Act global, protect local: Hollywood movies in China*

Chunhua Wu† Charles B. Weinberg‡ Jason Ho§

May 2018

Abstract

Movies are among the US's most successful exports, and China is by far the largest market. China welcomes high-quality US movies in order to grow its own theatrical market, while also diligently protecting locally produced movies. This paper evaluates the relative impact of these dual motives. China is known to limit the number of foreign movies, half of which are delayed beyond the US release date by four or more weeks. We empirically study the Chinese government's import decisions using Chinese market data and develop a movie market demand model, along with two models on simultaneous and delayed-releases where we consider release timing as an implicit trade barrier. We find that China prefers to import US movies with relatively high production budgets but limits them when the potential cannibalization effect from US blockbusters is high and when the market share of local movies is relatively low. Delayed-releases of US movies are strongly associated with weaker box-office performance in China, making control of release schedule another vehicle that China leverages in import decisions.

Keywords: Movies, Import Regulation, Chinese Theatrical Market, International Marketing

*We thank seminar participants at the 2016 Mallen Economics of Filmed Entertainment Conference and the 2016 INFORMS Marketing Science Conference for their valuable comments and constructive feedbacks. The financial support of the Social Sciences and Humaities Research Council of Canada is gratefully acknowledged.

†Sauder School of Business, University of British Columbia. Email: chunhua.wu@sauder.ubc.ca.

‡Sauder School of Business, University of British Columbia. Email: charles.weinberg@sauder.ubc.ca

§Beedie School of Business, Simon Fraser University. Email: jason_ho_3@sfu.ca.

Introduction

Global marketers need to be sensitive to local conditions, especially implicit and explicit government regulations. Such regulations can be complex, resulting (at least in part) from the multiple and potentially opposing goals of the local jurisdiction. Although World Trade Organization (WTO) policies attempt to limit trade barriers, many governments still seek to protect local interests. The operationalization and impact of such barriers are often difficult for managers to decipher. Implicit regulations are particularly challenging to understand, as they are seldom codified and tend to be justified for reasons not directly related to trade itself. For instance, the media and entertainment industries' ability to export products is often restricted in order to protect a country's cultural identity. Scientific products are often protected for reasons of national defense. Such regulations may be subjectively applied and their application may vary over time. However, if such implicit constraints are regularly applied, then empirical analysis can be performed to help understand their patterns.

The export of Hollywood movies[1] to China presents an instructive setting to empirically study the impact of explicit and implicit regulation on sales. Specifically, the State Administration of Press, Publication, Radio, Film and Television (SAPPRFT)[2], the government agency regulating both local and imported films in China, on one hand welcomes high-quality Hollywood movies in order to grow the Chinese theatrical market and to appeal to the tastes of a burgeoning middle class; and, on the other hand, diligently protects and promotes its locally produced movies. It is vital for producers of Hollywood movies to understand how these two somewhat opposing economic goals manifest in the market, but it is difficult for Hollywood executives or industry analysts do so. In fact, industry insiders often call SAPPRFT a "black box." A recent report for the US–China Economic and Security Review Commission noted that "the process to get films into China is arduous due to strict

[1]As most US movies are produced by the traditional studios based in the Hollywood area, US movies from either major or independent studios are called "Hollywood movies" hereafter.

[2]In 2018, it was announced that a new executive body would replace SAPPPRFT to regulate and manage the movie market Frater (2018), but no changes with regard to policies for the import of Hollywood movies were reported.

and opaque regulation of film imports" (O'Connor & Armstrong, 2015). The objective of this paper is to provide empirical evidence on the nature of Chinese movie-import regulation and its effectiveness, illustrating the interplay of the dual goals of SAPPRFT and thereby shedding light on the complex local conditions in this important theatrical market.

Hollywood movies are one of the most successful US exports, generating US$19.1 billion in box-office revenues from markets outside the US and Canada in 2016.[3] China is not only the US's largest export market, it is the only theatrical market close to the scale of the US market, which had the largest gross box-office sales around the world in 2016 (US: $10.3 billion; China: $8.2 billion; and the distant third, Japan: $2.1 billion; Canacine (2017)). As Ferreira, Petrin, and Waldfogel (2012) argue, the revenue from Hollywood movies in China would be higher if it were not for restrictions on the number of movies (e.g., only 34 movies a year can be imported on a revenue-sharing basis, where 25% of box-office revenue goes to the Hollywood studio) and other import controls (e.g., censorship of content; Sun, 2017). Although Hollywood studios regularly negotiate with the Chinese government (O'Connor & Armstrong, 2015) to improve their access to China's theatrical market, including co-producing films in China, most attention is placed on expanding the number of imported movies allowed, not on other important administrative controls adopted by SAPPRFT. As Frater (2017) reports, "[China] could easily expand the quotas, but then use other methods such as censorship, or unfavorable release dates, to ensure that there is no change to market share [of the Hollywood/foreign films]."

Table 1 lists the market shares of local and foreign films in China from 2009 to 2014, along with the total gross box-office revenue.[4] There is clearly a consistent pattern where Hollywood movies are close to but below a 50% market share of revenue. Given the complexity of the Chinese theatrical market–the large numbers of movie theaters, moviegoers, and movies, as well as the rapid growth of the market–such a consistent market-share split

[3]Calculated from data on boxofficemojo.com http://www.boxofficemojo.com/yearly/chart/?view2=worldwide&yr=2016&p=.htm.

[4]A few non-Chinese, non-Hollywood movies accounting for minimal box-office revenue were imported into China each year. For completeness, we include them in the aggregate revenue for Hollywood movies.

Table 1: Market Share of Local and Foreign Films in China from 2009 to 2014

Year	Market Size		Film Share		Revenue Share	
	Box Office (in billion yuan)	Annual Growth	Chinese Films	Hollywood Films	Chinese Films	Hollywood Films
2009	6.02		78%	22%	59%	41%
2010	10.17	69%	78%	22%	57%	43%
2011	13.12	29%	76%	24%	53%	47%
2012	17.07	30%	75%	25%	55%	45%
2013	21.77	28%	78%	22%	59%	41%
2014	29.64	36%	80%	20%	54%	46%

is unlikely to result from a purely organic industry evolution. Instead, such a delicate balancing act is probably achieved by a combination of strategic policy, constant monitoring, and micro-management by the Chinese administrators (see Su, 2014 for a more detailed discussion of these issues). In other words, such top-line and highly publicized import controls like revenue-sharing quotas and censorship are probably insufficient to explain the pattern of import shares shown in Table 1. We argue in this paper that China is indeed relying on at least one other administrative control tool, "delayed-release," to accomplish SAPPRFT's dual goals of growing the market while protecting local films, and we show that release date is an important factor in box-office success of Hollywood films in China. Delayed-release, which means waiting for an extended period to release a movie in the focal market after its initial global release, is an alternative to the simultaneous-release pattern, i.e., releasing a movie in most theatrical markets at or close to the same time. An example of delayed-release as a trade-control vehicle is *The Hunger Games: Mockingjay Part 1*, which was originally scheduled to be released in China in November 2014 along with the American and other markets to maximize the global excitement. However, SAPPRFT rescheduled its release for the following year, after initially agreeing to allow its simultaneous-release in China. As reported by VanderKlippe (2014), industry observers speculated that the decision to delay the release of this *Hunger Games* sequel was the result of foreign films earning a 53% market share of box-office revenues in the first half of 2014. Going beyond anecdotal evidence, we

empirically study the Chinese authority's decisions using Chinese market data from 2009 to 2014, finding that statistics indicating a low year-to-date cumulative box-office share by the Chinese local films would discourage SAPPRFT from releasing a Hollywood movie at the same time as it is released in other global markets.

Marketing and economics literature show the negative effect of delayed-release on the box-office revenues (Elberse & Eliashberg, 2003; Griffith, Yalcinkaya, & Rubera, 2014). Note that most literature regards delayed-release as a strategic decision taken by a movie studio for one or more of the following reasons: to conserve distribution costs by moving physical prints from larger to smaller markets sequentially (both within a country and across markets), to build demand through the generation of word-of-mouth, or to assess audience reaction to a movie before investing in the marketing cost of a wide release (Chen, Chen, & Weinberg, 2013). However, in the case of China, we are not studying the film producer but rather the decision of the state regulator to delay release of a Hollywood movie by four weeks or more from its release in the US. That is, to study the dual economic goals of China, we consider delayed release to be a decision taken by the executive body, SAPPRFT, and explicitly model this endogenous decision using a modified Heckman selection model (Lee, 1983).

We develop a movie market-demand model in this paper, along with two models of simultaneous releases and delayed releases. The estimation results reveal strong evidence that China, on one hand, imports Hollywood movies with relatively high budgets to grow the local theatrical market, and on the other hand, limits such imports to protect local producers when the potential cannibalization effect from Hollywood blockbusters is high and when the market share of local movies is relatively low. In addition, delayed releases of Hollywood movies are strongly associated with weaker box-offices, and thus, release-schedule control can be another vehicle SAPPRFT leverages in the import decisions. In fact, potential market cannibalization effect of delayed-release movies and the local movie market share status are found to be lesser concerns for the government than for simultaneous-release Hollywood

films. Overall, our research is the first in the literature to provide empirical evidence on the important factors underlying the "black box" of Chinese importation of Hollywood movies.

The next section presents the conceptual background and develops three hypotheses from the dual goals of SAPPRFT. Then the data and models used to test the hypotheses are addressed. We report the estimation results and conclude the paper with discussion of the implications and limitations.

Conceptual Background and Hypothesis Development

Trade and China

As is widely known and well-studied by economists, political scientists, and others, many (probably all) countries impose barriers to limit "free trade." The major benefit of universal free trade is that each country can freely export its product(s) around the world so that consumers can obtain their preferred combination of quality and price, and the most efficient companies (countries) can satisfy that demand. If each company or country can produce what it is "best" at, then in theory at least, all will be better off, i.e., there will be a net welfare gain. However, there are many arguments against free trade, both theoretical and practical, which result in the widespread implementation of trade barriers. Davidson and Matusz (2006, p.123) summarize the literature as follows: "Two of the most generally accepted propositions in economics are that trade liberalization harms some groups but that it also generates aggregate net benefits."

One of the strongest arguments for trade barriers is to protect "local" jobs and industries. Typically, the removal of a trade barrier (or the failure to impose one) has a particularly strong effect on the workers in a specific industry or in a local community. The demise of US jobs in the textile industry is a well-known example of this effect. While US consumers are better off with the lower prices of clothing due to international sourcing, many workers in the industry became unemployed and many formerly profitable companies went bankrupt as the

US production largely disappeared. Other motivations for trade barriers include the need to provide a time period for companies in a certain industry to develop the capability to become an efficient and competitive manufacturer, and the claim that either foreign companies are "dumping" their domestic products in an external market or the exporting country is unfairly providing financial or regulatory support; both factors are cited in US suits about the import of solar panels, for example. (A recent examination of this dispute can be found in Hughes and Meckling, 2017.) Among the many other arguments for trade barriers is the need to protect national security and to preserve the cultural heritage of a country. The latter is, of course, directly relevant to the movie industry. (For further discussion on free trade and trade barriers, see Davidson and Matusz (2006).)

