-number.com provides the information of the movie's nationality based on the producing company of the movies. Additional information is from Wikipedia of individual movies and nangdee.com.

Despite the total of 204 samples, only 132 movies will be chosen to analyze in the model. Some movies that were not widely known would not contain the online rating score and production cost information. Due to the data collection obstacle, that some has missing information, the regression analysis will omit the samples automatically. This is to ensure the accuracy among the model.

The specification of the empirical model that the author uses for analyzing the determinants of box office revenue in Thailand via regression analysis is below:

$$GrossTH = \beta_0 + \beta_1 MPAA + \sum_{i=1}^{10} \gamma_i Genre_i + \beta_{13} Nation + \beta_{14} Award + \beta_{15} Act + \beta_{16} Dir + \beta_{17} Franchise + \beta_{18} Budget + \beta_{19} IMDB + \beta_{20} Time + \beta_{21} Break + \varepsilon \quad \text{---- (1)}$$

Where $GrossTH$ is Thailand's 2017 domestic box office in US dollar. $MPAA$ is categorical variable for movie rating, it is PG for generally friendly will be noted as 1, PG-13 if contains mild violence and need guidance will be noted as 2, and R if it contains violence and restricted some audience will be noted as 3. $Genre_i$ includes genre dummy variables, including Action, Adventure, Animation, Comedy, Drama, Fantasy, Horror, Romance, Sci-Fi, Thriller, and Documentary. The dummy will be noted as 1 if the movie contains the genre. $Nation$ is a categorical variable representing movie's nationality based on its production company, it will be noted as 1 if it is Asian movies (excluding Thailand), 2 if it is European movie, 3 if it is other foreign movie, 4 if it is US movies, and 5 if it is Thai movie. $Award$ is a categorical variable representing the awarded or nominated film. Act is a categorical variable representing whether the movie contains awarded or nominated leading actor. Dir is a categorical variable representing whether the movie contains awarded or nominated director. $Franchise$ is number of franchise, sequels and prequels, that the movie has. $Budget$ is the estimated cost of production in million US dollar. $IMDB$ is the IMDB online rating score out of 10 with 1 decimal point. $Time$ is the movie runtime in minute. $Break$ is the categorical variable representing the release date in semester break period, April, May, and October.

Another specification that the author uses to explain the determinations of box office revenue in Thailand is to transform the equation (1) into the natural log form to explain the rate of change. The specification is written as below:

$$\ln(GrossTH) = \beta_0 + \beta_1 MPAA + \sum_{i=1}^{10} \gamma_i Genre_i + \beta_{13} Nation + \beta_{14} Award + \beta_{15} Act + \beta_{16} Dir + \beta_{17} \ln(Franchise) + \beta_{18} \ln(Budget) + \beta_{19} \ln(IMDB) + \beta_{20} \ln(Time) + \beta_{21} Break + \varepsilon \quad \text{---- (2)}$$

Where the variables are similar to the first equation, but the natural log transformation could tell the rate of change in percentages. Moreover, with such model that there are many dummy variables, the natural log model could increase the accuracy of the correlation explanations between variables.

Since the data retrieved also include the worldwide box office revenue, the comparison between the model of Thailand and the world could be done. With the same specification except the dependent variable to change from Thailand's box office revenue into worldwide box office revenue, the model could show the worldwide box office determinant in the following equation:

$$GrossWW = \beta_0 + \beta_1 MPAA + \sum_{i=1}^{10} \gamma_i Genre_i + \beta_{13} Nation + \beta_{14} Award + \beta_{15} Act + \beta_{16} Dir + \beta_{17} Franchise + \beta_{18} Budget + \beta_{19} IMDB + \beta_{20} Time + \beta_{21} Break + \varepsilon \quad \text{---- (3)}$$

As well as the equation (2), equation (3) could also apply the natural log form to explain the rate of change. The equation can be written as below:

$$\ln(GrossWW) = \beta_0 + \beta_1 MPAA + \sum_{i=1}^{10} \gamma_i Genre_i + \beta_{13} Nation + \beta_{14} Award + \beta_{15} Act + \beta_{16} Dir + \beta_{17} \ln(Franchise) + \beta_{18} \ln(Budget) + \beta_{19} \ln(IMDB) + \beta_{20} \ln(Time) + \beta_{21} Break + \varepsilon \quad \text{----(4)}$$

Results

Appendix 1 presents descriptive statistics for the model variables. The average box office revenue in Thailand is approximately \$993 thousands, with the maximum of \$9.3 million (The Fate of the Furious). Professor Marston & the Wonder Women was the film with lowest revenue with only \$2,937. The budget is averaged at \$56.93 million, while Justice League (2017) has the largest estimated cost at \$300 million, and Siam Square (2017) has spent the least on production cost with only estimated \$300,000. The movie runtime average is 114 minutes and IMDB rating average is at 6.58 score.

