THE EFFECT OF STAR POWER ON MOVIE SUCCESS: EVIDENCE FROM THE KAZAKH CINEMA INDUSTRY

by

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ABSTRACT

This paper studies the relationship between "star power" and movie success using the novel weekly box-office revenue data for Kazakhstan. We focus on an often overlooked problem of competition between movie casts by employing a fixed-effect model as the base model. Our main contribution consists of using a new measure for star power of competing movies and analyzing its effect under different model extensions. We also perform a robustness check of the main findings. The results show that the star power of competing casts has a statistically significant negative effect on box-office revenue of a movie. This paper contributes to existing research on star power and competition.

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1. Introduction

The film production is a well studied industry which actively contributes to the world economy. In 2016, the global box office for full-length movies reached 38.6 billion US dollars (MPAA, 2016). The Kazakh film-making industry has also undergone a significant development during the last decade. This sector has gained government attention and film studios have set up an ambitious target to produce 100 films a year (Nur.kz, 2014). At the same time, online media platforms are transforming the acting career in Kazakhstan[1]. It is now common for "Instagram generation" to cast in movies or even direct their own films (Informburo.kz, 2017). The freshly-minted stars heavily rely on their established fanbase for boxoffice success.

But what kind of impact celebrities have on box-office performance and how do they stand out from competition? The main goal of this paper is to find the impact of celebrity competition on film revenue using the novel weekly data for Kazakhstan. Several models are developed to study the power of celebrities in competing films. The preliminary results show that competing against films with strong casting negatively affects a movie's revenue. A better understanding of star power could help film studios to hire the right cast and cinema theaters to have the best movie lineup during the busiest holiday seasons. The study contributes to research on star power, weekly competition of movies, and film industry in CIS[2] region.

1.1 Literature Review

There is not a lot of studies both on star power effect and movie revenue competition. Quite a few studies specifically focused on star power and the link between

[1]Many young media stars have achieved mass popularity via online websites like Instagram and YouTube in relatively short time

[2]Commonwealth of Independent States

casting of popular actors and box office success. For example, Elberse (2007) used a high accuracy online market simulation[3] and found evidence that acting talent does affect theatrical revenues. On the other hand, the study by Treme (2010) looked into popularity or "celebrity" status of actors and its importance. Treme found that namely the long-term media popularity of actors and not their promotional efforts significantly affects box-office success. Carrillat et al. (2017) performed a meta-analysis of 150 studies and concluded that both popularity and artistic recognition of cast influence the commercial success of movies, but neither succeed in being a stronger predictor than another. Moreover, they anticipate that stars' influence on box-office weakens over time because of the "fading star power" effect.

The research which covers movie competition does not focus on the competition of stars or celebrity power of cast. Simonoff and Sparrow (2000) mention that high budget movies with strong cast are more likely to avoid direct competition with other blockbusters and leak their own release dates on purpose (a tactic to scare off competitors). Chintagunta et al. (2010) looked at how online user reviews affect the box-office performance in different markets. They controlled for competition and created a variable for average star power of competing movies. However, they were not focused on the variable and assumed its exogeneity without further analysis. And Legoux et al. (2016) examined weekly survival rates of movies in cinema. The research includes weekly competition (the number of new releases for a given week) as one of the factors affecting a movie runtime in theaters. The results suggest that total weekly competition negatively impacts a movie survival but local theater-level competition has the positive effect on the survival of a movie. Interestingly, the authors pointed out that the protective effect of critical reviews quickly declines when competition increases during the busy seasons.