Most countries recognize that having a wider market for their products is highly beneficial, but they simultaneously fear the consequences of opening their home markets to outsiders. Consequently, national leaders seek to establish trade unions across a range of countries and a variety of products, in the hope that each participant will see a net gain from decreasing (or even eliminating) trade barriers over a wide spectrum of products and/or geographies. The European Common Market, which was founded by 6 countries in 1957 and as of 2017 included 22 countries, is a well-known example of such an effort. Britain's vote in 2016 to exit the market exemplifies the challenges in maintaining a common market structure.

Turning more directly to China, since at least the 14th century (start of the Ming Dynasty), China has largely considered itself to be economically self-sufficient and limited foreign trade. However, as a consequence of the notorious Opium Wars of the mid-1800s, the dominant European powers forced the Chinese government to make a number of concessions, including the acceptance of imported products with minimal, if any, restrictions. By contrast, at least in the early years of the founding of the People's Republic of China in 1949, the government effectively excluded most imported products (with the exception of industrial equipment primarily purchased from the Soviet Union). In the 1980s, as China became more

focused on exporting products around the world, there was growing recognition of the need to allow imports on a broader scale, both to meet the needs of growing middle and upper classes and to satisfy the demands of trading partners. As China's trade surplus grew, their trading partners put increased pressure on China to "normalize" trading relations, as many believed that China strongly protected its local industries through a wide range of trade barriers and regulations. China's entry into the WTO after 2001 (with agreement to abide by its regulations) was the consequence of these pressures. However, many complaints were filed about the implementation of this agreement, and subsequent modifications continue to be made. As we discuss next, the movie industry is one example of a market where the complaints have persisted, both before and since China's membership in the WTO.

Import of Hollywood Movies into China

According to Sun (2017), for the first 25 years after the establishment of the People's Republic of China in 1949, virtually all foreign films were banned, especially those from Hollywood, thus limiting the exposure of Chinese citizens to foreign content. Of the many products that are covered by the WTO agreement, film stands out for political and cultural as well as economic reasons. Politically, films have been widely used by governments in many countries, including China, to support the governing power by building support for the government and also denigrating opposing forces both internal and external to the country. (See, for example, Sun, 2017, p.529.) In addition to encouraging the growth of such propaganda films, governments have sought to limit the exposure of their citizens to outside influences, even in the era of the internet and social media (Taubman, 1998). The Chinese government remains very concerned today about what media their residents are exposed to, and the content of those messages. This contributes to restrictions on the number of movies imported into China and on the content of those movies. Censorship also limits which Hollywood movies are allowed into China. As summarized in O'Connor and Armstrong (2015, p.9):

> "According to SAPPRFT regulations, all films exported to China must ad-

> here to the principles of the Chinese Constitution and maintain social morality. Therefore, any films depicting demons or supernaturalism, crime or any other illicit or illegal actions within China's borders, disparagement of the People's Liberation Army and police, and anything that could be perceived as anti-China—including merely damaging Chinese sites or monuments—are prohibited...How and when SAPPRFT chooses to enforce its authority remains opaque. ...In addition, because China does not have a rating system for its movies, all films must be appropriate for audiences of all ages, though in practice this standard is not uniformly applied. In general, nudity, violence, and inappropriate language are prohibited, [although]... disturbing sequences have appeared in films distributed in China."

As O'Connor and Armstrong (2015) and many others indicate, these regulations are broad and, in practice, unevenly applied. These censorship controls also lead to the cutting or reshooting of scenes to meet the requirements of SAPPRFT.

Concerns about the impact of Hollywood movies on a country's culture are not unique to China. In an interesting study, Walls and McKenzie (2012) found that as the relative size of the US domestic market decreases compared to global revenues, Hollywood films increasingly accommodate the cultural concerns of different export markets.

Economic Consequences of Importing Films into China

Prior to 1994 (as noted earlier), Hollywood movies were largely excluded from the Chinese film market, which was largely state-run, highly bureaucratic, composed of many small entities with conflicting goals, and was consequently highly inefficient.

Starting in 1994, in the face of inadequate financing for Chinese studios exhibitors as well as the apparent appeal of Hollywood movies to newly affluent Chinese audiences, the decision was made to admit ten Hollywood blockbusters into China each year. From an economic perspective, this was a highly successful strategy, as Su (2014) details: the plan to import ten Hollywood movies was an attempt to rescue the market rather than a well-defined ideological and cultural policy. The imported films stimulated the ailing Chinese film market. By 2000, ten imported revenue-sharing movies accounted for about 70% of China's film market, while approximately 100 domestically made films only earned 30% of market share. According

to some industry observers, "...imported films had become essential to the survival of the Chinese film industry" (Su, 2014, p. 100).

Despite its beneficial economic impact, having a small number of Hollywood blockbusters controlling 70% of the market was not viewed favorably in China. As China built up its own film-production system and added more controls, the share of revenues going to Hollywood studios declined, amounting to less than 50% of box-office since 2009, as shown earlier in Table 1.

As more Hollywood studios vie to get their movies released in China–the world's second-largest market in 2017 after the US–the quota of movies is clearly a binding constraint. It appears highly likely that if more Hollywood movies were allowed to enter China, the effects would include increasing overall box-office revenues and decreasing (to some extent) the revenues for locally produced movies. In addition to the historical perspective provided above, this view is supported by China's resistance to consistent filings of appeals by the US that China's quota system violates the WTO agreement, and the eventual rulings in favor of the US by the Appeals Board, resulting in a quota increase from 20 to 34 in 2012. (See O'Connor and Armstrong, 2015 for more details on these appeals and agreements.) However, even after this quota increase to 34, the share of box-office revenue going to Hollywood movies has not increased. This suggests that barriers other than quota exist and effectively limit the success of Hollywood movies in China.

Delayed Release as a Barrier

Although quotas and a difficult-to-interpret censorship system are widely recognized trade barriers, far less frequently mentioned is SAPPRFT's strategy of delaying the release of some Hollywood movies as an approach to limiting their sales impact in China. As O'Connor and Armstrong (2015) argue, the effects of delayed release–especially moving movies from peak-season release–are to provide a better opportunity for local movies to succeed in a "clear" market and to force delayed-release Hollywood movies to compete against each other. As

shown by Krider and Weinberg (1998), movie releases are strategically organized in the US market, and substantial changes from optimal timing of release can lead to decreased profitability (or, more strictly, non-equilibrium solutions). As Ainslie, Drèze, and Zufryden (2005) document, movie studios carefully choose their release date to limit the effect of competition; in addition, when the release of a movie in a country is substantially delayed from its worldwide release date, the effects of promotions and advertising are weakened, and the intensity of word-of-mouth about the movie declines over time. Furthermore, the delayed release of a movie makes it easier to produce high-quality pirated versions of it to satisfy the demand by people who want to see the movie now, even if it means watching a pirated version at home. As our data reveal, of the 206 Hollywood movies in our data sample, 107 (52%) were delayed more than four weeks beyond their release date in the US. Delayed release is a frequently used trade barrier by SAPPRFT, and as we show below, it is an effective one. We further show that the choice of delayed-release movies is influenced by different criteria than simultaneously (within four weeks) released movies.

Hypotheses Development

As the previous section indicates, China's policies with regard to its import of Hollywood movies since it joined the WTO are complex and reflect the twin economic goals of increasing the theatrical movie market in China while at the same time seeking to protect and encourage the growth of Chinese film production. Our review of the recent history of movies in China leads us to three main propositions, which we then re-state as formal hypotheses.

Proposition 1: *SAPPRFT, as an agent of the Chinese government, selects movies to enter China that will grow the local theatrical market for exhibitors.*

As we discuss in the section on model development, many factors influence the demand for a movie in a local market. However, most empirical studies find that production budget is typically positively related to market demand (see, e.g., Elberse and Eliashberg (2003)) and

is often employed in empirical modeling as an indicator of box-office appeal, as in Ferreira et al. (2012). Given that estimates of the production budget (at least for major movies) would be readily available to SAPPRFT, we propose the following hypotheses:

Hypothesis 1a (H1a): *Movies with larger production budgets are more likely to be accepted into China for simultaneous-release and for delayed-release than movies with lower budgets.*

The effect of production budget, however, is likely to be weaker for delayed-release movies, as there is more information available to potential moviegoers and therefore consumers may use other indicators of a movie's appeal than production budget.

Hypothesis 1b (H1b): *Production budget will have a lesser influence on box-office revenues in China for delayed-release as compared to simultaneous-release Hollywood movies.*

As shown in our data summary below, while movies with higher budgets are more likely to be accepted by SAPPRFT, not all large-budget movies are admitted into China. Considering the recent history of Hollywood box-office share consistently being below 50%, the apparent state desire to protect the local industry (Sun, 2017), persistent complaints from Hollywood producers about the impact of Chinese regulations on their access to the market (O'Connor & Armstrong, 2015), and the tactic of delayed-release of Hollywood movies in China (as illustrated in our data below), we find that these factors all lead to the following proposition:

Proposition 2: *SAPPRFT, as an agent of the Chinese government, protects the local film production market from Hollywood movies.*

The most direct threat of Hollywood movies to the local market is the degree of cannibalization that might occur. Consequently, we propose that:

Hypothesis 2a (H2a): *Hollywood movies with high potential to cannibalize the market share of local movies are less likely to be simultaneously released into China than those with less predicted impact on local market share.*

As discussed earlier, in recent years the collective revenue of Hollywood movies typically approaches a 50% market share but does not exceed it. Consequently, as in the example of the *Hunger Games* sequel, we suggest that recent market share of local movies will be used by SAPPRFT to decide whether or not to deny or delay release of a Hollywood movie that would otherwise qualify for showing in China. Consequently, we propose:

Hypothesis 2b (H2b): *When local movies' share of the market is lower, Hollywood movies are less likely to be simultaneously released than when the market share of local movies is higher.*

Finally, as we discussed above and as shown in the literature, when a movie's release is delayed from its main release date by four or more weeks, its market impact will be substantially lower. As a result, delayed-release movies are less of a threat to local movies than are simultaneously released movies.

Proposition 3: *Delayed-release as used by SAPPRFT is an effective strategy for reducing the box-office revenues of Hollywood movies imported by China. SAPPRFT will consequently be less concerned about protecting the local film-production market for delayed-release than for simultaneous-release Hollywood movies.*

We first test our proposition concerning the effect of delayed-release with the following hypothesis:

Hypothesis 3a (H3a): *Of the Hollywood movies that are exhibited in China, a delay in the release date will be associated with lower box-office performance.*

Based on hypothesis 3a, we further argue that delayed-release movies are less of a threat to the local film market and their level of cannibalization is likely to be low. Consequently, we hypothesize that:

Hypothesis 3b (H3b): *Neither the level of market share of local movies nor the level of cannibalization has a statistically significant impact on the likelihood that a delayed-release movie will be imported into China.*

Overview of Key Results

Using our unique data set and estimation approaches introduced by Lee (1983) to control for selection bias (in the choice of movies shown in China), we find strong empirical support for our hypotheses. Namely, China both seeks to increase box-office revenues by selecting movies with relatively high budgets to be shown, and to restrict the release of such movies when Chinese movies have a relatively low market share or when the threat of cannibalization is high. The use of a delayed-release strategy is effective in reducing the box-office revenues of Hollywood movies in China. Moreover, given this reduced impact, the selection of delayed-release movies is less likely to be influenced by local market conditions.