The averages in the dummy variables show their distribution in the sample set. The table shows that there are 17% of movies that are rated as PG, 44% rated as PG-13, and 39% that are rated as R. For the genre variables where one movie could contain more than one genre, the sum of the distribution could be above 100%. Genre that were introduced to Thailand the most is action movie with 32% (total of 42 movies), while documentary is the least with only 3% of the movie (total of 4 movies). For the nationality of the movies, it shows most of the movies are from USA with 81% (total of 107 movies), while the least nation introduced are from foreign (nations other than Asian, Europe, and USA) movies with only 2% (total of 3 movies). Lastly, the table shows that only 18% of the movies are released during the school break period (total of 24 movies).

Table 1: Regression Results

	(1) GrossTH	(2) GrossTH_log	(3) GrossWW	(4) GrossWW_log
1.MPAA	0 (.)	0 (.)	0 (.)	0 (.)
2.MPAA	413079.5 (1.30)	0.166 (0.32)	-81217069.3 (-1.21)	-0.154 (-0.33)
3.MPAA	105431.7 (0.36)	-0.351 (-0.66)	-131983641.6* (-2.01)	-0.868* (-2.05)
Action	315512.2 (1.36)	0.619* (2.01)	21607180.8 (0.52)	-0.0838 (-0.28)
Adventure	-279323.2 (-0.51)	0.545 (1.46)	-94508789.1 (-1.29)	0.0477 (0.11)
Animation	-443244.3 (-0.99)	-0.120 (-0.16)	-33821492.1 (-0.33)	0.459 (0.67)
Comedy	-230352.2 (-0.88)	-0.106 (-0.25)	-29950809.8 (-0.54)	0.776 (1.84)

Drama	-166304.7 (-0.65)	-0.522 (-1.34)	-67385332.3 (-1.20)	-0.0840 (-0.23)
Fantasy	145596.4 (0.33)	0.434 (0.85)	109305645.3 (0.64)	-0.467 (-0.85)
Horror	-48628.1 (-0.18)	0.993* (2.46)	59395188.4 (0.97)	1.052* (2.00)
Romance	-196521.0 (-0.60)	1.306** (2.77)	119134612.0 (0.96)	1.123 (1.85)
SciFi	-254063.0 (-0.61)	0.800* (2.25)	-77659190.7 (-1.17)	-0.244 (-0.59)
Thriller	-52195.1 (-0.28)	0.0725 (0.20)	-15060100.6 (-0.40)	0.0753 (0.19)
Documentary	-154494.7 (-0.34)	-0.0102 (-0.01)	-99068432.4 (-1.06)	-0.100 (-0.14)
1.Nation	0 (.)	0 (.)	0 (.)	0 (.)
2.Nation	765297.6* (2.20)	-0.278 (-0.41)	-128078928.8 (-1.09)	-2.299*** (-3.42)
3.Nation	639310.2* (2.27)	1.587* (2.22)	-65207493.8 (-0.53)	-0.186 (-0.31)
4.Nation	571946.6* (2.23)	0.676 (1.28)	-71239621.0 (-0.64)	-0.588 (-1.18)
5.Nation	2026849.9** (2.76)	5.266*** (5.47)	-88071516.4 (-0.65)	-1.282 (-1.01)
Award	301019.3 (1.52)	0.513 (1.46)	63836967.2 (1.74)	0.565 (1.22)
Act	349978.7 (0.87)	1.423* (2.07)	39490196.0 (0.81)	0.243 (0.35)
Dir	135663.8 (0.45)	0.230 (0.69)	23458067.3 (0.40)	1.389 (1.87)