Furthermore, most of the film industry literature is based on the data about North America. There are limited studies about box office performance outside of the United States. Terry et al. (2009) found that US domestic performance is a good predictor

[3]Hollywood Stock Exchange where players predicted box office revenues

of foreign box office sales. The study re-confirms the competitiveness of Hollywood movies abroad. Fetscherin (2010) studied the Indian film industry (Bollywood) but still focused on the box office sales data in the UK and US. In contrast, Fetcherin's conclusion was that movie success factors are likely to be regional or national rather than global. The few works which investigate regional markets include box office revenues in Republic of Korea (Song and Han, 2013), Russia (Pedyash, 2013), Italy (Boccardelli et al., 2015), Poland (Gmerek, 2015), and recently the European Union (Dvorakova, 2017). The shared outcome of these studies suggests that different countries prefer different movie genres. For example, premiering action movies in Korea and comedy films in Poland increased the box office numbers. Finally, there is no similar academic work about the modern movie industry in Kazakhstan except the few reports by research agencies.

2. Specifics of Kazakh Movie Industry

2.1 Background and growth

The film-making and movie theater industries in Kazakhstan are under rapid development. There is a noticeable increase in both the number of domestic movies released and the number of financially successful films in the last 10 years. For example, in 2008 there were 77 movie theaters and the number of domestic films produced was 4 (Brod.kz, 2013). Now in 2017, there are 94 theaters which complete around 580 thousand movie sessions every year (Energyprom.kz, 2017). The average domestic film production rate has reached 12 movies per year (Inform.kz, 2017).

The cinema audience is growing and more people are interested in Kazakh films (an absolute record of 14,47 million cinema visits was recorded in 2016) (Energyprom.kz, 2018). According to the same source, 62.4% of the visitors watched Hollywood-based movies, 10.5% preferred Russian movies, and 9.3% watched Kazakh films[1]. The share of domestic titles in total box office revenue increased from 6% in 2016 to 13% in 2017. This positive trend is also somewhat supported by the fact that there are now several successful movie franchises with sequels that have outperformed their predecessors in box office.

2.2 The role of government

However, the industry has been largely overlooked by the government. Many independent studios struggle to attract steady investments and remain vulnerable to business cycle factors. For example, after the financial crisis of 2015, the number of film studios decreased from 35 to 26 (Energyprom.kz, 2017). Additionally, local film

[1]Kazakh films accounted for 11% of all movie premieres

studios have to compete for prime-time cinema screens with Hollywood blockbusters and numerous Russian films [2].

Currently, Kazakhfilm is the only film studio financially supported by the government. As a result, it has a monopoly on high-budget historic movies and documentaries. The latest government plan is to fully commit to developing the industry and helping the small independent movie studios. The new film industry law intends to give tax breaks and subsidies to film studios, collect no sales taxes from cinema theaters, and secure quotas for prime-time sessions in cinema theaters for Kazakh films (Currenttime.tv, 2017).

[2]For comparison, domestic movie industry in Russia is strongly supported by the government through various subsidies and protective measures. As a result, Russian film studios have produced 82 films in 2014, 123 films in 2015, and 136 films in 2016. It is estimated that since 2009, more than 50% of production costs of all movies was covered by the Russian government. The average growth in box office revenues is expected to be 6% until 2020. (Sedyh, 2017)

3. Methodology

3.1 Data

The core data used in this study was downloaded from the local movie portal Brod.kz using a web crawler. The dataset contains weekly[1] box office revenue in national currency (KZT) for 546 movies that were shown in Kazakhstan between June 20, 2016 and February 11, 2018. The box office numbers from Brod.kz are restricted to commercial cinema theaters that are connected to the comScore/Rentrak ticketing system[2]. Therefore, while this data has accurate sales figures, it does not contain total box-office figures for Kazakhstan. Still, it is reasonable to assume that the revenue numbers in this data are representative of consumer movie preferences.

The primary dataset was combined with movie meta information from another local cinema website Kino.kz. The collected data includes details like release date, runtime, genre, audience ratings, list of actors, distributor in the region, country of production, and user ratings. Both datasets were stored in a single relational database. After removing movie re-runs from the database, the final dataset consists of 537 movie titles that produce a panel data of 2,132 observations in 84 week period[3].

Table 3.1 displays the breakdown of movies in the dataset by country of production. Russian films account for 15% and Kazakh films represent only 6.2% of all movies run in theaters during the 84 week period. Hollywood has produced more than 60% of the remaining movies. Another large set of foreign movies were from France and the United Kingdom. This means that for large periods of time only few Kazakh movies present in theater lineups.