Data Description

Data Collection

We compile a unique data set that contains both the Chinese and Hollywood theatrical markets' information for the period from year 2009 to 2014 inclusive.

The information for the Chinese theatrical market is collected from the leading movie-review website douban.com. Excluding the small number of non-Chinese, non-Hollywood movies, our data include 915 movies that were released in China during the study period. Of the 915 Chinese and Hollywood movies, 709 were either domestic movies (including mainland China and Hong Kong) or were co-produced with a Chinese studio so that they are not subject to the import quota restrictions. The remaining 206 movies were imported movies from the US. For movies in this part of the data, we have detailed information on characteristics such as genre and studio, whether the movie is imported or not, the movie release time, and the overall box-office performance for each movie. This data breakdown helps us understand the factors that determine the box-office performance in the Chinese market.

As the focus of this paper is on the import decisions regarding Hollywood movies in China, we need to collect information on all the Hollywood movies that could potentially be imported. This part of the data is collected primarily from IMDb Pro. [5] Because not all movies would have a chance to be imported, we use a criterion of larger than 1000 theatres in the widest release in the US market as a cutoff threshold in constructing our sample. We also include in our sample the movies released in year 2008 in the US because some of them could be imported with a delayed release. Based on these criteria, we have a total of 895 Hollywood movies in this sample across the seven-year period. For those movies, we have complete information on the release date, box-office performance in the US, production budget, production studio, genre, MPAA rating, and the consumer review scores on IMDb. The joint set of the above two data components contains the 206 Hollywood movies that were imported into China during this time period. For those movies, we observe the box-office performances in both markets. We also have release information in both markets, from which we construct the lag of release information about when they are imported.

We have slightly different variables for Chinese domestic movies and Hollywood movies given that the data are collected from different sources. In terms of genre, we match and merge the Chinese categories with the English categories and define the following: action, adventure, animation, comedy, drama, horror, scifi, thrill, and other. A movie may fit into more than one categories, and thus we create nine dummy variables to indicate whether each movie fits into each of the genre categories. All movies fit into at most four categories, and 80% of them are in either one or two categories. The domestic movies lack information on MPAA rating because China does not have such a rating system in place. The production-budget information is also hard to collect for domestic movies. In order to have good indicators for movie quality for domestic movies, we create two additional variables: director power and actor/actress power. These two indexes were constructed from a larger database containing the major domestic movies released in the years from 2006 to 2014. The

[5]For a small proportion of the movies, the records on IMDb are not complete, so we supplement the data with information from boxofficemojo.com and wikipedia.com for those movies.

Table 2: Threshold for the Power Index

Score	1	2	3	4	5
Best box-office revenue (in million Yuan)	0	(0-50]	(50-200]	(200-500]	> 500

lists of directors and actors are based on importance of the role in the movie. We take the first name in the director list and the first four names in the actors list (essentially the top billing) to construct the two measures. We create a panel of each director's and each actor's power index from the years 2009 to 2014. Specifically, the power is measured in discrete terms from 1 to 5, with the assigned numbers based on the best performance of box-office revenue of all the previous movies in which the director/actor has participated in a major role. The thresholds are defined in Table 2. The director power of a movie is defined as the main director's power index in the movie release year. The actor power of a movie is a weighted average score of the first four main actors/actresses' power index up to the movie's release year. Specifically, we define it as 80% of the geometric mean of the first two main actors/actresses plus 20% of the geometric mean of the next two main actors/actresses. We show the distributions of the constructed power indexes in Figure 1.

Finally, a list of the variables used is shown in Table 3.

Data Summary

The US and China are the two largest theatrical markets. Figure 2 shows the total box-office revenue for the two markets in the years 2009 to 2015. The US market saw little growth during the period, with an annual total box-office revenue of approximately 11 billion USD. In contrast, the total size of the movie market in China increased substantially. The box-office revenue was below 10% of the US market in 2009. However, it increased to 6.7 billion USD (60% of the US market) in 2015, with an annual compound growth rate of 37%. It is expected that China will surpass the US and become the world's largest movie market by

Table 3: List of Data Variables

Variable	Explanation
Common variables	
Genre	movie genre: action, adventure, animation, comedy, drama, horror, scifi, thrill, and other
Chinese movies' unique variables	
Hong Kong	dummy variable indicating whether it is a Hong Kong movie
Director power	an index indicating the performance of past movies from the main director, integer values from 1 to 5
Actor power	an index indicating the performance of past movies in which the main actors and actresses participated in a major role, a numeric value from 1 to 5
China release date	the release date in China
China box office	the total box-office revenue in China
Douban review	average review score on douban.com
Hollywood movies' unique variables	
MPAA rating	MPAA rating, PG, PG-13, R
Studio	production studio: WB, Disney, Universal, Sony, Fox, Paramount, Lionsgate, Mini major
Budget	movie-production budget
US release date	the release date in the US
US box office	the total box-office revenue in the US
Import	whether the movie is imported into China
Sequel	whether the movie is a sequel release
IMDb review	mean review score on IMDb
Imported Hollywood unique variables	
US box office	the total box-office revenue in US
China box office	the total box-office revenue in China
Release lag	the number of days between the US release date and the China release date
Simultaneous	whether the movie is imported simultaneously as in the US market, using 4 weeks in release lag as the cut off threshold

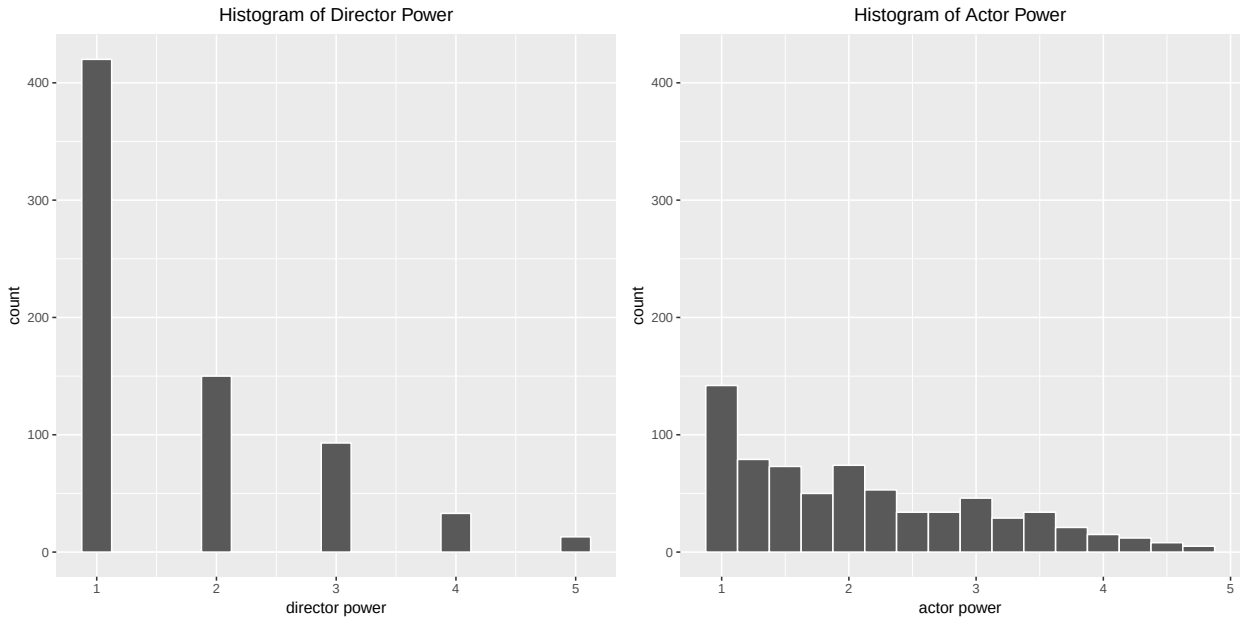

Figure 1: Histogram of Director Power and Actor Power

2020 (Fan, 2018).

Hollywood movies play an important role in China's movie market. Table 1 lists the film number share and revenue share for Chinese films and Hollywood films during our data period. Overall, about 23% of movies released in China are imported from Hollywood, yet they contribute about 45% of the total market-revenue share. On average, each Hollywood movie generates 1.7 times more revenue (averaging 193 million yuan) than a Chinese movie (averaging 72 million yuan). As discussed earlier, a particularly interesting phenomenon shown in Table 1 is that Hollywood movies are close to but consistently below a 50% market share of revenue. This consistent market share split is most likely achieved by a combination of strategic policies and tactical adjustments enacted by the Chinese administrators. Motivated by this observation, in the next section we develop movie-import selection models to test factors driving such balances.

Particular data patterns that are suggestive of factors impacting the import decisions for Hollywood movies. Table 4 shows the differences in movie budget, US market box-office revenue, and average consumer review score on IMDb for movies that are imported into

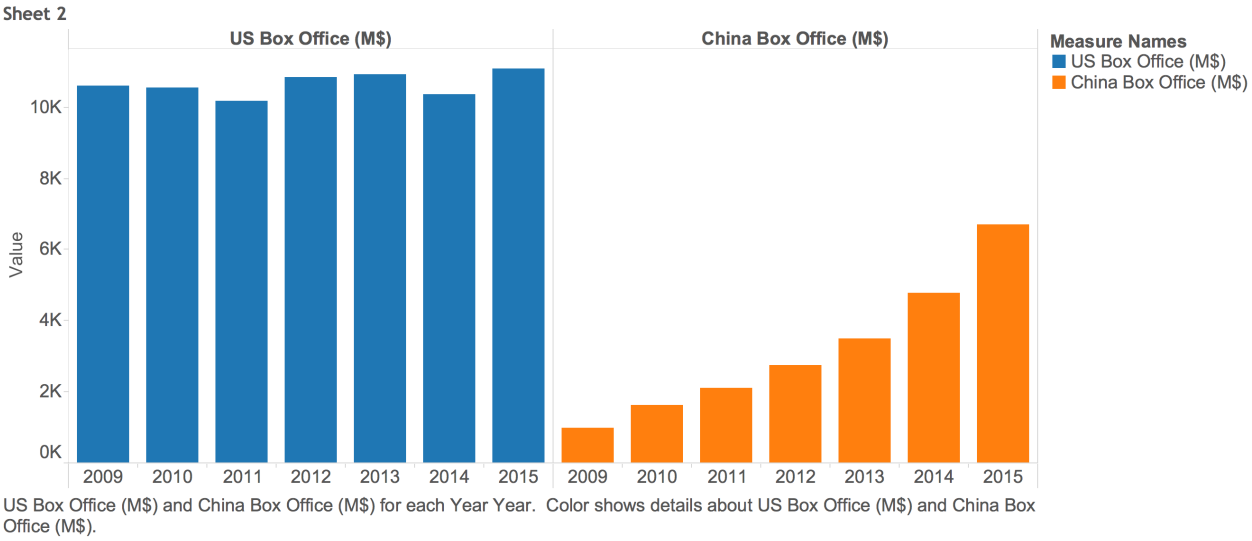

Figure 2: Total Movie box-office: US vs. China

China versus those that are not. It is evident that the imported movies stand out from the rest in terms of the budget, revenue, and consumer reviews. For example, the average budget for movies imported is 111.3 million USD, which is almost 3 times the budget of those not imported. Similarly, the US box-office revenues for those movies are on average 1.5 times greater. Average IMDb review score is also higher by 0.4. These patterns show that the Chinese government agency has incentives to import those Hollywood blockbusters to grow the total movie market in China under the quota constraints. We tested additional factors that might impact the import decisions. A Chi-square test shows that movies from different studios are not treated equally in the import decisions. Throughout our data sample period, movies produced by Disney have the highest probability of being imported (38%), followed by Paramount (30%) and Fox (26%), while movies from Universal (16%) and Independent studios (12%) are least likely to be imported. In terms of genre, movies with a major element of adventure (66%), scifi (64%), and action (54%) are among the top three that are most likely to be imported, while movies with comedy (5%), horror (8%), and drama (11%) elements are least likely to be imported. This pattern closely reflects the differences in culture and audience tastes between the two markets.