Franchise	265446.2*** (5.27)		32120360.5*** (4.22)	
Budget	10960.0** (3.18)		2222316.6*** (4.87)	
IMDB	53119.0 (0.63)		42043703.3** (2.75)	
Time	2097.4 (0.34)		-57401.4 (-0.04)	
Break	127780.0 (0.46)	-0.120 (-0.39)	-14916855.7 (-0.31)	-0.209 (-0.52)
Franchise_log		0.497** (3.20)		0.580*** (3.49)
Budget_log		0.653*** (3.96)		0.699*** (4.24)
IMDB_log		2.171* (2.31)		2.842* (2.43)
Time_log		-1.516 (-1.37)		0.159 (0.13)
_cons	-2287641.3* (-2.62)	10.06* (2.11)	-167987041.3 (-0.85)	8.318 (1.63)
<i>N</i>	132	132	132	132
adj. <i>R</i> ²	0.719	0.619	0.629	0.656

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 1 column 1 offers the regression analysis through OLS model with the specification of model (1) in the previous section. The data set includes 132 observations and explains over 72 percent of the variance in box office revenue based on the R-square results. 3 of the variables shows statistically significant results with at least 95% confidence level, while another 3 variables show statistically significant results with 90% confidence level. Comparing in the nation category with Asian movie as a baseline, the result significantly shows that in

average, European movies will gain about \$765,000 more, foreign movies will gain \$700,000 more, US movies will gain \$570,000 more, and Thai movies will gain \$2 million more in Thai box office. Both franchise and budget variable show the statistically positive correlation with the dependent variable at 95% confidence level. It could imply that, in average, a movie with 1 more franchise will gain \$260,000 in Thailand's box office. An additional million cost of production from a movie will also, in average, gain \$10,960 more in Thailand's box office. Unfortunately, the break variable which indicates the release date of the movie during semester break period doesn't show statistically significant results through the model.

The second column offers the regression analysis through OLS model with the specification of model (2) in the previous section. The data set includes 132 observations and explains over 62 percent of the variance in box office revenue based on the R-square results. 6 of the variables shows statistically significant results with at least 95% confidence level, while another 3 variables show statistically significant results with 90% confidence level. In this model, there are some genre variables that shows statistically significant results. The result reveals that Action, Horror, Romance, and SciFi genre has statistically significant positive correlation to the dependent variables. Meaning that in average, the movie that is labeled as Action, Horror, Romance, and SciFi, could generates respectively 62%, 99%, 103%, and 80% more revenue in Thailand's box office. Comparing between the nationality, this model still holds the results of statistically significant positive correlation on the foreign and Thai movies. It can imply that, in average, foreign movie will perform financially 159% better than the Asian movies. Thai movie would also perform financially 527% better than the Asian movies. The model also suggests that the movie with nominated or awarded actor would also gain 51% more revenue in average. As well as the previous model, the franchise and budget variable are also

statistically significant positive correlation to the dependent variable. Interestingly the IMDB rating also has the statistically significant results. On average, a percentage increase in IMDB rating would give additional 217% increase in the box office revenue.

The third column offers the regression analysis through OLS model with the specification of model (3) in the previous section. The data set includes 132 observations and explains over 62 percent of the variance in box office revenue based on the R-square results. 3 of the variables shows statistically significant results with at least 95% confidence level. Apart from franchise and budget, the IMDB rating score also shows the statistically significant result. This implies that an additional franchise for a movie would, in average, increase the worldwide box office revenue variable for \$32,120,360.5. While an additional million budget would in average increase the worldwide box office revenue for \$2,222,316.6. In this model, the additional IMDB score for a movie would also in average increase the worldwide box office revenue by \$42,043,703.3. Apart from that, rate R MPAA rating is also significant with 90% confidence level among the comparing between the PG rate MPAA variable. The result shows that by rated as R, a movie would in average perform \$131,983,641.6 than the PG rate movies.