[1]Monday to Sunday

[2]These are Chaplin Cinemas, Star Cinema, and Arsenal chains which are primarily located in Almaty and Astana. The two biggest cities represent 57% of all movie sessions in the country. The largest theater chain Kinopark and other smaller cinemas are not connected to comScore system.

[3]Unfortunately, box office data is absent for 2 weeks in November 2017

Country	Count	(%)
Kazakhstan	33	6.2
Russia	81	15
Other	423	78.8
Total	537	100

Table 3.1.
Movies by country of production.

To analyze star power of competing movies, three new variables were created for each observation: star power, competing star power, and the number of weeks passed after release date (WAR)[4]. Adopting a similar definition to one created by Treme (2010), actor's star power measure (or popularity status) is the number of mentions in the top 2 domestic news and celebrity gossip websites[5] in Kazakhstan. The number of mentions were obtained by using Google Custom Search engine[6] for different time periods. The process was simplified by searching only for the first 6 actors in a movie. Using this method, two data points were collected for each actor (then aggregated to represent movie's total cast power): number of mentions 3 months prior to release date[7] ($STAR3$) and number of mentions 21 months prior to STAR3 ($STAR21$). Therefore, STAR21and STAR3 periods do not overlap and are needed to control the short-term publicity effect[8]. And $STAR$ is the sum of STAR21 and STAR3. Note that domestically popular celebrities have larger number of mentions than internationally recognized Hollywood actors[9].

[4]WAR is 0 during the release week

[5]Most popular websites according to the analytics service zero.kz

[6]Documentation can be accessed at
https://developers.google.com/custom-search/docs/tutorial/creatingcse

[7]This often is the promotion time of movies

[8]Treme suggests that consumers are influenced by the established popularity of actor if STAR21 is significant and STAR3 is not. Treme (2010)

[9]For example, singer Kairat Nurtas

Movie release dates are known ahead of time and many moviegoers usually watch 1 or 2 films during the same visit to cinema. Thus, the popularity of competing cast is likely to play a role when people decide what movie to see. The competing star power measure for movie i in any week is calculated by the following formula

$$CSTAR_i = \sum_{j=1, i \neq j}^{N-1} \frac{STAR_j}{2^{WAR_j}} \tag{3.1}$$

where *WAR* is weeks passed after premiere date. It sums the popularity ratios of competing movies running in theaters during the particular week. Because many films make a large portion of box-office revenue during the first few weeks, the competing star power effect should diminish as movies run longer in theaters[10]. For example, let there be three movies running in theaters this week: two movies released last week with STAR measures of 2 and 10 and one movie released this week with STAR of 4. Then the first two movies have CSTAR of 9 and 5 and the newest movie has CSTAR of 6. The same formula is used with STAR3 and STAR21 instead of STAR to calculate CSTAR3 and CSTAR21 respectively.

Because Kazakh and Russian actors are mentioned more often, the CSTAR measure may underestimate the star power of other foreign movies[11]. Therefore, three new similar weekly measures were created for each movie using the CSTAR formula above: *CSTARKAZ* to capture competing star power of only Kazakh actors, *CSTARRUS* and *CSTARFOR* to measure competing star power of Russian and other foreign actors respectively.

Table 3.2 presents a descriptive summary on variables of interest. The two top-grossing films in the dataset ("The Fate of the Furious" and "Jumanji") are action movies. This is in order with the global box-office statistics. The average survival time of a movie on theater screens is around 2.23 weeks after the release date. How-

[10]See Figure A.1 in Appendix for weekly revenue distribution

[11]Kazakh celebrities are still more popular in local media than Russian celebrities. Foreign movies in the dataset do not feature Kazakh or Russian actors, while no Kazakh movie starred actors from Russia.

ever, the outliers like “Despicable me 3” and “Moana” were in theaters for additional 17 and 13 weeks after the premiere. This might be because of the high demand for animation genre which is especially popular among adults with children. According to data, celebrities like Emma Watson, Will Smith, and Jackie Chan are highly-popular in Kazakhstan. But the cast of domestic movies with large STAR measures consists of popular Kazakh singers and comedians. Also notice that CSTARFOR is twice larger than CSTARKAZ or CSTARRUS. This might indicate that an average movie faces stronger competition from foreign actors than from Kazakh and Russian counterparts.