As discussed in the introduction, not all movies imported are treated equally in the

Table 4: Hollywood Movies: Import Decisions and Performances

Import Decision	N Obs	Budget	US BO	China BO	Avg. IMDb	Avg. Douban
Not Imported	689	38.4	54.5	NA	6.21	NA
Imported	206	111.3	133.8	29.7	6.61	6.99
Simultaneous	99	132.8	156.2	41.3	6.63	7.13
Delayed	107	89.9	111.7	19.0	6.58	6.86

Note. Budget, US box-office and China box office are in millions of USD. We used an exchange rate of 1:6.5 for USD to Chinese Yuan in the China box-office revenue calculation.

Chinese market. Specifically, a subset of the movies receive more favorable considerations in the release timing than others. Figure 3 shows the distribution of the release lag for all the Hollywood movies imported into the Chinese market. The release lag is defined as the number of days' difference between the Chinese market release and the US market release. Almost all imported movies are released in China within a year from their original US release. Yet, from the distribution, we see two distinct groups: a big portion of the movies were released within four weeks, while the rest were mostly released with a delay between one and six months. Based on this histogram, we use a four-week release lag as the cut off threshold to define whether a movie is imported under a simultaneous-release schedule or a delayed-release schedule. Using this definition, 48% of the Hollywood movies were under a simultaneous-release schedule when they were imported. We further check the robustness of this practice by using a two-week cut off threshold in this paper. Details are reported in Appendix A.

We next look at the factors that may have potentially influenced the decision about simultaneous versus delayed-release. The bottom half of Table 4 shows the average values of the two release-type movies across budget, US box-office revenue, China box-office revenue, and average user review scores in both markets (IMDb score in the US and Douban score in China). Simultaneous-release movies have significantly higher values in terms of budget (50% more) and US box-office revenue (40% more). This further suggests that SAPPRFT tends to give the top priorities to the Hollywood blockbusters in order to grow the local theatrical

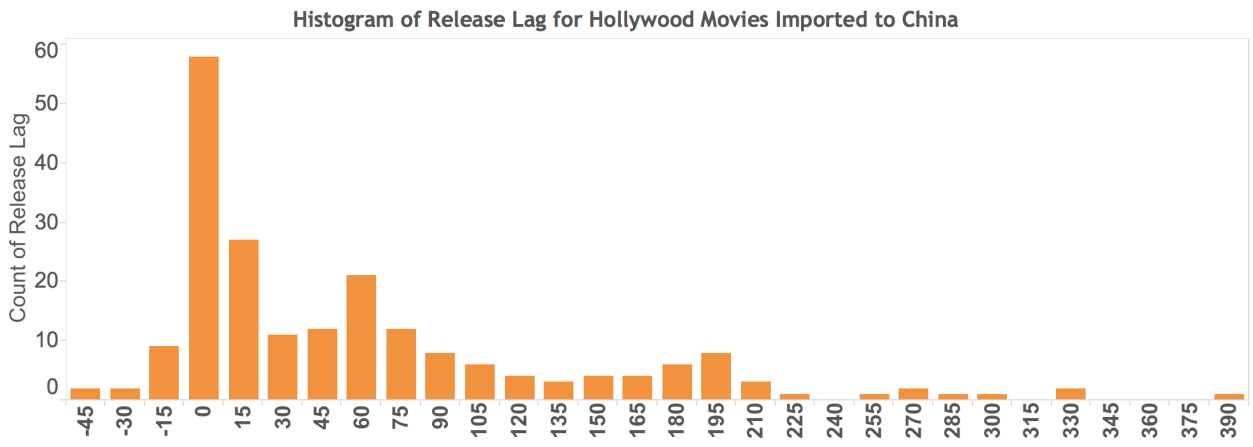

Figure 3: Distribution of Hollywood Film Release Lag in China (by Days) Compared to the US Release

market. Interestingly, with regard to user reviewers from IMDb and from Douban, there is no significant difference between movies imported and not, perhaps reflecting the lack of availability of IMDb reviews when import decisions are made, at least for simultaneous-release movies.

Examing the Hollywood movies imported by China also gives us an opportunity to directly compare the world's two largest theatrical markets. First of all, we can identify the consumer movie preferences in these two markets by looking at the correlations between movie review scores across these movies. The correlation between IMDb rating and Douban rating is 0.81, a high level suggesting that consumers in these two markets have quite similar preferences among the set of movies that are imported. Second, we look at how these preference correlations translate into box-office performances. The overall correlation for the box-office in the US and that in China is at a much lower level of 0.54 in comparison to the correlation of user reviews. These differences in correlation are consistent with the view that release strategy has an impact on box-office revenue. Third, the China market generates a significant portion of the worldwide revenue for those imported Hollywood movies. On average, an imported Hollywood movie will generate 22% of its US box-office revenue in the Chinese market. The proportion is higher for simultaneous-release movies (26%) than delayed-release movies (17%). Despite the variation in budgets, the big difference appears to

Table 5: Distribution of Movies Scheduled in Each Week

No. of new movies per week	0	1	2	3	4+
All Movies	0.0%	18.6%	25.3%	18.6%	37.5%
Chinese Movies	8.8%	25.3%	24.3%	17.9%	24.2%
Hollywood Movies					
Simultaneous	68.2%	30.2%	1.6%	0.0%	0.0%
Delayed	69.6%	25.3%	4.4%	0.7%	0.0%

be driven by the scheduling: movie-goers typically prefer current movies to delayed movies, and it is probably also true that if a movie is released with a four-week or more lag, people are more likely to be able to watch it elsewhere–for example, at home in a pirated version.

Finally, we look at the number of new movie releases per week. Table 5 shows the distribution of number of releases. The patterns for Chinese and Hollywood movies are quite different. For Chinese movies, in all but 8.8% of the weeks, at least one Chinese movie is released, and in nearly two-thirds of the weeks, two or more Chinese movies are released. For simultaneous-release Hollywood movies, in 68.2% of the weeks no movie is released, and in 30.2% of the weeks one Hollywood movie is simultaneously released. (In only 1.6% of the weeks are two Hollywood movies given a simultaneous-release.) For delayed-release Hollywood movies, there's a 5.1% chance that two or more movies will be released in a single week. Based on these patterns, we model the simultaneous-release decision in each week using a multinomial logit model, and the delayed-release decision in each week is depicted with independent binary logit models. We describe the model details in the next section.

Model Development

A distinct feature of the China film market is that SAPPRFT operates as the central authority responsible for the review and regulation of all films screened in China. It controls the importing and scheduling decisions for all foreign movies. As discussed earlier, SAPPRFT has two major objectives. It seeks to grow the theatrical movie market while at the

same time striving to protect the local movie producers. These two objectives impact the movie-import decisions in significant ways, as stated in our main hypotheses.

In this section, we develop empirical models to test and quantify these important, potentially conflicting factors. We first develop a box-office model rooted in consumer choice theory to quantify the major determinants of box-office performance in the Chinese film market. The model helps us quantify the expected impact on the box-office for any Hollywood movies that could potentially be imported. Next, based on this quantification, we build models to estimate the effect of the factors that determine the Hollywood movie import and scheduling decisions. Considering SAPPRFT's dual objectives, we make the following assumptions on the sequence of moves of SAPPRFT in the import-decision model. First, SAPPRFT would give highest priority to local movies, and local movies have the freedom to choose their schedules. Given this, we treat the local movie schedules as exogenous when we model the Hollywood movie-import decisions. Second, given the local movies scheduled, SAPPRFT then evaluates Hollywood movies that are scheduled in the coming month in the US market and determines whether to import and release any of them at the same time in the China market. This is the simultaneous-release decision stage. Third, given local movies and simultaneous-release imported movies scheduled, SAPPRFT further considers whether to release Hollywood movies that have been shown in the US in previous periods. Those movies, by definition, would have a delayed-release schedule in the China market. We call this stage the delayed-release import decisions.

The Box-Office Model

The first step towards understanding SAPPRFT's import decisions is to model the determinants of movie box-offices in the China market. We take a market-share approach in our modeling strategy. Movies released in each week compete directly in the market share of box-offices. We assume the total potential market size for movies released in the same week to be fixed at M. M includes the outside option of consumers choosing to watch none of

the movies. In our estimation, we set $M = 5$ billion yuan, which is around 10% of the annual box-office revenue in the market.[6] Notice that movies usually are screened for a few weeks in theaters, and thus movies released during different weeks potentially compete with each other as well. Our approach assumes that the market-share competition comes directly from same-week releases. Given that the opening-week box-office contributions are usually a significant percentage of the total box-office revenue, our assumption is a simplifying approximation. We can easily extend our model to include competition between movies released in different weeks; however, doing this may add complexity without much additional insight.

We model a representative consumer i 's utility of watching a movie j released in week t as:

$$u_{ijt} = X_{jt}\beta + \xi_{jt} + \varepsilon_{ijt}, \tag{1}$$

and the utility of the outside option is:

$$u_{i0t} = \varepsilon_{i0t}, \tag{2}$$

where X_{jt} includes movie characteristics (as outlined in Table 3) and time-variant factors like month and year indicator variables that shift the demand. Both the error terms ε_{ijt} and ε_{i0t} follow the standard Type-I extreme value distribution. ξ_{jt} represents movie-specific unobserved attractiveness in the market that we as researchers do not observe. We assume ξ_{jt} follows an iid normal distribution.

A consumer chooses an option that maximizes her utility in each week. She can either choose a particular movie that yields the highest utility or choose not to watch any movie at all. When we aggregate the movie-watching behavior across consumers, we can derive the total number of ticket sales Y_{jt}. Based on the error-term assumptions, we derive the market

[6] As is standard in the demand estimation literature (Berry, 1994), setting the total market size at different levels has minimal impact on the parameter estimates.

shares as follows (Berry, 1994):

$$\ln(S_{jt}) - \ln(S_{0t}) = X_{jt}\beta + \xi_j, \tag{3}$$

where $S_{jt} = \frac{Y_{jt}}{M}$ is the market share of box-office tickets sold for movie j. In the estimation, we approximate the market share using the observed box-office revenue, instead of the total number of tickets sold, given that we do not have movie-level ticket-price data. [7]

With this transformation, we can now use econometric techniques such as maximum likelihood methods or generalized methods of moments to estimate this regression problem. However, we need to pay extra attention to the unobserved error term ξ_{jt} here. The consumers would have access to information regarding this term in their movie choice decisions. More importantly, SAPPRFT, in deciding whether to import a movie, may also have such information. Because of this, Hollywood movies that are imported by China could be quite different than those not imported in this unobserved demand shock ξ_{jt}. This makes the conditional distribution of ξ_{jt} for imported movies not equal to zero. If we do not control for this selection bias, the estimates of the movie characteristics β will be biased. In addition, the conditional distributions of simultaneous-release imported movies could be different from those of the delayed-release movies. We describe the details of how we control this selection issue in subsection below, after we introduce the models for import decisions.