The fourth column offers the regression analysis through OLS model with the specification of model (4) in the previous section. The data set includes 132 observations and explains over 65 percent of the variance in box office revenue based on the R-square results. 3 of the variables shows statistically significant results with at least 95% confidence level, EU movies, franchise, and budget, and 3 variables with 90% confidence level, R rate movies, Horror movies, and IMDB score. Comparing to the Asian movies, excluding Thai movie, the result shows that EU movies would perform financially 229.9% more in worldwide box office. As well as the other mode, franchise and budget have the statistically positive correlation to the

worldwide box office. With 90% confidence level, movies that are labeled as R rated and horror, and the IMDB score variable has statistically significant result to the worldwide box office revenue. The result implies that if a movie is R rated, it will financially perform 86% worse than the PG rate movies. While if a movie is labeled as horror, it will in average increase the worldwide box office revenue by 105%. The IMDB score effect to the worldwide box office revenue still has the positive correlation evidence in the model.

Conclusion

To summarize the results, the study shows similar yet different results between determinants of Thailand box office and the worldwide box office. For both dependent variable, there are significant positive correlation results on the franchise and budget variable. While only Thailand has significant positive correlation results on the foreign and Thai nationality of the movies. At the same time, MPAA R Rate movies also have significant negative correlation only on the worldwide box office dependent variable. The result shows that Thailand and worldwide box office has different determinant due to the market characteristic. Most of the countries would take the R rate movies on age restriction seriously, while that might not be the case in Thailand. As well as the movie nationality. This could show that Thai consumer choose to consume foreign and Thai movies more than Asian movies, while it is inconclusive in the larger market.

Unlike the previous study, there are some of the factors that had significant effect but still inconclusive in this study. The study does not find the significant evidence on the award, actor, director, and genre variables. The assumption that the school break period is the peak period in Thai market also not valid in the study. The results disprove the study hypothesis statement of

the market has peak period on the school break period. However, the study has found the significant determinants on both Thai and worldwide box office revenue as stated.

For the future studies, it is recommended to look further in the social network factor. With the data availability and time limitation, there are difficulties in collecting and analyzing all the interesting variables that could affect the dependent variables. For example, due to the low exposure of cost of production, the samples are omitted by nearly 35% to make the regression model valid. Moreover, the current world might have more factors that influence the box office like social network factor that involve in the decision making process. These kinds of factors might not be well collected and presented at the moment so it might be interesting for further research to cover the specific variable. To make sure that there are significant number of samples to analyze, the dataset for five years is suggested.

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Appendix

APPENDIX 1

SUMMARY STATISTIC FOR BOX OFFICE REVENUE THAILAND (2017)

	Mean	Std. Dev	Max	Min
GrossWW (USD)	220,855,228.05	291,432,011.84	1,332,571,510	8,986
GrossTH (USD)	993,390.2	1,687,219	9,367,766	2,937
PG (= 1 if PG)	0.17	0.37	1	0
PG-13 (= 1 if PG-13)	0.44	0.50	1	0
R (= 1 if R)	0.39	0.49	1	0
Action (= 1 if Action)	0.32	0.47	1	0
Adventure (= 1 if Adventure)	0.12	0.33	1	0
Animation (= 1 if Animation)	0.09	0.29	1	0
Comedy (= 1 if Comedy)	0.15	0.36	1	0
Drama (= 1 if Drama)	0.25	0.43	1	0
Fantasy (= 1 if Fantasy)	0.04	0.19	1	0
Horror (= 1 if Horror)	0.11	0.32	1	0
Romance (= 1 if Romance)	0.02	0.15	1	0
Sci-Fi (= 1 if Sci-Fi)	0.12	0.33	1	0
Thriller (= 1 if Thriller)	0.13	0.34	1	0
Documentary (= 1 if Documentary)	0.03	0.17	1	0
Asian (= 1 if Asian)	0.05	0.22	1	0
EU (= 1 if EU)	0.08	0.27	1	0
Foreign (= 1 if Foreign)	0.02	0.15	1	0
USA (= 1 if USA)	0.81	0.39	1	0
Thai (= 1 if Thai)	0.04	0.19	1	0
Award (= 1 if Awarded or nominated)	0.84	0.37	1	0
Actor (= 1 if Awarded or nominated)	0.95	0.21	1	0
Director (= 1 if Awarded or nominated)	0.92	0.27	1	0
Franchise (Number of franchise)	2.23	3.12	18	1
Budget (million USD)	56.93	62.05	300	0.3
IMDB Rating (Score out of 10)	6.58	0.97	8.5	3.1
Runtime (minutes)	114.27	16.72	163	79
Break (= 1 if released during break period)	0.18	0.39	1	0