	Mean	SD	Min	Max
Revenue (in KZT)	5,324,010	12,832,640	1,200	156,958,250
lnRevenue (in log KZT)	13.65	2.17	7.09	18.87
WAR	2.23	2.71	0	35
STAR	10.96	28.92	0	562
CSTAR	98.04	71.48	4.72	329.37
STAR3	3.18	8.2	0	82
CSTAR3	27.41	21.35	0.62	85.75
STAR21	7.78	22.6	0	480
CSTAR21	70.63	52.9	2.83	259
CSTARKAZ	27.34	42.74	0	234.25
CSTARRUS	20.08	35.8	0	285.25
CSTARFOR	50.61	38.19	2.125	177.31

Table 3.2.
Summary of variables.

3.2 Model

The first study to find the determinants of cinema box office revenue was completed by Litman (1983) and used multiple regression model. Similarly, majority of studies on box office revenue characteristics also chose to use multiple regression models (Dvorakova, 2017) while few used three-stage least squares (Liu et al., 2013) and path analysis method (Hennig-Thurau et al., 2007). Alternative approaches include dynamic artificial neural networks by Sharda and Delen (2006) and later by Ghiassi et al. (2015) and nonlinear regression methods (machine learning algorithms) by Kim et al. (2015). Treme, who focused on celebrity power effect, employed two-stage least square technique in the two-equation structural model (Treme, 2010).

The current research is based on the example of previous multiple regression models and controls for movie and audience fixed-effects. The base empirical model is specified as:

$$lnRevenue_{it} = \alpha_1 + \alpha_2 WAR_{it} + \alpha_3 CSTAR_{it} + movie + week + year + \epsilon \tag{3.2}$$

Dependent variable $lnRevenue$ is log revenue in Kazakh tenges for movie i during week t. The log amount was used because of the skewed revenue distribution. Independent variable WAR is weeks passed after premiere and is set to 0 during the release week. $CSTAR$ is cumulative competing cast popularity that movie i faces during week t. Dummy variables $movie$, $week$, and $year$ are used to control for movie and time effects.

3.2.1 Extension 1: Including CSTAR3 and CSTAR21

$$\begin{aligned} lnRevenue_{it} = \alpha_1 + \alpha_2 WAR_{it} + \alpha_3 CSTAR3_{it} + \alpha_4 CSTAR21_{it} \\ + movie + week + year + \epsilon \end{aligned} \tag{3.3}$$

When CSTAR3 (short term promotional effort of competing movies) and CSTAR21 (long-term celebrity power of competitors) are included into the regression, both

measures negatively affect revenue but are not statistically significant. When only CSTAR21 is included, the resulting coefficient is negative and significant. This indicates that the long-term popularity of actors is more important than the short-term fame.

3.2.2 Extension 2: Including country-specific CSTAR

$$lnRevenue_{it} = \alpha_1 + \alpha_2 WAR_{it} + \alpha_3 CSTARKAZ_{it} + \alpha_4 CSTARRUS_{it} + \alpha_5 CSTARFOR_{it} + movie + week + year + \epsilon \tag{3.4}$$

This model partitions the competing star power effect according to country of production. It looks into the strength of competition from Kazakh, Russian, and other foreign actors. CSTARKAZ, CSTARRUS, and CSTARFOR all negatively affect a movie's box-office revenue, but only the coefficient of CSTARKAZ is significant. The regression results for the base model and its two extensions are presented in Table A.1 in Appendix.