The estimates from this part of our model will highlight the determinants of box-office revenue in the China theatrical market. In particular, we include the logarithm of the release lag for Hollywood movies that are imported under the delayed-release schedule as a main variable in this box-office model. The estimate of this variable provides a test for our hypothesis H3a regarding the negative impact of release lag on box-office revenue. We include separately the logarithm of production budget for simultaneous-release movies and

[7] Unlike the US market, the movie-ticket prices are not uniformly determined in China. The prices vary by movies as well as theaters. We could potentially improve our estimation if we had access to such granular-level price data. For the purpose of this paper, we believe that lacking such information does not impact our main conclusions.

for delayed-release movies in the model. The difference in these two estimates serves as a test for our hypothesis H1b on the differential impact of production budget on box-office revenue.

Given the market share formula in Equation 3, we can now derive the impact of importing a particular movie k in week t. Denote the set of movies scheduled without movie k as J. Then the total market box-office revenue is computed as:

$$M_t(J) = M \times \frac{\sum_{j \in J} \exp(v_{jt})}{1 + \sum_{j \in J} \exp(v_{jt})}, \tag{4}$$

where $v_{jt} = X_{jt}\beta + \xi_{jt}$ is the deterministic part of the utility function for movie j in week t. Now if we include the movie k, the total market box-office revenue will be changed, and the difference is the total net impact from movie k, which can be calculated as:

$$\Delta M_{kt}(J \cup k) = M \times \left[\frac{\exp(v_{kt}) + \sum_{j \in J} \exp(v_{jt})}{1 + \exp(v_{kt}) + \sum_{j \in J} \exp(v_{jt})} - \frac{\sum_{j \in J} \exp(v_{jt})}{1 + \sum_{j \in J} \exp(v_{jt})} \right]. \tag{5}$$

In other words, the total market cannibalization to already scheduled movies brought by adding Hollywood movie k is:

$$\Delta M_{Jt}(J \cup k) = M \times \left[\frac{\sum_{j \in J} \exp(v_{jt})}{1 + \sum_{j \in J} \exp(v_{jt})} - \frac{\sum_{j \in J} \exp(v_{jt})}{1 + \exp(v_{kt}) + \sum_{j \in J} \exp(v_{jt})} \right]. \tag{6}$$

The cannibalization effect expressed as a share can be derived as:

$$\begin{aligned} C_{kt}(J \cup k) &= \frac{\Delta M_{Jt}(J \cup k)}{M_t(J)} \\ &= \frac{\exp(v_{kt})}{1 + \exp(v_{kt}) + \sum_{j \in J} \exp(v_{jt})}. \end{aligned} \tag{7}$$

Simultaneous-Release Model

We now turn to structurally modeling the simultaneous-release import decisions for SAP-PRFT. Table 5 suggests that, in most weeks, there is at most one Hollywood movie scheduled

under the simultaneous-release model. Thus, we model the decision as a multinomial logit choice problem. As discussed earlier, SAPPRFT has the twin goals of growing the film market size while protecting local movies. We capture these components in our utility specification for the import decision. Specifically, denoting the utility of import movie k in week t under the simultaneous-release schedule as u^S_{kt}, where S stands for simultaneous-release, we have:

$$u^S_{kt} = \gamma^S_B \ln B_k + \gamma^S_C \ln C_{kt} + Z_{kt}\beta^S + \varepsilon^S_{kt}, \tag{8}$$

where B_k is the production budget, and C_{kt} is the cannibalization effect on the local movies as specified in Equation 7. Z_{kt} includes additional movie-specific attributes such as run time, sequel, MPAA ratings, and production studio. ε^S_{kt} is the error term that we model as standard Type-I extreme value distribution.

The tendency for SAPPRFT to import a Hollywood movie also depends on the overall movie market performance in the China market up till the time the movie-import decisions are being made. We thus model the utility of the outside option of importing none as follows:

$$u^S_{0t} = W^S_{kt}\delta^S + \varepsilon^S_{0t}, \tag{9}$$

where W_{kt} are characteristics describing the movie market performance information, and ε^S_{0t} is assumed to follow the standard Type-I extreme value distribution. We include the following terms in W_{kt}: an intercept, the number of Chinese movies already scheduled in the week, and the cumulative box-office share of Chinese movies until one month before week t. For any movie to be imported, the utility of having the movie must be larger than the outside option. Thus, the estimates of coefficients for W_{kt} can be viewed as the base movie-import threshold.

Based on the error-term assumptions of the model, the probability of importing movie k

in week t now follows the logit form:

$$Pr_{kt}^{S} = \frac{\exp(v_{kt}^{S})}{\exp(v_{0t}^{S}) + \sum_{j \in K} \exp(v_{jt}^{S})}, \tag{10}$$

where K is the set of the movies that SAPPRFT considers in the specific week, and v_{kt}^{S} is the deterministic part in the utility specification without the idiosyncratic error term.

The estimates from the simultaneous model help us test our hypotheses regarding how SAPPRFT determines which movies to import under its dual objectives. Specifically, the estimates of γ_B^S and γ_C^S give us tests on hypotheses H1a and H2a, respectively. The estimates for the threshold part δ^S help us test hypothesis H2b.

Delayed-Release Model

The delayed-release model closely follows the-simultaneous-release model. The difference is that when SAPPRFT considers which movies to import, it treats all the local movies and simultaneous-release movies as given, then considers the marginal impact from the delayed-release movies. Another empirical difference as shown in Table 5 is that in each week, in virtually all of the cases, at most one simultaneous-release Hollywood movie is scheduled; while for the delayed-releases it is more common (5%) to have multiple movies imported in the same week. Under this scenario, we treat these movies as repeat observations and model the selection probability for individual movies independently using binary logit models.

Specifically, denoting the utility of import movie k in week t under the delayed-release schedule as u_{kt}^{D}, where D stands for delayed-release, we have:

$$u_{kt}^{D} = \gamma_B^D \ln B_k + \gamma_C^D \ln C_{kt} + Z_{kt}\beta^D + \varepsilon_{kt}^{D}, \tag{11}$$

where B_k is the production budget, and C_{kt} is the cannibalization effect to the existing movies. Z_{kt} includes additional movie-specific attributes as in the simultaneous-release model. We also include the logarithm of the release lag in Z_{kt} to understand whether older

movies are more or less likely to be imported. ε_{kt}^{D} is the error term that we model as standard Type-I extreme value distribution.

Similarly, we specify the utility of the outside option of not importing a particular movie as follows:

$$u_{0t}^{D} = W_{kt}^{D}\delta^{D} + \varepsilon_{0t}^{D}, \tag{12}$$

where ε_{0t}^{D} is assumed to follow the standard Type-I extreme value distribution. For the import threshold variable W_{kt}^{D}, we include the following terms: an intercept, the number of Chinese movies already scheduled in the week, the number of Hollywood movies already scheduled, and the cumulative box-office share of Chinese movies till one month before week t.

The probability of importing movie k in week t now follows the logit form:

$$Pr_{kt}^{D} = \frac{\exp(v_{kt}^{D})}{\exp(v_{0t}^{S}) + \exp(v_{kt}^{D})}, \tag{13}$$

where v_{kt}^{D} is the deterministic part in the utility specification without the idiosyncratic error term.

Similar to the simultaneous-release model, the estimates from this part of the model help us test our hypotheses, specifically H1a and H3b. The comparisons between the simultaneous-release model and the delayed-release model help us test hypothesis H2b.

Sample Selection Control and Estimation Method

Because we observe only the box-office revenue of local movies and imported Hollywood movies, if we do not control for sample selection, the estimation results for the box-office model would potentially be biased. We follow closely the method proposed in Lee (1983) to control for the sample selection issue in our application.

Lee's method (1983) is a direct extension of the well-known Heckman model (Heckman,

1977) of sample selection with binary logit and multinomial logit models. Specifically, if we denote the error term for the outcome equation as $\xi_k = \sigma_\xi u_k$ where u_k follows a standard normal distribution, Lee (1983) imposes a correlation assumption between u_k and the error terms ε_k in the selection equation, using a standard multivariate normal distribution defined on transformed variables based on u_k and ε_k. The transformation ensures that we can express the correlation between the unobserved components in both the outcome and selection equations through the multivariate normal distribution. In particular, we transform the selection error as $\varepsilon^* = \Phi^{-1}(F(\varepsilon))$, where F is the cumulative density function of ε, and Φ is the cumulative density function of the standard normal distribution. Based on such a transformation, Lee (1983) showed that we can use a two-stage estimation approach to get consistent model estimates: in the first stage, we estimate the binary or multinomial logit models, and in the second stage, we compute the conditional distribution for ξ_k based on the probability from the selection equation; we then plug in a component as an additional control for the outcome equation and estimate the outcome equation. For both binary and multinomial logit selection models, the additional control component can be expressed as follows:

$$\kappa_k = -\sigma\rho\frac{\phi(\Phi^{-1}(Pr_k))}{Pr_k}, \tag{14}$$

where ρ is the measure of correlation between selection and outcome equations. Pr_k is the probability that a particular option k is selected, and ϕ is the probability density function of the standard normal distribution. This error-correction term is a generalization to the inverse Mills ratio in the Heckman selection correction framework. After including this error-correction term, the remaining error component follows an iid normal distribution.

Applying this method in our context, our estimation process involves the following steps:

1. Estimate the box-office model using Equation 3 without selection correction using ordinary least squares estimation.

2. Compute the expected cannibalization effect for each movie in the simultaneous-release

stage and in the delayed-import decision stage according to Equation 7 based on the estimates in the above step.

3. Estimate the simultaneous-release import decision model based on Equation 10 using the maximum likelihood estimation method.

4. Estimate the delayed-release import decision model based on Equation 13 using the maximum likelihood estimation method.

5. Compute the error correction terms κ_k^S and κ_k^D for movies imported under simultaneous-release and delayed-release schedules, respectively, using Equation 14.

6. Re-estimate the box-office model by adding the error correction terms κ_k^S and κ_k^D into the box-office model equation.

In our estimation procedure outlined above, we mainly follow the two-step estimation scheme in Lee (1983). We have an additional step in the beginning that estimates the box-office model without selection correction because we need to compute the expected cannibalization effect that enters into the simultaneous- and delayed-release import decision models.

It should also be noted that for better identification purposes, we need to include at least one variable that appears in the selection equation but not in the outcome equation. We include both the run time and the production studio in both the simultaneous-release and delayed-release equations but not in the box-office model because consumers mostly care about the quality and content of the movie in making their consumption decisions; thus a movie's run time and the production studio have minimal impact on box-office performance. On the other hand different movie studios have different levels of experiences and relationships with SAPPRFT, and thus we think the probability of each movie being imported might also depend on the production studio. The heterogeneity in import probabilities across studios discussed in our data summary section provides some preliminary

evidence of this. With regard to run time, all else being equal, shorter run times provide a theater with more flexibility in scheduling movies (Eliashberg et al., 2009).

Estimation Results

We estimate our model based on the estimation steps outlined in the previous section. Estimation results are reported in Tables 6, 7, and 8.