3.2.3 Extension 3: CSTAR variance by genre

$$lnRevenue_{it} = \alpha_1 + \alpha_2 WAR_{it} + (\alpha_3 + \alpha_4 comedy + \alpha_5 thriller + \alpha_6 action + \alpha_7 scifi + \alpha_8 animation + \alpha_9 drama) \cdot CSTARKAZ_{it} + movie + week + year + \epsilon \tag{3.5}$$

The goal of this model is to see how the competing star power effect varies depending on a movie genre through interaction variables. Movies in the dataset were categorized into 7 exclusive genres (comedy, thriller, science fiction, drama, action, animation, musical). Dummy variables were created for each genre and the musical film genre was used as the reference category (it was not included in the model). The results suggest that the negative effect of CSTARKAZ on box-office revenue varies a

little between genres, but it is strongest for action movies. The regression results of Extension 3 are presented in Table A.2 in Appendix.

3.2.4 Extension 4: Including STAR

$$lnRevenue_i = \alpha_1 + \alpha_2 STAR_i + \alpha_4 CSTARKAZ_i + comedy + thriller + action + scifi + animation + drama + week + year + \epsilon \tag{3.6}$$

This model analyzes the star effect (popularity effect of actors) and uses only the release week data on films. WAR variable and movie dummies were dropped from the model, but CSTARKAZ is the same that was used in Extension 2 and 3. We include dummy variables for genres and the omitted category is again musical. The resulting coefficient of STAR is positive and significant which reconfirms the findings of previous research on star power effect. During the release week, CSTAR effect is strongest for drama genre and weakest for animation movies. The regression results are presented in Table A.3 in Appendix.

3.2.5 Robustness

The robustness check of competing star power effect was performed by repeating the analysis of base model under modified CSTAR measure formula. In particular, in Equation 3.1, the denominator was changed from 2 to 1.5 and 3. This change allows us to check the sensitivity of CSTAR measure to discount rates. The choice of denominator results in less than 0.5% difference in CSTAR coefficient. We can conclude that the main findings of CSTAR are robust to changes in the assumptions. The analysis results are presented in Table A.4 in Appendix.

3.3 Results

Table A.1 in Appendix presents the results that were obtained after running all models in STATA 13 software using fixed-effects regression. As expected, the results show that box-office revenue of a movie decreases sharply for each additional week after the release date. The resulting CSTAR coefficient indicates that the competing celebrity power has negative effect on a movie's revenue.

The base model suggests that an additional increase in popularity measure of actors casted in competing movies slightly reduces the box office. For a mean number of CSTAR and CSTAR21, average revenues decrease by approximately 21.6% and 18.4% respectively. When the short-term promotional effect CSTAR3 was introduced to the model, the effect was still negative, although CSTAR3 and CSTAR21 were not significant. It is the long-term established popularity of competing cast that plays a larger role in revenue rivalry between movies. This is similar to the conclusion achieved by Treme (2010) on celebrity exposure. Furthermore, the results show that Kazakh actors are strong competitors. For a mean value of CSTARKAZ (star power of competing Kazakh movies) box office performance decreases by approximately 9%. For average values of CSTARRUS (Russian movies) and CSTARFOR (other foreign movies), the revenues reduce by only 3% and 7.7% respectively.

The analysis of genres indicate that, in the long term, there is little variance in competing star power effect due to film genre. However, drama and thriller movies are likely to lose more from the competition during the opening week than any other genre. Finally, the finding of positive star power effect reconfirms the results of previous research.

The analysis also showed that there is a statistically significant seasonality effect. The most profitable period for movies is the time between August and December. The least profitable time is during the months of February-May. Interestingly, most Kazakh films avoided summer release and premiered between the months of September-December and March-May.

4. Discussion

The past research completed on star power effect show that both artistic talent and media exposure of actors have statistically significant effect on box-office success. However, the authors often overlook the importance of competition between films. The analysis of weekly movie box-office revenues spanning almost two years determined that competing against films with a strong cast has a statistically significant negative effect on a movie's revenue. Although the underlying idea is not surprising, the new results contribute to few studies which focused on competition in movie industry. We also conclude that the long-term popularity of actors is more important to moviegoers. The nature of this research could be of value to both theater owners and film studios that face competition from abroad.