Results of the Box-Office Revenue Model

As shown in Table 6, our model of box-office performance in China achieves an R-square of 0.54. As indicated by the intercepts in this table, both simultaneous- and delayed-release Hollywood movies in general outperform Chinese movies. Hypothesis H1a relates to the effect of production budget on revenues in China. We find a significant and large positive effect (1.235) associated with the box-office revenue in the China market for simultaneous-release movies. However, there is no statistically significant effect for delayed-release movies. While there is a significant relationship only for simultaneous-release movies, the difference across the two Hollywood movie types does confirm our hypothesis H1b.

With regard to the effect of delayed-release (H3a), the negative estimate of -0.553 for the logarithm of release lag provides strong evidence of the negative impact of delayed-release for a Hollywood movie on its box-office performance in China. This confirms our hypothesis H3a that delaying the release can be an effective strategy for mitigating the potential cannibalization effect of Hollywood movies on the local market. One reason that delaying the release could harm the box-office is that people may have greater opportunity to watch a pirated version. We investigated this potential explanation by examining a data set containing the total number of downloads from China for pirated movies hosted on a major peer-to-peer file-sharing website.[8] These data are not available before 2014 and include 24

[8]We thank Jonne Guyt, Arjen van Lin, Yufeng Huang and Bram Gorissen for sharing with us these data, which are part of a larger study on the impact of downloads on box office revenues.

Hollywood movies that were released in China in 2014 and are part of our data set. Of these, 14 movies received a delayed-release. For these movies, we find a correlation of 0.523 between the logarithm of the number of downloads and the delay time in China (from the data of the US release), suggesting that the longer delay times are associated with a greater level of pirating. While this analysis is only suggestive, it is consistent with the view that consumers substitute watching pirated versions of a movie for going to a theater when the release is delayed.

We now turn to other variables of interest. Regarding the differences across years, we do not find statistically significant trends across the years in the study period. The significant market growth in the data period could be partially captured by the factors such as growing number of movies released, the growing production budget for the Hollywood movies, and the increasing trend in the director power and actor power indexes we constructed for Chinese movies. In terms of seasonality, the months of December to February and July to August generate the largest box-office revenues. The first period covers the holidays like New Year, and Chinese New Year when people typically have more time to watch movies. The second period is the summer holiday season for students, again leaving more time for leisure activities including movie-going. May and November seem to be the two months with the least demand for movies.

The second block of Table 6 reports the impact of MPAA ratings and movie genre. MPAA ratings seem to have no effect in the China market, likely because there is no formal rating system for movies in China. Regarding genre, Chinese audiences mostly prefer movies with action and scifi elements. The third block of Table 6 reports estimation results for additional variables. For Chinese movies, the estimates for the director power (0.347) and the actor power (0.800) are both positive and statistically significant, as expected. In addition, if a movie is mainly produced by a Hong Kong studio, the expected box-office revenue would be less than that of the mainland movies. This reflects a recent trend in consumer preference towards major movies produced by mainland directors and actors.

Table 6: Parameter Estimates for the Box-Office Model

Variables	Estimate	Std. Err	t-value	
Intercepts and dummy variables				
Intercept: Chinese movies	-7.428	0.245	-30.270	***
Intercept: Hollywood simultaneous releases	-3.395	0.618	-5.495	***
Intercept: Hollywood delayed releases	-4.262	0.627	-6.804	***
February	-0.262	0.219	-1.199	
March	-0.665	0.215	-3.092	***
April	-0.663	0.212	-3.131	***
May	-0.990	0.217	-4.560	***
June	-0.795	0.208	-3.823	***
July	-0.404	0.202	-2.002	**
August	-0.338	0.203	-1.661	*
September	-0.451	0.203	-2.217	**
October	-0.839	0.205	-4.090	***
November	-1.017	0.2053	-5.007	***
December	-0.448	0.213	-2.105	**
Year 2010	0.240	0.166	1.443	
Year 2011	0.048	0.154	0.314	
Year 2012	0.176	0.154	1.149	
Year 2013	0.198	0.155	1.272	
Year 2014	0.226	0.152	1.484	
Movie attributes I				
MPAA: PG	-0.039	0.578	-0.067	
MPAA: PG-13	0.138	0.586	0.236	
MPAA: R	0.246	0.631	0.390	
Action	0.436	0.106	4.101	***
Adventure	0.069	0.111	0.621	
Animation	0.168	0.148	1.135	
Comedy	-0.063	0.099	-0.638	
Drama	-0.020	0.108	-0.187	
Horror	0.052	0.207	0.251	
Scifi	0.431	0.143	3.017	***
Thrill	-0.164	0.192	-0.851	
Movie attributes II				
Hong Kong movie	-0.260	0.146	-1.784	*
Chinese movie: director power	0.347	0.053	6.586	***
Chinese movie: actor power	0.800	0.056	14.185	***
Hollywood simultaneous-release movie: budget (log)	1.235	0.240	5.152	***
Hollywood delayed-release movie: budget (log)	0.374	0.279	1.341	
Hollywood delayed-release movie: release lag (log)	-0.553	0.213	-2.598	***
Sequel: previous movie(s) not imported	0.359	0.380	0.943	
Sequel: previous movie(s) imported	0.818	0.267	3.065	***
Selection controls				
rho: simultaneous release	-0.283	0.219	-1.280	
rho: delayed release	0.558	0.220	2.520	**
log(sigma2)	0.355	0.047	7.591	***
Number of observations	915			
Log-likelihood	-1460.700			
Adjusted R-squared	0.554			

Significance levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.

We also investigate the box-office performance for sequel movies by including a dummy variable on a movie in a series that has been previously imported and another on a movie in a series that has not been imported (i.e., the sequel would be the first to be imported). Results show that sequel movies in a series that has not been imported before have no impact on the box-office performance; however, if a previous movie in the same series was released in China before, the current sequel will enjoy a positive and significant (0.818) demand increase.

We use two parameters to control for the sample selection issue in the box-office equation. The estimate for the correlation measure ρ^S between the box-office performance and simultaneous-release import decision is negative but not significant; while the estimate of ρ^D for the delayed-release import decision is positive (0.558) and significant. These results suggest that the import decisions made by SAPPRFT are less likely to be dependent on unobserved factors that are not taken into account in our model for simultaneous-release decisions. But for delayed-release decisions, it seems that the better a movie is in its unobserved quality, the more likely it is to be imported. One explanation is that at the simultaneous-release import stage, there is little information for SAPPRFT beyond the commonly observed variables, but in the delayed-release stage, because the movies have been shown in other markets, SAPPRFT might take into consideration other information or factors that are beyond the variables included in our model.

Results of the Import Decisions

Our estimation results for the import selection models, as reported in Tables 7 and 8, provide insights on how SAPPRFT decides on importing Hollywood movies and the timing of their releases. The production budget and expected cannibalization effect are the two most important factors we test. Production-budget estimates are positive and significant in both the simultaneous-release equation and the delayed-release equation. As production budget is a main predictor of box-office performance, this result confirms that part of SAPPRFT's objective is to import movies that attract a larger Chinese audience and expand

the theatrical market, a finding that underlies the reasoning for hypothesis H1a. The estimate for simultaneous-release is much larger than that for delayed-release (3.063 vs. 1.075), suggesting that box-office performance is potentially a greater concern of SAPPRFT when choosing to allow a simultaneously released imported movie than a delayed-release movie. This result confirms our hypothesis H1a. For the expected cannibalization effect, the estimate is negative and significant (-1.740) for the simultaneous-releases but insignificant for delayed-releases. This is reasonable, because at the simultaneous-release stage, local movies compete head to head with the latest Hollywood blockbusters, and Hollywood movies will generate a significant market share in most weeks. Therefore, SAPPRFT has considerable incentive to limit the potential cannibalization effect in order to protect the local movies. This concern is much less important in the delayed-release stage, because (1) the delayed movies would not cannibalize the market share of local movies as much, and (2) SAPPRFT has more flexibility in scheduling the movies at different weeks and it can partially address the cannibalization concern through the scheduling in particular weeks. The results confirm our hypothesis H2a.

Our modeling framework also captures the thresholds for movie imports, with the thresholds determined by the overall market conditions. For simultaneous-releases, we find a significant positive effect (0.167) of number of Chinese movies scheduled and a significant negative effect (-1.583) of the cumulative box-office share of Chinese movies from the beginning of the year up until one month before the scheduled release week of the potential import. These results imply that SAPPRFT is less likely to import a Hollywood movie under a simultaneous-release schedule if there are already several Chinese movies scheduled. SAPPRFT is also more likely to import a movie if the yearly cumulative box-office share for local movies is high, because the pressure on local movies to maintain a large proportion of the market share is lower under such circumstances. This finding is key to our conclusion on the dual objectives of the Chinese government agency and confirms our hypothesis H2a. Regarding delayed-release imports, neither the number of local movies scheduled nor

Table 7: Parameter Estimates for the Simultaneous-Release Selection Model

Variables	Estimate	Std. Err	t-value	
Selection utility				
Production budget (log)	3.063	0.371	8.259	***
Cannibalization for local movies	-1.740	0.350	-4.974	***
Run time	-0.092	0.544	-0.168	
Sequel: previous movie(s) not imported	0.925	0.565	1.635	
Sequel: previous movie(s) imported	2.319	0.533	4.347	***
MPAA: PG	0.213	0.873	0.244	
MPAA: PG-13	0.874	0.895	0.976	
MPAA: R	0.442	0.981	0.450	
Studio: Universal	0.000	n.a.	n.a.	
Studio: WB	0.690	0.604	1.142	
Studio: Disney	0.848	0.665	1.276	
Studio: Sony	1.087	0.625	1.739	*
Studio: Fox	1.757	0.609	2.884	***
Studio: Paramount	1.210	0.675	1.792	*
Studio: Lionsgate	0.930	0.700	1.328	
Studio: Mini Major	0.847	0.682	1.242	
Selection threshold				
Intercept	23.400	2.930	7.987	***
Number of Chinese movies scheduled	0.167	0.101	1.653	*
Yearly cumulative box-office share of Chinese movies	-1.583	0.804	-1.969	**
Number of observations	774			
Log-likelihood	-151.380			

Significance levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.

Table 8: Parameter Estimates for the Delayed-Release Selection Model

Variables	Estimate	Std. Err	t-value	
Selection utility				
Production budget (log)	1.075	0.206	5.211	***
Cannibalization for local movies	0.316	0.248	1.277	
Run time	0.010	0.427	0.023	
Sequel: previous movie(s) not imported	-0.683	0.600	-1.139	
Sequel: previous movie(s) imported	-0.315	0.483	-0.651	
Release lag (log)	0.015	0.166	0.090	
Average review rate on IMDb	0.181	0.122	1.482	
MPAA: PG	0.168	0.793	0.211	
MPAA: PG-13	0.469	0.814	0.576	
MPAA: R	-0.048	0.846	-0.057	
Studio: Universal	0.000	n.a.	n.a.	
Studio: WB	-0.186	0.404	-0.460	
Studio: Disney	-0.053	0.483	-0.109	
Studio: Sony	0.224	0.382	0.586	
Studio: Fox	0.119	0.418	0.285	
Studio: Paramount	-0.015	0.479	-0.032	
Studio: Lionsgate	0.039	0.354	0.109	
Studio: Mini Major	0.983	0.352	2.795	***
Selection threshold				
Intercept	9.223	1.558	5.919	***
Number of Chinese movies scheduled	0.051	0.078	0.657	
Number of Hollywood movies scheduled	0.872	0.278	3.134	***
Yearly cumulative box-office share of Chinese movies	0.670	0.691	0.970	
Number of observations	34098			
Log-likelihood	-639.169			

Significance levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.

the cumulative yearly market-share parameter estimates are significant. This confirms our hypothesis H3b. We believe the result is driven by the effectiveness of the delayed-release strategy itself, and thus such factors that are important considerations in the simultaneous-release decisions are of less concern for delayed-releases. On the other hand, the estimate for number of Hollywood movies scheduled under simultaneous-release is positive and significant (0.872), suggesting that SAPPRFT also balances the total number of releases for Chinese movies and for Hollywood movies, and as a result, it is less likely to schedule a delayed-release Hollywood movie in the weeks that a simultaneous Hollywood release is already scheduled.