This paper employed a fixed-effect model with panel data and can be extended in several ways. The future works can enhance this study by performing market-specific analysis, use larger time periods, and experiment with celebrity measure variations. Finally, it should be noted that the employed methodology has its limitations[1]. The resulting estimators provide a good snapshot of the complex relationship between factors affecting box office revenues but do not imply causality.

[1]For example, the distribution of actors across movies might not be random which raises endogeneity concerns.

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APPENDICES

A. Tables and Figures

Table A.1.
Regression results

	Coefficient (t-statistic)					
	Base Model		Extension 1		Extension 2	
WAR	-0.849	$(-11.75)^{***}$	-0.849	$(-11.75)^{***}$	-0.849	$(-11.72)^{***}$
CSTAR	-0.002	$(-2.37)^{*}$	-	-	-	-
CSTAR3	-	-	-0.005	(-1.2)	-	-
CSTAR21	-	-	-0.001	$(-.62)$	-	-
CSTAR21^{+}	-	-	-0.002	$(-2.18)^{*}$	-	-
CSTARKAZ	-	-	-	-	-0.003	$(-2.21)^{*}$
CSTARRUS	-	-	-	-	-0.001	(-1.06)
CSTARFOR	-	-	-	-	-0.001	(-1.00)
Intercept	18.32	$(37.31)^{***}$	18.29	$(37.14)^{***}$	18.30	$(37.19)^{***}$
$R-square$		0.79		0.79		0.79
Observations		2132		2132		2132

*p<0.05 **p<0.01 ***p<0.001

$^{+}$Without CSTAR3

Table A.2.
Regression result

	Coefficient (t-statistic)	
	Extension 3	
WAR	-0.85	$(-11.73)^{***}$
CSTARKAZ	0.0157	$(2.66)^{**}$
CSTARKAZ*Comedy	-0.0190	$(-3.18)^{**}$
CSTARKAZ*Thriller	-0.0196	$(-3.25)^{***}$
CSTARKAZ*Action	-0.0204	$(-3.18)^{***}$
CSTARKAZ*Scifi	-0.0153	$(-2.46)^{*}$
CSTARKAZ*Animation	-0.0201	$(-3.28)^{***}$
CSTARKAZ*Drama	-0.0190	$(-3.18)^{**}$
Intercept	18.26	$(37.36)^{***}$
$R - square$		0.79
Observations		2132

*p<0.05 **p<0.01 ***p<0.001

Table A.3.
Regression result

	Coefficient (t-statistic)	
	Extension 4	
STAR	0.0134	(3.42)***
CSTARKAZ	0.0123	(1.30)
CSTARKAZ*Comedy	-0.0199	(−2.19)*
CSTARKAZ*Thriller	-0.0075	(−0.75)
CSTARKAZ*Action	-0.0105	(−0.97)
CSTARKAZ*Scifi	0.0132	(1.08)
CSTARKAZ*Animation	-0.0048	(−0.46)
CSTARKAZ*Drama	-0.0198	(−2.09)*
Intercept	14.63	(20.39)***
$R-square$		0.16
Observations		472

*p<0.05 **p<0.01 ***p<0.001

Table A.4.
Robustness test:

	Discounting denominator					
	1.5		2		3	
WAR	-0.84	(−11.75)***	-0.84	(−11.75)***	-0.84	(−11.72)***
CSTAR	-0.0018	(−2.16)*	-0.0022	(−2.37)*	-0.0021	(−2.17)*
Intercept	18.34	(37.26)***	18.32	(37.31)***	18.29	(37.29)***
$R-square$		0.79		0.79		0.79
Observations		2132		2132		2132

*p<0.05 **p<0.01 ***p<0.001

Figure A.1. Revenue and weeks after release