We include additional variables such as a movie's run time, sequel status, and production

studio for both import decision stages, and the release lag and average review rating on IMDb for the delayed-release stage, as controls for our movie-import decision models. As discussed in the previous section, run time and production studio information serve as an exclusion restriction for our equation on the box-office performance. We find significant impacts of movie studios on the import likelihood: for simultaneous-release movies, Fox, Sony, and Paramount studios seem to have a better chance to enter the China market than others, everything else being equal; for delayed-release movies, small mini major studios seem to have a higher chance of acceptance. A movie that is a sequel has a significantly higher chance of being imported under a simultaneous-release schedule than other movies, but this does not hold for a sequel in a series that was not previously imported into China. On the other hand, this sequel status does not impact delayed-release import decisions. Run time is insignificant in both equations. And finally, the release lag information and average rating on IMDb seem to have no impact on the delayed-release decisions, even though such information may help us better understand the expected box-office performance in the Chinese market.

In summary, our estimation results confirm our hypotheses (See Table 9). We perform robustness checks of the simultaneous- versus delayed-release threshold on the main conclusions by shifting from the current threshold of four-weeks' lag to two-weeks' lag. The results remain robust and all hypotheses are supported except that the test for H2b becomes insignificant. Details of the robustness analysis are presented in Appendix A.

The Impact of Release Delays

We use our model estimates to further assess the economic impact of the delayed-release strategy. To achieve this, we compute the total expected box-office revenue in the market under two hypothetical scenarios.

In the first scenario, we keep the movie-release schedule the same as observed in the data, while assuming that a delayed-release movie would generate the same demand as if it were under simultaneous-release. To achieve this, we basically "turn off" the estimates of release

Table 9: Summary of Hypotheses Tests

	Hypothesis	Supported
H1a	Movies with larger production budgets are more likely to be imported	
	— Simultaneous release	Yes
	— Delayed release	No
H1b	Production budget will have a lower influence on box-office revenues for delayed release than for simultaneous release	Yes
H2a	Hollywood movies that are expected to generate larger cannibalization are less likely to be imported under simultaneous release	Yes
H2b	Hollywood movies are less likely to be simultaneously released when China movie market share is lower	Yes
H3a	A delayed release date will be associated with lower box-office revenues for imported Hollywood movies	Yes
H3b	For delayed release movies	
	— Cannibalization effect is not related to import decisions	Yes
	— China movie market share is not related to import decisions	Yes

delay (both the intercept and the coefficient for release lag variable) in the consumer utility function, then compute the expected box-offices. Given our finding that delayed-releases are more common in weeks with no simultaneous Hollywood movies scheduled, this estimate of the potential impact of release delays can be viewed as an upper-bound estimate for the true impact.

In the second scenario, we keep the movies imported as fixed while moving all the delayed-releases to the same week of their releases in the US market. Moving the delayed releases into the same release dates would bring in more competition among the simultaneous releases. Thus, the estimate from this approach can be viewed as a lower bound of the true impact. The total box-office revenue in our data sample is 90.55 billion yuan. The total box-office revenue calculated under our first counterfactual approach is 100.67 billion yuan, while the total box-office revenue under the second scenario is 98.75 billion yuan. Thus, we conclude that the delayed-release strategy resulted in an estimated economic loss of 8.2-10.12 billion yuan over the six year period, which equals 9.1% to 11.2% of the total market size. Interestingly, the total market share of imported Hollywood movies moves up from 44% to 50% in the first scenario and to 45% in the second scenario. This result offers important

evidence that a delayed-release strategy has been very effective in keeping the market share of imported movies just below 50%, a goal that people speculate SAPPRFT holds.

Discussion and Implications

Global marketers such as Hollywood movie studios that generate higher box-office gross revenues in markets outside rather than inside the US need to be very sensitive to local market restrictions that limit their ability to successfully export their products. Bilateral and multilateral trade agreements are designed to encourage trade among nations, but they often contain provisions that limit such trade and protect local producers. Such trade pacts represent a negotiated compromise between free trade and complete isolation of a local market. While the explicit terms of the trade agreement are typically clearly understood, participating countries often employ implicit constraints that serve to protect their local industry. From both a managerial and public-policy perspective, it is important to understand the nature of the implicit and explicit constraints and their effects, specifically on the success of global marketers.

The motion-picture industry provides an excellent setting for studying these issues. First and foremost, the export of Hollywood movies to China is of great economic significance to the US. Of all the non-US theatrical markets, China is by far the largest, accounting for US$8.9 billion in total box-office revenue, compared to US$11.1 billion in the US (and Canada) in 2017. Hollywood movies have a successful history in China. For example, in 2017, seven Hollywood movies earned more from the Chinese market than from the North American market (Fan, 2018).

There are three additional reasons why the motion-picture industry is a particularly appropriate setting to better understand the impact of implicit constraints. First, a review of the movie industry's development history in China suggests that China pursues dual goals of building its own theatrical market by importing major Hollywood movies while protecting

the local film-production industry and such dual goals are indeed typical of the balancing acts of many jurisdictions. Second, China employs a set of not well-defined and subjective constraints, being essentially a black box, to exclude certain movies from the Chinese market (Frater, 2017). These constraints are clearly impactful, as they have been subject to a number of complaints, as outlined in O'Connor and Armstrong (2015). Delayed-release is likely to be the main administrative control among the black box. Among the Hollywood movies that are admitted into China, 52% are delayed from their worldwide release date by four or more weeks. Delayed-release limits the impact of world wide advertising, social media (Kupfer, vor der Holte, Kübler, & Hennig-Thurau, 2018), and promotion on box-office performance and thus reduces the revenue a movie can earn. In addition, delayed-release may increase the opportunity for people who want to see the movie when it is first released to do so via pirated versions. Delayed-release is thus an important aspect of China's implicit regulation to protect the local industry. Third, the frequent introduction of new movies and the availability of data on the characteristics of movies and their revenue results create an empirical basis for testing our hypotheses using publicly available data on the US market and data especially compiled for this paper on the China market.

Summary of Findings

We survey the market background of the movie market in China and develop three main hypotheses regarding the box-office performances and selection rules under the government's dual objectives. We develop an econometric model of market demand with explicit controls for the selection effects captured by the simultaneous-release decision and the delayed-release decision models under a generalized Heckman framework. As summarized in Table 9, we find strong empirical support for our hypotheses. Specifically, we provide empirical evidence that China seeks to grow its theatrical market in terms of both increasing box-office revenues through selecting movies with relatively high budgets, and protecting the local industry by restricting the release of such movies when Chinese movies have a relatively low market

share or when the threat of cannibalization is high. The delayed-release strategy, a form of implicit barrier, seems to be effective in reducing the box-office revenues of Hollywood movies in China. Moreover, given their reduced impact, delayed-release movies are less likely to be a concern regarding local market protection.

Managerial Implications

In attempting to understand China's dual objectives, our research generates significant managerial implications for Hollywood studios in a number of important ways. First of all, foreign movie producers need to pay attention to both the explicit and implicit constraints of entering and competing in other markets. While the import quota set by the government is transparent and well-understood, the present work provides evidence of additional barriers that are implicit and lesser known. Specifically, we show how the incentives for SAPPRFT fill the quotas evolve over time and how the agency decides on release timing. Second, given the implicit barriers, the studios also need to build better relations with the import authority. As Sun (2017) notes,

> "The relationship between the Chinese film authority can be described as bumpy at best. On the one hand, SAPPRFT knows too well that Hollywood blockbusters are the most lucrative products in the Chinese market, and the Chinese state-run institutions...benefit most from their revenues. On the other hand, SAPPRFT...plays the gatekeeper's role to ensure that each foreign film is complying with Chinese laws, regulations, and 'national sentiment,' and this can be detrimental to Hollywood product....In the name of protecting domestic films (sometimes this purpose is never openly announced) it could postpone the release of a popular title, black out the exhibition of foreign films during a particular period of time, and schedule Hollywood blockbusters against each other to mitigate their impact on local films."

Third, it is important for the industry to use data to understand which factors are appropriate and relevant in SAPPRFT's decisions. For example, the industry could potentially assess the likelihood of simultaneous-releases in China and possibly time the US market release so that a movie is less likely to be delayed in the China market. In addition, managers in the

industry could benefit from data analytics regarding when China starts to use the delayed-release strategy and what is trending in the balance of simultaneous versus delayed-releases.

Public-Policy Implications

The successful export of Hollywood movies to markets around the world is a contributor to the US trade balance, to the economies of areas where the movies are filmed and the studios headquartered (primarily southern California), and to the individuals who work in the industry. While many countries impose limits on the ability of US producers to enter these foreign markets, government officials need to be particularly concerned about the role of implicit and explicit trade barriers in limiting box-office returns in China, the largest (and rapidly growing) market for films outside the US. The visibility of the industry overall and the ability to observe import restrictions on a movie-by-movie basis intensify this concern. While the success of a particular movie in any market is the studio's responsibility, government officials negotiate trade policy. Implicit constraints are often vague and difficult to quantify; for public-policy officials, one critical implication of this study is its demonstration that implicit constraints are present and have a significant and quantifiable impact on the performance of Hollywood movies in China. Moreover, the data show which constraints are important and under what circumstances. For example, the need to protect a local market is highly significant for simultaneous-release movies, but not for delayed-release movies. While no single study can identify and quantify all the implicit barriers that exist in a market, our study points out to trade negotiators the directions that they can take to ameliorate the impact of such barriers.

While one needs to be careful not to generalize to other products exported to China, this study also illustrates a way for US public-policy officials to identify and analyze the effect of trade barriers in other countries. While the movie industry generates particular challenges–as SAPPRFT tries to have successful movies to build the exhibition industry while limiting such success to protect local producers–the industry is a good one to study

because of the frequency of new product introductions and the availability of movie-specific data. Empirical studies of other industries will face different challenges in estimating effects, but the present work should encourage public-policy officials to study the effect of explicit and implicit barriers to trade to better determine what the key concerns should be in negotiating trade agreements.

Limitations and Future Research

While our research provides a first-step investigation into the important market-access question under explicit and implicit trade barriers in China's movie market, many critical issues remain unresolved regarding government regulations and barriers. Future research can explore and test such regulations in other industries and other markets–for example, video games, music, and other entertainment products. We did not explore how the content of movies can be changed to adapt to Chinese constraints, while in practice either SAPPRFT or the movie studios censor or modify certain content specifically for the China market. It is worth studying the limitations and constraints that globally branded products such as movies must consider in order to adapt to particular markets. In addition, we capture the market competition between local and Hollywood movies using a standard demand model that abstracts away the rich weekly or daily-level dynamics. Future research can build on our approach by looking at the inter-plays at a more granular level when data on weekly or even daily box-offices are available. Finally, Hollywood studios are developing strategies such as co-production with a Chinese studio to create films that are not subject to the current quota of 34 movie imports in order to access the China market. It is intriguing to try to understand the potential payoffs under such strategies and how the studios choose which avenue to pursue in the future. We leave these pursuits to future researchers.

References

Ainslie, A., Drèze, X., & Zufryden, F. (2005). Modeling movie life cycles and market share. *Marketing Science*, *24*(3), 508–517.

Berry, S. T. (1994). Estimating discrete-choice models of product differentiation. *The RAND Journal of Economics*, 242–262.

Canacine. (2017). Leading film markets worldwide in 2016, by gross box office revenue (in billions u.s. dollars). https://www.statista.com/statistics/252730/leading-film-markets-worldwide--gross-box-office-revenue/. Retrieved July 31, 2017.

Chen, X., Chen, Y., & Weinberg, C. (2013). Learning about movies: An empirical analysis of the platform release strategy. *Journal of Cultural Economics*.

Davidson, C. & Matusz, S. J. (2006). Trade liberalization and compensation. *International Economic Review*, *47*(3), 723–747.

Elberse, A. & Eliashberg, J. (2003). Demand and supply dynamics for sequentially released products in international markets: The case of motion pictures. *Marketing Science*, *22*(3), 329–354.

Eliashberg, J., Hegie, Q., Ho, J., Huisman, D., Miller, S. J., Swami, S., … Wierenga, B. (2009). Demand-driven scheduling of movies in a multiplex. *International Journal of Research in Marketing*, *26*(2), 75–88.

Fan, X. (2018). How China's Expanding Movie Industry Will Also Benefit US. http://partners.wsj.com/chinadaily/chinawatch/chinas-expanding-movie-industry-will-also-benefit-us/. Retrieved Jan 31, 2018.

Ferreira, F., Petrin, A., & Waldfogel, J. (2012). Trade, endogenous quality, and welfare in motion pictures. In *Working paper*.

Frater, P. (2017). U.S. and China Struggle Over Film Quotas. http://variety.com/2017/biz/asia/u-s-and-china-struggle-over-film-quotas-1201979720/. Retrieved July 31, 2017.

Frater, P. (2018). China Movie Industry Oversight Shifted to Communist Propaganda Department. Variety.com. http://variety.com/2018/film/asia/china-movie-regulation-communist-propaganda-department-1202732209/. Retrieved April 15, 2018.

Griffith, D. A., Yalcinkaya, G., & Rubera, G. (2014). Country-level performance of new experience products in a global rollout: The moderating effects of economic wealth and national culture. American Marketing Association.

Heckman, J. J. (1977). *Sample selection bias as a specification error (with an application to the estimation of labor supply functions)*. National Bureau of Economic Research Cambridge, Mass., USA.

Hughes, L. & Meckling, J. (2017). The politics of renewable energy trade: The us-china solar dispute. *Energy Policy*, *105*, 256–262.

Krider, R. E. & Weinberg, C. B. [Charles B]. (1998). Competitive dynamics and the introduction of new products: The motion picture timing game. *Journal of Marketing Research*, 1–15.

Kupfer, A.-K., vor der Holte, N. P., Kübler, R. V., & Hennig-Thurau, T. (2018). The role of the partner brand's social media power in brand alliances. *Journal of Marketing*.

Lee, L.-F. (1983). Generalized econometric models with selectivity. *Econometrica: Journal of the Econometric Society*, 507–512.

O'Connor, S. & Armstrong, N. (2015). Directed by Hollywood, edited by China: How China's censorship and influence affect films worldwide. *US-China Economic and Security Review Commission*, 4.

Su, W. (2014). Cultural policy and film industry as negotiation of power: The Chinese state's role and strategies in its engagement with global Hollywood 1994–2012. *Pacific Affairs*, *87*(1), 93–114.

Sun, S. (2017). An Overview of the Chinese Film Industry. In *The movie business book*. Jason Squire, ed.

Taubman, G. (1998). A not-so world wide web: The internet, china, and the challenges to nondemocratic rule. *Political Communication*, *15*(2), 255–272.

VanderKlippe, N. (2014). Coming soon to a theatre in China: Delays, disappointments – but not 'Mockingjay'. The Globe and Mail. https://www.theglobeandmail.com/report-on-business/international-business/asian-pacific-business/coming-soon-to-a-theatre-in-china-delays-disappointments-and-sabotage/article21646759/. Retrieved July 31, 2017.

Walls, W. D. & McKenzie, J. (2012). The changing role of hollywood in the global movie market. *Journal of Media Economics*, *25*(4), 198–219.

Online Appendix

A: Robustness Check

In this study of the robustness check, we change the cutoff threshold of simultaneous releases from four weeks to two weeks and perform the same model estimation as reported in the main paper. Results are depicted in the following three tables. Overall, we find patterns very similar to our main model using four weeks as the cutoff threshold, and the general results support the hypotheses we develop in our main paper.

There are a few small differences as compared with the main estimation results. First, the selection control for the delayed-release model becomes insignificant in this robustness study. Second, in the simultaneous-release model, a sequel movie with no earlier movie(s) from that series previously imported does not impact the likelihood of it being included in the simultaneous-release group in our main estimation, yet this factor becomes significant under the two-week cutoff threshold. Third, the impact of yearly cumulative box-office share of local movies now turns insignificant instead of supporting our hypothesis H2b. Finally, the release lag, on the other hand, becomes significantly negative in the delayed-release model estimation, suggesting that all else equal, SAPPRFT is more likely to important a movie that was introduced more recently in the US market.

Table 10: Estimates for the Box-Office Model (Two-Week Threshold for Delayed Release)

Variables	Estimate	Std. Err	t-value	
Intercepts and dummy variables				
Intercept: Chinese movies	-7.420	0.246	-30.212	***
Intercept: Hollywood simultaneous releases	-3.237	0.621	-5.214	***
Intercept: Hollywood delayed releases	-4.097	0.628	-6.524	***
February	-0.271	0.219	-1.239	
March	-0.689	0.214	-3.214	***
April	-0.685	0.212	-3.225	***
May	-1.007	0.220	-4.578	***
June	-0.800	0.208	-3.839	***
July	-0.411	0.202	-2.036	**
August	-0.341	0.203	-1.675	*
September	-0.456	0.203	-2.243	**
October	-0.844	0.205	-4.117	***
November	-1.030	0.205	-5.032	***
December	-0.464	0.213	-2.174	**
Year 2010	0.251	0.166	1.511	
Year 2011	0.050	0.154	0.326	
Year 2012	0.182	0.154	1.180	
Year 2013	0.200	0.157	1.277	
Year 2014	0.232	0.153	1.517	
Movie attributes I				
MPAA: PG	-0.102	0.577	-0.177	
MPAA: PG-13	0.020	0.587	0.033	
MPAA: R	0.053	0.631	0.084	
Action	0.436	0.106	4.101	***
Adventure	0.069	0.111	0.621	
Animation	0.158	0.148	1.067	
Comedy	-0.063	0.099	-0.638	
Drama	-0.020	0.108	-0.187	
Horror	0.061	0.207	0.293	
Scifi	0.441	0.143	3.082	***
Thrill	-0.172	0.193	-0.894	
Movie attributes II				
Hong Kong movie	-0.260	0.146	-1.784	*
Chinese movie: director power	0.347	0.053	6.587	***
Chinese movie: actor power	0.800	0.056	14.185	***
Hollywood simultaneous-release movie: budget (log)	1.354	0.260	5.210	***
Hollywood delayed-release movie: budget (log)	0.399	0.276	1.443	
Hollywood delayed-release movie: release lag (log)	-0.394	0.162	-2.429	***
Sequel: previous movie(s) not imported	0.268	0.389	0.689	
Sequel: previous movie(s) imported	0.717	0.268	2.676	***
Selection controls				
rho: simultaneous release	-0.093	0.270	-0.346	
rho: delayed release	0.375	0.271	1.385	
log(sigma2)	0.354	0.047	7.579	***
Number of observations	915			
Log-likelihood	-1640.48			
Adjusted R-squared	0.554			

Significance levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.

Table 11: Parameter Estimates for the Simultaneous-Release (within Two-Weeks) Selection Model

Variables	Estimate	Std. Err	t-value	
Selection utility				
Production budget (log)	2.758	0.394	6.998	***
Cannibalization on local movies	-2.500	0.398	-6.275	***
Run time	-0.013	0.587	-0.023	
Sequel: previous movie(s) not imported	1.870	0.571	3.276	***
Sequel: previous movie(s) imported	2.780	0.570	4.880	***
MPAA: PG	-0.619	0.883	-0.701	
MPAA: PG-13	0.178	0.912	0.195	
MPAA: R	-0.743	1.042	-0.714	
Studio: Universal	0.000	n.a.	n.a.	
Studio: WB	0.349	0.756	0.462	
Studio: Disney	1.120	0.762	1.469	
Studio: Sony	1.175	0.755	1.555	
Studio: Fox	1.864	0.744	2.507	***
Studio: Paramount	2.017	0.772	2.611	*
Studio: Lionsgate	0.319	0.769	0.415	
Studio: Mini Major	1.098	0.781	1.405	
Selection threshold				
Intercept	24.487	3.173	7.717	***
Number of Chinese movies scheduled	0.251	0.114	2.213	**
Yearly cumulative box-office share of Chinese movies	-0.978	0.861	-1.136	
Number of observations	774			
Log-likelihood	-127.540			

Significance levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.

Table 12: Parameter Estimates for the Delayed-Release (more than Two Weeks) Selection Model

Variables	Estimate	Std. Err	t-value	
Selection utility				
Production budget (log)	1.285	0.197	6.534	***
Cannibalization on local movies	0.070	0.219	0.318	
Run time	-0.211	0.371	-0.568	
Sequel: previous movie(s) not imported	-0.734	0.594	-1.252	
Sequel: previous movie(s) imported	-0.042	0.357	-0.117	
Release lag (log)	-0.287	0.113	-2.546	**
Average review rate on IMDb	0.168	0.111	1.514	
MPAA: PG	0.324	0.765	0.423	
MPAA: PG-13	0.711	0.794	0.895	
MPAA: R	0.316	0.817	0.386	
Studio: Universal	0.000	n.a.	n.a.	
Studio: WB	-0.043	0.350	-0.122	
Studio: Disney	0.072	0.424	0.171	
Studio: Sony	0.285	0.348	0.818	
Studio: Fox	0.292	0.364	0.803	
Studio: Paramount	0.017	0.443	0.039	
Studio: Lionsgate	0.186	0.331	0.562	
Studio: Mini Major	0.912	0.333	2.736	***
Selection threshold				
Intercept	9.621	1.547	6.220	***
Number of Chinese movies scheduled	0.124	0.075	1.653	*
Number of Hollywood movies scheduled	1.139	0.307	3.710	***
Yearly cumulative box-office share of Chinese movies	0.033	0.643	0.052	
Number of observations	35438			
Log-likelihood	-760.46			

Significance levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.